UNIVERSITY OF CAPE COAST

ANALYSIS OF COMMUNICATION METHODS FOR AGRICULTURAL EXTENSION DELIVERY IN THE HOUET PROVINCE OF BURKINA FASO

FLORENT YAMBILA LANKOANDE

2016

UNIVERSITY OF CAPE COAST

ANALYSIS OF COMMUNICATION METHODS FOR AGRICULTURAL EXTENSION DELIVERY IN THE HOUET PROVINCE OF BURKINA FASO

BY

FLORENT YAMBILA LANKOANDE

Thesis submitted to the Department of Agricultural Economics and Extension of the School of Agriculture, College of Agriculture and Natural Sciences, University of Cape Coast, in partial fulfilment of the requirements for award of Doctor of Philosophy Degree in Agricultural Extension

AUGUST 2016

Candidate's Declaration

I hereby declare that this thesis is the result of my own original research and that no part of it has been presented for another degree in this University or elsewhere.

Candidate's signature: ..... Date 20-03-2017

Name: Florent Yambila Lankoande

Supervisors' Declaration

We hereby declare that the preparation and the presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

Principal Supervisor's signature: ..... Date 20-03-17

Name: Prof. Festus Annor-Frempong

Co-Supervisor's Signature: ..... Date 20-03-17.

Name: Prof. Oluwasegun A. Adekunle

ABSTRACT

Communication is key to agricultural development and major stakeholders have been called upon to rethink about the way it should be modelled. The study analysed communication methods for agricultural extension delivery in Houet Province of Burkina Faso. A descriptive-correlational survey research design was used for the study. A census of 64 Agricultural Extension Agents (AEAs) and 99 farmers were involved in the study. Questionnaire and scheduled interview were used to collect data. SPSS version 15 and Excel were used to generate descriptive statistics and one way Analysis of Variances (ANOVA) was used to test the significance of differences in the variables and among groups at a 5% alpha level.

The study revealed that agricultural extension agents were highly competent in the use of farm and home visit methods of extension. Field trip was the most important source of information for AEAs while fellow famers were the most consulted information source for farmers. The study showed significant differences between the extent of use of selected communication methods and age and educational level of AEAs while the level of education of farmers differed significantly with the sources of information: ages, farming experience, extent of use of communication methods, and land tenancy influenced the perceived effectiveness of selected communication methods.

The study recommended among others the need for government to introduce extension-teaching programmes in all the professional training schools and centres of the ministries of rural development to equip AEAs with extension communication methods. AEAs should adhere to the key fundamentals in the use of selected extension communication methods.

ACKNOWLEDGEMENTS

My sincere gratitude and thanks go to my indefatigable principal supervisor, Prof. Festus Annor-Frempong for his immense contributions, counselling, encouragement and advocacy at various levels towards the completion of this work. I am also indebted to Prof. Oluwasegun A. Adekunle, the co-supervisor, for his valuable and insightful comments that tremendously contributed to the improvement of this work.

I wish to express my deep appreciation to Prof Georges Anicet Ouedraogo, President of the Polytechnic University of Bobo-Dioulasso for supporting me with funds raised from public and private institutions. My deep gratitude also goes to Mr Etienne Zongo, Director of Fonds National pour l'Education et la Recherche (FONER), for the substantial financial support from his Institute. Prof. Chantal Yvette Zoungrana/Kaboré of the University of Bobo-Dioulasso deserves to be mentioned for professional assistance and implication.

Furthermore, I also express my profound gratitude to Sasakawa Africa Fund for Extension Education (SAFE) Managing Director, Dr Naibakelao Deola for paying my school fees. My special thanks go to Prof J. A. Kwarteng for his spiritual support in my life and his constant encouragement to complete the thesis. Finally, my sincere gratitude goes to the provincial directors of the Houet Province, the AEAs and devoted farmers for their support providing information that enabled me to complete the researched thesis.

DEDICATION

Dedicated to my late father Yobyabna Lankoandé, my late daughter Marie Félicité Bèbzimpoulongo Wendgouda Lankoandé.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

AEAs: Agricultural Extension Agents

CT: Communication Technology

FAO: Food and Agriculture Organisation

FONER: Fonds National pour l'Education et la Recherche

ICT: Information and Communication Technology

MASA: Ministère de l'Agriculture et de la Sécurité Alimentaire

MoFA: Ministry of Food and Agriculture

NGO: Non-Governmental Organisations

PDAs: Personal Digital Assistants

SAFE: Sasakawa Africa Fund for Extension Education

SD: Standard Deviation

SMOs: Subject Matter Officers

SPSS: Statistical Product and Service Solutions

T&V: Training and Visit

UCC: University of Cape Coast

UPB: Université Polytechnique de Bobo-Dioulasso

CHAPTER ONE

INTRODUCTION

Background to the Study

Food, agriculture and extension innovation systems in most developing countries are facing new and increasingly complex challenges. These challenges emanating from the ever-changing social and natural environment of farmers, are dynamic within agricultural extension organisations and call for new funding arrangement. Evolution of extension theory and emergence of new communication technologies and opportunities pose as challenge to the innovation systems. The need to ensure food and nutrition security, the fight to alleviate poverty while protecting the environment and natural resources are among the other major challenges facing extension programmers (Leeuwis, 2004).

Anandajayasekeram, Ranjitha, Sindu and Dirk (2008) have called for new strategies and mechanisms to address these challenges. They suggested fostering agricultural development through the diffusion of innovation. Specifically, they recommended strengthening ways in which information, knowledge and technology are developed and disseminated to meet global changes and benefit to smallholders farmers, food insecure households and other vulnerable groups.

Agricultural extension systems operated by a Ministry of Agriculture in many developing countries are rigid and top-down mode (Weidemann, 1987). According to Rolling (1984), extension is widely criticized as not being able to reach poorer farmers and tending to better those farmers, only on 20% of the population. Extension activities do not reach intended beneficiaries because extension workers lack adequate knowledge and skills in participatory selection of farmers; and agenda imposed from higher levels that conflict with needs and wishes of local people. Field extension workers are not able to communicate effectively with targeted groups because they are not equipped with the necessary social skills, organizational know-how, and knowledge on communities (Axinn, 1987 and Odell, 1986).

Communication has been recognised as the key to developing effective agricultural extension and coping with the complex and ever-changing challenges in the agricultural system (Okwu & Daudu, 2011). They argued that major stakeholders need to rethink the way information is modelled and shared. Farmers, researchers and extension agents need common concepts and symbols to share information.

The agricultural extension in Burkina Faso has passed through several phases in a bid to improve on communication among farmers, extension agents and other stakeholders. The Training and Visit (T&V) system opened in the late 1980s has individual contact farmers as the direct focus of extension activity. Messages were expected to spread further from contact farmers to other farmers through more informal channels (Benor, Harrison, & Baxter, 1984). A gradual change occurred with individual farmers being replaced by farmer groups as contact points for extension under the management of the thirteen regional

chambers of agriculture. The group was used because it was conceived as common feature of rural society in Burkina Faso. Farmers were formed into groups to have collective action to construct and rehabilitate infrastructure, and to increase negotiating strength to obtain credit and market output (Bindlish, Evenson, & Gbatibouo, 1993).

In 1990, the National Service of Agricultural Extension system was imposed by the World Bank and the International Monetary Fund as part of the Structural Adjustment Programme in Burkina Faso (MAHRH, 2010). The new systems focused on farmer based groups.

In 1996, the SG 2000 Burkina Faso programme was launched in partnership with Ministry of Rural Development. Production Test Plots (PTPs) were used as a central strategy employed to improve communication among shareholders and introduce better varieties and improved cultivation methods. Over its nine-year history, 23,000 PTPs were established with farmers in maize, millet, rice, cowpeas and groundnut. Soil conservation and fertility improvement was also an important programme activity. This involved working with communities to construct stone dikes, introduce compost enriched with phosphate rock, and fallow improvement (MAHRH, 2010). The SG 2000 programme was based on the principle that "agricultural development cannot be achieved unless farmers have greater access to science-based knowledge and technology, namely, improved varieties, chemical fertilizers, and crop protection products, and improved crop management practices" (MAHRH, 2010). The main features of SG 2000 programme were:

1. Close collaboration in partnership with country's Ministry of Rural Development

2. Direct farmer participation in technology transfer, and
3. Promotion of agricultural intensification with appropriate, financially viable technology (Nubkupo & Galiba, 1999).

Statement of the Problem

The different agroecological zones of Burkina Faso produce different staple crops. The crops are of considerable importance in ensuring food security and income for households. Improved agricultural technologies have been provided in the Houet province of Burkina Faso to improve productivity level of decreasing land resource base due to global climate change. Effective extension system has been identified as crucial to the dissemination of recommended improved practices through effective communication. According to Israel and Wilson (2006), developing an understanding of extension communication methods (sources and channels) used by clients to obtain information is a pre-requisite for efficient educational programming because messages that go unheard or unseen cannot lead to change. Development of a special communication strategy to link research personnel and all other stakeholders in agriculture can ensure participation of stakeholders in agricultural development (FAO, 1987). Effective communication strategy is about appropriate combination of methods, messages and approaches to achieve objectives of an organization. Communication plays a vital role in the programme delivery and can ensure agricultural extension agents and farmers relate as friends and co–workers (Adebayo, 1997).

It is also about seeking change at different levels, including listening, building trust, sharing knowledge and skills, building policies, debating, and learning for sustained and meaningful change and development of a

comprehensive communication plan (Radtke, 1998; Bonk, Griggs, & Tynes, 1999).

Early extension efforts were based on direct communication with clients. However, changes in society and technology have resulted in the need for programmes to use diverse array of communication channels to reach clients directly and through surrogates (Okwu & Daudu, 2011). AEAs and famers, especially older people, to rely more on traditional communication channels for agricultural information and newer technologies as a complement (Howell & Hebron, 2004).

Generalisations about the use of information communication methods and their consequences on agricultural extension activities need to be continuously re-examined and re-tested against the realities of a changing agricultural world.

Despite the use of various communication methods to deliver extension messages and technologies among major stakeholders in Houet province of Burkina Faso, no studies have been conducted to examine how effective they are. Also, little is known about socio-demographic characteristics of the farmers and AEAs in the study which is very critical when we come to adoption of innovation issues and efficiency of agricultural extension delivery, respectively. Thus, Israel and Wilson (2006) have suggested that periodic studies be carried out to identify trends among audience segments as knowledge of clients' use of information channels and sources can have an impact on reaching them.The findings of such studies can assist agricultural extension stakeholders to modify communication strategies to meet the needs of various types of farmers (Rogers, 1995).

Objectives of the study

General objective

The overall objective of the study was to analyse communication methods used for agricultural extension delivery in Houet Province of Burkina Faso.

Specific objectives

The specific objectives were to:

1. Describe characteristics of AEAs in terms of their ages, sex, working and farming experiences, farming background, educational level, aspiration during schooling, area of specialisation, training attained and need of refresher courses.
2. Describe characteristics of farmers in terms of their ages, sexes, level of education, farming experiences, marital status, tenancy of land, and ethnic group.
3. Determine the sources of information used by farmers and AEAs
4. Examine farmers' perceived competencies of agricultural extension agents in the use of communications methods.
5. Examine the observance of principles associated with use of extension communication methods.
6. Examine the perceived effectiveness of communications methods used in extension delivery.
7. Determine if there are differences in selected demographic characteristics of AEAs and their opinion on importance of information sources, extent of use, effectiveness and participation of farmers in the use of extension communication methods.

8. Determine if there are differences in selected demographic characteristics of farmers and their opinion on importance of information sources, effectiveness, participation and adoption in the use of extension communication methods.

Research hypotheses

To achieve objective 7, the following hypotheses were set:

1. Ho: There is no significant difference between sex, ages, professional level, level of education and field of specialisation of AEAs and their perceived importance of information sources.

   H_1: There is significant difference between sex, ages, professional level, level of education and field of specialization of AEAs and their perceived importance of information sources.

2. Ho: There is no significant difference between sex, ages, professional level, level of education and field of specialization of AEAs and extent of use of communication methods by AEAs.

   H_1: There is significant difference between sex, ages, professional level, level of education and field of specialization of AEAs and extent of use of communication methods by AEAs.

3. Ho: There is no significant difference between sex, ages, professional level, level of education and field of specialization of AEAs and their perceived effectiveness of selected communication methods.

   H_1: There is significant difference between sex, ages, professional level, level of education and field of specialization of AEAs and their perceived effectiveness of selected communication methods.

4. Ho: There is no significant difference between sex, ages, professional level, level of education and field of specialization of AEAs and their perceived level of farmers' participation.

   H_1: There is significant difference between sex, ages, professional level, level of education and field of specialization of AEAs and their perceived level of farmers' participation.

   To achieve objective 8, the following hypotheses were set:

5. Ho: There is no significant difference between ages, level of education, years of experience, and tenure of land of farmers and their sources of information.

   H_1: There is significant difference between ages, level of education, years of experience, and tenure of land of farmers and their sources of information.

6. Ho: There is no significant difference between ages, level of education, years of experience, and tenure of land of farmers and their perceived effectiveness of selected communication methods.

   H_1: There is significant difference between ages, level of education, years of experience, and tenure of land of farmers and their perceived effectiveness of selected communication methods.

7. Ho: There is no significant difference between ages, level of education, years of experience, and tenure of land of farmers and their perceived participation in extension communication methods activities.

   H_1: There is significant difference between ages, level of education, years of experience, and tenure of land of farmers and their perceived participation in extension communication methods activities.

8. Ho: There is no significant difference between ages, level of education, years of experience, and tenure of land of farmers and their perceived level of adoption of extension technologies.

   H_1: There is significant difference between ages, level of education, years of experience, and tenure of land of farmers and their perceived level of adoption of extension technologies.

Justification

The study analyses the communication methods for agricultural extension programmes delivery in Houet Province of Burkina Faso. The study has presented the strengths and weaknesses of existing and frequently used communication methods by AEAs and their effectiveness in extension programmes delivery. Policy makers and Ministry of Agriculture in Burkina Faso can use the results to develop strategies for effective communication between AEAs and farmers which will lead to improved agricultural production. The training curriculum of Ministry and agricultural training institutions should be reviewed to address aspects of the new competencies identified with AEAs.

The results of the study has provided information on existing sources of relevant extension information and the importance in extension delivery. Policy makers, researchers, AEAs, farmers and other stakeholders can use the results to better understand that communication methods and factors such as human socio-economic characteristics play vital role in the extension delivery process. The results of the study has contributed tremendously to explain, the low level of productivity in the study area compared to the effort at various levels made by policy makers and others partners in Burkina Faso. The study has also

documented a large package of communication methods used in extension that training centres, schools and universities could improve their teaching materials in communication methods.

Finally, the study was of great importance because it has provided keys for understanding and predicting outcomes of communication process. Exposure to the use of various communication methods is a precondition for effective extension delivery to occur. It seems right to state that the influence of any medium in a communication situation or on the message depends not merely on the type of methods but also on how it is used, or the use to which it is put.

Delimitation of the Study

The study was restricted to the Houet Province of the Hauts-Bassins Region, one of the 45 provinces of the country. These delimitations were due to time and financial constraints. The study topic was also narrowed to the extension communication methods instead of addressing all the agricultural extension delivery patterns. Finally, no data were collected on technology even though mentioned in the conceptual framework.

Limitation of the Study

The data provided by farmers were based on memory recall. All farmers had no written record about their farming business. Therefore, the reliability was limited to their extent to which they were able to recall and provide correct information. The study was also limited by individual farmers' and Agricultural Extension Agents' perceptions and interpretations of items.

Definition of key terms

The keys terms used in the study are defined as follows:

Agricultural Extension Agent: An extension employee of the Ministry of Rural Development in Houet province with direct contact with farmers in the field and responsible for providing knowledge and skills in agriculture to farmers through effective communication.

Adoption: The use of agricultural technology.

Competency: A cluster of related knowledge, skills and attitudes that affects a major part of one's job (a role or responsibility), that correlates with performance on the job, that can be measured against well-accepted standards, and that can be improved via training and development (Lucia & Lepsinger, 1999).

Contact farmer: A farmer who has been selected by the Agricultural Extension Agent with the assistance of other farmers to lead and demonstrate farming practices to other farmers.

Effectiveness: The degree to which the results of extension education, adoption of improved agricultural technologies and yields of farms of agricultural extension delivery are perceived or observed by farmers and Agricultural Extension Agents.

Participation: The involvement of farmers and other stakeholders in the range of extension activities under programme planning, implementation and evaluation.

Perception: Personal indications to disregard some things and emphasize others and put meanings to concepts in one's own way. Perceptions,

opinions and attitudes have the same meanings and can be used interchangeably in this study (Van den Ban & Hawkins, 1996).

Extension Communication methods: Refers to educational techniques and tools used by extension system such as radio, television, meetings, methods and results demonstration, farm and home visit, etc.

Organisation of the Thesis

The study was organised in five chapters. Chapter One presents the background to the study, statement of the problem and the objectives of the study. It also outlines other aspects such as research hypotheses and the significance of the study. Chapter Two presents the review of relevant literature. The literature review is a summary of the writings of recognised sources. Chapter Three on the methodology describes in detail how the study was conducted. It consists of research design, the study area, the study population, the sample and sampling methods. The chapter also includes the instrumentation that was used, data collection procedures and data processing and analysis. The results and discussions in Chapter Four presents the data from the statistical analyses. All relevant findings have been presented in tables and figures to supplement text material. The discussions include both theoretical and practical applications of the study. Chapter Five consists of summary of the study, the conclusions drawn from the results of the study, recommendations and suggestions for future research.

CHAPTER TWO

LITERATURE REVIEW

Introduction

The chapter presents review of related on analysis of communication methods for agricultural extension delivery in the Houet Province of Burkina Faso. Topics discussed in the chapter include theoretical and conceptual frameworks. The empirical studies relating to extension communication and adoption of technology are also provided in the chapter.

Theoretical Framework

Theory is about what we know and how we know it. Theories of communication provide an abstract understanding of the communication process (Miller, 2002). According to William (2009), research on communication process has accumulated many theories that provide empirical, reflexive, analytical and functional understanding of communication process (Figure 1). For the purpose of this work, Information Theory, Co-orientation Theory, Dialogue Theory and Theory of Communication for Development were reviewed and adapted.

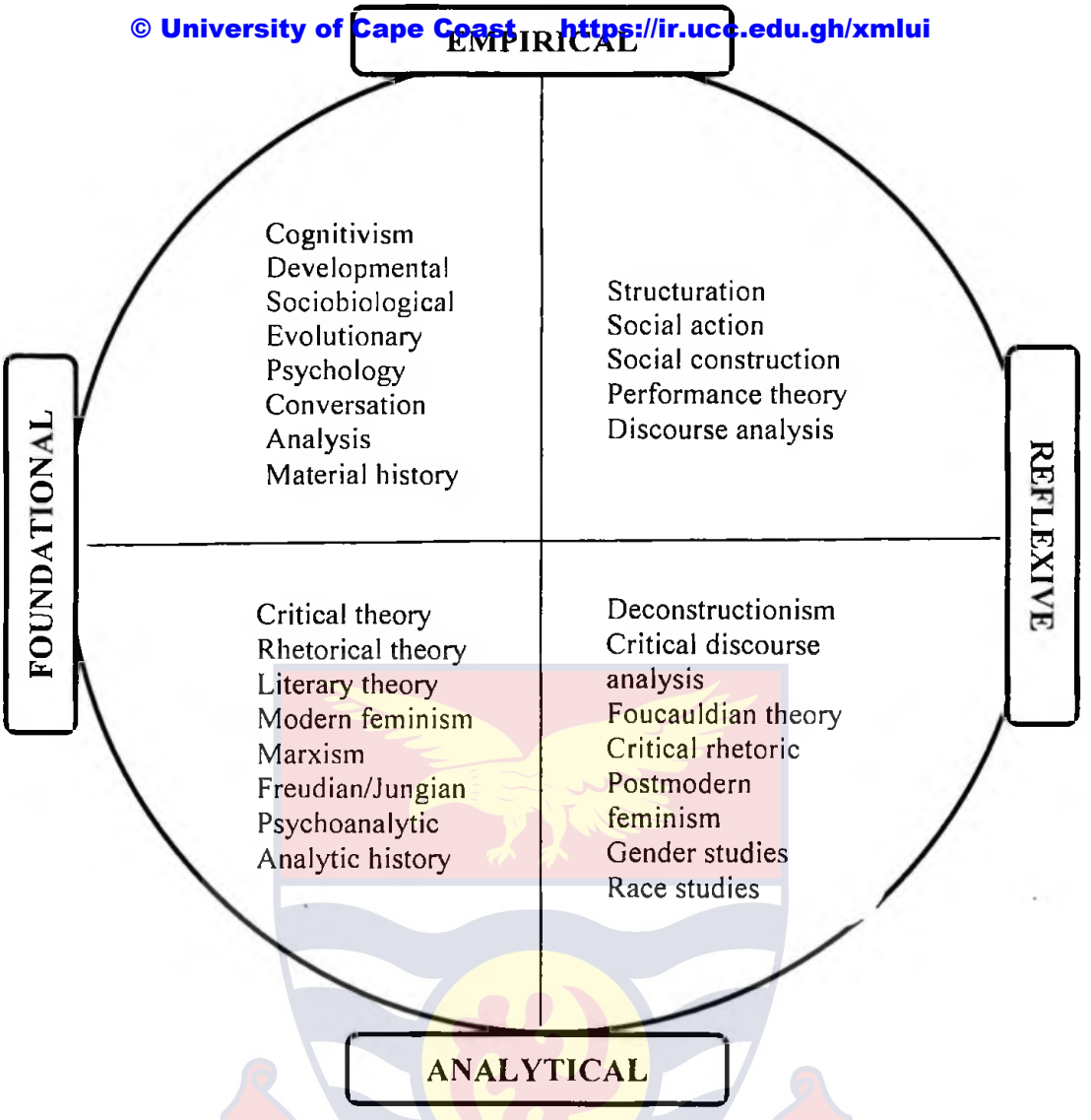


Figure 1 : Paradigmatic Theories of Communication

Source: Adapted from William (2009)

Information Theory

The theory sees communication as a metaphor for linear transmission between human senders and receivers the information theory viewed information as a measure of the entropy or uncertainty in a system and models communication as a source producing a message, which is passed along a channel, to a receiver that interprets the message (Shannon & Weaver, 1949). The channel affects the level of information that can be transmitted. Information theory is likened to signal transmission. Information theory seemed to be useful

in designing transmission systems. It is criticized as not able to address the meaning of a message but only provide equations that help engineers figure out how to get signals efficiently from one place to another (Stephen, 2009). Significantly, the information theory model disregards the influence of contexts and environments on communication. It assumes that all communication travels from point to point, either from one source to one receiver or from many sources to many receivers. Rather than being viewed as contextual influences, extraneous information is considered to be noise, which the receiver must filter out in order to discern the meaning of the message (Shannon & Weaver, 1949). Essentially, Shannon and Weaver's information theory reflects a cybernetic view of communication that is entirely focused on "nodes" (speakers and hearers), which are connected only to each other and not with their contexts (Stephen, 2009). Despite that Shannon and Weaver's information theory has had a significant influence on the development of communication theory.

Co-orientation Theory

The original source of co-orientation theory is an article written by Theodore M. Newcomb, published in the Psychological Review in 1953, under the title "An Approach to the Study of Communicative Acts" (Newcomb, 1953). Newcomb outlined his framework of analysis in this way: Communication, in its essence, serves two ends, to establish a common orientation of two (or more) individuals with respect to each other and, simultaneously, to link them to a shared object of concern.

The originality of his conception resides in this recognition of interpersonal adaptation as mediated by a joint interest in the state of an objective world, one that communicators are mutually connected to and by.

Interaction is now seen through a new lens, that of some aspect of the world to which more than one person orients (James, 2009). This idea of social interaction contrasted with the then popular mathematical theory of communication associated with Shannon and Weaver (1949), commonly called information theory, which concentrated on information quantities in messages and how to encode messages most efficiently in linking a source to a destination. Shannon and Weaver had denuded messages of reference to interaction. Newcomb's innovation served to correct this abstraction from ordinary reality by reestablishing communicative acts as embedded within both a social and a material reality (James, 2009).

Dialogue Theory

The term "dialogue" derives from the Greek word "*dialogos*", in which logos refers to meaning and dia is a prefix that translates as through or across. Implied in its Greek roots is the notion that meaning emerges from interaction; it is not something that already exists, waiting to be discovered. Meaning is co-constituted through communication, reflecting both the form of message exchange and the relationship between individuals. Dialogue is made possible by the attitudes with which participants approach each other, the ways they talk and act, and the context within which they meet. Matson and Montagu (1967) pointed out that dialogue is often contrasted with monologue, a transmission-focused process that is primarily concerned with the control of the other and of the situation, and with discussion and debate, both of which involve dissecting or breaking things apart, with an emphasis on the presentation and defense of positions.

From a communication perspective (Benjamin, 2009), dialogue represents a form of discourse that emphasizes listening and inquiry, with the aims of fostering mutual respect and understanding. Dialogue allows communicators to become aware of the different ways that individuals interpret and give meaning to similar experiences. It is viewed as a dynamic, transactional process, with a special focus on the quality of the relationship between participants.

Dialogue points beyond the everyday exchange of messages, implying a particular quality of communication that makes possible learning and change, in both self and others. Dialogue does not preclude disagreement; indeed it allows participants to explore complexities of their own perspectives as well as those of others. Scholars advocate dialogue as a constructive way for individuals to navigate their differences in interpersonal, organizational, community, and public realms. This entry provides a brief overview of the primary "thought leaders" in dialogue theory and traces the way in which dialogue theory was incorporated into and developed within the communication discipline (Benjamin, 2009).

Matson and Montagu (1967) described how dialogue promotes both development of self and knowing the other in the context of strengthening the relationship between individuals. They characterized dialogue as the "unfinished third revolution" in communication theory, sketching out a vision of communication that would move from detachment to connection, from objectivity and subjectivity to intersubjectivity, and from estranged aloofness to "something resembling an act of love."

Theory of Communication for Development

Castello and Braun (2006) defined Communication for Development as the planned and systematic use of communication, through inter-personal channels, ICTs, audio-visuals and mass media to:

1. collect and exchange information among all those concerned in planning a development initiative with the aim of reaching a consensus on the development problems being faced and the options for their solution.
2. mobilize people for development action and to assist in solving problems and misunderstandings that may arise during development plan implementation.
3. enhance the pedagogical and communication skills of development agents so that they may have a more effective dialogue with their audience.
4. apply communication technology to training and extension programmes, particularly at the grassroots level, in order to improve their quality and impact.

The theory perceived human communication as the process through which people exchange meanings for mutual understanding. Hence, there is a great need to indicate the importance of a variety of devices used such as words and language, pictures, drawings and music during communication process. These devices or signals are symbolic, which means that they refer to something else. Symbolic signals are transferred through channels and media (Leeuwis, 2004). A variety of such methods exists for the 'transportation' of visual, auditive, tactile and olfactory signals.

The World Congress on Communication for Development and more recently the FAO Expert Consultation on Communication for Rural Development recognized the need to focus on capacity development in communication for development at all levels and recommended to develop ad hoc learning programmes fostering inter-agency cooperation (UN, 2009; FAO, 2011). Mario, Marzia, Cleofe, and Mari (2004) perceived communication for development as a systematic use of participatory communication methods and tools to facilitate information and knowledge sharing among the stakeholders of a development initiative, in order to achieve common goals.

The theory of communication for development promoted combination of a range of participatory methods and communication tools to address the knowledge and information needs of rural stakeholders, and to facilitate their active involvement in development initiatives. Stakeholder engagement is required at every stage of the development process. To this end, field workers and community leaders need to enhance their skills in designing and implementing participatory communication strategies and services, especially to face new pressing challenges in the agricultural sector (Yahaya, 2001; Yahaya, 2003; Mario *et al.*, 2004).

Summary of theoretical Review

From the communication theories reviewed, it was necessary to summarise each of the theories into key issues. Hence, the information theory considered information as central in the communication process and viewed information as a measure of the entropy or uncertainty in a system and models communication as a source producing a message, which is passed along a channel, to a receiver that interprets the message (Shannon & Weaver, 1949).

The co-orientation theory of communication positioned on the establishment of a common orientation of individuals taking part in the communication process with respect to each other and, simultaneously, to link them to a shared object of concern of the communication. Its originality resides in this recognition of interpersonal adaptation as mediated by a joint interest whose interaction is now seen through a new lens from which common interaction can be derived (James, 2009).

Concerning the dialogue communication theory, it reflected on both the form of message exchange and the relationship between individuals where dialogue is made possible by the attitudes of participants governed by the context in which the communication takes place, their approaches in terms of ways they talk and act (Benjamin, 2009).

As for theory of communication for development, it is a people-centred way of communicating development, which promotes and elaborates on people's own development needs, perspectives and aims. It is a communication about the full range of social, cultural, economic and political themes within people's experience of development. It is a communication that takes varied forms: text, audio, video, art and performance (Mario *et al.*, 2004; Leeuwis, 2004).

Concept of Communication

The word "communication" derived from the Latin word 'communicare' that means to impart, to participate, to share or to make common. It is a process of exchange of facts, ideas, opinions and as a means that individual or organization share meaning and understanding with one another. In other words, it is a transmission and interacting the facts, ideas, opinion, feeling and attitudes (Vikram & Priya, 2009). The term communication is commonly used in both broad and narrow senses, from simple human contact to technical uses as in information theory. Defining communication broadly, perhaps as the transfer of information, provides the advantage of including most or all the possible instances that the term communication might ever be used to reference.

Two approaches exist when attempting to define communication. The first formation start with "Communication is…". This form assumes that words have fixed or relatively fixed meanings and that the function of definitions is one of discovery of the correct meaning of a term. The concept of fixed definitions implies that there are correct definitions and meanings that are inherent in objects. Thomas (2009) presumes that the definitional process involves seeking out this inherent preexisting meaning and then phrasing this meaning accurately in the definition.

Alternately, definitions can be regarded as human creations that are changeable over time, context, sociocultural language group and purpose. The human creation approach involves evaluating definitions according to their ability to further the purposes of the persons involved in the communication transactions in question and is often more useful in studying communication. The definitional process in the second approach is seen as a search for utility of

usage wherein definitions can be discarded or changed according to that utility (Thomas, 2009). This formula gives place to the central thrust of human communication which concerns mutually understood symbolic exchange. Hence, this entry considers the purpose and form of definitions and the function of the message, source, receiver, and channel considerations in defining the term communication. It discusses the consequences of different definitions of communication for the meaningful use of the term.

Communication includes four major issues in its operationalization process that are sender, message, channel and receiver. Other critical elements are inherent and need consideration for the communication to be effective. These elements include the context in which the communication takes place, the feedback, the encoding and the decoding that ensure the interaction, the mutual understanding and the vitality aspects of the all process. According to Vikram and Priya (2009), the process of communication involves the following elements:

1. **Sender or transmitter:** The person who desires to convey the message is known as sender. Sender initiates the message and changes the behaviour of the receiver.
2. **Message:** It is a subject matter of any communication. It may involve any fact, idea, opinion or information. It must exist in the mind of the sender if communication is to take place.
3. **Encoding:** The communicator of the information organises his idea into series of symbols (words, signs, etc.) which, he feels will communicate to the intended receiver or receivers.

4. **Communication channel:** The sender has to select the channel for sending the information. Communication channel is the media through which the message passes. It is the link that connects the sender and the receiver.
5. **Receiver:** The person who receives the message is called receiver or receiver is the person to whom the particular message is sent by the transmitter. The communication process is incomplete without the existence of receiver of the message. It is a receiver who receives and tries to understand the message.
6. **Decoding:** Decoding is the process of interpretation of an encoded message into the understandable meaning. Decoding helps the receiver to derive meaning from the message.
7. **Feedback:** Communication is an exchange process. For the exchange to be complete the information must go back to whom from where it started (or sender), so that he can know the reaction of the receiver. The reaction or response of the receiver is known as feedback.
8. **Brain drain:** On whole process there is a possibility of misunderstandings at any level and is called brain drain. It may arise on sender side if they do not choose the adequate medium for delivery of message, by using default channel and it may also arise when receiver does not properly decode the message. In other words, we can say that it is the breakdown of the cycle at any level.

In practice, communication for innovation can take many forms, not just in terms of the methods and techniques used, but also with regard to the wider intervention purpose, which again relates closely to the assumed nature of the problematic situation (Leeuwis, 2004). Communication strategies differ not only in terms of their intervention purpose, but also with regard to the preferred role division between communication workers and clients. Similarly, each distinct strategy requires a different emphasis to the key processes that change agents may usefully support during the interaction.

Concept of Agricultural Extension

Agricultural extension provides research-based educational and informational programs typically for rural populations. Historically, agricultural extension assisted farm people through educational procedures aimed at improving farming methods and techniques, increasing production efficiency and income, and bettering standards of living. However, increasingly extension serves both the rural and urban populations with a wide range of programs aimed at helping to improve beneficiaries' quality of life. Different people view agricultural extension differently and have defined and interpreted extension differently. The term Agricultural Extension means different things to different people (Purcell & Anderson, 1997). The definition of agricultural extension has been changing as its objectives and the models or approaches followed have changed. However, in all these interpretations, there are common features.

Savile (1965) regarded agricultural extension as an evolution of the agricultural advisory service which is seen as a form of community development effort with an agricultural bias and an educational approach to the problem of rural community. The agricultural advisory service is designed to

advise the farmers of improved farming techniques which would be of help to them and also to assist them to implement a benevolent government's plans for the development of the country's economy.

According to Maunder (1972), extension is a service or system which assists farm people through educational procedures in improving farm methods and techniques, increasing production efficiency and income, bettering their levels of living and lifting the social and educational standards of rural life.

FAO (1975) defined Agricultural extension as an informal out-of-school educational service for training and influencing farmers (and their families) to adopt improved practices in crop and livestock production, management, conservation and marketing. Extension is also compared to a teaching process by which information about improved methods of farming is passed on to farmers who have no knowledge about such methods or are not using these methods.

For Swanson (1984), extension means an ongoing process of getting useful information to people and then assisting those people to acquire the necessary knowledge, skills and attitudes to utilize effectively the information or technology. Van den Ban and Hawkins (1996) gave a concept of Extension that seems to synthesise diverse perpectives in five goals that are transfering knowledge, advising farmers in their decision making, educating farmers to be able to make similar decisions in future, enabling farmers to clarify their own goals and possibilities and to realise them, and finally stimulating desirable agricultural development.

One of the most completed definition is given by Christophos (2010) who views Agricultural extension as a system that facilitates access of farmers or their organizations to new knowledge, information and technologies and promotes interaction with research, education, agri-business, and other relevant institutions to assist them in developing their own technical, organizational and management skills and practices.

Importance of Agricultural Extension

An effective agricultural extension services support agricultural research to address farmers needs sustaining high levels of agricultural production and incomes (Benor, Harrison, & Baxter, 1984). In many developing countries, rural farm households and their agricultural land collectively represent the most important national resource; yet in too many countries these human and natural resources remain stagnant and largely untapped. Agricultural extension is the most effective means of transferring under-used resources into sustained agricultural development for national economic growth. The main role of agricultural extension is to ensure food production, food security and intensification. Although the overall world food situation has improved, there are still 800 million people who are chronically undernourished (Zijp, 1998).

The improvement of food security is a challenge which is not simply about producing more food (making food available) as many of the causes of food insecurity relate to insufficient access to available food, insufficient economic development outside agriculture, bad governance, detrimental trade relations, debt crisis, inadequate functioning of agricultural institutions, etc. (Koning et al., 2002). Yet, sufficient food production remains an important condition for alleviating food insecurity and extension has been useful in this

area (Leeuwis, 2004). Effective investment in agricultural extension contributes directly to national wealth through increased agricultural production and enhanced national food security.

Extension contributes more efficiently to agricultural development through appropriate communication tools for technology transfer, particularly among large members of small-scale men and women farmers of developing countries. These roles are not mutually exclusive. Agricultural Extension therefore, aims at the following:

1. It teaches farmers in rural communities how to identify and assess their needs and problems.
2. It helps farmers acquire knowledge and skills required in coping with their needs.
3. It inspires farmers to actions that improve the quality of their life.
4. At its best, extension focuses on helping people to convince themselves of the benefits of scientific information, new technologies, practices and alternative approaches to solving problems or managing their own affairs.
5. Extension links farmers to research based and tested technology, practices and inputs that are expected to benefit them.

Savile (1965) had a view that without the help of extension, the research findings would remain hidden in reports. According to Swanson (1984), since agricultural development implies a shift from traditional methods of production to new resource based methods of production that include new technological components, Agricultural Extension should take it as a role to teach farmers,

management and decision making skills as new technology is developed and to help rural people develop leadership and organizational skills.

The development and dissemination of the right information at the appropriate time among farmers is key to providing change in agriculture and this is the function extension education purports to provide (Asiedu-Darko, 2013). Apart from this central role of disseminating useful, and practical information in agriculture to farmers, extension education fulfills two other educational purposes in making farmers accept and adopt relevant change. According to Bown and Okedara (1981), agricultural extension education enables the farmer and his family to develop knowledge, skills and favourable attitudes which empower them, "to benefit from research and technology with the ultimate aim of raising their efficiency and achieving higher levels of living". In terms of using such knowledge, it could be said that, extension education provides the opportunity for farmers to learn and use the practical knowledge in solving the problems they face in their daily activities.

History and Evolution of Agricultural Extension in Burkina Faso

The introduction of extension in Burkina Faso dates back to 1924 during the area of Governor Hesling in the den Upper Volta when efforts were made to introduce production technologies for cotton production. Until 1932, the management of agricultural system in the country was directly under the colonial administration. In 1944, Direction of Agriculture, Livestock and Forestry at the General Governorate of West Africa were created to allow the gradual implementation of a few technical structures. The history of extension which is linked to research and development can be divided into five major historical periods (MAHRH, 2010; FAO, 2001)

The first period (1947-1960) was characterized by the evolvement of several foreign research, development and outreach structures that focused on cash crops. Research structures were put in place to support the action of the intervention societies. These structures were characterized by a quasi-taxation technology to the producers (vertical extension approach) to stimulate the production of mainly cash crops. This approach was bossy. The instruments or tools of diffusion/dissemination of technological innovations used were the provident societies, demonstration farms and rural extension training centres.

The second period (1960-1980) was characterized by the integration of agricultural policies and strategies by the national authorities. The transfer of technologies was mainly provided by a network of agents who received coaching from their technical direction of technological packages from research stations

The third period (1980-1990) is characterized by the creation of the National Extension Service in 1981 which was transformed in 1985 to Extension Service and Rural Animation (SVAR) and Direction of Agricultural Extension (DAE) in 1988. Coordination and management activities of the extension and research-development were at national level. The intervention methods remained interventionist.

The fourth period (1990 – 2000) was characterized by the adoption and generalization of a single national agricultural extension system (SNVA) for the whole country. During this period, the Structural Adjustment Program (SAP) was adopted. This program developed several structural and economic reforms. These reforms led to the reorganization of agricultural offices that has influenced the organizational framework and content of agricultural extension

delivery. Private organisations such as Non-Governmental Organizations (NGOs), projects and Farmer Based Organisations were involved in the field agricultural extension.

The last period starting from 2000 up to now is characterized by the establishment of the National System of Agricultural Extension (SNVACA). It aims to address:

1. the advisory support test ;
2. the adoption of several strategies and policies with a priority confirmed for the Rural World, especially the necessary link-production market ;
3. the strengthening of local development approaches and the entrenchment of decentralization.

The current agricultural extension in Burkina Faso is provided by public structures, national and international organizations. Public structures involved in this domain are Ministries in charge of rural development, research institutions and universities, extension services and farmers' organizations.

Pertaining to the training aspect, Burkina Faso was the first Francophone country to adopt the SAFE program in 2004 at the Université Polytechnique Bobo Dioulasso, to upgrade the skills of mid-career extension staff. This was a hopeful sign that the government understood the need to invest in upgrading the skills of its extension personnel, especially those with considerable field experience to consolidate farmers' acquired talents in farming for more productivity. In 2005, at the request of the SAA donor for program consolidation, it was decided to bring the SG 2000-Burkina Faso program to a conclusion. Since 2010, the Ministry of Agriculture and Food security has put in place a new agricultural extension system not different from the previous but

opens doors of grabbing fund for NGOs and others partners to finance the extension activities (MAHRH, 2010).

Analysing the above evolution of the extension system in the country, it can be said agreed with Munyua, Adams and Thomson (2002) that improved agricultural production cannot be achieved without an effective agricultural extension service, which is well linked to research that generates relevant information to farmers' needs.

Socio-demographic Characteristics of Extension Agents

This section reviews the characteristics of agricultural extension agents in terms of their sex, age, social status, rank, work experience, family background, domain of specialization and academic achievements. These characteristics had been revealed by research findings of earlier researchers to influence on the agricultural extension programme delivery activities (Beilin, 1995; Budke & Paddie, 1994)

The Agricultural Extension Agents

The most important resource available to an extension service is its staff members (Van den Ban & Hawkins, 1996). Different and usually higher standards are expected of them under conditions of change. A great deal of responsibilities of bringing change in farmers and other clientele rest on the shoulders of the Agricultural Extension Agents (AEAs). The Agricultural Extension Agents are the contact men and women at the field level who are in direct contact with farmers. About 95 percent of extension staff work in public agricultural systems (Umali & Schwartz, 1994), and 90 percent of extension workers in the world are located in developing countries, over 70 percent in

Asia. According to Swanson, Farner and Bahal (1990) the ratio of AEAs to farmers varies from developed to developing countries.

The Agricultural Extension Agents are responsible for the implementation of extension programmes at the field level and their effectiveness can often determine the success or the failure of an extension programme, as they are the critical elements in all agricultural extension activities. Benor, Harrison, and Baxter (1984) have asserted that, it is the responsibility of the extension organisation to ultimately make the AEAs more effective in their work. Vijayarajaran and Singh (1997) observed that AEAs should be effective in:

1. Making regular and systematic visits to villages and farms to develop rapport with the clientele to understand their problems.
2. Undertaking educational activities in the form of meeting, campaigns, demonstrations, field days, training sessions and exhibitions.
3. Providing advisory service to farmers and solve their production problems.

Selected Characteristics of Extension Agents

According to Davies and Sparrow (1985) age plays an undeniable role in work performance. They argued that in some job specifications, older workers are more productive than younger workers, and where older workers are more productive than younger workers, the difference disappears when output is corrected for job experience. Sabihi (1978) noted that younger agents and specialists perceive a greater need for training in working experience than older agents and specialists. This argument brings out two controversial ideas: the great perceived need of training may be due to either lack of working

experiences which may negatively influence the job performance or to the transcendence of human and intellectual needs which are always ever changing and never satisfactory. The latter idea can tremendously and positively contribute to competencies enhancement of the work institution.

Byres and Byres (1977) argued that, education enhances one's ability to receive, decode, understand information, and the processing and the interpretation of that information are indispensable for performing many jobs. Cernea (1981) focusing on education levels of farmers and extension agents stated that one with a higher level of education is expected to be able to participate more in extension activities than one with a lower level of education. He also stressed the importance of the ability to process information in a particular job.

A study by Celis (1971) came out with the result that Mexican extension workers with less than three years' experience expressed a greater need for training in the social sciences/agricultural extension. On the contrary, those with more than three years expressed a minimal need for training in social science and agricultural extension and in some statistical tools used to analyse research data. Hurley (2000) pointed out that people seek training when a skill is required to improve work, there is a clear incentive for their involvement and a skill one learnt.

Budke and Paddie (1994) explained that supervisors who hold positions for long period of time tend to generate less extra effort and satisfaction from subordinates. In the same way, Sabihi (1978) reported that specialists who have more experience perceive a lesser need for training. Scrank and Warring (1983) supported that age and working on a job are a rough index of knowledge and

experience. It then follows that workers with many years of job experience are more plausible to break new grounds in the performance than workers with just a few years working experience (Perlmutter & Hall, 1992).

Al-Subaiee *et al.* (2005) studied the perceptions of extension agents about sustainable agriculture in the Riyadh Region of Saudi Arabia. The results regarding the demographic profile of respondents showed that the ages of the respondents ranged from 22 to 60. The mean age was 36.19. The majority (52.4%) of the extension agents were between 31 and 40 years old. Approximately, two-thirds (64.8%) of the extension agents in the Riyadh Region were born in urban communities. Over three-fourths (78.4%) of the extension agents identified urban communities as their current residence. Over one-half (54%) of the extension agents reported a diploma from a Saudi agricultural institute as their highest education level.

Just over one-third (34.9%) of the extension agents had a bachelor's degree, and 6.3% reported high school or less as their highest level of education. Only 4.8% of extension agents had a master's degree. Slightly less than one-third (31%) of the extension agents reported general agriculture as their area of specialization and 27.4% indicated plant production and protection as areas of specialization. Agricultural engineering was the area of specialization for 17.7%. Only 10.5% of the extension agents specialized in the social science. The mean years served in extension were 9.8. Two-thirds (66.6%) of the extension agents had served in extension from 1 to 11 years while one-third (33.3%) had served in extension for 12 to 32 years.

Socio-Demographic Characteristics of Farmers

Characteristics of farmers influence on their performance in agricultural production. Olawoye (1993) indicated that rural men have traditionaly been the recipients of most agricultural extension services. According to Palmer (1985) and Olawoye (1993), men have more access and control over production resources (land, labour, capital), decision making and extension services than women. Morever, women do not inherit land but obtain the right to use land through their husband (Nagy, Ohim, & Sawadogo, 1990).

Chamala (1983) reported that age, educational level and years of farming were considered important in relationship to farming practices, particularly for soil and water conservation practices. Furthermore, years of farming, age and social participation are positively and significantly relevant to conservation practices. Kumi (2004) pointed out that self-confident farmers with very long farming experience can make it difficult for extension agents to persuade them to adopt inovations. For Dankwa (2004), farmers with high working experiences adopted many of the recommended practices and improved performance in farming. Mensah (2006) had pointed out that long-term security of land is crucial to agricultural growth.

Lee and Stewart (1983) explained that ownership had a significant impact on the attitudes of farmers to adopt soil erosion control compared to those who were tenured. They further concluded that landowners with small holdings have lower minimum tillage adoption rates on cultivated cropland than do part owners or tenured owners. Thus, the ownership factor influences the attitude of farmers towards adoption of soil erosion control and minimum tillage practices on cultivated crop areas of land.

Jamison and Moock (1984) investigated on farmer education and farm efficiency in Nepal. The objective was to ascertain the relation between education and farmer efficiency. They found a positive effect of education on efficiency for three major crops, but only with the recently introduced wheat crop was the effect statistically significant at standard levels.

The level of education influences farmers' level of participation in agricultural programmes. Sukaryo (1983) investigating on farmer participation in the training and visit system and the role of the village extension worker experience in Indon found that better educated farmers can exploit wider range of information sources and raise their level of participation in agricultural programmes and adoption.

Sagna and Holmes (1988) conducted a study in Casamance in Senegal to identify the characteristics of rice growers in the research area. They reported that 89% of the respondents were married. As many as 8 out of 10 respondents had never attended school. Of those who went to school, 12% did so at the elementary level (1-6 years), and 8% at high school. Average age of the respondents was 48 years. Average number of formal schools was only 1.03 years. It was observed that younger respondents had more schooling than older respondents. Respondents between the ages of 15 and 30 years had an average of 2.49 years of formal education, those between 31 and 50 years had an average of 1.89 years, and those beyond 50 years of age had less than 1.07 years of formal education.

Khan (1991) reported that among the socio-economic characteristics of the study respondents, age factor was very important as it influences one's behaviour and widens the vision of an individual through experience. It is generally believed that with the increase in age the individual becomes mentally mature and takes rational decisions. Therefore, age can be one of the important factors affecting the adoption behaviour of respondents.

Lynne, Casey, Hodges and Rahmani (1995) reported that socio-economic factors like age, education and years of farming influenced the adoption of new technology by the farmers who grow Strawberry in their fields. Rutatora and Rutachokozibwa (1995) studied that age, educational level, farm size and the farming experience of the farmer were related to adoption decisions, as younger farmers had been found to be more knowledgeable about new practices.

Quispe (1997) conducted a study in Mexico to identify the characteristics of farmers designated as leaders, followers and non-participants in system of self-managed extension. He reported that all farmers were male. The average age of farmers in three groups was about the same and close to the average age of 48 years from other regions of Mexico. Average number of years of schooling for the three groups was also about the same and slightly higher than the other rural regions of Mexico. Literacy ratio was twice as higher for non-participating farmers as the other two groups and also higher than the 7% rate for rural areas of Mexico. Average family size was considerably higher for leaders as compared to the other two groups. Leaders in both the development districts of the study owned nearly twice as much land in their farms as followers. Non-participants had the smallest landholdings.

Lewis (1998) identified some socio-economic characteristics of the farmer respondents and concluded that length of farming experience, age and farm business were positively and significantly related to innovation adoption process about latest agricultural knowledge and techniques.

Ani (1998) had indicated that farming experience of farmers to a large extent affects their managerial know-how and decision making. Besides, it influences the farmers' understanding of climatic and weather conditions as well as socio-economic policies and factors affecting farming. In this study, the finding indicated that the length of farming experience among the respondents was not a very important determinant of adoption of technologies. This can be attributed to the fact that farmers who had been long in the business were usually older, less educated and were more resistant to change than new entrants.

Ajayi (2001) evaluated the effectiveness of field days conducted by agricultural trainees as a technology transfer strategy and also explored the socio-economic characteristics of farmers. The results of the study showed that a higher proportion of the respondents was between 21 and 30 years of age (63.5%) than those above thirty years of age. The results also showed that 23.1% of the farmers were single. A majority had only primary certificates (48.1%), followed by respondents who did not have any formal education (25.0%).

Chizari, Lindner and Lashkarara (2001) studied the demographic characteristics of wheat growers in Lorestan Province, Iran and reported that approximately 50% of the respondents were over 50 years old. Less than 10% were 30 years old or younger. On average wheat growers had 31 years of experience in cultivation of wheat crop. Thirty three percent of growers described themselves as illiterate. Thirty eight percent of respondents had some

elementary education. Approximately 21% of them had middle school education, and less than 5% had high school or post secondary education. Eighty percent of the sample lived in rural areas and the remaining 20% lived in urban areas. Nearly all the respondents were married.

Based on survey on on-farm egg crack in Ogun State in Nigeria, Adeyemi, Awosansya and Fasina (2002) reported that the ages of poultry farmers are mostly between age range 24 and 62 years. Ani, Ogunnika, and Ifah (2004) indicated that age was not significantly related to adoption of most of the farm technologies studied. It was only on the use of mechanized farm operations and the use of storage chemicals that age could be said to have somewhat significant relationship. The authors found a significant relationship between level of education and adoption level implying that the educated farmers adopted more than the less or non-educated ones. Education enhances the ability to derive, decode and evaluate useful information for agricultural production (Ani, 1998). The low educational level of most Nigerian farmers can inhibit agricultural productivity. The rate at which one can assimilate and idealize new knowledge could depend on the educational level of the individual. Thus, low level of education tends to foster unfavourable attitudes towards the acceptance of improved farm practices.

The relationship between level of education and access to information established by previous studies (Akinbile, 2005; Adekoya & Ayayi, 2000) made the level of education achieved by the farmers good enough to aid their propensity to improve their production.

Cidro and Radhakrishna (2006) studied the demographic profile of hybrid rice farmers in Philippines and reported that majority of the hybrid rice farmers were male (87.2%), married (92.2%) and most of them were middle aged (below 51 years old; 63.1%). About 38.6% of the hybrid rice farmers completed college education, 12% reported completing some college, 16.3% had completed high school education, and 6.6% received a diploma from a vocational school, while 11.7% had completed elementary education. More than one-half (56%) of the farmers have been planting rice for more than 16 years.

Oladoja and Olusanya (2007) reported that 80.7% of the poultry famer respondents in Ogun State in Nigeria were males while 19.3% were females. They related the implication of their study results to the fact that high drudgery is involved in poultry business which many women cannot afford and that women require much time to take adequate care of the home which poultry business may deprive them from doing well. The study also showed that majority of the poultry farmers (73.9%) were within the ages of 31-50 years indicating that majority of the respondents are young. It can therefore be implied that the majority of the poultry farmers were middle age and might still have energy to cope with the rigours of poultry activities.

Aging farmers should not be selected and appointed as contact farmers as they most likely will not exhibit the zeal and interest required in promoting and popularising the new innovation (Ofuoku, Egho, & Enujeke, 2009). Marriage is an important factor in the livelihood of individuals as it is perceived to confer responsibility on the individual. While those who are single consider their well-being only, the married individuals are responsible for the well-being of not only themselves but also of other members of the household (Ofuoku *et*

al., 2009). They also reported that the highest educational level attained by most of the farmers was secondary education (41%), 10% had tertiary education, 28.40% had primary education; while 20.60 had no formal education. They concluded that the education of farmers influenced their ability for a balanced assessment of innovations disseminated to them.

Competencies of Agricultural Extension Agents (AEAs)

Technical Competencies of Agricultural Agents

Technical competency is the agricultural knowledge possessed by the Agricultural Extension Agent. It includes the practical skills alongside technical skills. Extension workers often lack technical and practical skills. Frequently their demonstration plots show how much they have to learn from the farmers, who are supposed to be taught (Siddiqui,1991). A major criticism on US extension workers in Latin America was that they were pre-occupied with extension methods rather than farm technology (Adams, 1994). In this regard, sound body of technical knowledge and practical skill of Agricultural Extension Agent can play a significant role in their communication interventions.

Rogers (1983) defined credibility as the degree to which a communication source or channel is perceived as knowledgeable and expert, they have the advantage of safety credibility, the degree to which a communication source or channel is perceived as trustworthy. This definition implies that, if the AEA has the technical knowledge of the field and trustworthiness, he can be more effective in the dissemination of technical knowledge to farmers.

Pathak and Majumdar (1986) in a study carried out on 30 extension

workers in West Bengal found that three attributes (communication skill, knowledge level and attitude orientation) together predicted communication skills fidelity to the extent of 63%. Extension workers who were poorly equipped with the encoding-decoding skills, acquired sub-standard knowledge and carried indifferent attitude turned up less effective in their communication pursuits. Practical training in the technical competency played a pivotal role in the dissemination of information.

Drysdale and Shute (1989) while evaluating the Sanrego Area of South Salawesi, Indonesia, focused on the efficiency and effectiveness of the extension services and reported that the extension agents were inadequately trained to carry out their job, particularly in the area of estate crops, fisheries, and animal husbandry. Secondly, field extension workers had a low knowledge about their responsibilities, particularly in the area of farmer group development. Moreover, a major barrier faced by field workers was the large area of responsibility and lack of transportation. Training was irregular and also field worker maintained very few demonstration plots in the south Sulawi, Indonesia.

Wijeratne (1989) on the basis of his study carried out in Sri Lanka, stated that extension workers transformed their acquired knowledge into meaningful information to the farmers only when they felt that a particular knowledge message was meaningful to a particular set of farmers. Knowledge storage and retrieval process must be embodied in the formal extension systems especially in the T&V. Furthermore, there was a strong need to conduct more of fortnightly refresher type trainings so that extension workers could enrich "storehouse" and "retrieval capacity". This would increase efficiency of the extension workers.

Igodan, Gawry and Ekpere (1990) in a case study conducted on the critical skills and competency needs of extension agents in Nigeria, found that the critical skills and competencies of extension agents in promoting innovations among the farmers made the difference between success and failure in Nigeria's attempt to modernise the agricultural sector. Findings showed that extension agents were more competent in the skill area of extension and administration (mean=3.34, rank 1) and the least competent in understanding forestry (mean=2.77, rank 9) among the nine-extension task areas in which extension agents were deficient and required further training.

Malik, Chaudhry, Akbar and Ahmad (1991) reported that the majority of the contact farmers were not satisfied with the knowledge level of field assistants. Moreover, the field assistant did not conduct the meetings and field demonstrations satisfactorily. Karim and Mahboob (1993), in their study carried out on job performance of the Subject Matter Officers under T&V Extension System of Bangladesh, reported that out of 15 independent factors, only two (total service tenure and sub-block visit) were found to have significant effect on job performance.

Ali *et al.* (1994) found that extension workers of some developing countries were often lacking in practical ability as a result of poor training and selection. In Nigeria, it was found that the majority of extension workers were primary school leavers. Extension workers in developing countries were also insufficient in technical competency. They needed training in a number of areas, such as crop production, farm management, land development, extension teaching methods and programme development.

Professional Competencies of Agricultural Extension Agents

Competency can be defined as the ability of fitness to perform job activities. Competency is a skill of function, and it included the knowledge, necessary ability to its performance. Other necessary capabilities include interpersonal communication skills, problem solving, technical skills, self-directed learning, and reflection. In the 1980s, competence was seen as knowledge, skills, and abilities observable in performance (Neufeld & Norman, 1985).

Professional competence had been also defined as "the ability to function in task considered essential, within a given profession" (Willis & Dubin, 1990). They delineated two broad domains within professional competency: proficiency and general characteristics. Proficiency is capability specific to the profession and includes discipline-specific knowledge, technical skills, and problem solving ability. General characteristics refer to intellectual ability, personality traits, motivation, attitude, and values. In agricultural extension context, the professional competency relates to the professional qualities to be possessed by the Agricultural Extension Agents to satisfactorily perform their job as change agents. The professional qualities include empathy, credibility, humanity, and professional commitment. In some cases these qualities are God gifted but others have to work hard to acquire them (Adams, 1994).

Martin and Sajilan (1989) conducted a study in Malaysia to identify the teaching competencies perceived to be important to Malaysian Extension personnel in teaching adult farmers. The result of this study showed that all 53 competency statements were perceived as being at least moderately important

to the respondent in transferring new agricultural technologies to Malaysian farmers, 16 competency statements were considered highly important. The researcher recommended that a need assessment should be conducted in the total Malaysian Extension system to the extent to which training in educational techniques and processes was necessary.

Patterson (1991) described the characteristics of tomorrow's extension agents who believes that extension agents of future will be prepared to manage change with a combination of knowledge, attitudes and skills that come together under three themes that are an autonomous learner, an effective communicator and a systemicist.

Randavay and Vaughn (1991) studied the self-perceived professional competency levels possessed by agricultural extension workers in the western region of Thailand. They found that the respondents rated most of the competencies as "high level needed" to perform their duties. Twenty-nine (49.2%) of the competencies received mean ratings of 3.0 or above. Of these competencies, fifteen were in the "Teachings and Communication" area; nine were in "Planning"; three were in "Implementing" and two were in "Evaluating" competency area. For the competency levels possessed, the respondents perceived that they possessed medium to high level of proficiency for each competency. Twenty-nine (49.2%) competencies were rated as medium level possessed and 30 (50.8%) were rated as high level possessed. The professional competency area in which the most workers had the greatest training need was in the area of teaching and communication. The competencies in which the workers needed training were: obtain funds for extension programs, use principles of motivation, use principles of learning, use television in teaching,

use principles of teaching adults, use radio in teaching, prepare teaching material, select proper teaching methods, use result demonstrations, and use method demonstrations. The authors suggested that additional studies should be carried out to determine how the perceptions of extension workers and farmers compare to job performance rating of these workers.

Ali (1991) conducted a study to identify, validate and rank the job performance competencies needed by agricultural extension field assistants in Faisalabad district, Pakistan. The target population consisted of 167 field assistants. Eighty were selected randomly. In order to validate their responses all 20 Agricultural Officers and 80 contact farmers selected through stratified random sampling technique, matched with Field Assistants, were also included in the sample. The findings indicated that the Field Assistants possessed from low level to an average level of competence in most of the competencies for their job performance. Significant differences were found between the perception of Field Assistants and those of contact farmers for 13 out of 17 competencies on the possessed level.

Karim and Mahboob (1993) determined and described the effects and contributions of 15 selected-related and attitudinal factors to job performance of the Subject Matter Officers under T&V Extension system in Bangladesh. Data were collected from a sample of 114 Subject Matter Officers (SMOs) of 22 randomly selected districts under Extension & Research Project II. Stepwise multiple correlation analysis indicated that, out of 15 independent factors, only two (total service tenure and sub-block visit) were found to have significant effect on job performance. Regression coefficient between supervisor's relation and job performance approached very close to the significant level. The

combined effect of variables caused 46% variation in job performance.

Raad, Yoder and Diamond (1994) conducted a research study to determine professional competencies needed by extension specialists and agents in Iran. Both specialists and agents reported more frequently that professional competencies should be developed at the in-service level rather than the pre-service level. There were four competencies in the administration competency area identified as needing to be developed at the pre-service level. They suggested that almost all the professional competencies should be learned or developed after the agents are employed. This suggests that even after pre-service programs are implemented it remains a substantial need for continuing education programs for updating the knowledge level of extension personnel.

Muhammad, Garforth and Malik (1995) conducted a study on competence of extension field staff in using various communication channels for effective extension work in Faisalabad, Pakistan. They stated that the field worker respondents had very little knowledge about basic essentials of almost all the selected communication channels. The situation in case of method demonstration was even worse as all but one respondent had no idea about it. However, the awareness level regarding farm and home visits was relatively high.

Reynar and Bruening (1996) examined the perceptions of T&V extension staff in Bangladesh concerning agricultural extension issues. The study findings were descriptive of sample and were not generalised to the population. Forty agricultural extension issues in nine categories were explored. Thirty-six issues were considered serious. Some of the serious were: timely availability of resources of production inputs; lack of vehicles for block

supervisors; non-availability of resources for applying technologies; capacity for dissemination of technology to intended audience; flow of information and research to extension; lack of performance appraisal for block supervisors; lack of periodic training and frequent transfer of block supervisors. Dissimilarity between the perceptions of these groups of personnel was noted on statements/issues of: supervisor lacked technical training, few training institutions, block supervisors lacked periodic training, performance appraisal lacking for block supervisors and frequent transfer of block supervisors. The study highlighted sufficient challenges facing agricultural extension in Bangladesh. Continued improvement of communication links among the three levels of extension system was considered necessary to meet these challenges.

Chizari, Pishbin and Lindner (1997) determined the self-perceived professional competency levels needed and competency levels possessed by agricultural extension agents in Fars province of Iran. The study adopted a descriptive survey design. A random sample of 75 extension agents was selected for the study. They stated that all of the competencies in the study were perceived by the extension agents to be important for the performance of their duties.

Chizari *et al.* (1997) identified the perceptions of extension agents regarding sustainable agriculture in Iran. They noted that agents perceived sustainable agriculture to mean lower chemical input, natural resources and environmental protection effective and efficient agricultural production system and reliance on organic matter. Agents also indicated a performance for agricultural practices. Younger and experienced agents tended to prefer

sustainable over traditional agricultural practices. Agents also indicated the need for more local research

Owusu, Zinnah and Frempong (2000) conducted a study to determine the present levels of professional competencies of extension agents, in the Central and Northern regions of Ghana as perceived by the agents themselves and their supervisors. The results of the study showed that extension agents generally possessed medium level of competency in nine competency areas. Extension agents in Northern region perceived themselves as possessing higher level of competency than their counterparts in the Central region; the agents and supervisors in both regions were unanimous in ranking program planning and evaluation as the most important competency areas in which agents required training. Competency in need assessment was ranked the least ranked areas in which agents required training. Majority of agents indicated that they acquired their present level through seminars and workshops on the job. They suggested, among other things, that the curricula of agricultural colleges should be regularly reviewed to reflect the current changes in agriculture. In-service training need should be targeted at the specific needs of extension agents. In the Central region emphasis should be placed on communication, programme planning and evaluation, maintaining professionalism and emerging issues such as environment, gender and population.

In rethinking extension communications, Donnellan and Montgomery (2005) posed new roles for extension agents as a consulting communicator as someone who applies knowledge of social science research to help plan communication strategies, analyses audiences and select best communication tools to achieve desired goals.

Message Content

Communication contents include the extension messages which are being communicated to the farmers by Agricultural Extension Agents through certain channels or communication techniques. These contents can have impact on agriculture only if they are properly prepared and timely presented in a simple, clear, concise and complete manner. Message is the actual physical product of the source-encoder. Speech, writing, painting, gestures also called movements, and expression of face are messages. At least three factors identified as message code, message content, and message treatment are to be considered. For Supe (1998), message is the information that a communicator wishes to his audience to receive, understand, accept and act upon. This message can be information, instructions or order.

Ayaz (1994) affirmed that message is the information that is to be sent from sender to receiver. The sender must submit the message to the audience in an acceptable form, and an appropriate selected channel. The success or the failure of the message is more likely depending upon a good or bad choice of language, content, organisation, or channel. Message of communication is the content one sends to receiver. When planning communication, the message should be formulated in terms of the desired residue of the communication in the mind of the receiver. The message is always conveyed by a person or other means. The body language or the choice of the medium has to support the message, if not, the result cannot be productive (Khan, 2003).

A study by Umar, Lawrance and Hock (1987) on Fijian Farm Radio Programme revealed that radio had been identified as the second most important source of information to most farmers of the world. Fijian farmers owned a

radio-set and listened to broadcasts three hours daily. This had significantly enhanced their latest know how on crop management systems. On the whole, agricultural radio programmes were quite good in their content, presentation, and language.

Olowu and Yahya (1997) carried out a study to determine the information needs of women farmers in North-central Nigeria comprising Kaduna and Katsina States. A sample of 376 women farmers were randomly selected for the study. The study findings revealed that women generally were highly involved in various agricultural activities. The most critically needed technical information for women farmers was related to disease/pests control (65.10%), cropping system (59.60%) and crop storage (59.30%). The researchers further concluded that the current and future market prices were the major marketing information needs while social and legal information needs were moderately important. It was recommended in the study that extension packages for women farmers should focus on technical information.

Ocheing (1999), on the promotion of community media in Uganda, reported that respondents in rural areas had about 30 types of sources of information. These sources varied from one locality to another. The sources ranged from modern to traditional media. Radio Uganda had some developmental programmes that were relevant to their day to day needs. However, respondents observed poor reception, poor timing of broadcasting, and inappropriate language. Similarly TV and print media were reported to have inappropriate language and content which violated and distroyed the dignity and cultural norms of the communities in Uganda.

Ashraf (2001) carried out a study on the effectiveness of communication methods used by EFS of different pesticide companies and reported that conducting result demonstration and discussion meetings arranged by field staff of Novatis were appropriate and subject matter for discussion was based on audience's interest. Besides, literature used by the fied staff to disseminate agricultural information was nicely prepared, adequately dressed up with pictures, diagrams, and provided complete information in a simple and easily understandable language.

Girard (2001) argued that rural radio as an extension tool is widely regarded in its ability to reach illiterate farmers and provide information relating to all aspects of agricultural production in a language they understood. Extension services had been critisized both for failing to reach the majority of farmers in many developing countries and to communicate successfully with those that fall within range. Rural radio offers both the reach and the relevance to its listeners when the programmes are generated in community based and participatory fashion. More than any other mass communication medium, radio speaks in the language and with the accent of its community.

Michels (2001) discussed that development of message content that reflects what the target population needs: use appropriate language in communication materials to suit audiences; use multiple communication channels to reinforce messages. Major themes and appeals are identified. He suggested that Extension Field Staff must be trained in how to select appeals that are culturally appropriate and audience-specific. They are then guided into distinguishing various ways of appealing to the target audiences and how and

when to choose emotional versus rational appeals, positive versus negative, mass versus individual.

Communication Techniques in Extension

Extension organizations in developing countries have two major problems when it comes to having face-to-face contact with farmers and researchers: first, physical distances, and second, lack of transportation facilities (Anandajayasekeram, Ranjitha, Sindu, & Dirk, 2008). New information technologies could bypass these physical barriers to a great extent through the development and application of appropriate, interactive information mechanisms.

The arrival of the information age has naturally led to an interest in its potential for innovative applications of the latest communication technologies (IT) to enhance extension delivery. Information and Communication Technology (ICT) comprises various techniques and infrastructure for storage, processing and management of information. These include computers, software, books, personal digital assistants (PDAs), digital and non-digital libraries and different communication channels such as mail and email, radio, television, telephone, mobile phone, instant messaging, internet etc. The application should be considered along with the more traditional extension methods such as mass media, group meetings, field days, demonstrations and exchange visits. Innovations in this category are most directly associated with overcoming the generic problems of scale and complexity through cost efficiencies associated with certain mass media, contributing to fiscal sustainability.

According to Wete (1991), the most traditional approach, print with graphics and radio are most appropriate and cost-effective in a developing

country. Zijp (1996) concluded that cost effective use of Information Technology (IT) is achieved only at significant initial and operating costs. Further, this impact tends to occur when the media are used in combination with other innovations, indicating that it is best considered not in isolation, but as a 'force multiplier' enabling or enhancing the effectiveness of other innovations and conventional extension methods (Antholt, 1992). The suitability of different media depends upon the message, target audience and social environment. Radio and television are more appropriate for reaching many people quickly with relatively simple ideas while print media are better suited to provide timely reminder of information. Nonetheless, differential time flexibility should be taken into account when using some media. According to Leeuwis (2004), the time flexibility of many mass media can be high, meaning that the time of receiving can be adjusted to the preferences of audience. Written mass media can often be consulted whenever people choose while the timing of radio and television broadcasting can, in principle, be tuned to the working schedule of farmers. However, radio and television often have other audiences who pose different demands which may compete with farmers in terms of timing. The needs of these other audiences often prevail in view of commercial considerations.

Interpersonal communication, including extension agents, group meetings, and demonstrations are best suited for teaching and enhancing credibility of information. Based on Lionberger (1968) model of adoption process, Campbell and Barker (1997) recommended that:

1. mass media and popular theatre to provide new or additional information in the 'awareness stage';

2. group meetings, radio and field days to increase knowledge in the 'interest' stage;
3. result and methods demonstrations, and farmer exchange to improve skills in the 'evaluation' stage;
4. individual visits, farmer exchange, on-farm trials, and methods demonstration to induce behavioural change in the 'trial' stage; and
5. recognition programs, competitions and incorporating practices into farming systems to consolidate attitudinal changes in the 'adoption' stage.

Wete (1991) pointed out some limitations of excessive dependency on information technologies:

1. information alone is an insufficient condition for social change;
2. far from being neutral, provision of information can actually widen the gap between the rich and poor;
3. communication Technology (CT) does not have to produce effects without government commitment to change, reflected in its provision of budgetary support and conducive policy and complementary services; and
4. most developing countries cannot afford CT hardware costs; as a result the benefit/cost ratio of some CT applications is doubtful.

It is worth noting that IT by itself cannot overcome the problem of relating cause and effect and in terms of coverage, IT cannot replace face-to-face contact between extension agents and farmers. Nevertheless, increased investments in many IT applications appear to make sound economic and social service, and deserve public sector support (Zijp, 1998).

In many countries, erstwhile emphasis on using vernacular press, radio and television for reaching to farmers is being augmented with the use of state-of-the-art communication technologies such as internet and satellite communication. Connectivity is being exploited to facilitate a two-way communication among all the stakeholders in the Research–Extension–Marketing–Farmers loop.

Ogunwale and Laogan (1998) carried out a study on sources of farm information and technologies used by registered farmers in two Nigerian agricultural development programmes. The results showed that more emphasis was placed on individual channels of communication than mass media. Especially, no farmer mentioned the use of agricultural film shows and mobile open broadcasts. They recommended the use of combinations of extension methods to facilitate extension service and adoption of farm technologies.

A study by Dankwa (2004) on farmers' and extension staff perceptions of agricultural extension delivery in the Ashanti region of Ghaha indicated that most of farmer respondents (84%) rated farm visit as the most effective extension education method followed by group discussions, method and result demontrations, the radio method being the least one.

According to Weisbord and Janff (1995) and Bunker and Alban (1997), the following principles must be followed in order to have productive meetings:

1. Get representatives of the 'whole system' in the room, including all relevant stakeholders and management levels;
2. Analyse the global context, and act locally;
3. Focus on common ground and the future, rather than on immediate conflicts and problem-solving;

4. Let small groups direct their own internal processes;
5. Participants must attend the whole workshop;
6. Provide sufficient time to include enough 'break points' (i.e. include two overnight stays);
7. Let participants publicly declare the actions they will take next;
8. Meet under healthy conditions in terms of food, space, daylight, etc.

Ajayi (2003) analysed the use of mass media for agricultural information by farmers in Nigeria and revealed that the use of radio was the most popular even though majority of the farmers preferred the use of television. News was chosen as the first priority followed by agricultural information. Lack of frequent use of local language and follow-up of farm information by extension agents were major problems with the use of mass media. Significant relationships were found between the use of mass media and farmers' level of education, annual income and membership of cooperative society.

Chapman, Blenech, Berisarljevic and Zakariah (2003) mentioned that the rural radio programmes were well received by the target audience, and the format in which it was presented was popular and easily understandable. They further reported that rural radio programmes have had even more effect if continued over several cultivation seasons. The broadcasts should be timely to coincide with the start of farming season and repeated at regular intervals, for instance, once or twice monthly, and until harvest time.

Acquaintance of Farmers with Agricultural Extension Agents

Acquaintance is the ability of someone to know slightly somebody. Acquaintance of farmers with AEAs not only shows the interest taken by AEAs in different educational programmes for the farmers. Some of the relevant literature is reviewed as follow:

Javied, Khan, Chaudhry and Malik (1990) carried out a study on evaluating the extension activities of livestock and dairy development. The findings pointed out that a fair majority (63.33%) of the 120 farmer respondents were acquainted with Stock Assistant and Veterinary Compounder both by face and name, while a simple majority (51.67%) of the farmer respondents were acquainted with Veterinary Officer of the area by face only. An overwhelming majority (82.50%) had acquaintance with the Assistant Director, Livestock and Dairy Development in any respect. They further indicated that a large majority (72.50%) of farmer respondents reported that weekly to monthly visits paid to them by veterinary field staff. About one-fourth (24.17%) of them however, had a negligible segment (3.33%) of the farmer respondents complained that the veterinary field staff neither visited their farm nor met at home.

Akinbode (1991) indicated that the male agents reached more women than their female counterparts. The proportion of contact of extension services with woman farmers was 61.5% in Ougun State; 45% in Gongola State; 23% in Cross River State; and 79% in Kano and Niger States of Nigeria. It was also pointed out that the extension agents needed intensive and comprehensive training in fisheries, agro-forestry, and gender specific non-agricultural technologies to fill their clients development gaps.

Das (1995) carried out a study to improve the relevance and effectiveness of agricultural extension activities for women farmers, collected data from 480 randomly selected women farmers of four countries namely Thailand, Trinidad, Nigeria and Syria. The outcomes of the study reported that a large majority (78.13%) of women farmers in Nigeria were visited by extension agents, followed by 58% in Syria, and 35% in Thailand. The study also pointed out that nearly 44% of women farmers in Trinidad had not been visited by extension agents. Concerning the reporting of farmers' problems to extension agents, Badar (2006) reported that a simple majority (54.9%) of farmers claimed they were reporting their problems to field staff.

Awareness and Adoption of New Technologies in Agriculture

For farmers of different agricultural zones to adopt a new agricultural technology, she/he must be aware of the technology, have valid and up-to-date information on the technology, the applicability of the technology to their farming system and receive the technical assistance necessary to adopt the technology (Asiabaka, Morse, & Kenyon, 2001). Institutional inefficiencies in the development and delivery of relevant information and assistance from national extension systems are often the major reasons why farmers do not adopt farming innovations. Integration of local information and assistance from extension can facilitate the adoption process, but unless there is information and assistance from external sources, little change can be expected in farmer's adoption behaviour (Njoku, 1990).

Farmers may be desirous of adopting new practices but may be constrained by inadequate information about that particular innovation, which may in part be caused by the inability of the extension personnel to reach the

farmers. It has been reported that why most farmers stick to old practice may be as a result of economic handicap on the part of the farmers to afford the cost of innovations, risk involved, ignorance of existence of innovations plus their conservative attitude (Onyewaku, 1988; Ani, 1999)

Adoption rates, measured as the proportion of farms planted to the new varieties, range from 5 to 80% for adjacent farming communities (Nweke, Ezumah, & Spencer, 1998). These wide ranges in adoption rates imply that the farmers differ in the relative importance they attach to the new varieties, a trend that reflects the different opportunity costs of adoption. Equally, the level of adoption of improved cassava varieties is below 40% (Polson & Spencer, 1992).

Asiabaka and Owens (2002) conducted a study on Determinants of Adoptive Behaviors of Rural Farmers in Nigeria. The objective was to assess the effect of information source and the attributes of a technology on the adoptive behaviour of rural farmers in Nigeria. It assessed the perceptions of rural farmers on the availability, credibility, and degree of use of information sources. The variables tested in technology attributes were complexity, availability and cost and compatibility. Findings indicate farmers' socio-economic characteristics such age and education influenced their adoption behaviour. Results indicate that the source of information was a significant factor in determining farmer's adoption behaviour. Variables such as credibility, availability, interest and usefulness of the information source had positive coefficients and were found to be statistically significant at 0.05 level. Findings also show that technology attributes such as complexity, cost and availability and compatibility were positive and statistically significant at both 0.05 and 0.01 levels. The study concluded that farmer's personal characteristics,

the source of agricultural information and technology attributes were significant determinants of farmer's adoption behaviour. It recommended that extension providers in Nigeria should consider these variables in planning and implementing extension intervention strategies.

Okunade (2006) assessed the factors influencing adoption of improved farm practices among women farmers in the three agricultural zones of the Osun State. Eighty (80) women farmers were randomly selected and information was collected through a pre-tested structured interview schedule. Descriptive statistical techniques like frequency counts, mean and percentages were used to analyse the data. The inferential statistics used were correlation which was used to determine the relationship between the variables. The study showed positive and significant relationship between adoption of innovation and credibility (r = 0.470), communication ability (r = 0.241), divisibility (r = 0.251) and relative advantage (r=0.235). However, negative and significant relationship exists between adoption and religion (r = -0.431), complexity (r = -0.401), cost (r = -0.351), land tenure (r = -0.320), norms (r =-0.311) and beliefs (r = -0.253).

Oladoja and Olusanya (2007) carried out a study on adoption of coccidiosis vaccines by poultry farmers in Ijela Area of Ogun State in Nigeria. Eighty eight (88) poultry farmers were selected through stratified sampling methods from six local government councils using a pre-tested questionnaire. Specifically, the poultry farmers selected personal characteristics such as age, sex, religion, marital status, educational attainment, farm income and sources of credit were identified. Their level of awareness and adoption was established. The relationship between adoption and constraints to adoption was also established. The study revealed that age and sex were significantly related to

adoption amongst other personal characteristics tested. The study also revealed that there is no significant relationship between adoption and constraints to adoption.

A research carried out by Ofuoko and Emah (2008) to isolate the determinants of improved fish production technologies in Delta State, Nigeria, collected data from a sample population of 250 fish farmers from ten randomly selected Local Government Areas of Delta State. The data were elicited from respondents with the use of structured interview schedule while descriptive statistics and multiple regression analysis were used to analyse the data. The recommended fish farming technologies at different stages of adoption process were p^H testing and regulation, testing of dissolved oxygen level, feed formulation, polyculture, practices integrated fish/poultry or rice farming, re-circulation method, cage system spawning and stocking density. The level of adoption was low. The grand mean adoption score and adoption index were 1.02 and .10 respectively. The low level of adoption was attributed to cost of the technologies, their complexities and lack of extension contact. The level of education, age of farmers, farm size, farm income and extension contact were the major determinants of fish production technologies adoption at 0.05 level of significance.

Ofuoku, Egho and Enujeke (2009) assessed the adoption of integrated pest management among farmers in Central Agro-Ecological zone of Delta State, Nigeria. Three hundred and twenty farmers were selected and interviewed with the use of structured interview schedule. The findings revealed that 13.63% of the farmers adopted technology and extension contact was encouraging. Result of the probit model analysis of the same study showed that marital status,

household size, and involvement of every household member were the significant demographic factors influencing the use of the innovation. The study recommended that extension agents should select contact farmers from those that are married, willing to involve all household members in decision making, and middle aged for rapid technology adoption and diffusion.

For Ofuoku *et al.* (2008), in disseminating the innovation, more efforts need to be made by extension agents to identify the large sized farm households whose heads are middle age, married, willing to involve every household member in decision making and educated. If such household heads are used by extension agents as contacts farmers, the adoption rate of the technology will be very encouraging and its diffusion rapid also.

A study carried out by D'Emden *et al.*, (2006) on adoption of conservation tillage in Australian cropping regions: an application of duration analysis shows that the probability of no-till adoption was strongly influenced by the length of time in which growers first became aware of no-till being used in their district. This finding is consistent with the role of information quality and learning in a framework of the role of risk, uncertainty and learning in adoption of agricultural technology outlined by Marra, Pannell and Abadi Ghadim (2003) and cognitive externalities that are dependent on the proximity of early users (Baptista, 2001). Also Information-related factors are also clearly important in adoption (D'Emden *et al.*, 2006). These include the use of extension and availability of other opportunities for local field observations.

According to Leeuwis (2004), an important practical conclusion relating to the stimulation of adoption was that people required and searched for

different kinds of information during each stage. The information requirements evolved from:

1. Information clarifying the existence of tensions and problems addressed by the innovation or policy measure;
2. Information about the availability of promising solutions;
3. Information about relative advantages and disadvantages of alternative solutions;
4. Feedback information from one's own or other people's practical experiences;
5. Information reinforcing the adoption decision made.

The introduction on innovation or technology transfer has been variously conceptualised but basically includes two types of actors, an advocate of change and a potential acceptor of change; the situations in which these actors operate; communication between the actors; and the subject of that communication, a new thing or an idea.

Byrnes (1978) observed that, as a process, the introduction of innovation involves:

1. the innovation;
2. the information about the innovation;
3. the communication of such information to potential adopters;
4. a channel or medium through which the information is conveyed;
5. evaluation of the innovation by the individual
6. the allocation of resources to acquire the innovation or the appropriate inputs for a trial of the innovation
7. an adoption decision

An innovation is any idea, object or practice perceived as new by an individual. African farmers have depended largely on traditional farm practice and tools in performing farm activities. As a result, they get easily fatigued and suffer damage to their bodies and overall health. This partly explains the low farm productivity. They spend long hours performing arduous work on planting, processing, storage and marketing of crops. Regrettably, they continue to suffer the drudgery associated with these productive activities because of their limited access to agricultural technologies. Some factors responsible for this limited access are:

1. limited access to education in science and technology (especially in agriculture);
2. lack of access to credits needed to purchase technologies;
3. absence of collateral such land and other properties;
4. lack of information or knowledge about the range of technological alternatives (Olorunnipa, 1993).

Olorunnipa (1993) indicated further that there appears to be an increasing awarness in developping countries that the use of improved technologies is a sine quo non for expanding food supplies. However, chosing 'appropriate technologies' and giving both men and women 'fair' access to these technologies has been a major agricultural development problem in Africa.

In agriculture, an important fact from adoption research is that innovations are not adopted by everyone at the same time. Particular innovations are used quickly by some and only taken up later by others, while others never adopt them. More importantly, adoption research suggested that

there was a pattern in the rate at which people adopted innovations, meaning that some would usually adopt early, while others would adopt late (Leeuwis, 2004). Such conclusions were arrived at through the analysis of adoption indices, which were used as a measure for innovativeness, defined as 'the degree to which an individual is relatively earlier than comparable others in adopting innovations' (Rogers, 1983). An adoption index was usually calculated by asking people whether, at a given time, they had adopted any of 10 to 15 innovations recommended by the local extension service. Individuals would receive a point for each one adopted. On the basis of their score, adoption researchers typically classified people into five different categories:

1. Innovators 2.5%
2. Early adopters 13.5%
3. Early majority 34.0%
4. Late majority 34.0%
5. Laggards 16.0%

Many researchers have investigated the relationship between an individual's adoption index and a variety of social characteristics. Cidro and Radhakrishna (2006), Lewis (1998), Quispe (1997), Lynne *et al.* (1995) and Khan (1991) have investigated the relationship between an individual's adoption index and a variety of social characteristics that include:

1. Education
2. Literacy
3. Higher social status
4. Larger size units
5. Intelligence

6. Social participation
7. Cosmopolitanism (urban contacts)
8. Change agent contact
9. Mass media exposure
10. Exposure to interpersonal channels
11. More active information seeking
12. Knowledge of innovations
13. Opinion leadership

An effective communication is then when the change agent deals appropriately with these patterns by integrating innovation principles in genuine communication methods and channels to fit farmers' social characteristics.

Agricultural Extension Information Sources

Information is data transformed into a usable item. For Röling and Engel (1991), information is processed or interpreted data, data being the raw material for information and being described as facts or forms of sensory input such as observation and smell. Leeuwis (2004) sees information as knowledge expressed in tangible, that is, captured and stored in physical or electronic such as book, file, leaflet, newspaper, picture, sound and website. The most important common character about all these, is that they should be communicable in a simple way to and appropriately and timely useful to the adressed audience.

Agricultural extension agents also use various sources of information to communicate new and emerging technologies to farmers. Farmers also seek relevant information from accessible sources to improve their productivity. CIDA (2003) examined different ways information and knowledge are shared

among development workers and concluded that information can be obtained verbally through person-to-person communication, on the job, training, classroom, education, by listening to the radio or watching television or by reading books and newspaper.

The analysis of information sources for agriculture should take into account written, printed, oral, storage, information producers, research and experimentation, teaching, extension, agrobusiness and farming, information services from libraries, information centres and information consumers such as the farmers and rural development. Dulle (2000) investigated the information seeking patterns of extension workers in Tanzania. He concluded that, main information sources are personal. attendance at professionnal meetings, courses and conferences, and reading newspapers. The study also revealed that, contact with researchers and use of agricultural libraries, although sources of information used by extension agents, were very unpopular.

Information source factors such as availability, credibility, interest, usefulness and the socio-economic characteristics of the farmers can determine the frequency of use of such information. There are relationships between farmer characteristics and extension contacts on farmer's use of agricultural information. An extension campaign that utilizes several different methodologies of information dissemination (e.g. radio messages, information dissemination at markets, banners, posters, bulletin boards) will be more effective than relying solely on one-to-one visits. This is especially true when trying to reach farmers demographically different from the extension agents.

Asiabaka and Owens (2002) and Bel-Molokwu (1997) found that the farmers ranked fellow farmers and friends as the most available source of

information. Extension agents and farmer's cooperatives followed this observation. They pointed out that the source of agricultural information and technology attributes is one of the most significant determinants of farmer's adoption behaviour. They also stated that farmers have limited access to other agricultural personnel such as researchers or university personnel. The study recommended that extension providers in Nigeria should consider these variables in planning and implementing extension intervention strategies.

A study on extension agents' use of information sources (Radhakrishna & Thomson, 1996) described the extent of information use by extension agents in the United States. The major findings were:

1. extension agents need an item for information the same day to answer a client's inquiry; and
2. agents frequently communicate with a number of information sources, clients, other agents, extension specialists, local news agencies, and local business organizations.

Significant differences were found between demographic characteristics (age, gender, education level, and primary area of program responsibility) and information sources used.

Characteristics that at first appear to be attributes of sources in fact vary from receiver to receiver (Mundy, 1992). Such variation may be real or perceptual. For instance, receivers vary in their proximity to any one source. One receiver may view a source as exceptionally relevant, credible, and easy to use; another may think the opposite of the same source. And the specific sources that receivers refer to may be different: "your boss" refers to a different person for each receiver. These characteristics can be seen as features of the

relationship between receiver and source - a formulation that eases their use as predictors of information flows for two reasons. They may depend on the receiver's perception of the source, and thus, be subjective in nature. The source's credibility is one such attribute. Alternatively, they can vary among receivers according to objective criteria. Ogunwale and Laogan (1998) revealed that village extension workers constituted the most used source of farm information and technologies. Other sources used by farmers included fortnightly training meetings, radio agricultural programmes, friends and neighbours, demonstration sites, and contact farmers.

Ofuoku, Emah and Itedjere (2008) conducted a study to assess the utilization of information on fish farming techniques by rural fish farmers in central agricultural zone of Delta State, Nigeria. Findings revealed that Information used ranged from stocking rate to preservation techniques. The sources of these information included extension agents, other farmers, fish farmers' groups, university, research institutes and Non-governmental organisations (NGOs) . The study pointed that 86%, 70% and 70% of the fish farmers get information through farmers' groups, other farmers and NGOs respectively. Very few (10%) access information through Research Institutes and another handful (10%) through Universities, while 45% access information through extension agents (there were multiple responses). This implied that Research Institutes and Universities have not put in enough efforts to carry out their function of information generation and delivery to farmers. The same study also indicated that farmers mentioned print and electronic media as sources of information but quoted that these sources are not readily affordable or reliable in the rural communities. The study concluded that the greatest constraint to

access to information by farmers included inadequate extenstion contact (33%), ineffective communication (29%), distance from other farmers (25%) and illiteracy (13%).

Participation in Extension Communication

Opinion from the literature indicates that the failure of development projects and programs is attributable to a number of causes (Hornik, 1988; Mefalopulos, 2003) These range from poor design and lack of people's support to open opposition to the projects' objectives and related activities. Often, these problems could have been addressed and avoided if relevant stakeholders' inputs, perceptions, and knowledge were taken into account when the initial investigation and assessment of the situation were conducted. Using dialog and other empirical research methods to involve stakeholders and to probe risks and opportunities would avoid most of these failures.

An increasing number of analyses of projects have shown that participation by local people is one of the critical components of success in various agricultural sectors (Pretty, 1995). The concept of participation has been defined and interpreted in many various ways by many scholars. Cernea (1995) defined 'participation as empowering people to mobilize their own capabilities to be social actors, rather than passive subjects, manage resources, make decisions and control the activities that affect their life'.

A study of 230 rural development institutions employing some 30,000 staff in 41 countries of Africa found that participation for local people was most likely to mean simply having discussions or providing information to external agencies (Guijt, 1991). Government and non-government agencies rarely permitted local groups to work alone, some even acting without any local

involvement. These external agencies did permit some joint decisions, but usually controlled all the funding.

Kroma (2003) introduced participation and social learning as a suitable way of learning toward sustainability. She wrote that a critical aspect of the social learning process is the opportunity it creates for farmers and change/extension agents to reflect on new ideas and experiences, and on how such insights can inform and guide subsequent action. Such a process also reflects a view of extension agents, not merely as service providers, but as facilitators, linking farmers to networks of knowledge and resources that support productive activities.

For Mohammad (2008), an important value of a social learning approach is that extension professionals are themselves enabled to learn their way through on how to work with farmers in a participative rather than a didactic, top-down way, while ceating the social networks for facilitating exchange of knowledge between researchers and farmers.

Another study of 121 rural water supply projects in 49 countries of Africa, Asian and Latin America found that participation was the most significant factor contributing to project effectiveness and maintenance of water systems (Nayayan, 1993). Most of the projects referred to community participation or made it a specific project component, but only 21 percent scored high on interactive participation. Clearly, intentions did not translate into practice. It was when people were involved in decision making during all stages of the projects that the best result occurred. If they were just involved in information sharing and consultations, then results were much poorer. It is quite clear from this study that moving further down the typology moves a project

from a medium to highly effective category. Great care must therefore, be taken when both using and interpreting the term participation. It should always be qualified by reference to the type of participation, as most types will threaten rather than support the goals of participation. What will be important is for institutions and individuals to define better ways of shifting from the more common passive, consultative and incentive-driven participation toward the interactive end of the spectrum. It is believed that rural people are more prepared to participate when they feel the need to do so (Oakley, 1991).

According to Düvel (2000), the principle of maximum community participation is based on the notion of self-determination, self-reliance, self-responsibility and self-help as a normative goal. A further reason for emphasizing participation is that it is associated with greater effectiveness, and thus not an end in itself, but a means to an end. The reasoning beyond this is that, from Cohen and Uphoff (1980) cited by Düvel (2000), people adjust to change most rapidly when they initiate, identify and solve problems that directly affect their welfare. Furthermore, deliberate and continuous involvement contributes to understanding and commitment.

If the main causes of many past failures are to be ascribed to the insufficient, or the absence of, stakeholders' engagement in the problem analysis of social, political, and cultural environments, there can be little doubt that dialogue and the professional use of two way communication are the best remedies to successfully address this issue. The dialogic functions of communication, in addition to its more informative functions, have become crucial to rectify past mistakes and to enhance projects' design and sustainability (Mefalopulos, 2008). The dialog-based approach can define priorities and

project objectives in a more reliable and effective way, thus shaping and improving the overall design of the initiative. Another factor influencing the growing role of communication in the current context of international development, a factor increasingly embraced by major national and international organizations, resides in the rights-based approach as a key element for development. In this regard, development communication not only leads to better and more sustainable results but also promotes people's participation in accord with the ethical and democratic principles of the current development paradigm. In sum, while providing the inputs for better and more sustainable design of development initiatives, communication also enhances the application of the rights-based approach, facilitates people empowerment, and supports transparency and accountability, key elements of good governance (Mefalopulos, 2008).

The degree of interest gives a measure of the farmers' participation in the project and their understanding and internalising of its goals (Meera, Jhamtani, & Rao, 2004). Agricultural extension systems in the majority of developing countries are operated by a ministry of agriculture or a sectoral ministry in a generally rigid, top-down mode (Weidemann, 1987). They have been widely criticized as not being able to reach poorer farmers and tending to focus on better-off farmers, who represent, at most, only 20% of the population (Rolling, 1984). Major reasons often cited for extension activities' failure to reach their intended beneficiaries include:

1. the extension workers' lack of knowledge and skills;
2. the common practice of selecting local leaders as contact farmers;

3. agendas imposed from higher levels that conflict with local people's needs and wishes.

Under these circumstances, extension field workers cannot communicate effectively with targeted groups not only because they do not have much in common with them but also because they are not equipped with the necessary social skills, organizational know-how and knowledge of the communities they are dealing with (Axinn, 1987 ; Odell, 1986). Selected contact farmers tend to be the wealthier and more powerful in the community. They are neither representative of it, nor willing or able to act as a bridge between other farmers and extension services. Hence, the quick and convenient practice of selecting local leaders or better-off farmers as contact persons for extension services may benefit these groups at the expense of the already marginalized farmers.

The widespread inefficiency and counterproductive outcomes of conventional extension services have led to new extension delivery models introduced by development agencies or donor-assisted projects that aim to fill the gap left by the official extension system. With many forms and under various names, new models such as the Training and Visit system introduced by the World Bank, Farmer Field Schools or the Integrated Agricultural Development programs try to address problems mentioned above by incorporating the participation of local people in some or all stages of the process. As Albrecht (1986) has suggested, extension can help only if there is successful communication with rural people. It is widely believed that communication problems can be solved once local farmers are allowed to take part in research and development activities and to express opinions in their own

words and on their own behalf. Participatory development, which used to be taken for granted as a panacea, however, fails to live up to expectations if it is not managed effectively. Biggs and Smith (1998) have asserted that ''including'' certain kinds of people in the development process is not sufficient to affect the group they represent and that inclusion does not guarantee meaningful participation. Participatory processes can make claims of empowerment and efficiency only if they can address power relations within communities.

How and why have participatory approaches failed to match rhetoric? One of the most important factors often associated with this problem is the naïve and simplistic treatment of a ''community'' as a homogeneous and harmonious entity in terms of relations and concerns.

Participatory processes are often criticized for not dealing well with the complexity of community differences, including age, economic situation, religions, caste, ethnicity and, in particular, gender and for failing to recognize conflicting interests within communities and the methodological implications of such differences (Guijit & Shah, 1998). The notion of community homogeneity has resulted in local power relations as well as inequalities and discrimination being overlooked. As research and development activities are unlikely to be accessible to every community member, it is important to understand a community's composition and internal dynamics in order to adjust the approach accordingly.

The need to recognize and take into account intracommunity power relations in extension and development work has been emphasized by various studies (Moose, 2001; Cleaver, 1999; Cooke & Kothari, 2001; Hailey, 2001).

Participatory development approaches originated from the recognition of unequal power relations between local people at the micro level and those at the institutional level. Participation of local people in research and development, therefore, implies empowerment. Power, however, does not only exist between development beneficiaries, donors, or local governments but can be found at all levels including farming communities. All individuals are vehicles of power and their behaviour and social relations are deeply linked to power. The production and representation of knowledge should, therefore, be seen as inseparable from the exercise of power (Kothari, 2001). An understanding of local power relations and community dynamics is essential in order to avoid reinforcing existing power hierarchies within targeted communities.

A study by Axinn (1988) stated that the success of an agricultural extension program tends to be directly related to the extent to which its approach fits the program goals for which it was established; that is to say taking beneficiaries' views, experiences and aptitudes can be done through involvement of those first concerned, the farmers.

Extension has long been grounded in the diffusion model of agricultural development in which technologies are passed from research scientists via change agents to farmers. This approach is amplified by the training and visit (T&V) system. Important lessons have been learned from the problems associated with T&V, and there is clearly a need to address the systemic issues facing extension (Antholt, 1994). Extension will need to build on traditional communication systems and involve farmers in the process of extension. Incentive systems will have to be developed to reward staff for being in the field and working closely with farmers. There must be a well-defined link between

the well-being of field officers and the extension system, based on the client's view of the value of extension and field workers' performance (Antholt, 1992).

In designing extension, an approach is less important than its ingredients. It is important to isolate the ingredient of success and find ways to replicate or transfer their characteristics to improve the performance of another approach. These ingredients involve using local people as field agents, who belong to target groups, training extension workers in human resources development skills and collaborating with community organizations and their support groups to help them to use their own systems of knowledge, experimentation and communication (Anandajayasekeram *et al.*, 2008). Impact on coverage can also be obtained by prioritizing, categorizing, and stratifying farmers with target groups, using cost-recovery schemes with more commercially oriented farmers to release public funds to serve small-scale farmers. Impact on coverage problem is most powerful through participation and control by farmer organizations, mobilizing other players, and using appropriate media (Anandajayasekeram *et al.*, 2008).

While redesigning extension, it is important to:

1. explore ways of integrating positive characteristics of the private sector or NGO operations with public sector management;
2. broaden the historical tendency of extension to focus on production and pay more attention to transformation and marketing;
3. integrate farmer participation and control into other extension modifications;

4. recognize that addressing the generic problems of extension requires decentralization, and is even more effective when institutional pluralism is built in.

Summary of the Literature Review

Literature on communication theories revealed that although the communication field now has the legitimacy and coherence that comes from disciplinary status, it remains a continually evolving and changing discipline and scholars continue to understand patterns across cultures and contexts for more comprehensive understandings of how communication works.

From the reviewed literature communication is perceived as a process of transmitting ideas, information, and attitudes by the use of symbols, words, pictures, figures from the source to a receiver, for the purpose of influencing with intent. So communication is considered as a process through which senders and receivers of messages interact in a given social context.

Literature conceived agricultural extension as a system that facilitates access of farmers or their organizations to new knowledge, information and technologies and promotes interaction with research, education, agri-business, and other relevant institutions with the purpose of providing the opportunity for farmers to learn and use the practical knowledge in solving the problems they face in their daily activities.

Various research studies revealed that AEAs used different communications methods for the dissemination of agricultural information among the target population. Similarly, farmers also obtain the required information from various sources depending upon the reliability, credibility and accessibility of these sources. Among the methods used, studies revealed that

only farm and home visits and results demonstrations appeared to be effective. Also AEAs were perceived as less competent in handling communication methods such as television, radio in terms of respect to their principles of use. Participation of farmers in extension activities was found low to medium justified by lack of awareness, finance, inadequate training of AEAs and so on. However, AEAs required intensive and comprehensive training in different fields of agriculture to enhance farmers' participation in extension activities.

The main purpose of communication is the positive change in farmers' behavior which can be measured by their awareness and adoption of agricultural innovations. Literature revealed that farmers' awareness and adoption level of recommended technologies was low. This was generally due to illiteracy, lack of knowledge, finance, unavailability of inputs and poor involvement in extension activities. Also, socio-demographics characteristics such as age, education and land tenancy were found significantly related to the awareness and adoption of recommended technologies.

Conceptual Framework

The study was based on the conceptual framework presented in Figure 2 which was derived from the key issues from the review of theories of communication. The conceptual framework is premised on the fact that communication methods are key to ensuring that extension agents related to farmers to send appropriate technologies for adoption. Communication is the process by which we share information with one another to reach a mutual understanding. As Axinn (1997) points out, the essential role of agricultural extension services is to promote innovations to farmers or end users through education. An innovation could be a new idea, a practice, an object or a technology, such as improved seed, chemical fertilizer, use of irrigation, or adoption of various postharvest technologies such as storage, processing, packaging and marketing. Effective communication requires carefully examining the credible source of the information, identifying the right message and selecting the most appropriate information channel to reach the target audience farmers, in the case of agricultural extension. Diffusion of innovation and its adoption vary depending on the sociocultural context of the community, characteristics of the decision-making unit or the target audience, and perceived attributes of the innovation (Rogers, 1995).

Hence, for a given new idea or technology to be transferred, the whole process starts with the integrated key issues of above various reviewed theories. An agricultural extension agent, based on his level of understanding more often sustained by items such as level of education, experience in work, personality and other personal traits, analyses the new idea or innovation by looking at its attributes such as:

Relative advantage: What are the cost and economic return of adopting the innovation compared with current practice?

Compatibility: Is the innovation compatible with existing practice or culture?

Complexity: How complex is the innovation? Simple practices are adopted more quickly than complex ones.

Trialability: Can the innovation or technology be tried out or experimented with or adopted on a limited basis before its full adoption?

Observability: Can people observe the results or benefits of adopting the innovation? The degree to which the results can be visible is important for its adoption.

After becoming aware of or knowledgeable about the attributes of the new idea or innovation, AEA should confront them with farmers' socioeconomic characteristics, personality, traits and their social system communication that may influence the knowledge of an idea or innovation. Also farmers' previous practice, their felt needs, infrastructure and marked status and others sociocultural norms should be in list of the assets of that process of analysis. It is only when AEA has become aware of or knowledgeable about sociocultural characteristics of farmers and attributes that communication methods or channels come into play. That shows the close link between the audience characteristics and the technology attributes in the choice of the very appropriate communication methods through which the message should be conveyed.

Communication methods play a key role in the innovation decision process. Methods are interpersonal, group or mass media. Interpersonal channels require a long time or many staff members to reach a large audience.

Group methods such as farmers' training classes, study tours and farmer field schools can reach more people more quickly, but they may not reach all the members of the social system. Mass media channels can reach a large audience with the same message in a relatively short time period. The tools and techniques taken into account in the study on analysis of communication methods for agricultural extension delivery include : farm visit, home visit, methods demonstration, results demonstration, lecture meetings, discussion meetings, literature, Radio, television, Exhibition, campaigns, office calls, ICT. AEAs has to make the choice of appropriate communication methods (Campbell & Barker, 1997) without forgetting that certain communication methods are effective at different stages of the innovation decision process (Rogers, 1995). Accordingly, mass methods are useful in creating awareness about an innovation (knowledge stage) while interpersonal methods are relatively more important at the persuasion or decision stage of the innovation decision process.

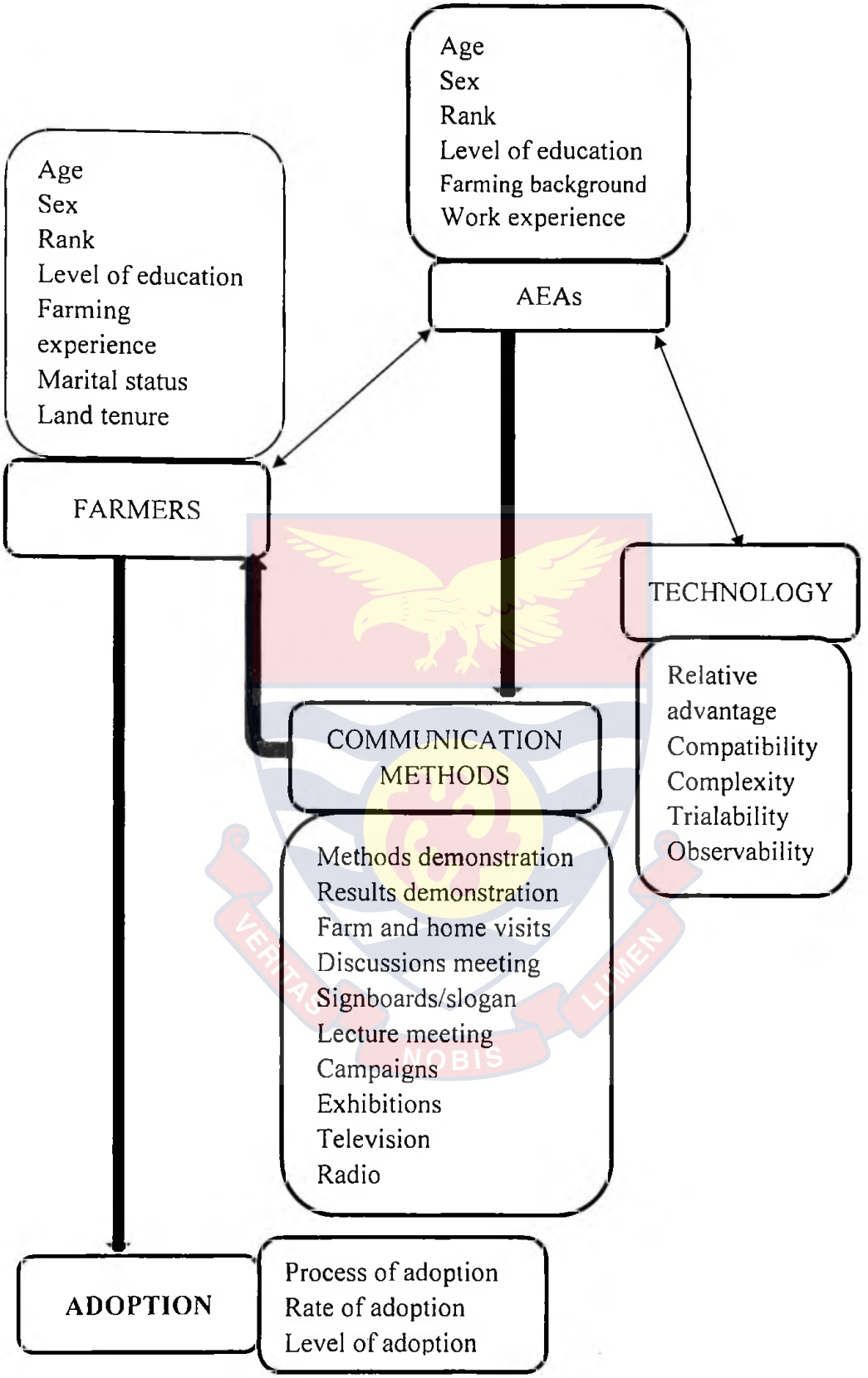


Figure 2: Conceptual Framework for Analysing Communication Methods

Source: Author Construct

CHAPTER THREE

METHODOLOGY

Introduction

This chapter outlines the techniques and procedures that were used to investigate on the analysis of communication methods for agricultural extension delivery in the Houet Province of Burkina Faso. The chapter comprises the research design, the study area, the study population, the sample and sampling methods. The chapter also covers the instrumentation that was used, data collection procedures and data processing and analysis.

Research Design

According to Babbie and Rubin (2010), research design is a blue print for research which indicates which questions to answer, relevant data to collect and how to analyse data to provide viable and credible results for the study. Besides, it describes the procedure for conducting the study such as when, from whom and under what conditions data should be obtained. Research design stands also for a means to provide valid and accurate answers to research questions (McMillan & Schumacher, 2001)

A descriptive survey design was used to collect data for the study. The design was deemed appropriate since the study collected data and described the

nature, strength and direction of relationships among the variables of the study (Franckel & Wallen, 1990). Isaac and Michael (1984) argued that survey design ensures collection of detailed information that describes existing phenomenon, identifies problems, justifies current conditions and practices, and makes comparison and evaluation. Warwick and Lionberger (1975) further stated that descriptive survey design lays the groundwork for the pursuit of objectives such as hypotheses testing, prediction and development of indicators. Best and Kahn (1995) also claimed that the descriptive design involves hypothesis formulation to arrive at generalizations. Moreover, descriptive survey employs methods that are non-experimental as they deal with relationships among non-manipulated variables (Muijs, 2004). The objectives of the study were in line of the above descriptions hence, justifying the choice of the design that was deemed appropriate (Stanovich, 2007)

Study Area

The research was carried out in the Houet Province, one of the three provinces of the Hauts Bassins Region located in the Western part of Burkina Faso (Figure 3). The study area is bounded to the West by Republic of Mali, on the East by the Southeast Region, to the South by Cascades Region and to the North by Boucle du Mouhoun Region. It occupies a total land area of 24.779 square kilometres (9% of the national land), with about 20.000 square kilometres under cultivation. The regional capital of Houet province is Bobo-Dioulasso which is about 365 kilometres from Ouagadougou, the capital town of Burkina Faso. Burkina Faso is a landlocked country in West Africa. The country occupies an extensive plateau, with a geography characterised by a

savannah that is grassy in the north and gradually gives way to sparse forests in the south (Guinko, 1984; Fournier, 1991).

The climate is Sudanian with two climatic seasons. The dry season occurs between November to April during which the harmattan is experienced. The rainy season is experienced between May to October. The rainfall ranges from 800 mm to 1,200 mm with a yearly decrease and disparity in distribution over time and space. The western part of Burkina Faso is known to receive the highest rainfall per annum in the country. The larger part of the country is made up of a peneplain, which forms a gently undulating landscape with, in some areas, a few isolated hills (MAHRH, 2010).

The agricultural potential in Houet province attracts farmers from other regions, especially the central and the northern parts to farm in the province. The existing agro-ecological conditions of the area make it possible to produce a variety of crops and raise livestock on sustainable basis (Guinko, 1984)

The main occupation of the people is farming which includes the cultivation of crops and rearing of animals. The major crops grown are maize, rice, sorghum and cotton. Farmers are involved in production of fruits such as mangoes and oranges. The various animals reared in order of importance are cattle, sheep, poultry, pigs, rabbit, and goats (MAHRH, 2010).

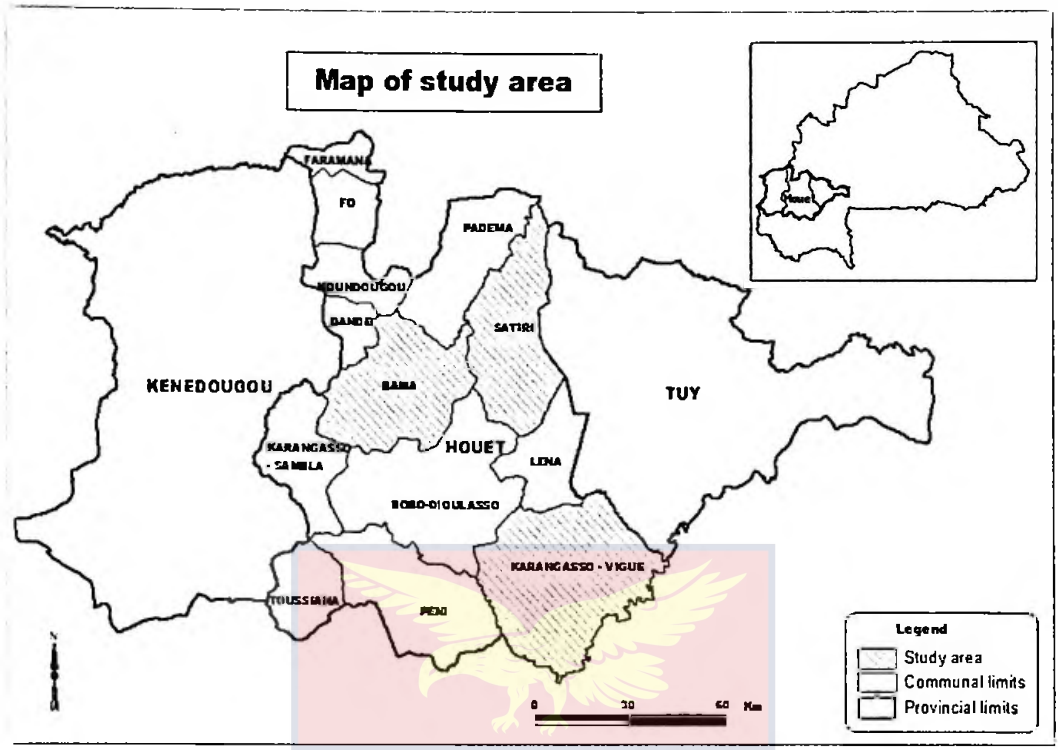


Figure 3: Map of Houet Province showing the study area

Source: IGB Burkina

Study Population

The population of the study comprises all Agricultural Extension Agents and all the farmers under the supervision of the agricultural extension agents in the Houet province in the Hauts-Bassins region of Burkina Faso.

Sampling Procedures and Sample Size

Applied statistics research plays pivotal role in diverse problems of social sciences, agricultural sciences, health sciences, etc. Many investigations are conducted by survey research. The technique of sampling and determination of sample size have crucial role in survey-based research problems in applied statistics. Specific sampling procedures are used for specific research problems because one technique may not be appropriate for all situations (Singh &

Masuku, 2014). The sample size is a subset or a portion of the overall population which may be too large for a study while sampling is related with the selection of a subset of individuals from within a population to estimate the characteristics of the whole population (Muijs, 2004). The two mains advantages of sampling are the faster data collection and lower cost (Singh & Masuku, 2014)

Agricultural Extension Agents

The Agricultural Extension Agents (AEAs) worked in the three provincial directorates namely the Ministry of Agriculture and Food Security, the Ministry of Animal resources and the Ministry of Environment (Table1) in the thirteen zones of Houet Province of Burkina Faso. The census of 64 AEAs was used because they were not many and all could be reached. The population is less than thousand individuals, everyone was needed to achieve statistical confidence (Dawson, 2007). For Sudman (1976), census as a sample is one approach for small population. Although cost considerations make this impossible for large populations, a census is more attractive for small population (e.g., 200 or less). A census eliminates sampling error and provides data on all the individuals in the population (Singh & Masuku, 2014). The choice depends upon the quantity of data to be collected and the instrument used.

Table 1

Distribution of Agricultural Extension Agents in the Houet Province

Zones	Number of Agricultural Extension Agents
Bama	15
Bobo-Dioulasso	14
Dandé	3
Faramana	2
Fô	3
Karangasso-Sambla	3
Karangasso-Vigué	4
Koundougou	3
Léna	2
Péni	5
Padéma	3
Satiri	4
Toussiana	3
Total	**64**

Source: Field survey, Lankoande (2011)

Farmers

A multi-stage procedure was use to select the sample of farmers involved in the study. First of all, Bobo-Dioulasso was deliberately eliminated from the sampling procedure because of the cosmopolitism that does not provide opportunity of normal agricultural production activities. Secondly, a purposive selection of 2 out 12 remaining zones. Purposive sampling also known as judgment, selective or subjective sampling is a sample technique in which research relies on his or her own judgment when choosing members of population to participate in the study. According to Black (2010), purposive sampling is a non-probability sampling method and it occurs when "elements selected for the sample are chosen by the judment of the researcher. Researchers often believe that they can obtain a representative sample by using a sound judment, which will result in saving time and money" (Phillips, 1976).

A list of farmers working with AEAs in the two selected was compiled giving a total population size of 134 farmers considered as supervised by AEAs under extension activities. To simplify the process of determining the sample for a finite population and ensure that it is that the representativeness, a published table of Krejcie and Morgan (1970) adopted by Glenn (1992) was used (Table 2). According to this table, for a population of 134 which is very close to 130, a sample size of 99 would be required to be representative. Glenn (1992) supported the usefulness of the published table for respecting confidence and precision levels 95% and ±5% precision, respectively.

The next step was selection of sample size in the two selected zones. A stratified proportion sampling procedure was applied to obtain the sample size from each district. A stratified random sampling is a "probability sampling design that first divides the population into meaningful, non-overlapping subsets, and then randomly choosing the subjects from each subset" (Sekaran, 2003).

Finally, a random sampling technique was to select farmers from the population of each selected zone. According to Best and Kahn (1995), random selection provides equal probability for members of the population to be selected. When random sampling is employed whether the sample is large or small, the errors of sampling may be estimated, giving researchers an idea of the confidence that they may place in their findings. A sample of 99 farmers was retained as results emerging from the adoption of the table.

Table 2

Glenn's Sample Size Table adapted

Size of Population	Sample Size (n) for Precision (e) for		
	±5%	±7%	±10%
100	81	67	51
125	96	78	56
150	110	86	61

Source: Glenn (1992)

Instrumentation

Validated questionnaire (Appendix A) and interview schedule (Appendix B) were used as the instruments to collect data for this study. The interview schedule was administered to farmers, while the questionnaire was used to collect data from agricultural extension agents. Close-ended and open-ended items were used on the instruments. Each instrument had the items arranged based on the objectives of the study.

Questionnaire for Agricultural Extension Agents

A questionnaire was used targeted at AEAs. Even though it has disadvantages such as a low response rate, lack of opportunity to clarify issues among others (Kumar, 1999; Colton & Covert, 2007) it was adopted because it is inexpensive and research remains anonymous for the respondents (Kumar, 1999; Baker, 1994)

The first section of the questionnaire consisted of closed and opened questions on the socio-demographic characteristics of the AEAs. Items included are sex, age, field of specialisation, working experience, professional level, student life time aspiration, highest academic degree earned, participation in training, training needs, family background and experience in farming.

The second section was made up of questions seeking information on the importance of the information sources. The perception of AEAs on the importance of sources of information such as professional journals (local and foreign), colleagues in the field, courses or seminars, books, scientists, extension organisation, publications in extension journals were sought. All the items in the section were measured using the five-point Likert-type scale where 1 = Very important, 2 = Important, 3 = Moderately important, 4 = Not important, 5 = Unimportant.

Section three of the questionnaire consisted of structured questions on the characteristics of each information source. All the items in the section were measure on a four-point Likert-type scale ranging from 1 = strongly developed, 2 = developed, 3 = moderately developed and 4 = poorly developed.

Section four consisted of questions that sought information on AEAs' relationships with other shareholders in the agricultural extension system. The perceived relationship were rated on the five-point Likert-type scale ranking from 1 = poor to 5 = excellent.

Section five consisted of structured and unstructured questions that sought professional and technical information of AEAs. Items included among others the relevance, specificity, meaningfulness, completeness, conciseness, and timeliness of the extension messages, the use of communication techniques and the perceived effectiveness of these techniques. Also included were questions seeking information on farmers' participation in agricultural extension activities and their receptiveness to extension messages. Almost all the items in this section were rated on the five-point Likert-type scale ranging from 1 = very poor, 2 = poor, 3 = medium, 4 = high, 5 = very high.

Structured Interview Schedule

The structured interview schedule was used to collect data from farmers (Appendix B). In this tool comprised of six sections, the researcher asks a pre-determined set of questions (Kumar, 1999). Data collected include the socio-demographic characteristics, access and importance to information sources, extension messages delivered, the appropriateness and effectiveness of the communication techniques used by extension. Views were also sought from farmers on the competencies of AEAs in the use of the communication

techniques, the contents of the messages conveyed through various communication techniques used by AEAs, the acquaintance and the interaction between Farmers and AEAs. Views were finally sought on farmers' participation in different agricultural extension activities undertaken by the AEAs using a five-point Likert type scale from 1 = poor level to 5 = excellent. Farmers' views on the general attitudes of the AEAs in performing their duties were measured using the five-point Likert-type scale rating from 1 = very poor, 2 = poor, 3 = medium, 4 = high, 5 = very high.

Validity and Reliability of Instruments

Experts in the field of Department of Agricultural Economics and Extension, University of Cape Coast determined the content validity of the questionnaire and structured interview schedule. The questionnaire and the structured interview schedule were pretested between April and June 2010. Reliability of the scale items were measured using Cronbach's Alpha reliability test co-efficient. Alpha was developed by Lee Cronbach to provide a measure of consistency of a test or scale; it is expressed as a number between 0 to 1 (Cronbach, 1951). Internal consistency describes the extent to which all the items in a test measure the same concept or construct at hence it is connected to the inter-relatedness of the items within the test. Internal consistency should be determined before a test can be employed for research or examination purposes to ensure validity (Mohsen & Reg, 2011).

The items on the subscales were considered very reliable on Georges and Mallery (2003) interpretation scale (Table 3). According to their scale, the closer the coefficient is to 1.0, the greater is the internal consistency of the items in the scale.

Table 3

Reliability interpretations

Alpha Coefficient	Interpretation
>0.9	Excellent
>0.8	Good
>0.7	Acceptable
>0.6	Questionable
>0.5	Poor
<0.5	Unacceptable

Source: Table adapted from Georges and Mallery (2003)

The content validated questionnaire was translated into French language before administered to AEAs. The Cronbach Alpha coefficients for the subscales in the questionnaire used for AEAs ranged from 0.704 to 0.925 (Table 4).

Table 4

Cronbach's Alpha Coefficient of the AEAs' Instrument

Variables	Cronbach`s Alpha	Items
Importance of sources	0.889	11
Relationship	0.704	4
Characteristics of sources	0.898	14
Extent of use of Methods	0.905	13
Effectiveness	0.925	13
Participation	0.905	20

Source: Field survey, Lankoande (2011)

The Cronbach Alpha coefficients for the subscales in the interview schedule used for farmers ranged from 0.742 to 0.940 for different items tested (Table 5).

Table 5

Cronbach's Alpha Coefficient of the Farmers' Instrument

Variables	Cronbach's Alpha	Items
Personal Competencies	0.818	28
Frequency of use	0.776	12
Effectiveness	0.765	12
Professional Competencies	0.742	12
Competencies in Methods	0.940	90

Source: Field survey, Lankoande (2011)

Data Collection

The data for the study was collected between October 2010 and February 2011. The AEAs respondents were educated so they responded to the questions of the translated questionnaire. The data collection was carried out by the researcher himself accounting for the long period of data collection. Before data collection started, the researcher took advantage of AEAs monthly meeting to explain the importance of the study, the necessity of their contribution to the success of the study by filling the questionnaire and the recording of the answers. Follow-ups were made to ensure all the selected AEAs responded to the instrument. All the completed questionnaires were received from the AEAs with the help of the three provincial directors on the 27th February 2011.

The structured interview schedule was not translated into any other language since, the data was collected by the researcher himself. Farmers gave

the needed information orally and face-to-face. The instrument was administered to farmers in the comfort of farmers' homes after scheduled meetings. The direct contact with farmers during data collection provided opportunity to the researcher to explain more explicitly to avoid misunderstanding of certain questions. Also, the researcher may also evaluate the sincerity and insight of the subject (Best & Kahn, 1995). Moreover, not all the farmers could read and write. At the end, out of the sample of 180 farmers, 172 responded to the structured interview schedule, giving a response rate of 95.6% which is very high. Selected farmers who did not respond were unavailable or unsuccessfully reached.

Data Processing and Analysis

The completed questionnaire from AEAs were scrutinised for completeness and accuracy. This ensured data omissions and mistakes detected and corrected. A codebook was created to transform the data into numbers for computer analysis. The computer analysis was done using the Statistical Product and Service Solutions (SPSS) version 15 and Excel.

To describe selected demographic characteristics of farmers and agricultural extension agents, such as age, sex, rank, working experiences, family background, area of specialisation and academic achievements, frequencies, percentages and cumulated percentages were computed (Objectives 1 and 2).

Descriptive statistics such as means and standard deviation were computed to determine the sources of information used by farmers and AEAs (Objective 3).

To Examine farmers' perceived competencies of agricultural extension agents in the use of communications methods means and standard deviation were also generated (Objective 4).

Furthermore, descriptive statistics such as means and standard deviation were computed to examine principles associated with the use of extension communication methods (Objective 5).

Descriptives such as frequencies, percentages means and standard deviation were also computed to examine the perceived effectiveness of communications methods used in extension delivery (Objective 6)

One way Analysis of Variances (ANOVA) was used to test the significant differences in the variables and among groups in objectives 7 and 8. Scheffé Post Hoc Analysis Test was also used to explore the data and to evaluate the interesting differences that exist within the groups. An alpha level of 5% for significance was set *a priori*. Scheffé test was used because it uses a tremendously cautious technique to reduce the Type 1 error and has the distinction of being one of the safest of all the post hoc tests. This derives from the fact that the critical value of F-ratio is the same as used for the overall ANOVA. Therefore, Scheffé test requires that every post-test satisfies the same criteria used for the complete analysis of variances (Dawson, 2007; Gravetter & Wallnau, 1991).

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

The results of the study are presented and discussed in this chapter according to the objectives of the study.

Demographic Characteristics of Agricultural Extension Agents

The section deals with the findings of the study with regard to the demographic characteristics of the Agricultural Extension Agents on duty in the Houet Province of Bobo-Dioulasso. These include age, sex, professional rank, work experience, farming experiences, family background, domain of specialization and academic achievements.

Age of AEAs

Age distribution of agricultural extension agents is presented in Table 6. The ages ranged from 25 to 57 years with a mean age of 41.5 years. The standard deviation is 10.2 revealing a large variation in ages of AEAs. Slightly more than half of the AEAs (53.2%) were up to 40 years. The results were consistent with a study by Al-Subaiee *et al.* (2005). This relative youthfulness of the respondents results a greater need for training and experience as supported in a study by Sabihi (1978). The respondents of this age range still had the

possibility of going back to training centres for further courses. The results also show that 17.2% of the respondents were between 41 and 50 years indicating the proportion of AEAs in mid-career. About a third (29.9%) were over 50 years revealing a range of AEAs with long experiences but need replacement because almost ready to go on retirement.

Table 6

Age Distribution of Agricultural Extension Agents

Age (years)	Frequency	Percent	Cumulative %
Up to 30	12	18.7	18.7
31 - 40	22	34.4	53.1
41 - 50	11	17.2	70.3
Above 50	19	29.7	100.0
Total	**64**	**100.0**	

Range: 25 - 57 years Mean age = 41.5 years and SD = 10.2

Source: Field survey, Lankoande (2011)

Sex Distribution of AEAs

Most of the AEAs (77%) were males. (Figure 4). Even though the female proportion was seen to be low, it was considered high compared to the results of a study by Dankwa (2004) that showed only 10% of female proportion in extension work in cocoa production. The low proportion of female agricultural extension staff could be attributed in part to the general national female literacy level and also to the low level of the enrolment of women in agriculture as a career (MAHRH, 2010) and also the sample composition in the study area.

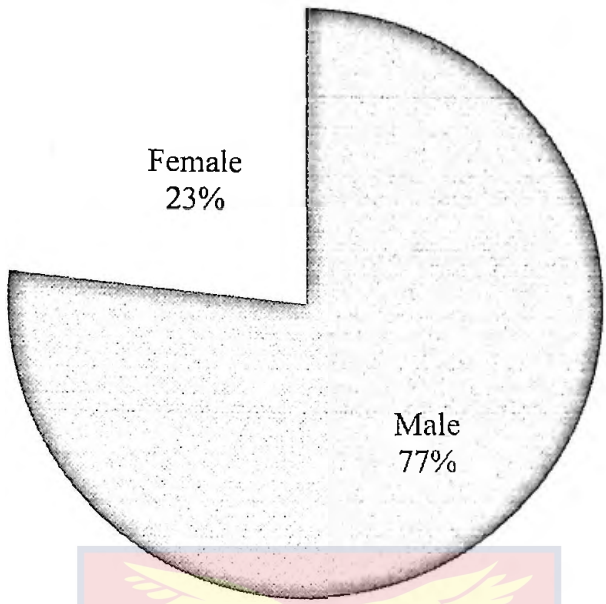


Figure 4: Sex Distribution of Agricultural Extension Agents

Source: Field survey, Lankoande (2011)

Working and Farming Experiences of AEAs

The AEAs working experiences ranged from 1 to 37 years with a mean year of 16.7 years and a mode of 6 years. From Table 7, 57.8% of AEAs respondents had worked from 10 to 40 years while 42.2% had been working for 10 years and below. The Working experiences can tremendously contribute to the effectiveness of AEAs in the field only if necessary and adequate logistics and incentives are made available. In addition, with their experiences, AEAs are more likely to break new ground in the performance of their duties. The finding is consistent with a study by Perlmutter and Hall (1992) that stated that workers with many years of job experience are more plausible to break new grounds in the performance than workers with just a few years of working experience

Table 7

Job Experience of Agricultural Extension Agents

Years	Frequency	Percent	Cumulative %
0 - 10	27	42.2	42.2
11- 20	8	12.5	54.7
21 - 30	17	26.6	81.3
31 - 40	12	18.7	100.0
Total	**64**	**100.0**	

Range: 1 - 37 years Mean = 16.7 years Mode = 6 SD =12.2

Source: Field survey, Lankoande (2011)

As shown in Figure 5, majority (69%) of the respondents have had farming experiences while 31% did not. This finding implies that the majority of AEAs can use their experience in farming to enrich their professional work as skilled agricultural officers.

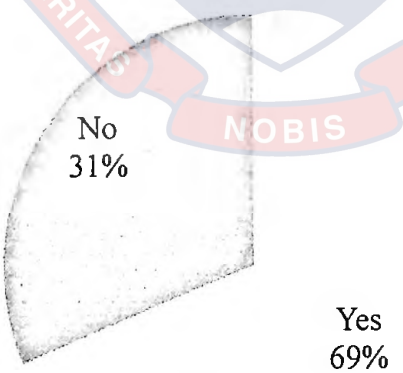


Figure 5: AEAs Experience in Farming

Source: Field survey, Lankoande (2011)

Rank of AEAs

Table 8 shows professional position of the AEAs. The majority of the AEAs (87.5%) were within the rank of Superior Technician. This important proportion was not motivated, worked under conditions with less possibility being involved in decision-making which is likely to negatively influence the extension services delivery. Again, due to the poor working conditions with low salary, these agents would be doing any other work for more income. They will even be working hard for the examinations conducted every year to go back to school for better position.

Table 8

Distribution of the Rank of AEAs

Professional rank	Frequency	Percent	Cumulative %
Technician	25	39.1	39.1
Superior Technician	31	48.4	87.5
Superior Specialised Technician	7	10.9	98.4
Other	1	1.6	100.0
Total	**64**	**100.0**	

Source: Field survey, Lankoande (2011)

Educational Status of AEAs

Table 9 presents the results on the educational levels of AEAs in the study area. The majority (87.5%) have attained either primary or middle school learning level of education. Only 4 of the 64 AEAs have Diploma or BSc as the highest level of education. The finding differs from a study by Al-Subaiee et al. (2005) that reported the majority (54%) of respondents have diploma as a highest degree in the study on the perceptions of extension agents about sustainable agriculture in the Riyadh Region of Saudi Arabia. The results imply the low educational level of the agents in service in the study area and this may lead to have negative impact on the extension delivery through ineffective communication as Byres and Byres (1977) argued that education enhances one's ability to receive, decode, and understand information, and the processing and the interpretation of that information are indispensable for performing many jobs. With respect to educational level, Cernea (1981) concluded that extension agents with a higher level of education have the ability to process information in a particular job.

Table 9

Highest Degree Earned by AEAs

Highest Degree earned by AEAs	Frequency	Percent	Cumulative %
CEP (Primary School Certificate)	10	15.7	15.7
BEPC (Middle School Leaving Cert.)	46	71.9	87.6
Baccalauréat (A levels)	4	6.3	93.6
DEUG (Diploma on High Education)	2	3.2	96.8
Licence (BSc.)	2	3.2	100
Total	**64**	**100**	

Source: Field survey, Lankoande (2011)

Farming Background of the AEAs' Family

The results in Table 10 present the family farming background of the AEAs. The majority (79.7%) of the AEAs were from farming families while 20.3% were not. Figure 6 shows that 71.4% of the AEAs were born in rural communities while 28.6% were from urban areas.

Table 10

AEAs' Farming Background

Farming background	Frequency	Percent
Farming	51	79.7
No farming	13	20.3
Total	**64**	**100.0**

Source: Field survey, Lankoande (2011)

The advantage of AEAs coming from farming background and being trained in modern agricultural practices can ensure that farmers understand the farming very well. This is in line with a study by Benor *et al.* (1984) that pointed out that extension workers having farming background and preferably with some experience in extension can perform better job.

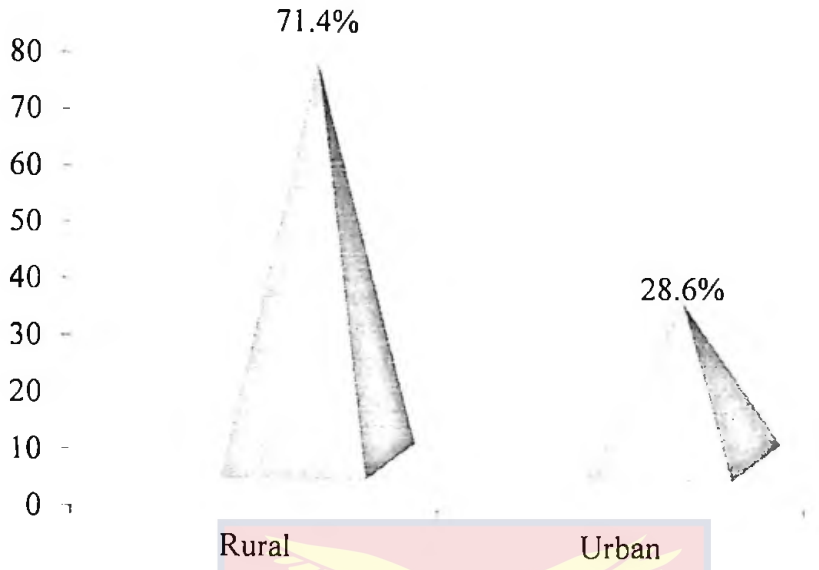


Figure 6: Urban and Rural Background of AEAs

Source: Field survey, Lankoande (2011)

Aspiration of AEAs during Schooling

Agricultural extension agents were asked to respond to whether during their student life they had ever aspired to become agricultural officers. Data given in Figure 7 show that the majority (66%) of AEAs had during their student life, aspired to be agriculture officers in the future. The finding indicates that majority of AEAs got their job based on their aspirations. The remaining 34% of the respondents said that during their student life they did not aspire to work as agriculture officers which means that their current occupation is not their preferred choice. This has implications for the level of motivation and dedication to the job by these agents.

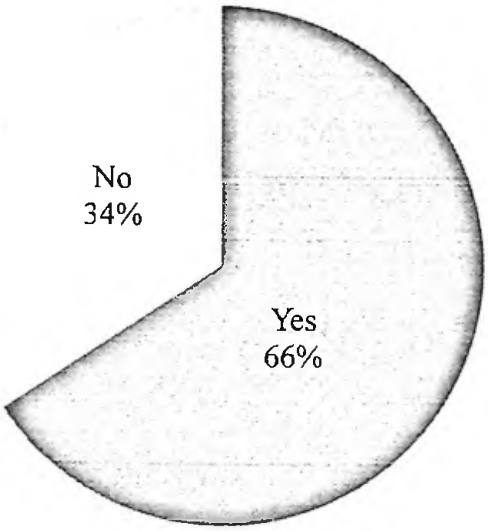


Figure 7: Aspiration of AEAs during Schooling

Source: Field survey, Lankoande (2011)

Area of Specialisation of AEAs

The data presented in Table 11 show that only 37.50% had general agriculture as a professional domain, 21.88% had animal husbandry speciality while 40.62% had forestry and environmental backgrounds. A similar study conducted by Celis (1971) conducted on Mexican extension workers showed that 31% of them were specialists in general agriculture, 27.4% in plant production and protection, 17.7% in agricultural engineering while only 10.5% were agricultural extension specialists. The findings showed further that AEAs were essentially agents with a general level of knowledge to perform their duties as extension workers. They were specially skilled in general agriculture, animal husbandry and forestry and environment but with little experience in extension acquired from short training seminars and refresher courses sponsored by private agencies, NGOs and other development partners.

Table 11

Area of Specialisation

Domain of specialisation	Frequency	Percentage	Cumulative Percentage
Crop production	24	37.5	37,5
Animal husbandry	14	21.9	59.4
Forestry and environment	26	40.6	100.0
Total	**64**	**100.0**	

Source: Field survey, Lankoande (2011)

The AEAs can be said to have come from multidisciplinary areas in the study area. The findings disagreed with a study on the efficiency and effectiveness of agricultural extension services in Indonesia by Drysdale and Shute (1989) which stated that the extension agents were inadequately trained to carry out their job, particularly in the area of estate crops, fisheries, and animal husbandry. Benor *et al.* (1984) supported that for effective performance in agricultural extension programme delivery, AEAs should be well empowered through knowledge and experiences with agricultural background obtained through formal trainings and not just through short seminars and refresher courses but also with satisfactory experience in domains of extension activities.

Training and Refresher Courses

Figure 8 presents results on training and refresher courses received by extension agents. Majority (69%) had received training and/or refresher courses all along their professional careers. The remaining 31% did not receive any training on refresher course.

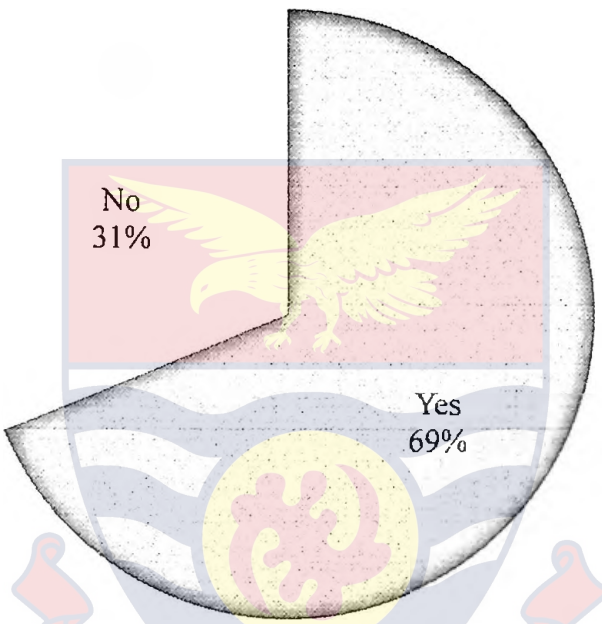


Figure 8: Training or Refresher Course Attended

Source: Field survey, Lankoande (2011)

Results presented in Table 12 indicate that extension agents perceived a need for training. Extension agents indicated that they perceive a need for training to update their technical and professional knowledge to deal with ever-changing challenges experienced by famers. Furthermore, they expressed the need for use of information communication methods and the ability to choose information sources in extension. According to Sabihi (1978), a great perceived need of training can tremendously and positively contribute to acquisition of

competencies to enhance the work of an institution. Hurley (2000) argued that people seek training when a skill is required to improve work. However a clear incentive should be provided if new skill is to be utilized.

Table 12

Perceived Training or Refresher Courses need

Need for training	Frequency	Percentage
Yes	64	100
No	0	0
Total	**64**	**100.0**

Source: Field survey, Lankoande (2011)

Demographic Characteristics of Farmers

Selected demographic characteristics of the farmers such as age, sex, level of education, farming experiences type of land tenancy, social and marital status, and ethnical background are described in this section.

Age of Farmers

Age distribution of the farmers is presented in Table 13. The farmers were aged between 22 and 85 years with a mean age of 49 years. This is consistent with the findings of Quispe (1997) in the study of farmers towards privatization of agricultural extension in Veracruz. Slightly above half (51.5%) of farmers had up to 50 years of age. The remaining 48.5% of the farmers were aged above 50 years indicating aged or ageing farmers. Khan (1991) reported that the age factor is very important as it influences the behaviour and experience of individuals. Therefore with the increase in age it is expected that farmers will become mature to make rational decisions.

Table 13

Age Distribution of Farmers

Years	Frequency	Percent	Cumulative Percent
Up to 30	7	7.1	7.1
31 - 40	19	19.2	26.3
41 - 50	25	25.3	51.6
51 - 60	34	34.3	85.9
Above 60	14	14.1	100.0
Total	**99**	**100.0**	

Mean=49 years SD=11.8

Source: Field survey, Lankoande (2011)

Sex Distribution of Farmers

Almost all the farmers interviewed (96%) were males (Figure 9). This is not surprising since males were heads of rural families in the study area. The few of females (4%) were female who were in charge family farming activities. This is consistent with the study by Okwu and Daudu (2011) on extension communication channels' usage and preference by farmers in Benue State of Nigeria. According to Palmer (1985) and Olawoye (1993), the large proportion of male farmers in a population can be attributed to the fact that men have more access and control over production resources, decision-making and extension services.

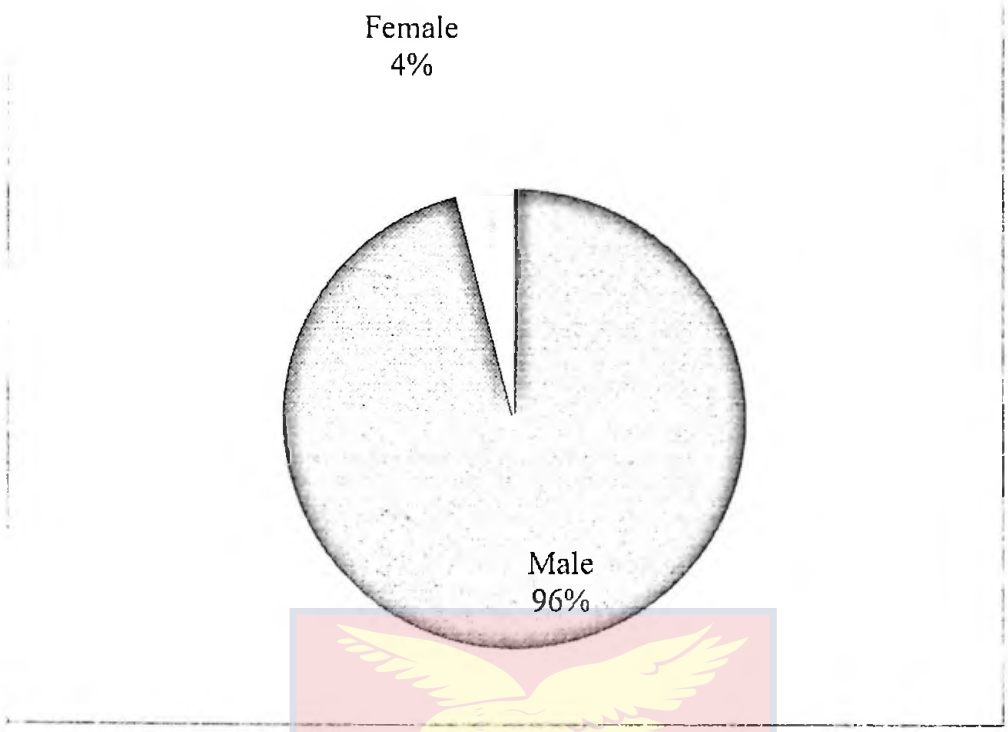


Figure 9: Sex Distribution of Farmers

Source: Field survey, Lankoande (2011)

Level of Education of Farmers

Education is vital for development and is considered as an important factor in the adoption process because the extension agent's communication becomes easier with a person who is educated than one who is not educated. Table 14 presents data on level of education of farmers. The results show that the majority (69.70%) of the farmers have had no formal education and 26.30% were up to primary school level. Only few (4%) attended secondary school. The low educational level of farmers can limit their access to various sources of communication from which relevant and current agricultural information can be acquired. Various educational materials are printed on papers which is supposed to increase knowledge and wisdom (Misra, 1997). Khan (1991) also supported that education has a significant effect on the adoption of improved farm practices by the farmers. The level of education influences farmers' level of

participation in agricultural programmes. Sukaryo (1983) concluded that better educated farmers can exploit wider range of information sources and raise their level of participation in agricultural programmes and adoption of technologies.

Table 1

Highest Level of Education of Farmers

Level of education	Frequency	Percent
No formal Education	69	69.7
Primary	26	26.3
Secondary	4	4.0
Total	**99**	**100.0**

Source: Field survey, Lankoande (2011)

Farming Experiences

Table 15 presents the farming experience in terms of number of years of farming of farmers. Farmers had been farming between 7 and 59 years with a mean of 32.7 years of experience of farming. The majority of the respondents (67.7%) had been in farming between 10 and 40 years and 29.3% had more than 40 years of experience in farming. Only 3 percent of the farmers interviewed had less than 10 years of farming experience.

The results revealed that most of the farmers have a higher farming experience. According to Dankwa (2004), experienced farmers often adopt recommended extension practices to improve productivity and livelihood. Therefore it is likely that farmers in the study area will adopt the technologies since they are experienced.

Kumi (2004) and Lewis (1998) reported that AEAs often have difficulties in convincing and persuading very experienced farmers who have full self-confidence to adopt innovations. Ani (1998) also found that farming experience of farmers, to a large extent, affects their managerial skills know-how and decision making.

Table 1

Farming Experience of Farmers

Years of experience	Frequency	Percent	Cumulative Percent
1 - 10	3	3.0	3.0
11 - 20	14	14.2	17.2
21 - 30	31	31.3	48.5
30 - 40	22	22.2	70.7
More than 40	29	29.3	100.0
Total	**99**	**100.0**	

Source: Field survey, Lankoande (2011)

Marital Status of Farmers

Results presented in Table 16 show that three of the four females were widowed while only 2 out of the 92 male were in the same status. Most of the farmers interviewed (92 out of 99) in the study area were married. Marriage serves as a means of generating family labour and since women and children are able to participate in crop production, processing and marketing, farming practices and use of technologies are related to marital status.

Table 16

Marital Status by sex of Farmers

Sex	Marital status			Total
	Married	Single	Widow/er	
Male	91	2	2	95
Female	1	0	3	4
Total	**92**	**2**	**5**	**99**

Source: Field survey, Lankoande (2011)

Tenancy Status of Farmers

Results presented in Table 17 shows that 45.5% of farmer respondents were landowners. Farmers normally owned land through inheritance or purchasing. More than half (53.5%) were owners and tenants. Tenancy of land plays an important role in adoption of technologies process. For Badar (2006), the owner farmers who are independent in making decisions may adopt latest technologies more easily or readily than the tenants who are not sure about their tenancy status. Also, the long-term security of land is crucial to agricultural growth (Mensah, 2006).

Table 17:

Land Tenancy of Farmers

Tenancy status	Frequency	Percent	Cumulative Percent
Owner	45	45.5	45.5
Tenant	1	1.0	46.5
Both Owner and tenant	53	53.5	100.0
Total	**99**	**100.0**	

Source: Field survey, Lankoande (2011)

Ethnic Group and Social Status

The social status and ethnic background of farmers are presented in Table 18. The findings revealed that majority (78.8%) of the farmers were migrants while only 21.2% were natives. Among the migrant farmers the Mossi was in the majority (63.6%), followed by the other minority tribes such as Peulh, Samo and Dafing (11.1%) and Bobo (4.0%). The high proportion of migrant farmers were attracted due to fertility of the land in the study.

Table 18

Ethnicity and Origin of Farmers

Ethnicity	Social status					
	Native		Migrant		Total	
	Number	%	Number	%	Number	%
Mossi	0	0.0	63	63.7	63	63.7
Bobo	18	18.2	4	4.0	22	22.2
Others	3	3.0	11	11.1	14	14.1
Total	**21**	**21.2**	**78**	**78.8**	**99**	**100.0**

Source: Field survey, Lankoande (2011)

Sources of Agricultural Extension Information

This section discusses the findings of the study on source of agricultural extension information.

Perceived importance of Information Sources used by AEAs

The information sources for agricultural extension delivery is changing. These information sources provide more options for agricultural extension agents to obtain highly relevant information to perform extension service delivery. The study objective four sought to identify the information sources used by both AEAs and farmers. The results in Table 19 show that AEAs generally perceived the various sources to be very important in acquiring the needed agricultural information for extension work (mean=4.0; SD=0.1). The AEAs perceived sources of information from Farm field trip to foreign journals according to their importance to them with the means ranging from 4.8 to 3.32. Specifically, the field trip was perceived to be an extremely important source of agricultural information for AEAs (mean=4.8; SD=0.6). Similar findings were stated by Badar (2006).

Furthermore, AEAs perceived courses and seminars (mean=4.3; SD=0.9), colleagues (mean=4.1; SD=0.9), scientists (mean=4.0; SD=1.1), specialists book (mean = 4.0; SD=1.0), superiors (mean = 4.0; SD = 1.1), domestics journals (mean=4.0; SD=1.1), extension authority (mean=4.0; SD=1.0), extension journals (mean=3.6; SD=1.0) and chambers of agriculture (mean=3.6; SD=1.1) to be very important information sources. Foreign journals were only perceived to be important as information source (mean=3.3; SD=1.1). This is consistent to Dulle (2000) investigating information seeking patterns of extension workers in Tanzania. That study found that the main information

sources are personal, attendance at professionnal meetings, courses and conferences, and reading newspapers.

Mundy (1992) supported that the importance of the sources of information used by AEAs depends on the familiarity to the source, the relevance of the contents conveyed by the source and more importantly again, by the accessibility of the source (Mundy, 1992).

Table 19

Importance of Information Sources used by AEAs

Source of information	Number of responses	Mean	SD
Field trip	64	4.8	0.6
Courses and seminars	62	4.3	0.9
Colleague	60	4.1	0.9
Scientists	59	4.0	1.1
Specialist books	62	4.0	1.0
Superiors	57	4.0	1.1
Domestic journals	62	4.0	1.1
Extension authority	60	4.0	1.0
Extension journals	61	3.6	1.0
Chambers of agriculture	61	3.6	1.1
Foreign journals	62	3.3	1.1
Composite	**61**	**4.0**	**1.0**

N = 64. Some respondents did not entirely respond to the question

Means and standard deviation were calculated from a scale of 1=Very lowly important, 2=Fairly important, 3=Important, 4=Very important, 5=Extremely important.

Source: Field survey, Lankoande (2011)

Sources of Agricultural Extension Information used by Farmers

The information sources are used by farmers to gather the needed agricultural information which have a significant influence on the adoption of innovations by farmers (Asiabaka & Owens, 2002; Bel-Molokwu, 1997). The results displayed in Figure 10 showed the importance of information source perceived by farmers. Fellow famers was perceived as the very important information source and the most frequently used with a mean value of 4.2. The findings were in agreement with the results reported by Asiabaka and Owens (2002) and Bel-Molokwu (1997) who found that the farmers ranked fellow farmers and friends as the very important source of information. A study by Dankwa (2004) also indicated that most of farmers' respondents (84%) rated farm visit as the most effective extension education method followed by group discussions, method and result demontrations, the radio method being the least one.

Whilst farmers moderately perceived AEAs as a source of information to be important (mean=2.9), they lowly perceived private agricultural agencies to be important (mean=2.2). This is not surprising as AEAs are more accessible than private agricultural agencies in the study area. Other information sources such as radio (mean=2.1), television (mean=1.6) were perceived by farmers to be moderately important. The printed materials (mean=1.3) was perceived to be very lowly important. This could be attributed to the high level of illiteracy of the farmers in the study area. The Radio and Television were not used by farmers while seeking extension information. Few radio broadcasts were dealing with extension issues, while television programmes on extension did exist.

The findings imply that fellow farmers were the very important extension information source. The findings are in line with that of Ofuoku, Emah and Itedjere (2008) that fish farmers consider farmer groups, other farmers and NGOs to be very important and major sources of information for their activities.

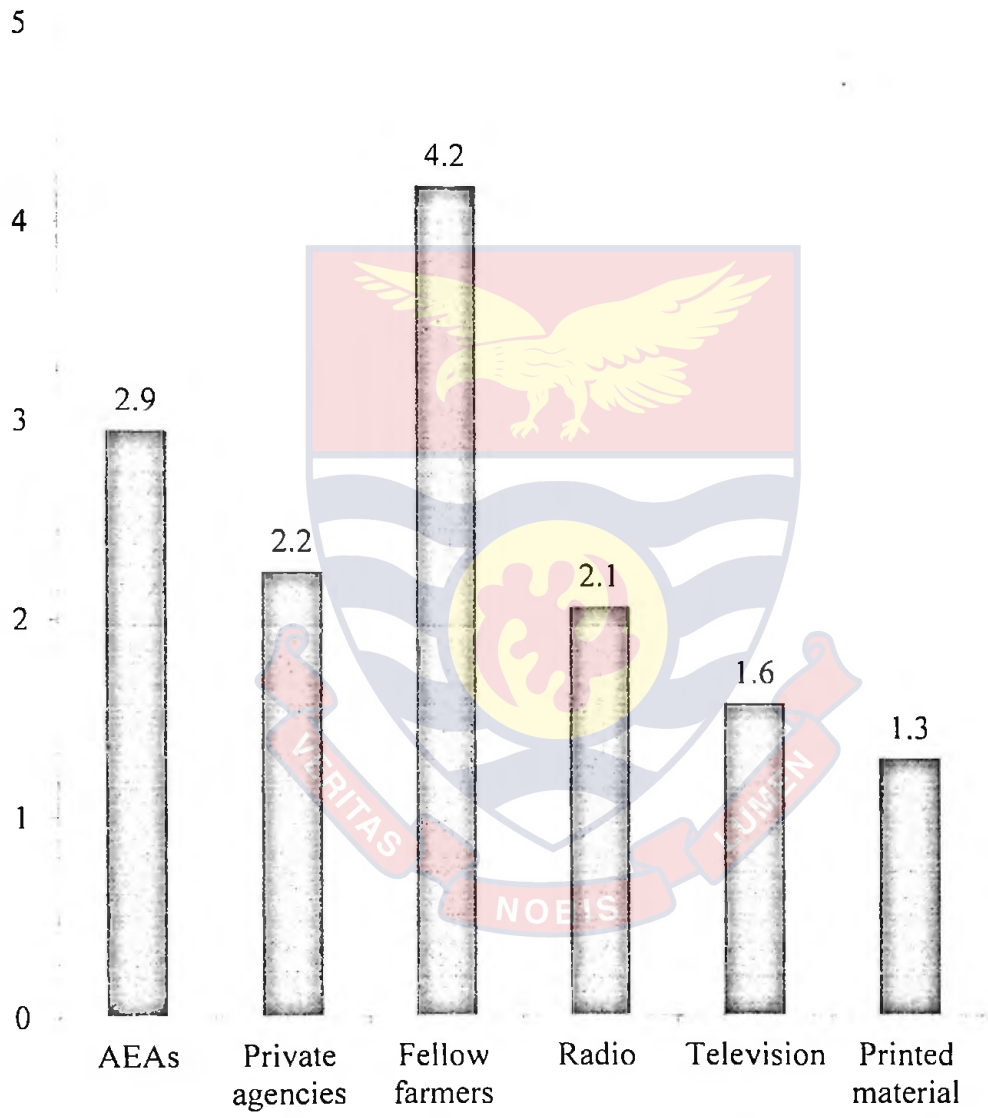


Figure 10: Farmers' Extension Information Sources

Means and standard deviation were calculated from a scale of 1=Very lowly important, 2=Fairly important, 3=Important, 4=Very important, 5=Extremely important.

Source: Field survey, Lankoande (2011)

Perceived Competencies of Agricultural Extension Agents

This section discusses results on perception of farmers on the competencies of agricultural extension agents in the use of communication methods for extension delivery.

Farmers' Perception of AEAs' General Human Relation Competencies

Human relations are key to effective communication. The human relation competencies of agricultural extension agents have effect on the dissemination of agricultural extension information. Therefore, farmers were asked to rate the general human qualities of agricultural extension agents such as credibility, trustworthiness, honesty, flexibility, sociability, adaptability and comprehensiveness competencies. The results were presented in Table 20. The human relations competencies of AEAs were perceived by farmers to be satisfactory (mean=3.2 SD=0.7). Farmers perceived AEAs to be good in credibility (mean=3.7; SD=0.7) and sociability (mean=3.6; SD=0.8). They also perceived AEAs to be satisfactory in comprehension (mean=3.4; SD=0.7), honesty (mean=3.3; SD=0.8), intelligence (mean=3.2; SD=0.6), trustworthy (mean=3.2; SD=0.8), flexible (mean=3.1; SD=0.8), dedicated (mean=3.1; SD=0.6), ambitious (mean=3.1; SD=0.5) and self-confidence (mean=3.0; SD=0.7). These results are similar to those by Ali (1991) who found that agricultural field staff possessed from low to an average level of competence in most of the competencies, whereas, all competencies were perceived as highly important for their job performance.

Table 20

Views of Farmers on Human Relation competencies of AEAs

Competencies	Mean	SD
Credible	3.7	0.7
Sociable	3.6	0.8
Comprehensive	3.4	0.7
Honest	3.3	0.8
Intelligent	3.2	0.6
Trustworthy	3.2	0.8
Flexible	3.1	0.8
Dedicated	3.1	0.6
Ambitious	3.1	0.5
Self confidence	3.0	0.7
Adaptability	2.9	0.7
Composite	**3.20**	**0.70**

Mean were calculated from a scale of 1=Poor, 2=Fair, 3=Satisfactory, 4=Good, 5=Excellent.

Source: Field survey, Lankoande (2011)

Perception of Farmers on Communication Methods Competencies of AEAs

The extension communications methods are very important in the dissemination of agricultural extension information. The key issue is about the competencies and the abilities of AEAs to appropriately use the communication methods in extension delivery. The results were presented in Table 21. Farmers perceived that AEAs' competency was good in the use of Farm and Home visit (mean=4.1; SD=0.7) and Method demonstrations (mean=4.0; SD=0.8). Farmers also perceived competency level of AEAs to be satisfactory in Result demonstrations (mean=3.4; SD=0.8), Discussion meetings (mean=3.0;

SD=0.7), Exhibitions (mean=3.0; SD=0.8). Furthermore, AEAs were perceived by farmers to be fairly competent in the use of communication methods such as campaigns (mean=2.6; SD=0.8), radio (mean=2.2; SD=0.7), lecture meetings (mean=2.1; SD=0.7) and television (mean=2.0; SD=0.8). The lowest perceived competencies of AEAs in communication methods used were in Signboards/slogan (mean=1.8; SD=0.7) and ICT (mean=1.6; SD=0.7).

A study by Muhammad *et al.* (1995) on competence of extension field staff in using various communication methods for effective extension work in Faisalabad, Pakistan stated that the field worker respondents had very little knowledge about basic essentials of almost all the similar communication methods.

Table 21

Farmers' views on Communication Methods Competencies of AEAs

Extension Communication Methods	Mean	SD
Farm and home visit	4.1	0.7
Methods demonstration	4.0	0.8
Results demonstration	3.4	0.8
Discussions meetings	3.0	0.7
Exhibitions	3.0	0.8
Campaigns	2.6	0.8
Radio	2.2	0.7
Lecture meetings	2.1	0.7
Television	2.0	0.8
Signboards/slogan	1.8	0.7
ICT	1.6	0.7
Composite	**2.7**	**0.8**

Mean were calculated from a scale of 1=Poor, 2=Fair, 3=Satisfactory, 4=Good, 5=Excellent.

Source: Field survey, Lankoande (2011)

Perception of Farmers on Professional Attitudes of AEAs

The results on perception of farmers on the professional attitudes of EAs were presented in Table 22. The overall professional attitudes were perceived by farmers to be satisfactory (Mean=3.3; SD=0.7). A similar question viewed by Owusu, Zinnah and Frempong (2000) who conducted a study to determine the present levels of professional competencies of extension agent in the Central and Northern regions of Ghana as perceived by themselves and their supervisors. The results of this study showed that extension agents generally possessed medium level of competency in nine competency areas. Specifically, Famers perceived the general professional competencies of AEAs in terms of personality (Mean=3.6; SD=0.5), attitudes to farmers (Mean=3.6; SD=0.7) and knowledge about the topic (Mean=3.5; SD=0.9) to be good.

They also perceived AEAs to be satisfactory in decision making (mean=3.2; SD=0.7), self-confidence (mean=3.2; SD=0.6), leadership (mean=3.1; SD=0.7), communications skills (mean=3.0; SD=0.6) and dutifulness (mean=3.0; SD=0.7). The findings were in line with Patterson (1991) who, describing the characteristics of tomorrow's extension agents, believes that extension agents of future will be prepared to manage change with a combination of knowledge, attitudes and skills that come together under three themes that are an autonomous learner, an effective communicator and a systemicist for effective communication with farmers.

Nevertheless, the result is not consistent with Badar (2006) who reporting on the same issues stated that the agricultural extension staff were in contrary, poor in most of the professional attitudes. He therefore concluded AEAs needed to give special attention towards the qualities such as

communication skills, self-confidence, attitude towards farmers, dutifulness, leadership and decision making.

Table 22

Farmers' Perception of AEAs' Professional Attitude

Professional attitudes	Mean	SD
Personality	3.6	0.5
Attitude towards farmers	3.6	0.7
Knowledge level	3.5	0.9
Decision making attitude	3.2	0.7
Self confidence	3.2	0.6
Leadership qualities	3.1	0.7
Communication skills	3.0	0.6
Dutifulness	3.0	0.7
Composite	**3.3**	**0.7**

Mean were calculated from a scale of 1=Poor, 2=Fair, 3=Satisfactory, 4=Good and 5=Excellent. Source: Field survey, Lankoande (2011)

Farmers' Perception on Characteristics of Messages Conveyed by AEAs

Message is very important in the communication process. The characteristics of message are key to mutual understanding of message. Ayaz (1994) affirmed that the message being the information that is to be sent from sender to receiver must be accessible to the sender. Results presented in Table 23 depict perception of farmers on certain characteristics including relevance, comprehensiveness, appropriateness and meaningfulness of the messages sent by AEAs. The farmers seem to be satisfied with the messages conveyed by AEAs and found the characteristics to be moderately high (mean=3.3; SD=1.0).

Farmers highly perceived the message sent by AEAs to be problem solving oriented (mean=3.8; SD=1.0), involved use of local language (mean=3.6; SD=1.0) and comprehensive (mean=3.5; SD=0.8).

The findings was not in line with the commonly called information theory which concentrated on information quantities in messages and how to encode messages most efficiently in linking a source to a destination (Shannon & Weaver, 1949). Furthermore the results failed to confirm Leeuwis (2004) in his theory of development who perceived human communication as the process through which people exchange meanings for mutual understanding by the use of various devices used such as words and language, pictures, drawings, music during communication process for effective presentation of the message to the audience. The findings reveals that AEAs needed to pay more attention to the characteristics of messages conveyed in order to better contribute to the effectiveness of the communication process. According to Castello and Braun (2006), this calls for training to enhance the pedagogical and communication skills of AEAs so that they may have a more effective dialogue with their audience.

Table 23

Aspects of Message Conveyed by AEAs

Characteristics	Mean	SD
Problem solving oriented	3.8	1.0
Use of local language	3.6	1.0
Comprehensive	3.5	0.8
Attractive	3.4	1.1
Relevant	3.3	0.9
Simple	3.3	1.0
Correct	3.3	0.9
Applicable	3.3	0.9
Concise	3.2	1.1
Specificity	3.2	0.9
Logical	3.2	1.0
Complete	3.2	0.95
Timeliness	3.1	0.9
Meaningful	3.1	0.9
Composite	**3.3**	**1.0**

Means and standard deviation were calculated from a scale of 5=Very high, 4=high, 3=Moderate, 2=Low, 1=Very low.

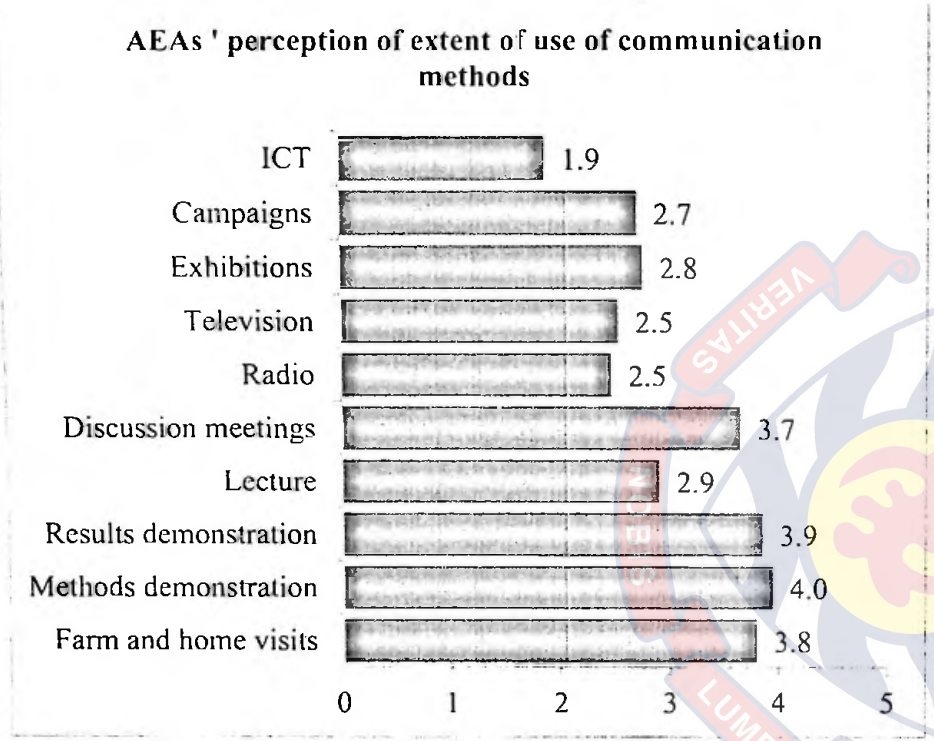
Source: Field survey, Lankoande (2011)

Extent of Use of Communication Methods

The results on Figure 11 show that both AEAs and farmers perception on the use of various communications methods were similar. However while AEAs rated themselves to have highly used the communication method, farmers rated extent of use of some to be a little lower. The farm and home visits is the very highly frequently used extension communication methods in the study area as perceived by both farmers (mean=4.2) and AEAs (mean=3.8). Also, farmers and AEAs perceived the use of method demonstrations to be very frequent (farmers mean=4.0, AEAs mean=3.8). Whilst farmers perceived the use of result demonstrations to be very frequent (mean=3.9) AEAs felt they have used it moderately frequent (mean=3.1). Pertaining to the use of discussion meetings as communication methods, farmers perceived them to have been used very frequently (mean=3.7) while AEAs perceived their use to have be moderately frequent (mean=3.2). Furthermore, the extent of the use of exhibitions was perceived by both farmers and AEAs to be moderately frequent (farmers mean=2.8; AEAs mean=2.7).

This is followed by the use of lecture (farmers mean=2.9, AEAs mean=2.0), campaigns (farmers mean=2.7, AEAs mean=2.3), radio (farmers mean=2.5, AEAs mean=1.7) and television (farmers mean=2.5, AEAs mean=1.6) that was perceived by farmers to be moderately used while AEAs felt them to be lowly frequently used. On the other hand the ICT is the lowly frequently used extension communication method in the study area as perceived by both farmers (mean=1.9) and AEAs (mean=1.5).

The findings revealed that farm and home visits, method demonstrations, result demonstrations and discussions meeting were the highly frequently used extension communication methods in the study area. This is in line with Badar (2006) and Malik et al. (1991) who argued that direct contact communication methods were the most used ones in Pakistan.



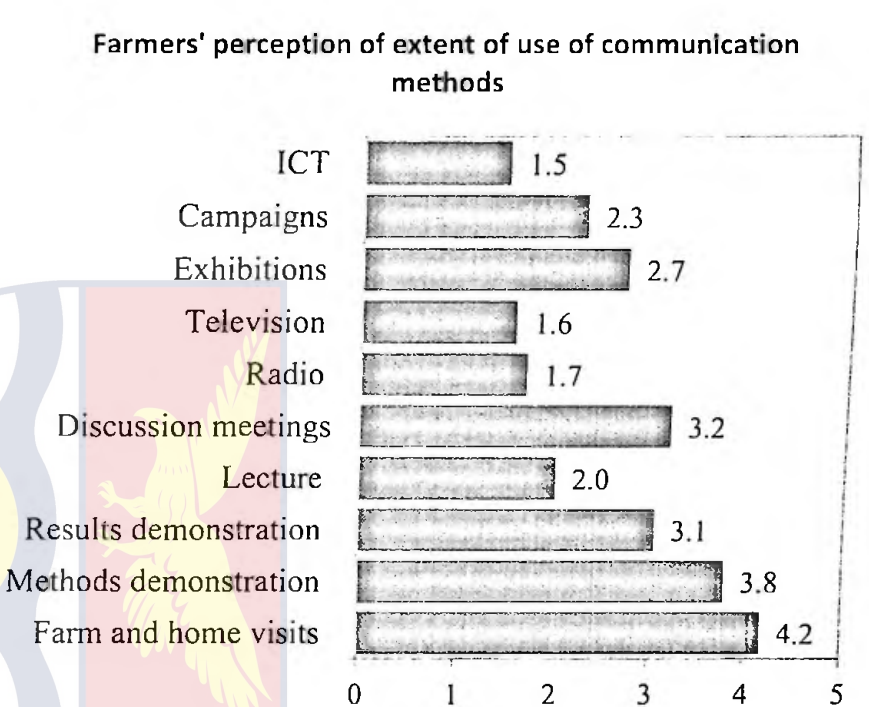


Figure 11: Perception of farmers and AEAs on Extent of use of Communications Methods

Mean were calculated from a scale of 1=Very lowly frequent, 2=Lowly frequent, 3=Moderately frequent, 4=Highly frequent, 5=Very highly frequent.

Source: Field survey, Lankoande (2011)

Observance of Principles Associated with use of Extension Communication Methods

The effectiveness of communication methods and media lie on their appropriate use. Hence, those aspects needed important and constant consideration by AEAs at the planning and implementation stages. This section presents views of the farmers on the factors affecting the use of selected communication methods by AEAs to perform extension activities.

Farm and Home Visits

Table 24 presents results with respect to basic principles of Farm and Home visits to be observed by Agricultural Extension Agents while using this method in dissemination of information and technologies. Farmers generally perceived the observation by AEAs of the basic principles of Farm and home visits in disseminating extension information and technologies to be moderate (mean=3.5; SD=.08). Specifically, factors such as choice of appropriate time (mean=4.1; SD=.08), involvement of farmers in planning (mean=4.0; SD=.06), choice of appropriate place (mean=3.9; SD=.08), planning with specific purpose (mean=3.8; SD=.07) and noting down problems of farmers (mean=3.6; SD=.07) were perceived to be highly observed by the extension agents. The remaining factors that include discussion on farmer problems, development of relationship, punctuality, recording of any farmer demand, recording of visit achievement, arrangement of needed materials, suggestion of relevant solutions, giving freedom to farmers in decision making, maintaining farmer's interest throughout the visit and following up the visit were perceived to be moderately observed by AEAs with means ranged from 3.5 to 2.8. Badar (2006) pointed

out that only follow up of farm and home visits was very lowly observed by Extension Field Staff in Pakistan.

Table 24

Perceived Level on Observation of Basic Principles of Farm and Home Visits

Basic principles of Farm and home visits	Mean	SD
Choice of appropriate time	4.1	0.8
Involvement of farmers in planning	4.0	0.6
Choice of appropriate place	3.9	0.8
Planned with specific purpose	3.8	0.7
Unsolved problems noted down	3.6	0.7
Farmers' problems discussed	3.5	0.8
Development of relationship	3.5	0.8
Punctually observed	3.5	0.8
Any demand recorded	3.4	0.9
Visit achievements recorded	3.3	0.8
Arrangement of needed materials/Equipment	3.3	0.8
Relevant solutions suggested	3.2	0.9
Farmers' interest maintained throughout	3.1	0.9
Freedom for farmers in decision taking	2.9	0.9
Visit properly followed up	2.8	0.9
Composite	**3.5**	**0.8**

Mean were calculated from a scale of 1=Very low, 2=Low, 3=Moderate, 4=High, 5=Very high.

Source: Field survey, Lankoande (2011)

Radio Broadcast

Table 25 depicts the results on farmers' perceived level of observance of basic principles in the use of Radio broadcast by AEAs as extension communication method to raise awareness of farmers in the study area. The relevance of radio broadcast to farmers' problems was perceived to be highly observed (mean=3.6; SD=0.7). Furthermore, farmers felt timeliness of broadcast principle (mean=3.1; SD=0.5) was perceived moderately observed. This failed to confirm Leeuwis (2004) who sustained that the time flexibility of many mass media can be high, meaning that the time of receiving can be adjusted to the preferences of audience. In addition, principles such as appropriateness of duration of time of broadcast (mean=3.0; SD=0.6), avoidance of unnecessary details (mean=3.0; SD=0.9) and comprehensiveness of information (mean=2.9; SD=0.6) were perceived to moderately observed by AEAs.

Table 25

Basic Principles of Radio Broadcast Observed by AEAs

Basic Principles of Radio Broadcast	Mean	SD
Relevance of broadcast to farmers' problems	3.6	0.7
Timeliness of broadcasting	3.1	0.5
Appropriateness of duration of time of broadcast	3.0	0.6
Avoidance of unnecessary details	3.0	0.9
Comprehensiveness of information	2.9	0.6

Mean were calculated from a scale of 1=Very low, 2=Low, 3=Moderate, 4=High, 5=Very high.

Source: Field survey, Lankoande (2011)

Television

Table 26 presents the results on the perceived level of observance of the basic principles while using telecast to reach farmers. Farmers generally perceived them to be moderately observed (mean=3.0; SD=0.8) by AEAs in the study area as television broadcast is used to reach farmers. The items including relevance of telecast to audience problems (mean=3.4; SD=1.0), appropriateness of duration of time of telecast (mean=3.2; SD=0.9), explanation of visuals (mean=3.1; SD=0.9), avoidance of unnecessary details (mean=3.0; SD=0.8), comprehensiveness of information(mean=2.9; SD=0.9) and clarity of visuals(mean=2.9; SD=0.9) were perceived to be moderately respected by the agricultural extension agents in the study area. The latest was timeliness of telecast (mean=2.7; SD=1.0) also perceived to be moderately observed.

Table 26

Perceived level on Observance Basic Principle of Television

	Mean	SD
Relevance of telecast to audience problems	3.4	1.0
Appropriateness of duration of time of telecast	3.2	0.9
Explanation of visuals	3.1	0.9
Avoidance of unnecessary details	3.0	0.8
Comprehensiveness of information	2.9	0.9
Clarity of visuals	2.9	0.9
Timeliness of Telecast	2.7	1.0
Composite	**3.0**	**0.8**

Mean were calculated from a scale of 1=Very low, 2=Low, 3=Moderate, 4=High, 5=Very high.

Source: Field survey, Lankoande (2011)

Methods Demonstration

The results in Table 27 reveal that AEAs have highly observed the basic principles while using method Demonstrations as a communication tool in extension activities in the study area (mean=3.6; SD=0.7). The findings of the study imply that AEAs were using this tool appropriately. Farmers perceived differently the level of observation on individual basic principles. Accordingly, timeliness of demonstration (mean=4.1; SD=0.8), appropriateness of place for demonstration (mean=4.1; SD=0.8), clarity of words (mean=3.9; SD=0.7), opportunity given for farmers to practice (mean=3.7; SD=0.9=, Logical sequencing of presentation (mean=3.6; SD=0.5) were highly perceived to be observed by AEAs. This implies farmers understand the insights of the message conveyed in the methods. They also take advantages of opportunity given to master their practices. Furthermore, principles such as Arrangement of needed materials/equipment, introductive presentation of activities, ending with summary on demonstration, distribution of supplementing materials were perceived to be moderately observed by AEAs while implementing method demonstration activities with means ranging from 3.4 to 2.6. The findings failed to agree with a study by Muhammad *et al.* (1995) which stated that the field staff had very little knowledge about the basic essentials of almost all the selected communication channels. The availability of supplement materials need to be taken into consideration at the planning stage for their further distribution to participant farmers at the end of the implementation of the method demonstration activities.

Table 27

Basic Principles of Methods Demonstration

Basic Principles Methods Demonstration	Mean	SD
Timeliness of Demonstration	4.1	0.8
Appropriateness of place for Demonstration	4.1	0.8
Clarity of words	3.9	0.7
Opportunity given for farmers to practices	3.7	0.9
Logical sequencing of presentation	3.6	0.5
Arrangement of needed materials/equipment	3.4	0.7
Introductive presentation of activities	3.3	0.6
Ending with summary on Demonstration	3.2	0.7
Distribution of supplementing materials	2.6	0.8
Composite	**3.6**	**0.7**

Mean were calculated from a scale of 1=Very low, 2=Low, 3=Moderate, 4=High, 5=Very high.

Source: Field survey, Lankoande (2011.

Results Demonstration

Table 28 presents results with respect to basic principles of Result Demonstration tool to be observed by Agricultural Extension Agents while using it in dissemination of information and technologies. The findings show they were highly observed (mean=3.7; SD=0.7). Farmers perceived principles such as timeliness of demonstration (mean=4.1; SD=0.7) and appropriateness of place of demonstration (mean=4.0; SD=0.7) to be highly observed. Furthermore, farmers felt that participation in various stages of demonstration (mean=3.5; SD=0.8), ending with summary on demonstration (mean=3.3; SD=0.8), cooperation of extension agents (mean=3.3; SD=0.8), arrangement of farmers' meetings at comparison time (mean=3.3; SD=0.7), arrangement of needed materials/equipment (mean=3.2; SD=0.6), publication of results

(mean=3.0; SD=1.0) and involvement of farmers in planning activities (mean=3.0; SD=1.3) were moderately observed. The findings differ from Badar (2006) who argued that extension field staff did not observe the basic essentials of result demonstrations.

Table 28

Distribution of Basic Principles of Results Demonstration

Basic Principles of Results Demonstration	Mean	SD
Timeliness of Demonstration	4.1	0.7
Appropriateness of place for Demonstration	4.0	0.7
Participation in various stages of Demonstration	3.5	0.8
Ending with summary on Demonstration	3.3	0.8
Cooperation of extension agents	3.3	0.9
Arrangement of Farmers' meetings at comparison time	3.3	0.7
Arrangement of needed materials/equipment	3.2	0.6
Publication of results	3.0	1.0
Involvement of farmers in planning activities	2.7	1.3
Composite	**3.7**	**0.9**

Mean were calculated from a scale of 1=Very low, 2=Low, 3=Moderate, 4=High, 5=Very high.

Source: Field survey, Lankoande (2011).

Lecture

Lecture is a very important tool in disseminating extension information and innovations to farmers, especially for awareness purpose. Results presented in Table 29 depict perception of farmers on certain factors to be observed by AEAs for the lecture tool to be effective. The farmers seemed to be lowly satisfied with the way the lecture method is conducted by AEAs in the study area (mean=2.5; SD=0.8). Also, farmers moderately perceived the use of lecture tool to be timely relevant (mean=2.8; SD=0.9). The use of correct words (mean=2.8; SD=0.8), drawing summary and conclusion at the end (mean=2.8; SD=0.9), appropriateness of place for lecture (mean=2.7; SD=0.8), relevance to audience interest (mean=2.6; SD=0.9) were perceived to be moderately observed by AEAs in using lecture as extension communication tool. However, the presentation of the message in logical sequence (mean=2.2; SD=0.8), the use of gestures to stressed verbal message (mean=2.1; SD=0.7) and distribution of supplementing materials at the end of lecture (mean=2.1; SD=0.8) were perceived to be slowly observed by agricultural extension agents. The findings reveal that the agricultural extension agents were not skilled in planning and implementing effective and successful lecture meetings with regard to the observance of the selected fundamentals of the method. Similar findings were drawn by Ashraf (2001).

Table 29

Basic Principles of Lecture

Basic Principles of lecture	Mean	SD
Timeliness of lecture	2.8	0.9
Use of correct words	2.8	0.8
Summary, conclusion drawn at the end	2.8	0.9
Appropriateness of place for lecture	2.7	0.8
Relevance to audience interest	2.6	0.9
Logical presentation	2.2	0.8
Verbal message stressed by gestures	2.1	0.7
Distribution of supplementing materials	2.1	0.8
Composite	**2.5**	**0.8**

Mean were calculated from a scale of 1=Very low, 2=Low, 3=Moderate, 4=High, 5=Very high.

Source: Field survey, Lankoande (2011)

Discussion Meetings

Table 30 presents results on basic figures of discussion meetings observed by AEAs during dissemination process in the study area. The appropriate choice of venue (mean=4.0; SD=0.8), timely scheduling of discussion meetings (mean=4.0; SD=1.0), involvement of participants in discussions (mean=3.6; SD=0.9), and giving summary of key points at the end of discussion meetings (mean=3.6; SD=0.8) were perceived to be highly observed by AEAs while conducting discussion meeting activities. In addition, farmers perceived basic aspects of the method such as seating arrangements (mean=2.3; SD=0.7) and use of visuals (mean=2.0; SD=0.8), to be lowly observed. However, the seating arrangements permit participants to experience facial and gestures expression of each other and can bring about more involvement of participants in discussions and exchanges. The findings revealed

that discussion meetings were moderately conducted (mean=3.1; SD=0.8). Badar (2006) found that the observance of basic principles of discussion meetings were between fair and satisfactory.

Table 30

Ranking of Basic Principles of Discussion Meetings

Basic principles of Discussion Meetings	Mean	SD
Timeliness of lecture	4.0	1.0
Appropriateness of place for lecture	4.0	0.8
Involvement of farmers in discussions	3.6	0.9
Summary of points at the of discussions	3.6	0.8
Presence of subject matter specialist	2.9	0.8
Not domination of influential farmers	2.7	0.7
Seating arrangements	2.3	0.7
Use of audio visuals	2.0	0.8
Composite	**3.1**	**0.8**

Mean were calculated from a scale of 1=Very low, 2=Low, 3=Moderate, 4=High, 5=Very high.

Source: Field survey, Lankoande (2011)

Campaigns

The results in Table 31 depict farmer views on AEAs' observance of key essentials of campaign methods. Hence, farmers generally felt that basic fundamentals of campaigns were moderately respected by AEAs in the method conducting process (mean=2.9; SD=0.7). They moderately felt extension agents observed aspect such as farmers informed about activities before campaigns of activities (mean=3.4; SD=0.8), schedule at appropriate time (mean=3.1;

SD=0.6), involvement of trained and competent staff (mean=2.9; SD=0.7), use of appropriate teaching methods (mean=2.9; SD=0.7), appropriateness of duration of time of campaign (mean=2.8; SD=0.6), timely arrangement of materials (mean=2.7; SD=0.6). The involvement of local farmers in planning implementation was perceived to be lowly observed (mean=2.3; SD=0.9).

It could be inferred from findings that agricultural extension campaign method users moderately observed the key features when planning and implementing campaign method activities (mean=2.9; SD=0.7). The findings corroborate the results of a study by Badar (2006) that pointed out that basic essentials of campaigns were moderately observed by the extension field staff. Consequently, he argued that much needed to be done in providing more talents to extension agents through training for effective communication incentive in the extension delivery.

Table 31

Basic Principles of Campaigns Methods

Basic principles of Campaigns	Mean	SD
Farmers informed about activities	3.4	0.8
Scheduled at appropriate time	3.1	0.6
Involvement of trained and competent staff	2.9	0.8
Use of most appropriate teaching methods	2.9	0.7
Appropriate of duration of time of campaign	2.8	0.6
Timely arrangement of materials	2.7	0.6
Involvement of local farmers in planning implementation activities	2.3	0.9
Composite	**2.9**	**0.7**

Mean were calculated from a scale of 1=Very low, 2=Low, 3=Moderate, 4=High, 5=Very high.

Source: Field survey, Lankoande (2011)

Signboards/Slogans

With regard to signboards or/and slogans used by AEAs as extension channels to deliver extension messages, farmers were asked to give their views on the observance by AEAs to the basic fundamentals of the method. The results in Table 32 reveal that AEAs lowly observed the basic principles while using signboard/slogans as a communication tool in extension activities in the study area (mean=1.6; SD=0.8).

Key fundamentals of signboards/slogans including methods being very attractive to people, displayed at suitable venue, displayed with appropriate information, easy to understand and attractive colour scheme were perceived to be in between lowly and very lowly observed. It could then be inferred that any of the fundamentals of signboards/slogans did not get much attention by extension agents. Undeniably, AEAs needed to pay attention to all the selected key essentials of the method.

Table 32

Basic Principles of Signboards/Slogans

Basic Principles	Mean	SD
Very attractive to people	1.8	0.5
Displayed at suitable venue	1.8	0.7
Appropriate information displayed	1.7	0.7
Easy message for understanding	1.5	0.7
Attractive colour scheme	1.5	1.1
Composite	**1.6**	**0.8**

Mean were calculated from a scale of 1=Very low, 2=Low, 3=Moderate, 4=High, 5=Very high.

Source: Field survey, Lankoande (2011)

Exhibitions

The findings in Table 33 show the fundamentals of the exhibitions method used to deliver agricultural extension services to farmers in the study area were generally perceived to be moderately observed (mean=3.2; SD=0.7). Farmers perceived arrangement of needed materials and equipment (mean=3.8; SD=0.7), involvement of relevant agencies (mean=3.8; SD=0.8), scheduling at the appropriate venue (mean=3.7; SD=0.8), informing farmers about venue, time and purpose (mean=3.6; SD=0.7) were highly observed while scheduling at appropriate time (mean=3.4; SD=0.7) and logical arrangement of exhibition materials (mean=3.4; SD=0.6) felt to be moderately observed. Moreover, focusing on real needs of farmers (mean=2.4; SD=0.9) and ensuring availability of documents for visitors (mean=2.0; SD=0.9) were perceived as lowly observed.

Table 33

Basic Principles of Exhibitions

Basic Principles of Exhibitions	Mean	SD
Arrangement of needed materials/equipment	3.8	0.7
Involvement of relevant agencies	3.8	0.8
Scheduled at appropriate venue	3.7	0.8
Farmers aware of time, venue and purpose	3.6	0.7
Scheduled at appropriate time	3.4	0.7
Logical arrangement of exhibitions materials	3.4	0.6
Focus on real needs of farmers	2.4	0.8
Availability of documents for visitors	2.0	0.9
Composite	**3.2**	**0.7**

Mean were calculated from a scale of 1=Very low, 2=Low, 3=Moderate, 4=High, 5=Very high. Source: Field survey, Lankoande (2011)

Effectiveness of Communication Methods

Farmers and AEAs were asked to give their perceptions on the effectiveness of the extension communication methods used by AEAs in the study area. Table 34 displays the results on the issue. The farm and home visits (farmers mean=4.2; AEAs mean=4.0) and method demonstrations (farmers mean=4.0; AEAs mean=4.0) are the highly effective extension communication methods in the dissemination of innovations and information in the study area as perceived by both farmers and AEAs. This could be attributed to the fact that farm and home visits give opportunities to farmers to ask relevant questions that address issues of concern. The method demonstrations tool offers chance for farmers to practice the process.

Whilst farmers perceived the result demonstrations (farmers mean=3.4; AEAs mean=4.0) and discussion meetings (farmers mean=3.2; AEAs mean=3.8) to be effective AEAs felt they were highly effective. Furthermore the effectiveness of extension communication methods such as lecture (farmers mean=3.0; AEAs mean=3.1), exhibitions (farmers mean=2.9; AEAs mean=3.1), radio (farmers mean=2.8; AEAs mean=2.8), television (farmers mean=2.5; AEAs mean=2.8), were perceived by both farmers and AEAs to be effective. Concerning the campaign, farmers perceived it to be lowly effective (mean=2.4) while AEAs perceived it to be effective (mean=2.8). The lecture, campaign and exhibition do not give opportunity for farmers to ask questions and practice what is right hence, their perception about these methods being ineffective in dissemination of information and innovation. These methods according to CIDA (2003) and Leeuwis (2004) are used to create awareness. The low perceived effectiveness was found on ICT (Farmers mean=2.0; AEAs

mean=2.2) by both farmers and AEAs. Farmers perceived ICT to be lowly effective in diffusion of information and innovation because they are not able to use it.

From the findings, it can be inferred that both AEAs and farmers had similar views on the effectiveness of the common selected extension communications methods of the study only with slight differences.

Table 34

AEAs and Farmers' Perceived Effectiveness on Communication Methods

	Farmers		AEAs	
Communication Methods	Mean	SD	Mean	SD
Farm and home visits	4.2	0.9	4.0	0.8
Methods demonstration	4.0	0.7	4.0	0.9
Results demonstration	3.4	0.9	4.0	0.9
Discussion meetings	3.2	0.8	3.8	0.9
Lecture	3.0	0.6	3.1	1.2
Exhibitions	2.9	0.9	3.1	1.1
Radio	2.8	1.1	2.8	1.2
Television	2.5	0.8	2.8	1.3
Campaigns	2.4	1.0	2.8	1.2
ICT	2.0	0.8	2.2	1.3

Mean were calculated from a scale of 1=Very lowly effective, 2=Lowly effective, 3=Effective, 4= Highly effective, 5=Very highly effective.

Source: Field survey, Lankoande (2011)

Perceived level of satisfaction of Farmers on Extension Messages Conveyed

Views were also sought from farmers to investigate the level of satisfaction of how extension messages are communicated by AEAs. Table 35 displays the findings on the use of language, the content and the presentation of the message. Farmers generally perceived the use of language by AEAs during the dissemination of information and technologies to be very satisfactory (mean=3.7; SD=0.7). The criteria of the messages conveyed by AEAs such as use of local language (mean=4.3; SD=0.9), easiness (mean=3.9; SD=0.6) and simplicity (mean=3.6; SD=0.7) of the messages conveyed were perceived to be very satisfactory. The comprehensiveness (mean=3.5; SD=0.7), and the understanding (mean=3.4; SD=0.6) of the messages while disseminating information and technologies were perceived by farmers to be satisfactory. This is consistent with Ashraf (2001) who pointed out that agricultural information should be nicely prepared, adequately dressed up with pictures, diagrams, and provide complete information in a simple and easily understandable language.

Pertaining to the message content, farmers perceived the overall level of satisfaction to be satisfactory (mean=3.2; SD=0.8). Farmers perceived aspects related to the message content in deseminating extension information and technologies such as timeliness (mean=3.4; SD=1.0), feasibility (mean=3.4; SD=0.8), completeness (mean=3.3; SD=0.7), conciseness (mean=3.2; SD=0.6), correctness (mean=3.1; SD=0.8) and technicality (mean=3.1; SD=0.8) to be satisfactory. Concerning the presentation of the message, the level of satisfaction was perceived to be satisfactory (mean=3.2; SD=0.7). Farmers perceived messages presentation by AEAs to be satisfactorily persuasive (mean=3.4; SD=0.7), clear and appropriate (mean=3.2; SD=0.8) and logical

(mean=3.0; SD=0.5). Furthermore the use of gestures (mean=2.8; SD=0.7) and ending the presentation with summary (mean=3.5; SD=1.0) were also perceived to be satisfactory. The findings on level of satisfation on messages conveyed is in line with Umar, Lawrance and Hock (1987) who revealed that agricultural messages were quite good in their content, presentation and language.

Table 35

Farmers' Perceived Satisfaction of Messages Conveyed

Characteristics of message conveyed		Mean	SD
Language Use	Easiness	3.9	0.6
	Simplicity	3.6	0.7
	Understanding	3.4	0.6
	Comprehensiveness	3.5	0.7
	Use of local language	4.3	0.9
	Composite	**3.7**	**0.7**
Message Content	Timeliness	3.4	1.0
	Completeness	3.3	0.7
	Correctness	3.1	0.8
	Feasibility	3.4	0.8
	Technicality	3.1	0.8
	Conciseness	3.2	0.6
	Composite	**3.2**	**0.8**
Message Presentation	Persuasiveness	3.4	0.7
	Use of gestures	2.8	0.7
	Logical sequence	3.0	0.5
	Clear and appropriate	3.2	0.8
	Ending with summary	3.5	1.0
	Composite	**3.2**	**0.7**

Mean were calculated from a scale of 0=Not at all satisfactory, 1=Slightly satisfactory, 2=Moderate satisfactory, 3=Satisfactory, 4=Very satisfactory, 5=Extremely satisfactory.

Source: Field survey, Lankoande (2011)

Knowledge of AEAs by Farmers

The results of knowledge of AEAs by the farmers are displayed in Table 36. More than half (52.53%) of the farmers knew AEAs by name and face while less than one third (27.27%) knew AEAs only by face. However, the majority (79.80%) of farmers had met AEAs in the study area. Close to one-fifth (19.19%) did not know AEAs by name nor by face and only 1.01% knew them by name. In comparison, a study by Javied *et al.* (1990) evaluating the extension activities of livestock and dairy development has shown that a fair majority (63.33%) of the 120 farmers acquainted with veterinary agents both by face and name, while a simple majority (51.67%) of the farmer respondents were acquainted with agents of the area by face only.

Table 36

Frequency Distribution of the Nature of Farmers' Acquaintance with AEAs

Nature of Acquaintance	Frequency	Percent	Cumulative Percent
Only by name	1	1.0	1.0
Only by face	27	27.3	28.3
By name and face	52	52.5	79.8
Neither by name nor by face	19	19.2	100.0
Total	99	100.0	

Source: Field survey, Lankoande (2011)

Farmers Reporting Extension Problems to AEAs

Investigation on whether farmers were reporting their extension problems to the AEAs in the study area are summarised in Table 37. The results show that the farmers were almost equally divided in their opinions. The reason advanced by farmers was that they were organised into farmers groups or associations and their agricultural extension problems were first discussed at the groups meeting before and reported them to AEAs by their representatives. Furthermore feedback came also through the same channel.

This implies that farmers were getting all their problems either directly or indirectly reported to AEAs. The findings differ from Badar (2006) who reported that a simple majority (54.9%) were reporting their problems to extension field staff.

Table 37

Frequency Distribution of Farmers Reporting Extension Problems to AEAs

Reporting problems to AEAs	Frequency	Percent
Reporting to AEAs	49	49.5
Not reporting to AEAs	50	50.5
Total	**99**	**100.0**

Source: Field survey, Lankoande (2011)

Perception of Farmers on Cooperation of AEAs in Problem solving Process

Results presented in Table 38 indicate that farmers were either satisfied or feel good (65%) about their cooperation with AEAs. Less than one-fifth felt their cooperation with AEAs were either excellent (18.4%) or fair and poor (18.4%). This implies that farmers and AEAs are cooperating with each other for effective extension delivery.

Table 38

Farmers' Perceived Levels of AEAs' Cooperation in Problem Solving Process

Level of Cooperation	Frequency	Percent	Cumulative Percent
Poor	2	4.1	4.1
Fair	7	14.3	18.4
Satisfactory	12	24.5	42.9
Good	19	38.8	81.6
Excellent	9	18.4	100.0
Total	**49**	**100.0**	

Source: Field survey, Lankoande (2011)

Farmer Awareness and Adoption of Extension Practices

The level of awareness and adoption of extension recommended practices disseminated using various communication methods are displayed in Table 39. The majority of the farmers were aware of the extension recommended practices. The frequencies ranged from 92.9% to 100%. This in line with Asiabaka, Morse and Kenyon (2001) who stated that for a farmer to adopt a new agricultural technology, she/he must be aware of the technology, have valid and up-to-date information on the technology, the applicability of the technology to their farming system and receive the technical assistance necessary to adopt the technology. However, close to one-fifth (15.2%) and more than two-thirds (67.7%) had not adopted certain technologies. Whilst all farmers were aware of sowing, five of them had not adopted it. Those farmers felt sowing in line is tedious and their large farm of production and high cost of labour they prefer sowing anyhow. The majority (98%) were aware of land preparation in the study area. However, 94.8% have adopted which is very

encouraging. The adoption percentage ranged from 32.3% for animal breeding methods to 89.5% for use of improved varieties. This range is encouraging compared Nweke, Ezumah and Spencer (1998) who found that adoption rates, measured as the proportion of farms planted to the new varieties, range from 5 to 80% for adjacent farming communities. Furthermore, Ofuoku *et al.* (2009) revealed that 13.63% of the farmers adopted technology and extension contact was encouraging.

It should be noted that awareness and adoption do not follow the same principles. It has been reported by Onyewaku (1988) that why most farmers stick to old practices may be as a result of economic handicap on the part of the farmers to afford the cost of innovations, risk involved and ignorance of existence of innovations plus their conservative attitude. For Rogers (1995), diffusion of innovation and its adoption vary depending on the sociocultural context of the community, characteristics of the decision-making unit or the target audience, and perceived attributes of the innovation. These attributes of innovation are relative advantage, compatibility, complexity, trialability and observability.

Table 39

Frequency Distribution of Awareness and Adoption of Recommended Practices

Recommended Practices	Awareness				Adoption			
	Yes		NO		Yes		NO	
	N	%	N	%	N	%	N	%
Use of improved varieties	95	96	4	4	85	89.5	10	10.5
Land preparation	97	98	2	2	92	94.8	5	5.2
Sowing practices	99	100	0	0	94	94.9	5	5.1
Farm management practices	96	97	3	3	92	95.8	4	4.2
Harvesting practices	97	98	2	2	88	90.7	9	9.3
Post-harvesting practices	96	97	3	3	81	84.4	15	15.6
Selection of suitable land	97	98	2	2	54	55.7	43	44.3
Use of irrigation	94	94.4	5	5.1	48	51.1	46	48.9
Use of fertiliser	92	92.9	7	7.1	32	34.8	60	65.2
Animal breeding methods	96	97	3	3	31	32.3	65	67.7

Source: Field survey, Lankoande (2011)

Farmers' Perceived Level and Factors of Yield Satisfaction

Results presented in Table 40 showed farmers satisfaction of yield. A large majority (85.86%) of the farmers were not satisfied with their yield. Only less than one-fifth (14.14%) were satisfied with their yield. A study of Badar (2006) showed that close to two-thirds (62.3%) of apple growers in Pakistan were not satisfied with their yield.

Table 40

Frequency Distribution of Yield Satisfaction

Yield satisfaction	Frequency	Percent
Satisfied	14	14.1
Not satisfied	85	85.9
Total	**99**	**100.0**

Source: Field survey, Lankoande (2011)

In addition, farmers were questioned on the factors associated with non-satisfactory yield and the results are presented in Table 41. Farmers (44.3%) were not satisfied because of the high cost of fertiliser. The high cost prevented farmers from acquiring the recommended fertiliser in right quantities. Above one-third (41.2%) perceived the low prices for agricultural produce to reduce the willingness of farmers to invest in fertiliser. Farmers (40.5%) did not have adequate sources of finance or subsidies. The soil were perceived to be poor by 40.8% of the farmers while 38% of them felt that agro-chemicals were not available. One-fourth (25.1%) of farmers felt poor cooperation of AEAs prevented them from acquiring appropriate knowledge in recommended technologies. Other reasons for farmers' non-satisfaction of yield were inadequate technical skills, lack of interests in conducted extension activities

and poor awareness, lack of time and inefficient communication. According to Badar (2006) and Siddiqui (1991) reasons of low yield include low soil fertility, technologies constraints, moderate finance, adulteration of chemicals, inefficient communication interventions of extension field staff, shortage of skilled labour and non-availability of sufficient irrigation water.

Table 41

Farmer's Perceived Reasons of Non-satisfaction of Yield

Reasons of non-satisfaction of Yield	Percent
High cost of fertiliser	44.3
Low price of produce	41.2
Poor soil	40.8
Inadequate financial resources	40.5
Non availability of chemicals	38.0
Inadequate technical skill	32.1
Inefficient communication	29.2
Poor cooperation of AEAs	25.3
Inappropriate time of conducted extension activities	24.3
Poor awareness of technologies	21.2
Lack of interest in conducted extension activities	13.8

Source: Field survey, Lankoande (2011)

Level of Farmer's Participation in Extension Activities

This section outlines the findings on the level of farmer participation in various extension activities. The involvement of the farmers in agricultural extension activities is one of the most fundamental issues for successful agricultural extension programme delivery.

AEAs' Distribution on Perception of Farmers' Participation

Table 42 depicts various proportions of AEAs on the level of participation of farmers in selected extension communication method activities in the study area. A little more than one-third (35.5%) of AEAs highly perceived farmers to participate in farm and home visit while 41.9% of them felt this involvement of farmers to be moderate. This implies that the majority (75.4%) of the AEAs perceived participation of farmers to be between moderate and high which is encouraging. Almost one-third (35.8%) of respondents perceived moderately that farmers participated in method demonstration activities while a little less than half (45.8%) felt highly that farmers participated in the activities of this communication method.

Whilst 42.6% of AEAs seemed highly that participated to extension activities in results demonstration methods, almost one-third (32.8%) moderate professed farmers' involvement in the activities of this method. With respect to the participation of farmers in lecture method activities, respondents who perceived it to be low were more (39.3%) than those who seemed it to moderate (22.9%) or high (14.7%). The results implies that majority of respondents felt the participation of farmers in the selected communication method activities to be in between moderate and high.

Table 42

Frequency Distribution of Farmers Participation in Activities Perceived by AEAs

Communication media	Very low	%	Low	%	Moderate	%	High	%	Very high	%	Mean
Farm and Home Visits	1	1.6	5	8.1	26	41.9	22	35.5	8	12.9	3.5
Methods demonstrations	1	1.6	3	4.9	20	32.8	28	45.9	9	14.7	3.7
Results demonstrations	1	1.6	5	8.2	20	32.8	26	42.6	9	14.7	3.6
Lecture meetings	13	21.3	24	39.3	14	22.9	9	14.7	1	1.6	2.3
Discussion meetings	2	3.3	7	11.5	14	22.9	28	45.9	10	16.4	3.6
Exhibitions	9	14.5	15	24.2	23	37.1	13	21.0	2	3.2	2.7
Campaigns	8	13.1	15	24.6	23	37.7	13	21.3	2	3.3	2.8

Source: Field survey, Lankoande (2011)

Perceived Participation of Farmers in Extension Activities by Farmers and AEAs

The results in Figure 12 depicts compared views of farmers and agricultural extension agents on participation of farmers in extension communications methods activities in the study area. The farmers and AEAs perceived farmer participation in farm and home visits (farmers mean=4.3; AEAs mean=3.8) and method demonstrations (farmers mean=4.1; AEAs mean=3.7) to be high. Whilst farmers perceived their participation in discussions (mean=3.3) and result demonstrations (mean=3.2) to be moderate, AEAs perceived farmers' participation high in both extension communication method activities with means of 3.6.

The farmers and AEAs rated farmers' participation in lecture method activities to be low with similar mean of 2.3. This implies that both farmers and AEAs agreed that farmers were less motivated in the activities of this communication method which are less practical. While farmers felt their participation in campaign activities to be low (mean=2.5), AEAs professed farmers' participation moderate in the activities of this method (mean=2.8).

In some cases such as farm and home visits, method demonstration and exhibitions, the farmers perceived their participation to be higher than AEAs in terms of mean. This could be attributed to the fact that the farmers experienced their participation as actors and beneficiary than AEAs being service delivers. That means the contents of the message met farmers' needs. This is supported by Düvel (2000) who argued that the principle of maximum community participation is based upon the notion of self-determination to meet its interests.

Similarly, Oakley (1991) believed that rural people are more prepared to participate when they feel the need to do so.

Consequently, in certain cases including result demonstrations, discussions and campaigns methods activities, the AEAs perceived farmers' participation to be higher than farmers themselves. This implies that the AEAs were conscious that the success of agricultural extension programme can be ensured by taking beneficiaries' views, experiences and aptitudes through involvement of those first concerned, the farmers (Axinn, 1988). Furthermore, Kroma (2003) pointed out that participation is a suitable way of leaning to bring about learning, sustainability of programme and to ensure participation to create opportunity for farmers and extension agents to reflect on new ideas and experiences and use them to subsequently bring action.

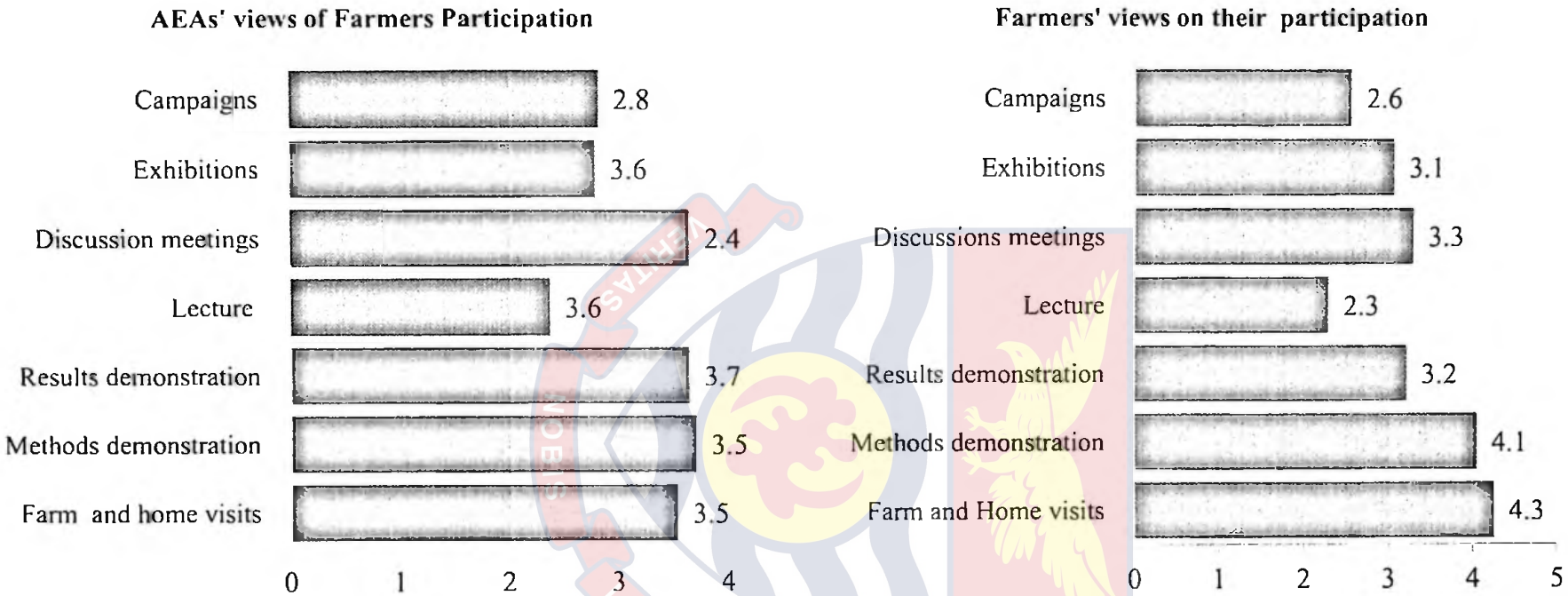


Figure 12: Perception of AEAs and Farmers on Farmer Participation in Extension Communication Methods Activities

Mean were calculated from a scale of 1=Very low, 2=Low, 3=Moderate, 4=High, 5=Very high.

Source: Field survey, Lankoande (2011)

AEAs' Perceived Reasons limiting Farmers' Participation

The results in Table 43 depicts views of AEAs on the main reasons that limit farmers' participation in extension selected communication method activities in the study area. According to extension agents, farmers did not participate in selected communications method activities because the subject matter was not relevant (20.2%). Furthermore, scheduled time (17.9%) by AEAs was not suitable to farmers. The lack of subsidies (16.7%) to apply what is learnt as programme limited farmers' participation. Others did not because they could not read or write what is taught (16.7%). AEAs indicated that some farmers did not have information about events (9.5%) while others were not motivated (7.1%). Some AEAs did not have facilitation skills (7.1%) whereas some extension communication methods were not adapted (4.8%) to the delivery situation.

Table 43

AEAs' Perceived limiting Reasons of Farmer Participation

Reasons of low level of Participation	Percent
Irrelevance of subject matter	20.2
Inappropriate schedule of time	17.9
Illiteracy	16.7
Lack of financial resources	16.7
Lack of information	9.5
Poor skills of AEAs	7.1
Not motivated	7.1
No adapted methods	4.8
Total	**100.0**

Source: Field survey, Lankoande (2011)

Demographic Characteristics of Extension Agents and Extent of Use of Communication Sources and Methods, Effectiveness of Selected Methods, Perceived Participation of Farmers, Farmers' Awareness and Adoption of Technologies

This objective of the study sought to determine if there are differences in selected demographic characteristics of agricultural extension agents such as sex, ages, professional level, level of education and field of specialisation and perceived importance of information sources, extent of use of the extension communication methods, perceived effectiveness of the communication methods and perceived level of the farmers' participation in extension communication methods activities.

Differences between Selected characteristics of AEAs and their Perceived Importance of Information Sources

H_0: There is no significant difference between sex of extension agents and their perceived importance of information sources.

H_1: There is significant difference between sex of extension agents and their perceived importance of information sources.

The ANOVA for AEAs' perceived importance of extension information sources based on sex of AEAs is displayed in Table 44. The results showed no significant difference between sex of extension agents and their perceived importance of extension information sources ($p=0.386>0.05$). The researcher therefore accepts the null hypothesis that there is no significant difference between sex of extension agents and their perceived importance of sources of information.

Table 44

ANOVA for AEAs' Perceived Importance of Information Sources and Sex

Characteristic	Source	Sum of Squares	df	Mean square	F	Sig
Sex	Between Groups	0.347	1	0.347	0.762	0.386
	Within groups	28.245	62	0.456		
	Total	28.592	63			

Source: Field survey, Lankoande (2011)

H_0: There is no significant difference between ages of extension agents and their perceived importance of information sources.

H_1: There is significant difference between ages of extension agents and their perceived importance of information sources.

The researcher accepts the null hypothesis that there is no significant difference between ages of extension agents and their perceived importance of extension information sources. The ANOVA for AEAs' perceived importance of extension information sources based on age reported in Table 45 showed no significant difference between perceived importance of extension information sources and age of AEAs ($p=0.856>0.05$). The findings differ from a study by Frempong (2005) who found significant difference between ages of extension agents and importance of sources of information.

Table 45

ANOVA for AEAs' Perceived Importance of Information Sources and Age

Characteristic	Source	Sum of Squares	df	Mean square	F	Sig
Age	Between Groups	0.627	4	0.157	0.331	0.856
	Within groups	27.965	59	0.474		
	Total	82.592	63			

Source: Field survey, Lankoande (2011)

H_0: There is no significant difference between professional level of extension agents and their perceived importance of information sources.

H_1: There is significant difference between professional level of extension agents and their perceived importance of information sources.

The professional level (rank) of AEAs did not differ significantly from perceived importance of the sources of extension information ($p=0.646>0.05$) as depicted in Table 46. Consequently, the researcher accepts the null hypothesis that there is no significant difference between professional level of extension agents and their perceived importance of information sources. This is not in line with the findings of Frempong (2005).

Table 46

ANOVA for AEAs' Perceived Importance of Information Sources and Professional Level

Characteristic	Source	Sum of Squares	df	Mean square	F	Sig
Professional level	Between Groups	0.098	1	0.098	0.212	0.646
	Within groups	28.494	62	0.460		
	Total	28.592	63			

Source: Field survey, Lankoande (2011)

H_o: There is no significant difference between level of education of extension agents and their perceived importance of information sources.

H_1: There is significant difference between level of education of extension agents and their perceived importance of information sources.

The ANOVA for AEAs' perception of the importance of extension information sources based on their level of education is reported in Table 47. The findings showed no significant difference between level of education of extension agents and their perceived importance of information sources ($p=0.856>0.05$). The researcher then accepts the null hypothesis that there is no significant difference between level of education of extension agents and their perceived importance of information sources. This differs from the findings of Frempong (2005).

Table 47

ANOVA for AEAs' Perceived Importance of Information Sources and Level of Education

Characteristic	Source	Sum of Squares	df	Mean square	F	Sig
Level of education	Between Groups	0.627	4	0.157	0.331	0.856
	Within groups	27.965	59	0.474		
	Total	28.592	63			

Source: Field survey, Lankoande (2011)

H_0: There is no significant difference between field of specialization of extension agents and their perceived importance of information sources.

H_1: There is significant difference between field of specialization of extension agents and their perceived importance of information sources.

The field specialisation of AEAs did not differ significantly with their perceived importance of extension information sources ($p=0.590>0.05$) as displayed in Table 48. Accordingly, the researcher accepts the null hypothesis that there is no significant difference between field of specialization of extension agents and their perceived importance of information sources.

Table 48

ANOVA for AEAs' Perceived Importance of Information Sources and Field Specialization

Characteristic	Source	Sum of Squares	df	Mean square	F	Sig
Field specialisation	Between Groups	0.490	1	0.245	0.532	0.590
	Within groups	28.102	62	0.461		
	Total	28.592	63			

Source: Field survey, Lankoande (2011)

Differences between Selected characteristics of AEAs and their Extent of Use of Communication Methods by AEAs

H_o: There is no significant difference between sex of extension agent and extent of use of extension communication methods.

H_1: There is significant difference between sex of extension agent and extent of use of extension communication methods.

The researcher accepts the null hypothesis that there is no significant difference between sex of extension agent and extent of use of extension communication methods. The ANOVA for the extent use of extension communication methods based on sex of respondents reported in Table 49 showed the sex of extension agents did not differ with the extent of use of extension communication methods ($p=0.431>0.05$).

Table 49

ANOVA for Extent of Use of Communication Methods by AEAs and Sex

Characteristic	Extent of Use	Sum of Squares	df	Mean square	F	Sig
Sex	Between Groups	0.350	1	0.350	0.630	0.431
	Within groups	34.501	62	0.556		
	Total	34.852	63			

Source: Field survey, Lankoande (2011)

H_o: There is no significant difference between ages of extension agents and extent of use of extension communication methods.

H_1: There is significant difference between ages of extension agents and extent of use of extension communication methods.

The ANOVA for the extent of use of extension communications methods by AEAs based on age is reported in Table 50. The results showed significant differences between ages of agricultural extension agents and extent of use of extension communication methods in the study area ($p=0.007<0.05$). Consequently, the researcher failed to accept the null hypothesis that there is no significant difference between age of extension agents and extent of use of extension communication methods. The results differ from the findings of Frempong (2005).

Table 50

ANOVA for Extent of Use of Communication Methods by AEAs and Age

Characteristic	Extent of use	Sum of Squares	df	Mean square	F	Sig
Age	Between Groups	6.350	3	2.117	4.456	0.007*
	Within groups	28.502	60	0.475		
	Total	34.852	63			

* Significant at alpha level p=0.05.

Source: Field survey, Lankoande (2011)

The Scheffe's post hoc multiple comparisons depicted in Table 51 showed that AEAs aged between 41and 50 years were importantly using the selected extension communication methods.

Table 51

Scheffe' post hoc Multiple Comparison of Extent of Use of Communication Methods by AEAs and their Ages

Extent of use		N	Mean	Mean difference	Standard error	Sig.
	Up to 30	12	3.5449	--	--	--
Up to	31 - 40	32	2.6416	0.90326*	0.24734	0.007
30 years	41 - 50	19	2.9663	0.57857	0.28770	0.267
	More than 50	11	2.9290	0.61586	0.25414	0.130

Means and standard deviation were calculated from a scale of 1=Very lowly important, 2=Fairly important, 3=Important, 4=Very important, 5=Extremely important.

Source: Field survey, Lankoande (2011)

H_0: There is no significant difference between professional level of extension agents and extent of use of extension communication methods.

H_1: There is significant difference between professional level of extension agent and extents of use of extension communication methods.

Table 52 depicts the ANOVA for extent of use of extension communication methods by AEAs based on professional rank of AEAs. The results showed no significant difference between professional level of extension agent and extent of use of extension communication methods in the study area ($p=0.077>0.05$). The researcher therefore accepts the null hypothesis that there is no significant difference between professional level of extension agents and extent of use of extension communication methods. This is not consistent with the findings of Frempong (2005).

Table 52

ANOVA for Extent of Use of Communication Methods by AEAs and Professional Level

Characteristic	Extent of Use	Sum of Squares	df	Mean square	F	Sig
Professional level	Between Groups	1.724	1	1.724	3.227	0.077
	Within groups	33.128	62	0.534		
	Total	34.852	63			

Source: Field survey, Lankoande (2011)

H_0: There is no significant difference between level of education of extension agents and extent of use of extension communication methods

H_1: There is significant difference between level of education of extension agents and extent of use of extension communication methods

The researcher failed to accept the null hypothesis that there is no significant difference between level of education of extension agent and extent of use of extension communication methods. The ANOVA for extent of use of extension communication methods based upon highest degree (level of education) reported in Table 53 showed significant differences between the extent of use of extension communication methods and level of education of AEAs ($p=0.003<0.05$). This is consistent with the findings of Frempong (2005).

Table 53

ANOVA for Extent of Use of Communication Methods by AEAs and Level of Education

Characteristic	Extent of use	Sum of Squares	df	Mean square	F	Sig
Level of education	Between Groups	8.089	4	2.022	4.458	0.003*
	Within groups	26.763	59	0.454		
	Total	34.852	63			

* Significant at alpha level p=0.05.

Source: Field survey, Lankoande (2011)

The Scheffé's post hoc multiple comparisons depicted in Table 54 showed that AEAs with Baccalaureat qualifications were very importantly using existing agricultural extension information sources (mean=3.9615) than DEUG, Licence, BEPC and CEP holders in the study area who were importantly using information sources for extension delivery services.

Table 54

Scheffe' post hoc Multiple Comparison of Extent of Use of Communication Methods by AEAs and Level of Education

Extent of use		N	Mean	Mean difference	Standard error	Sig.
Baccalaureat	BEPC	46	2.7527	1.209*	0.351	0.027
CEP	DEUG	2	2.9615	0.617	0.235	0.157
BEPC	CEP	10	3.3693	0.461	0.673	0.976
DEUG	Licence	2	3.4231	0.538	0.583	0.930
Licence	Baccalaureat	4	3.9615	0.408	0.522	1.000

Means and standard deviation were calculated from a scale of 1=Very lowly important, 2=Fairly important, 3=Important, 4=Very important, 5=Extremely important.

Source: Field survey, Lankoande (2011)

H_o: There is no significant difference between field of specialization of extension agents and extent of use of extension communication methods

H_1: There is significant difference between field of specialization of extension agents and extent of use of extension communication methods

The researcher accepts the null hypothesis that there is no significant difference between field specialisation of extension agents and the extent of use of selected extension communication methods. The ANOVA for extent of use of selected extension communication methods based on field specialisation of

AEAs presented in Table 55 showed no significant difference between extent of use of selected extension communication methods and field specialisation of AEAs (p=0.119>0.05)

Table 55

ANOVA for Extent of Use of Communication Methods by AEAs and Field Specialization

Characteristic	Extent of use	Sum of Squares	df	Mean square	F	Sig
Field specialisation	Between Groups	2.346	2	1.173	2.201	0.119
	Within groups	32.506	61	0.533		
	Total	34.852	63			

Source: Field survey, Lankoande (2011)

Differences between Selected characteristics of AEAs and their Perceived Effectiveness of Selected Communication Methods

H_0: There is no significant difference between sex of extension agents and their perceived effectiveness of selected communication methods.

H_1: There is significant difference between sex of extension agents and their perceived effectiveness of selected communication methods.

Sex of AEAs did not differ significantly with their perceived effectiveness of selected communication methods ($p=0.464>0.05$) as shown in Table 56. Consequently, the null hypothesis that there is no significant difference between sex of extension agents and their perceived effectiveness of selected communication methods is accepted.

Table 56

ANOVA for AEAs' Perceived Effectiveness of Selected Communication Methods and Sex

Characteristic	Effective-ness	Sum of Squares	df	Mean square	F	Sig
Sex	Between Groups	0.343	1	0.343	0.543	0.464
	Within groups	39.157	32	0.632		
	Total	39.500	63			

Source: Field survey, Lankoande (2011)

H_o: There is no significant difference between age of extension agents and their perceived effectiveness of selected communication methods

H_1: There is significant difference between age of extension agents and their perceived effectiveness of selected communication methods

The findings displayed in Table 57 on the ANOVA for AEAs' extent of use of extension communication methods by AEAs' perceived effectiveness of selected communication methods based upon age showed no significant difference between age of extension agents and their perceived effectiveness of selected communication methods ($p=0.094>0.05$). The researcher therefore accepts the null hypothesis that there is no significant difference between age of extension agents and their perceived effectiveness of selected communication methods

Table 57

ANOVA for AEAs' Perceived Effectiveness of Selected Communication Methods and Age

Characteristic	Effective-ness	Sum of Squares	df	Mean square	F	Sig
Age	Between Groups	4.893	4	1.223	2.085	0.094
	Within groups	34.607	59	0.587		
	Total	39.500	63			

Source: Field survey, Lankoande (2011)

H_0: There is no significant difference between professional level of extension agents and their perceived effectiveness of selected communication methods.

H_1: There is significant difference between professional level of extension agents and their perceived effectiveness of selected communication methods.

Table 58 presents ANOVA for AEAs' perception on the effectiveness of selected communication methods based on AEAs' professional level. The results showed that the professional level of AEAs did not significantly differ with their perceived effectiveness of selected communication methods ($p=0.739>0.05$). The researcher then accepts the null hypothesis that there is no significant difference between professional level of extension agents and their perceived effectiveness of selected communication methods.

Table 58

ANOVA for AEAs' Perceived Effectiveness of Selected Communication Methods and Professional Level

Characteristic	Effective-ness	Sum of Squares	df	Mean square	F	Sig
Professional level	Between Groups	0.071	1	0.071	0.112	0.739
	Within groups	39.429	62	0.636		
	Total	39.500	63			

Source: Field survey, Lankoande (2011)

H_0: There is no significant difference between highest degree of extension agents and their perceived effectiveness of selected communication methods.

H_1: There is significant difference between highest degree of extension agents and their perceived effectiveness of selected communication methods.

The researcher accepts the null hypothesis that there is no significant difference between highest degree of extension agents and their perceived effectiveness of selected communication methods. The ANOVA for AEAs' perceived effectiveness of selected communication methods based on highest degree reported in Table 59 showed no significant difference between highest degree of extension agents and their perceived effectiveness of selected communication methods ($p=0.094>0.05$)

Table 59

ANOVA for AEAs' Perceived Effectiveness of Selected Communication Methods and Level of Education

Characteristic	Effective-ness	Sum of Squares	df	Mean square	F	Sig
Level of education	Between Groups	4.893	4	1.223	2.085	0.094
	Within groups	34.607	59	0.587		
	Total	39.500	63			

Source: Field survey, Lankoande (2011)

H_0: There is no significant difference between field of specialization of extension agents and their perceived effectiveness of selected communication methods.

H_1: There is significant difference between field of specialization of extension agents and their perceived effectiveness of selected communication methods.

The ANOVA for AEAs' perceived effectiveness of selected communication methods based on field of specialization of AEAs is displayed in Table 60. The results showed no significant difference between field of specialization of AEAs and their perceived effectiveness of selected communication methods ($p=0.887>0.05$). The researcher therefore accepts the null hypothesis that there is no significant difference between field of specialization of extension agents and their perceived effectiveness of selected communication methods.

Table 60

ANOVA for AEAs' Perceived Effectiveness of Selected Communication Methods and Field Specialization

Characteristic	Effective-ness	Sum of Squares	df	Mean square	F	Sig
Field specialisation	Between Groups	0.156	2	0.078	0.121	0.887
	Within groups	39.344	61	0.645		
	Total	39.500	63			

Source: Field survey, Lankoande (2011)

Differences between Selected characteristics of AEAs and their Perceived Level of Farmers' Participation

H_0: There is no significant difference between sex of extension agents and their perceived level of participation of farmers in extension methods activities.

H_1: There is significant difference between sex of extension agents and their perceived level of participation of farmers in extension methods activities.

Sex of AEAs did not differ significantly from AEAs' perceived level of participation of farmers in extension methods activities ($p=0.307>0.05$) as portrayed in Table 61. Consequently, the researcher accepts the null hypothesis that there is no significant difference between sex of extension agents and their perceived level of participation of farmers in extension methods activities.

Table 61

ANOVA for AEAs' Perceived Level of Farmers' Participation and Sex

Characteristic	Participa-tion	Sum of Squares	df	Mean square	F	Sig
Sex	Between Groups	0.684	1	0.684	1.061	0.307
	Within groups	39.348	62	0.645		
	Total	40.032	63			

Source: Field survey, Lankoande (2011)

H_o: There is no significant difference between age of extension agents and their perceived level of participation of farmers in extension methods activities.

H_1: There is significant difference between age of extension agents their perceived level of participation of farmers in extension methods activities.

Table 62 depicts the ANOVA for AEAs' perceived level of participation of farmers in extension methods activities based on age of AEAs. The results showed no significant difference between age of AEAs and perceived level of participation of farmers ($p=0.141>0.05$). The researcher therefore accepts the null hypothesis that there is no significant difference between age of extension agents their perceived level of participation of farmers in extension methods activities.

Table 62

ANOVA for AEAs' Perceived Level of Farmers' Participation and Age

Characteristic	Participa-tion	Sum of Squares	df	Mean square	F	Sig
Age	Between Groups	4.421	4	1.105	1.800	0.141
	Within groups	35.611	58	0.614		
	Total	40.032	62			

Source: Field survey, Lankoande (2011)

H_0: There is no significant difference between professional level of extension agents and their perceived level of participation of farmers in extension methods activities.

H_1: There is significant difference between professional level of extension agents and their perceived level of participation of farmers in extension methods activities.

The researcher accepts the null hypothesis that there is no significant difference between professional level of AEAs and their perceived level of participation of farmers in extension methods activities. The ANOVA for AEAs' perceived level of participation of farmers in extension methods activities based on professional level depicted in Table 63 showed no significant difference between AEAs' perceived level of participation of farmers in extension methods activities and their professional level ($p=0.536>0.05$).

Table 63

ANOVA for AEAs' Perceived Level of Farmers' Participation and Professional Level

Characteristic	Participa-tion	Sum of Squares	df	Mean square	F	Sig
Professional level	Between Groups	0.253	1	0.253	0.112	0.536
	Within groups	39.779	61	0.652	0.388	
	Total	40.032	62			

Source: Field survey, Lankoande (2011)

H_o: There is no significant difference between level of education of extension agents and their perceived level of participation of farmers in extension methods activities.

H_1: There is significant difference between level of education of extension agents and their perceived level of participation of farmers in extension methods activities.

The educational level of AEAs did not differ significantly with their perceived level of participation of farmers in extension methods activities ($p=0.141>0.05$) as presented in Table 64. For that reason, the researcher accepts the null hypothesis that there is no significant difference between level of education of extension agent and their perceived level of participation of farmers in extension methods activities.

Table 64

ANOVA for AEAs' Perceived Level of Farmers' Participation and Level of Education

Characteristic	Participa-tion	Sum of Squares	df	Mean square	F	Sig
Level of education	Between Groups	4.421	4	1.105	1.800	0.141
	Within groups	35.611	58	0.614		
	Total	40.032	62			

Source: Field survey, Lankoande (2011)

H_0: There is no significant difference between field of specialization of extension agents and their perceived level of participation of farmers in extension methods activities.

H_1: There is significant difference between field of specialization of extension agents and their perceived level of participation of farmers in extension methods activities.

Table 65 presents the ANOVA for AEAs' perceived level of participation of farmers in extension methods activities based upon field of specialization of extension agents. The findings revealed EAEs' field specialization did not differ significantly with their perceived level of participation of farmers in extension methods activities ($p=0.605>0.05$). The researcher then accepts the null hypothesis that there is no significant difference between field of specialization of extension agents and their perceived level of participation of farmers in extension methods activities.

Table 65

ANOVA for AEAs' Perceived Level of Farmers' Participation and Field Specialization

Characteristic	Participa-tion	Sum of Squares	df	Mean square	F	Sig
Field specialisation	Between Groups	0.664	2	0.332	0.506	0.605
	Within groups	39.368	60	0.656		
	Total	40.032	62			

Source: Field survey, Lankoande (2011)

Demographic Characteristics of Farmers and Sources of Information, Perceived Effectiveness of Selected Communication Methods, Perceived Levels of Participation, and adoption of technologies

This objective of the study sought to determine if there are differences in selected demographic characteristics of farmers such as ages, level of education, years of experience, and tenure of land and extension information sources, perceived effectiveness of the selected communication methods and perceived level of farmers' participation in extension method activities and perceived levels of awareness and adoption of extension technologies.

Differences between Selected Characteristics of Farmers and their Sources of Information

H_0: There is no significant difference between age of farmers and sources of information.

H_1: There is significant difference between age of farmers and sources of information.

The ANOVA for farmers information sources based on age of farmers is displayed in Table 66. The results showed no significant difference between age of farmers and extension information sources ($p=0.874>0.05$). The researcher therefore accepts the null hypothesis that there is no is no significant difference between age of farmers and sources of information.

Table 66

ANOVA for Information Sources of Farmers and age

Characteristic	Source	Sum of Squares	df	Mean square	F	Sig
Age	Between Groups	0.225	4	0.056	0.305	0.874
	Within groups	17.330	94	0.184		
	Total	17.556	98			

Source: Field survey, Lankoande (2011)

H_o: There is no significant difference between level of education of farmers and sources of information.

H_1: There is significant difference between level of education of farmers and sources of information.

The researcher failed to accept the null hypothesis that there is no significant difference between level of education of farmers and their sources of information. The ANOVA for farmers' sources of information based on level of education reported in Table 67 showed significant difference between sources of information and level of education of farmers ($p=0.042<0.05$).

Table 67

ANOVA for Information Sources of Farmers and Level of Education

Characteristic	Source	Sum of Squares	df	Mean square	F	Sig
Level of education	Between Groups	1.119	2	0559	3.226	0.042*
	Within groups	16.437	96	0.171		
	Total	17.556	98			

* Significant at alpha level p=0.05. Source: Field survey, Lankoande (2011)

The Scheffe's post hoc multiple comparisons portrayed in Table 68 showed that farmers who attained secondary school were importantly using existing agricultural extension information sources (mean=2.8750) than those who achieved primary and those with no formal education.

Table 68

Scheffe' post hoc Multiple Comparison of Sources of Information and Educational Level of Farmers

Characteristic	Sources	N	Mean	Mean difference	Standard error	Sig.
Secondary	No formal Education	69	2.3454	0.52959*	0.21281	0.050
	Primary	22	2.4295	0.44551	0.22224	0.140
	Secondary	4	2.8750	--	--	--

Means and standard deviation were calculated from a scale of 1=Very lowly important, 2=Fairly important, 3=Important, 4=Very important, 5=Extremely important. Source: Field survey, Lankoande (2011)

H_o: There is no significant difference between years of experiences of farmers and sources of information.

H_1: There is significant difference between years of experiences of farmers and sources of information.

Years of experiences of farmers did not differ significantly from their sources of extension information ($p=0.293>0.05$) as depicted in Table 69. Consequently, the researcher accepts the null hypothesis that there is no significant difference between years of experiences of farmers and their sources of information.

Table 69

ANOVA for Information Sources of Farmers and Years of Experiences

Characteristic	Source	Sum of Squares	df	Mean square	F	Sig
Years of experience	Between Groups	0.891	4	0.223	1.256	0.293
	Within groups	16.665	94	0.177		
	Total	17.556	98			

Source: Field survey, Lankoande (2011)

H_o: There is no significant difference between tenure of land of farmers and sources of information.

H_1: There is significant difference between tenure of land of farmers and sources of information.

The ANOVA for farmers sources of information based on tenancy of land is reported in Table 70. The findings showed no significant difference

between tenure of land of farmers and sources of information (p=0.805>0.05). The researcher then accepts the null hypothesis that there is no significant difference between tenure of land of farmers and sources of information.

Table 70

ANOVA for Information Sources of Farmers and Tenure of Land

Characteristic	Source	Sum of Squares	df	Mean square	F	Sig
Tenure of land	Between Groups	0.079	2	0.039	0.217	0.805
	Within groups	17.477	96	0.182		
	Total	17.556	98			

Source: Field survey, Lankoande (2011)

Differences between Selected Characteristics of Farmers and their Perceived Effectiveness of Selected Communication Methods

H_0: There is no significant difference between age of farmers and their perceived effectiveness of selected communication methods.

H_1: There is significant difference between age of farmers and their perceived effectiveness of selected communication methods.

The researcher failed to accept the null hypothesis that there is no significant difference between age of farmers and their perceived effectiveness of selected communication methods. The ANOVA for farmers' perceived effectiveness of selected communication methods based on age of respondents reported in Table 71 showed age of farmers differ significantly with the and

their perceived effectiveness of selected communication methods ($p=0.021<0.05$).

Table 71

ANOVA for Farmers' Perceived Effectiveness of Selected Methods by Age

Characteristic	Effective-ness	Sum of Squares	df	Mean square	F	Sig
Age	Between Groups	2.453	4	0.613	3.026	0.021*
	Within groups	19.053	94	0.203		
	Total	21.506	98			

* Significant at alpha level p=0.05. Source: Field survey, Lankoande (2011)

The Scheffe's post hoc multiple comparisons presented in Table 72 showed that farmers who were aged from 31 years importantly rated selected communication methods to be effective.

Table 72

Scheffe' post hoc Multiple Comparison of Perceived Effectiveness of Selected Communication Methods and Age of Farmers

Effectiveness		N	Mean	Mean difference	Standard error	Sig.
Above 60 years	Up to 30	7	2.3247	0.68831*	0.20841	0.034
	31 - 40	19	2.7895	0.22351	0.15857	0.738
	41 - 50	25	2.8945	0.11844	15028	0.960
	51 - 60	34	2.7754	0.23759	0.14297	0.600
	Above 60	14	3.0130	--	--	--

Means and standard deviation were calculated from a scale of 1=Very lowly important, 2=Fairly important, 3=Important, 4=Very important, 5=Extremely important. Source: Field survey, Lankoande (2011)

H_0: There is no significant difference between level of education of farmers and their perceived effectiveness of selected communication methods.

H_1: There is significant difference between level of education of farmers and their perceived effectiveness of selected communication methods.

The ANOVA for the perceived effectiveness of selected communication methods by farmers based on level of education is reported in Table 73. The results showed no significant differences between level of education of respondents and their perceived effectiveness of selected communication methods in the study area ($p=0.755>0.05$). Consequently, the researcher accepts the null hypothesis that there is no significant difference between level of education of farmers and their perceived effectiveness of selected communication methods.

Table 73

ANOVA for Farmers' Perceived Effectiveness of Selected Methods by Level of Education

Characteristic	Effective-ness	Sum of Squares	df	Mean square	F	Sig
Level of education	Between Groups	0.126	2	0.063	0.282	0.755
	Within groups	21.380	96	0.223		
	Total	21.506	98			

Source: Field survey, Lankoande (2011)

H_o: There is no significant difference between years of experiences of farmers and their perceived effectiveness of selected communication methods.

H_1: There is significant difference between years of experiences of farmers and their perceived effectiveness of selected communication methods.

Table 74 depicts the ANOVA for the perceived effectiveness of selected communication methods of farmers based on their years of experiences The results showed significant difference between professional level of extension agent and extent of use of extension communication methods in the study area ($p=0.007<0.05$). The researcher therefore failed to accept the null hypothesis that there is no significant difference between years of experiences of farmers and their perceived effectiveness of selected communication methods.

Table 74

ANOVA for Farmers' Perceived Effectiveness of Selected Methods by Years of Experiences

Characteristic	Effective-ness	Sum of Squares	df	Mean square	F	Sig
Years of experiences	Between Groups	2.975	4	0.744	3.773	0.007*
	Within groups	18.531	94	0.197		
	Total	21.506	98			

* Significant at alpha level p=0.05. Source: Field survey, Lankoande (2011)

The Scheffe's post hoc multiple comparisons depicted in Table 75 showed that farmers who with more than 40 years of experience were perceiving selected communication methods in the study area to be importantly effective though all farmers with more than twenty years of experience perceived the methods to be important.

Table 75

Scheffe' post hoc Multiple Comparison of Perceived Effectiveness of Selected Communication Methods and Years of Experience of Farmers

Effectiveness		N	Mean	Mean difference	Standard error	Sig.
21 - 30	1 – 10	03	2.3939	0.52981	0.26846	0.426
	11 - 20	14	2.4481	0.47570*	0.14297	0.032
	21 - 30	31	2.8223	--	--	--
	31 – 40	22	2.8966	0.10144	0.12377	0.954
	More than 40	29	2.9238	0.2720	0.11470	0.999

Means and standard deviation were calculated from a scale of 1=Very lowly important, 2=Fairly important, 3=Important, 4=Very important, 5=Extremely important. Source: Field survey, Lankoande (2011)

H_o: There is no significant difference between tenure of land of farmers and their perceived effectiveness of selected communication methods.

H_1: There is significant difference between tenure of land of farmers and their perceived effectiveness of selected communication methods.

The researcher failed to accept the null hypothesis that there is no significant difference between tenure of land of farmers and their perceived effectiveness of selected communication methods. The ANOVA for perceived effectiveness of selected communication methods based upon tenancy of land displaed in Table 76 showed significant differences between perceived effectiveness of selected communication methods and tenure of land of farmers ($p=0.037<0.05$).

Table 76

ANOVA for Farmers' Perceived Effectiveness of Selected Methods by Tenure of Land

Characteristic	Effective-ness	Sum of Squares	df	Mean square	F	Sig
Tenure of land	Between Groups	1.427	2	0.714	3.412	0.037*
	Within groups	20.078	96	0.209		
	Total	21.506	98			

* Significant at alpha level p=0.05. Source: Field survey, Lankoande (2011)

Differences between Selected Characteristics of Farmers and their Perceived Participation in Extension Activities

H_0: There is no significant difference between age of farmers and their perceived participation in extension communication methods activities.

H_1: There is significant difference between age of farmers and their perceived participation in extension communication methods activities.

Age of farmers did not differ significantly with their perceived participation in extension communication methods activities ($p=0.301>0.05$) as reported in Table 77. Consequently, the null hypothesis that there is no significant difference between age of farmers and their perceived participation in extension communication methods activities is accepted by the researcher.

Table 77

ANOVA for Farmers' Perceived Participation in Methods Activities and Age

Characteristic	Participa-tion	Sum of Squares	df	Mean square	F	Sig
Age	Between Groups	1.475	4	0.369	1.237	0.301
	Within groups	27.727	93	0.298		
	Total	29.202	97			

Source: Field survey, Lankoande (2011)

H_0: There is no significant difference between level of education of farmers and their perceived participation in extension communication methods activities.

H_1: There is significant difference between level of education of farmers and their perceived participation in extension communication methods activities.

The findings displayed in Table 77 on the ANOVA for farmers' perceived participation in extension communication methods activities based upon level of education showed no significant difference between level of education of farmers and perceived participation in extension communication methods activities ($p=0.256>0.05$). The researcher therefore accepts the null hypothesis that there is no significant difference between level of education of farmers and their perceived participation in extension communication methods activities.

Table 78

ANOVA for Farmers' Perceived Participation in Methods Activities and Level of Education

Characteristic	Participa-tion	Sum of Squares	df	Mean square	F	Sig
Level of education	Between Groups	0.825	2	0.413	1.381	0.256
	Within groups	28.377	95	0.299		
	Total	29.202	97			

Source: Field survey, Lankoande (2011)

H_0: There is no significant difference between years of experiences of farmers and their perceived participation in extension communication methods activities.

H_1: There is significant difference between years of experiences of farmers and their perceived participation in extension communication methods activities.

Table 79 presents ANOVA for farmers' perception on their participation in extension communication methods activities based on farmers' years of experience. The results showed that the years of experience of farmers did not significantly differ with their perceived participation in extension communication methods activities ($p=0.109>0.05$). The researcher then accepts the null hypothesis that there is no significant difference between years of experiences of farmers and their perceived participation in extension communication methods activities.

Table 79

ANOVA for Farmers' Perceived Participation in Methods Activities and Years of Experiences

Characteristic	Participa-tion	Sum of Squares	df	Mean square	F	Sig
Years of experience	Between Groups	2.257	4	0.564	1.948	0.109
	Within groups	26.945	93	0.290		
	Total	29.202	97			

Source: Field survey, Lankoande (2011)

H_0: There is no significant difference between tenure of land of farmers and their perceived participation in extension communication methods activities.

H_1: There is significant difference between tenure of land of farmers and their perceived participation in extension communication methods activities.

The researcher accepts the null hypothesis that there is no significant difference between tenure of land of farmers and their perceived participation in extension communication methods activities. The ANOVA for farmers' perceived participation in extension communication methods activities based on tenure of land presented in Table 80 showed no significant difference between tenure of land farmers and their perceived participation in extension communication methods activities ($p=0.069>0.05$).

Table 80

ANOVA for Farmers' Perceived Participation in Methods Activities and Tenure of land

Characteristic	Participa-tion	Sum of Squares	df	Mean square	F	Sig
Tenure of land	Between Groups	1.596	2	0.798	2.746	0.069
	Within groups	27.606	95	0.291		
	Total	29.202	97			

Source: Field survey, Lankoande (2011)

Differences between Selected Characteristics of Farmers and their Perceived Level of Adoption of Extension Technologies

H_o: There is no significant difference between age of farmers and their perceived level of adoption of extension technologies.

H_1: There is significant difference between age of farmers and their perceived level of adoption of extension technologies.

Table 81 presents the ANOVA for farmers' perceived level of adoption of extension technologies based upon age of respondents. The findings revealed farmers age did not differ significantly with their perceived level of adoption of extension technologies ($p=0.800>0.05$). The researcher then accepts the null hypothesis that there is no significant difference between age of farmers and their perceived level of adoption of extension technologies.

Table 81

ANOVA for Farmers' Perceived Level of Adoption and Age

Characteristic	Adoption	Sum of Squares	df	Mean square	F	Sig
Age	Between Groups	0.117	4	0.029	0.412	0.800
	Within groups	6.701	94	0.071		
	Total	6.818	98			

Source: Field survey, Lankoande (2011)

H_o: There is no significant difference between level of education of farmers and their perceived level of adoption of extension technologies.

H_1: There is significant difference between level of education of farmers and their perceived level of adoption of extension technologies.

The researcher accepts the null hypothesis that there is no significant difference between level of education of farmers and their perceived level of adoption of extension technologies. The ANOVA for farmers' perceived level of adoption of extension technologies based on level of education depicted in Table 82 showed no significant difference between farmers perceived level of adoption of extension technologies and their educational level ($p=0.385>0.05$).

Table 82

ANOVA for Farmers' Perceived Level of Adoption and Level of Education

Characteristic	Adoption	Sum of Squares	df	Mean square	F	Sig
Level of Education	Between Groups	0.134	2	0.067	0.963	0.385
	Within groups	6.684	96	0.070		
	Total	6.818	98			

Source: Field survey, Lankoande (2011)

H_0: There is no significant difference between years of experiences of farmers and their perceived level of adoption of extension technologies.

H_1: There is significant difference between years of experiences of farmers and their perceived level of adoption of extension technologies.

The number of years of experiences of farmers did not differ significantly with their perceived level of adoption of extension technologies ($p=0.565>0.05$) as presented in Table 83. Consequently the researcher accepts the null hypothesis that there is no significant difference between years of experiences of farmers and their perceived level of adoption of extension technologies.

Table 83

ANOVA for Farmers' Perceived Level of Adoption and Years of Experiences

Characteristic	Adoption	Sum of Squares	df	Mean square	F	Sig
Years of experiences	Between Groups	0.209	4	0.052	0.743	0.565
	Within groups	6.610	94	0.070		
	Total	6.818	98			

Source: Field survey, Lankoande (2011)

H_0: There is no significant difference between tenure of land of farmers and their perceived level of adoption of extension technologies.

H_1: There is significant difference between tenure of land of farmers and their perceived level of adoption of extension technologies.

Table 84 presents the ANOVA for farmers' perceived level of adoption of extension technologies based on tenancy of land. The findings revealed tenancy of land did not differ significantly with their perceived level of adoption of extension technologies ($p=0.663>0.05$). The researcher then accepts the null

hypothesis that there is no significant difference between tenure of land of farmers and their perceived level of adoption of extension technologies.

Table 84

ANOVA for Farmers' Perceived Level of Adoption and Tenure of land

Characteristic	Adoption	Sum of Squares	df	Mean square	F	Sig
Tenure of land	Between Groups	0.085	2	0.029	0.412	0.663
	Within groups	6.760	96	0.070		
	Total	6.818	98			

Source: Field survey, Lankoande (2011)

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

This chapter outlines the purpose of the study, summary of the methodology used to carry out the study, and a summary of the results and discussions. It also presents the conclusions drawn from the findings, and recommendations issuing from the conclusions made.

Summary of Findings

The study was carried out to examine the communication factors affecting the agricultural extension programme delivery in the Houet province of Burkina Faso. Specifically, the study was directed by the following objectives:

1. to describe characteristics of AEAs in terms of their ages, sex, working and farming experiences, farming background, educational level, aspiration during schooling, area of specialization, training attainted and need of refresher courses.
2. To describe characteristics of farmers in terms of their ages, sexes, level of education, farming experiences, marital status, tenancy of land, and ethnic group.
3. To determine the sources of information used by farmers and AEAs.

4. To examine farmers' perceived competencies of agricultural extension agents in the use of communications methods.
5. To examine the observance of principles associated with use of extension communication methods.
6. To examine the perceived effectiveness of communications methods used in extension delivery.
7. To determine if there are differences in selected demographic characteristics of AEAs and their opinion on importance of information sources, extent of use, effectiveness and participation of farmers in the use of extension communication methods.
8. To determine if there are differences in selected demographic characteristics of farmers and their opinion on importance of information sources, effectiveness, participation, and adoption in the use of extension communication methods.

Pertaining to the approaches used for the investigation, a descriptive-correlational survey design was used by the study to describe the study variables. The main study was conducted in Houet Province of Bobo-Dioulasso, in the Western part of Burkina Faso. The target population comprised farmers and AEAs of the study area. A total number of 64 AEAs was involved in the study while 99 farmers constituted the sample of farmer respondents. Questionnaire was designed for AEAs and interview schedule for farmers. Collected Data were computed and analysed with SPPS version 15 and Excel was used to drawn all the figures in the document. The statistics tools used to analyse the collected data were descriptive methods such as frequencies, percentages, cumulated percentages, means, and standard deviation. In addition,

one way Analysis of Variances (ANOVA) was used to test the significant differences in the variables and among groups. A summary of the findings based on the specific objectives is presented as follow:

Background characteristics of AEAs

On the issue of age distribution of the agricultural extension agents, slightly more than half (53.1%) of the AEAs were up to 40 years. With respect to AEAs' job experiences, the findings showed very rich working experiences at the time of the study with 57.8% of AEAs who had worked from 10 to 40 years. Majority (69%) of them had personal experiences in farming while 31% did not. With regard to gender distribution of the AEAs, majority (77%) of the AEAs were male and 23% were female. Pertaining to the educational status, majority (71.9%) of the AEAs' respondents possessed Middle School Leaving Certificate, 6.2% possessed A level, 3.1% with Diploma and another 3.1% with Bachelor of Science Certificate. The remaining (15.6%) of AEAs were Primary School Certificate holders. With regard to the family background of the AEAs, 79.7% of them were from farming families while 20.3% were not. Majority (71.4%) of them were born in rural communities while 28.60% were from urban areas. In terms of AEAs' aspiration during their student life, two-thirds (66%) of AEAs had, during their student life, aspired to be agriculture officers in the future while 34% of the respondents to the same period had not aspired to work as agriculture officers. Concerning the professional field of AEAs', the results of the study revealed that respondents were essentially composed of agents with general knowledge. They were especially skilled in general agriculture (37.5%), animal husbandry (21.9%), and forestry and environment (40.6%) but with little

experience in extension acquired from occasional short training seminars and refresher courses.

Background characteristics of the farmers

Slightly above half (51.5%) of the farmers were aged between 22 to 50 years. In addition, the study revealed the interest of the youth in agricultural activities which is in line with the government policy that aims to encourage the youth to take up farming in order to reduce unemployment, alleviate poverty by then ensure food security. On the issue of gender, almost all farmers (96%) were men with only few females (4%). In addition, almost all female respondents, 3 out of the four female farmers' respondents were widows while only few that were 2 out of the 92 male respondents were described as such widowers. Pertaining to the farmers' educational status, the findings of the showed that more than two-thirds (69.7%) while 26.3% and 4.0% of them achieved primary and secondary levels, respectively. In terms of farming experiences, most of the farmers had high farming experiences and would have adopted many of the recommended extension practices and improved their livelihood through high productivity. About 53.5% of farmers' respondents were both owners and tenants while 45.4% of them were owners. The majority (78.8%) of the farmers were migrants while only 21.2% were native.

Extension sources of information

Pertaining to information sources, field trip was rated as the extremely important (mean=4.8) source of information for AEAs while fellow famers were perceived as the important (mean=4.2) information source and the most frequently used source by farmers among others. The remaining sources of information for farmers were AEAs, private agencies, radio, television and printed materials that fell in between mean values of 3.9 and 1.6.

Competencies of AEAs in the use of communications methods

AEAs' human relation competencies were perceived by farmers to be satisfactory (mean=3.2; SD=0.7). The findings indicated that AEAs were perceived to be satisfactory competent (mean=2.7; SD=0.8) in selected extension communications methods. The overall professional attitudes were perceived by farmers to be satisfactorily (Mean=3.3; SD=0.7). The farmers seem to be satisfied with the messages conveyed by AEAs and found the characteristics to be moderately high (mean=3.3; SD=1.0). The farm and home visits is the very highly frequently used extension communication method in the study area as perceived by both farmers (mean=4.2) and AEAs (mean=3.8). Also, farmers and AEAs perceived the use of method demonstrations to be very frequent (farmers mean=4.0, AEAs mean=3.8). Whilst farmers perceived the use of result demonstrations to be very frequent (mean=3.9) AEAs felt they have used it moderately frequently (mean=3.1).

Observance of the principles associated with use of extension communication methods

The farmers generally perceived the observance by AEAs of the basic principles of Farm and home visits in disseminating extension information and technologies to be moderate (mean=3.5; SD=.08). The farmers perceived the remaining aspects to be satisfactorily observed. The relevance of radio broadcast to farmers' problems was perceived to be highly observed (mean=3.6; SD=0.7). Furthermore, the farmers felt timeliness of broadcast principle (mean=3.1; SD=0.5) was perceived to be moderately observed. The farmers generally perceived them to be moderately observed (mean=3.0; SD=0.8) by AEAs in the study area as television broadcast is used to reach farmers. Furthermore, the results reveal that AEAs highly observed the basic principles while using method Demonstration as a communication tool in extension activities in the study area (mean=3.6; SD=0.7). Pertaining to the basic principles of result demonstrations the findings show they were highly observed (mean=3.7; SD=0.7).

Lecture method is a very important tool in disseminating extension information and innovations to farmers, especially for awareness purpose. The farmers seemed to be lowly respected with the way the lecture method is conducted by AEAs in the study area (mean=2.5; SD=0.8). General abilities of AEAs were scaled satisfactory (mean=3.1; SD=0.8) in accordance with their observation of the fundamentals of discussion meetings used as extension communication channel. Also, farmers generally felt that basic fundamentals of campaigns were moderately respected by AEAs in the method conducting process (mean=2.9; SD=0.7). The results reveal that AEAs lowly observed the

basic principles while using signboard/slogans as a communication tool in extension activities in the study area (mean=1.6; SD=0.8). Finally, the fundamentals of the exhibitions method used to deliver agricultural extension services to farmers in the study area were generally perceived to be moderately observed (mean=3.2; SD=0.7).

Perceived effectiveness of selected communications methods

The farmers generally perceived the use of language by AEAs during the dissemination of information and technologies to be very satisfactory (mean=3.7; SD=0.7), the message content to be satisfactory (mean=3.2; SD=0.8) and messages presentation to be satisfactory (mean=3.2; SD=0.8).

More than half (52.53%) of the farmers knew AEAs by name and face while less than one third (27.27%) knew AEAs only by face. However, the majority (79.80%) of farmers had met AEAs in the study area. The findings indicate that farmers were getting all their problems either directly or indirectly reported to AEAs. Only 18.4% of the farmers found AEAs' cooperation to be poor and fair. However, AEAs cooperation to solve farmers' extension problems were perceived as satisfactory, good and excellent by 24.5%, 38.9% and 18.4% of farmers' respondents, respectively. Majority of the farmers were aware of the extension recommended practices. The frequencies ranged from 92.9% to 100%. The majority (85.9%) of the farmers of the study area did not get satisfaction with regard to yield. Only 14.1% were satisfied with their yield.

The farmers and the AEAs perceived farmer participation in farm and home visits (farmers mean=4.3; AEAs mean=3.8) and methods demonstration (farmers mean=4.1; AEAs mean=3.7) to be high. In some cases such as farm

and home visits, methods demonstration, and exhibitions method activities farmers perceived their participation to be higher than AEAs in terms of mean.

Differences in selected demographic characteristics of AEAs and their opinion on importance of information sources, extent of use, effectiveness and participation of farmers in the use of extension communication methods

The results indicated that there were no significant differences between the importance of extension sources of information and sex, age, level of education, rank and field of specialisation of AEAs. Likewise there were no significant differences between the extent of use of selected communication methods and sex, rank and field of specialisation of AEAs. However, there were significant differences between the extent of use of selected communication methods and age and educational level of AEAs. Baccalaureat holders were vey importantly using existing agricultural extension information sources than DEUG, Licence, BEPC and CEP holders in the study area who were importantly using information sources for extension delivery services. The results of the study showed that there were no significant differences between the perceived effectiveness of selected communication methods and sex, age, level of education, rank and field of specialisation of AEAs. Besides, the findings of the study revealed that there were no significant differences between perceived level of participation of farmers in extension methods activities and sex, age, level of education, rank and field of specialisation of AEAs.

Differences in selected demographic characteristics of farmers and their opinion on importance of information sources, effectiveness, participation and adoption in the use of extension communication methods

The background characteristics including age, years of experience and tenancy of land of farmers did not differ significantly with the sources of information while the level of education differed significantly with the sources of information. Although the educational level and tenancy of land of respondents did not differ significantly, farmers ages and years of experience in farming differed significantly with the extent of use of selected communication methods. The results indicated that they were no significant differences between farmers' perceived participation in extension communication method activities and the ages, level of education, years of experience and tenure of land. Similarly, they were no significant differences between farmers' perceived level of adoption of extension technologies and the ages, level of education, years of experience and tenure of land.

Conclusions

From the results of this study the following conclusions can be drawn with respect to the specific objectives:

Background Characteristics of AEAs

The proportion of females among AEAs staff was very low and this could be attributed to the national female literacy level and to the low level of the enrolment of women in agriculture. AEAs had accumulated long and undeniable working experiences that can tremendously contribute to the effectiveness of AEAs actions in the field only if necessary and adequate logistics and incentives are made available. In addition to their long experiences, AEAs are more likely to break new ground in the performance in their duties if these are available. In the light of the findings, majority (93.7%) of AEAs did not have higher education level and this may lead to the ineffectiveness of the extension services delivery in the study area. The AEAs' integrated situational advantages of being familiar to farming and trained in modern agricultural practices can help comprehend farmer situation and farming systems as well. Majority of AEAs were in the career of their choice while a minority had not necessarily wanted to be AEAs. This has implications for job motivation and commitment.

Background Characteristics of the farmers

Farmers' respondents were almost equitably comprised of the youth and the elderly and then the former can benefit from the latter experiences while adjusting those experiences with the acquiring modern agricultural knowledge. From the findings of the study, farmers had long farming experience. Accordingly, they could understand many agricultural issues, policies, and

factors affecting the farming system. However, this large farming experience among the farmers' respondents could be a negative influence on technology adoption and this can be attributed to the fact that farmers with long experiences are usually older, less educated and could be more resistant to change and adoption of new ideas. The unrealistic proportions of marital status aspect can only be attributed to the fact that most of the males' respondents were polygamous and did not take themselves as widowers even when one had come to lose at least one of the spouses. Almost all the farmers' respondents had their own land and this can tremendously influence innovations adoption. Indeed, all farmers will only be willing to adopt recommended practices when they have security in terms of land tenancy. Majority of farmers of the study area were migrants. They will be enthusiastic about adopting agricultural innovation to achieve their ambitions if only communication methods are effectively and efficiently used by AEAs to convey extension messages.

Sources of Extension Information

The results argued on the opportunity of both theoretical and practical advantages in field trip since, theoretical information acquired in the field trip can be *ipso facto*, corroborated with the practical ongoing action. The general view of AEAs on the selected information sources were due to the abilities of AEAs to make use of those extension sources for their personal development. In addition, the availability and the accessibility of some sources could have contributed to explain the low relative mean values of certain extension information sources in accordance with their use. The results of the study also indicated that fellow farmers were the major extension information source for

farmers, far ahead of the second one that was AEAs and other remaining sources.

Competencies of AEAs

AEAs' general human competencies level were above satisfactory in the study area. AEAs were highly competent in using the communication tools such as method demonstrations, result demonstrations and radio broadcast while they were moderately competent in farm and home visits, telecasts, exhibitions, discussion meetings, and campaigns. They were lowly competent in the use of lecture and signboards/slogans methods where there was a need for AEAs to acquire more skills and competencies for the ineffective use. AEAs were perceived satisfactorily competent in almost all the selected criteria used in assessing their professional attitudes while disseminating extension information and technologies to farmers in the study area.

Observance of Principles of Selected Communication Methods by AEAs

The results indicated that AEAs moderately observed the basic principles of farm and home visits, method and result demonstration methods in conducting extension activities in the study area. The methods are more appropriate to raising awareness in recommended practices. The high observance of the basic principles justify the results showing almost all farmers were aware of extension technologies and information being disseminated in the study area. Furthermore, the fundamentals of radio were highly observed while those of television, campaigns and exhibitions were moderately respected. In addition, the basic essentials of discussion meetings were satisfactory respected while those from lecture and signboards/slogans were rated to be lowly observed by AEAs in the study area. Television programmes

on agricultural agenda did not meet the highest scales with respect to their observance by agricultural extension agents of the study area.

Effectiveness of Communication Methods Used and Messages Conveyed

The results revealed that the messages conveyed by AEAs were effective in the study area through very satisfactory use of language, satisfactory message content and message presentation. In addition majority of farmers had met extension agents in the study area and all farmers' problems were reported to extension agents. However, AEAs were poorly to fairly cooperative in solving farmers' problems. Majority of farmers were aware of the recommended extension practices or innovations showing an effective cooperation. Nonetheless, majority of them did not get satisfaction with heir yield. In some cases such as farm and home visits, method demonstrations, and exhibitions method activities farmers perceived their participation to be higher than AEAs in terms of mean. This implies that farmers experienced their participation as actors and beneficiaries than AEAs.

Recommendations

In the light of the main findings of the study from which the above conclusions have been drawn, the recommendations below are formulated with the aim of bringing about improvement of the effectiveness of the use of the selected agricultural extension communication methods in the study area. These recommendations are addressed to the government, the farmers, the agricultural extension agents and to all the national training institutions and centres in Burkina Faso.

Recommendations to the Government of Burkina

1. Policy should initiate special and attractive conditions to motivate women enrollment in agriculture career to contribute to the poverty reduction on women, eradicate sex boundaries with jobs and finally attract women farmers to immerge in the field to solve the almost unisexual management of farm activities.
2. Government should take advantage of the interest of youth in agriculture to develop strong policies and build strong institutions to promote agriculture as a successful job domain, which will motivate more young farmers to enroll and invest in agriculture coping then with unemployment, poverty and food insecurity challenges. This can be done through ensuring access to agricultural credit and equipment, access to and security of land.
3. Government should introduce extension-teaching programmes in all the professional training schools and centres of the ministries of rural development to equip AEAs with extension communication methods in order to improve their competence in the use and observance to the individual basic essentials of these methods.
4. The ministries in charge of rural development should have full control over all AEAs' trainings going on in the country sponsored either by government or by any other development agencies, to make sure that the course contents expose AEAs to extension communication methods.
5. Government should develop a unique national agricultural extension system with a unique training curriculum instead of allowing each of the ministries of rural development (Ministry of Agriculture, Ministry of

Animal Resources, and Ministry of Environment) to be struggling in its own unstable and unreliable system with no proper budget but only relying on short developmental programmes and projects.

Recommendations to the agricultural extension agents

1. AEAs should use appropriate approaches to compel more women farmers to participate in agricultural extension activities since they are the true actors in adoption of agricultural extension recommended practices.
2. AEAs should use available sources of information to ensure the completeness, timeliness and meaningfulness of information addressed to farmers.
3. AEAs should acquire more and relevant competencies in most of the selected communication methods to improve their extent of their use.
4. AEAs should pay much attention to the strict observance of the key fundamentals of all the selected extension communication methods in the communication process to succeed in their extension duties more effectively. This demands mastering knowledge and competencies in, and getting familiarity with these communication methods and their individual key principles while conducting any of the selected methods in extension information and technologies dissemination. This implies acquiring adequate knowledge during their training time in training institutions such as universities and training centres.
5. AEAs of the Houet Province should pay more interest in farmers to improve their level of participation in activities, especially when using campaign, exhibitions and lecture meetings as agricultural extension

communication tools by giving more opportunities to farmers to take more advantages of the activities conducted.

Recommendations to training institutions

1. All agricultural training schools should introduce, in addition to the formal specialised programme, new courses in agricultural extension to provide field staff with relevant knowledge in extension and competencies in extension communication methods for the effectiveness of the overall extension programme delivery in the country.
2. The department of Agricultural Extension should, in addition to the existing master's programme, quickly develop curricula for middle career levels for field staff such as Diploma and B.Sc. in agricultural extension to provide farmers with high skilled extension field staff who will be more familiar with the most common extension communication methods for the effectiveness of the extension delivery.
3. The department of Agricultural Extension should stress on the improvement of the curriculum to ensure that various extension communication methods, their principles and use are developed in details to expose AEAs in training.
4. The department of Agricultural Extension should establish a continuous training programme for the country extension staff to continuously update their knowledge in appropriate choice and use of the extension communication methods.

Contribution of the Study to the Body of Knowledge

The current study has confirmed existing information on the theoretical, empirical and conceptual framework in relation to the analysis of communication methods for agricultural extension delivery in the Houet Province of Burkina Faso. It also made available critical information on characteristics of the farmers and the AEAs in the study area which is fundamental for understanding local extension staff and farmers constraints for future planning. Furthermore, the study laid down useful recommendations to targeted stakeholders that have the potential to generate further research and extension curriculum design in Burkina Faso, and in the long run, contribute to the improvement of the agricultural extension delivery in the country if the appropriate policy briefs can be sent to the right places.

Suggestions for Further Research

From the findings of the study and the conclusions, the researcher wishes to suggest the following:

1. Similar research should be undertaken in other provinces to provide insights into the use of extension communication methods in Burkina Faso.
2. Research should also be oriented towards the assessment of the extension methods taught in various public and private training institutions and centres to provide useful data for future harmonisation of programmes.
3. Research should finally be undertaken on adoption of recommended practices in the Houet Province. This will provide insights in the level and rate of adoption as the effect of the use of the selected communication methods in the study.

REFERENCES

Adams, M. E. (1994). *Agricultural Extension in Developing Countries.* Intermediate Tropical Agriculture Series. Essex England: Longman Scientific and Technical.Harlo.

Adebayo, K. (1997). *Communication in Agriculture.* Lagos, Nigeria: Integrity prints.

Adekoya, A. E., & Ayayi, M. A. (2000). An assessment of farmer's awarness and practices on land management techniques in Iddo LGA. *Oyo State J. Environ. Ext.*, 99-103.

Adeyemi, O. A., Awosansya, R. A., & Fasina, O. E. (2002). A survey of on-farm Egg Cracks in Ogun State. *Ogun J. Agri. Sci.*, 166-176.

Ajayi, M. (2001). Evaluation of the effectiveness of field days carried out by agricultural trainees as a technology transfer strategy. *Journal of International Agricultural Extension Education, 8*(03), 57-64.

Ajayi, M. T. (2003). Analysis of mass media used for agricultural information by farmers in Nigeria. *J. Ext. Sys., 19*, 45-53.

Akinbile, L. A. (2005). Contributions of Home Gardening to Household Food Security in Egbeda LGA Oyo State. *11th Conference of Agricultural Extension Society in Africa*, (pp. 1-13).

Akinbode, I. A. (1991). *Women's participation in Nigeria: a case study of Ogun, Gangola, Cross River, Kano and Niger States.* FAO, Federal Department of Agricultural Extension.Nigeria.

Albrecht, H. (1986). Extension research: Needs and uses. In G. E. Jones (Ed.), *Investing in Rural Extension: Strategies and Goals* (pp. 239-245). London, UK: Elsevier Applied Science Publishers.

Ali, T. (1991). *An identification and validation of job performance competencies needed by agriculture extension field assistants in Faisalabad district of Pakistan.* Doctoral dissertation, University of Minnesota. USA.

Ali, T., Khan, S. A., Malik, N. H., & Saleem, I. (1994). Investigation into some common factors which affect agricultural research and extension work in developing countries. *Pak. J. Agri. Sci., 31*(3), 245-249.

AL-Subaiee, S. F., Yoder, E. P., & Thomson, J. S. (2005). Extension Agents' Perceptions of Sustainable Agriculture in the Riyadh Region of Saudi Arabia. *Journal of International Agricultural Extension Education,, 12*(01), 5-14.

Anandajayasekeram, P., Ranjitha, P., Sindu, W., & Dirk, H. (2008). *Concepts and practices in agricultural extension in developing countries: A source book.* IFPRI (International Food Policy Research Institute), Washington, DC, USA, and ILRI (International Livestock Research Institute), Nairobi, Kenya. 275 pp.

Ani, A. (1998). Assessment of farmers' extension education needs in Yobe State, Nigeria. *J. Agric. Educ., 1*, 152-158.

Ani, A. O. (1999). An impact study on the adoption of improved agricultural technology by groundnut farmers in Hawul L.G.A. of Borno State, Nigeria. *Nigerian J. Rural Dev. Coop.*, 19-25.

Ani, A. O., Ogunnika, O., & Ifah, S. S. (2004). Relationship Between Socio-Economic Characteristics of Rural Women Farmers and Their Adoption of Farm Technologies in Southern Ebonyi State, Nigeria. *Int. J. Agric. Biol., 6*(5), 802-805.

Antholt, C. (1992). *Relevancy, responsiveness and cost-effectiveness: Issues for agricultural extension in the 21st century.* World Bank Asia Region, Technical Department. Washington, DC, USA: World Bank.

Antholt, C. H. (1994). *Getting ready for the twenty-first century: Technical change and institutional modernization in agriculture.* World Bank Technical Paper 217. Washington, DC, USA: World Bank.

Ashraf, I. (2001). *A study into the effectiveness of communication methods used by pesticide companies to popularize their products among the farmers of tehsil Arifwala.* M. Sc. thesis, Uni. of Agri., Faisalahad.

Asiabaka, C. C., & Owens, M. (2002). Determinants of Adoptive Behaviors of Rural Farmers in Nigeria. *AIAEE 18th Annual Conference.* Durban, South Africa.

Asiabaka, C. C., Morse, S., & Kenyon, L. (2001). *The Development, Dissemination and Adoption of Technologies Directed at Improving the Availability of Clean Yam Planting Material in Nigeria and Ghana.* Report of a study mission commissioned By UK Government Department for International Development (DFID) Crop Protection Program (CPP)11 –22 June 2001.

Asiedu-Darko, E. (2013). Agricultural extension delivery in Ghana: A case study of factors affecting it in Ashanti, Eastern and Northern regions of Ghana. *Journal of Agricultural Extension and Rural Development, 5*(2), 37-41. Retrieved from www.academicjournals.org/JAERD

Axinn, G. (1987). The different systems of agricultural extension education with special attention to Asia and Africa. In W. M. Rivera, & S. G.

Schram (eds), *Agricultural Extension Worldwide: Issues, Practices and Emerging Priorities* (pp. 103-114). London, UK: Croom Helm.

Axinn, G. (1997). Challenges to agricultural extension in the twenty-first century. In V. Scarborough, S. Killough, D. A. Johnson, & J. Farrington, *Farmer-led extension: concepts and practices.* London, UK: Intermediate Technology Publications Ltd.

Axinn, G. H. (1988). *T&V extension. Interparks, Interchange, international agricultural* (Vol. 5). Urbana, USA: College of Agriculture, University of Illinois at Urbanan-Champaing.

Ayaz, M. (1994). Extension programmes in Pakistan. In R. A. Memon, & E. Bashir, *Extension methods* (pp. 121-154). Islamahad, Pakistan: National Book Foundation.

Babbie, E., & Rubin, A. (2010). *Research methods for social work.* Belmont, USA: Brooks/Cole.

Badar, N. S. (2006). *Analysis of communication interventions of extension field staff in apple growing areas of Balochistan (Pakistan).* A Thesis submitted for partial fulfillment to the requierments for the Degree of Doctor of philosophy in Agricultural Extension, University of Agriculture, Faisalabad.

Baker, T. L. (1994). *Doing Social Research* (2nd ed.). USA: McGraw-Hill, Inc.

Baptista, R. (2001). Geographical clusters and innovation diffusion . *Technol. Forecast. Soc. Change, 66*(1), 31-46.

Beilin, R. (1995). The Construction of Women in Landscape. Does it Make a Difference? *Rural Society, 5*(2/3), 20-29.

Bel-Molokwu, J. (1997). *Business Communication Theory and Practice.* Abuja, Nigeria: National Library of Nigeria.

Benjamin, J. B. (2009). Dialogue Theory. In W. L. Stepeh, & A. F. Karen, *Encyclopedia of communication theory* (pp. 301-306). London, UK: SAGE Publications Inc.

Benor, D., Harrison, J. Q., & Baxter, M. (1984). *Agricultural Extension: The Training and Visit System.* Washington, D.C., USA: World Bank.

Best, J. W., & Kahn, J. V. (1995). *Research in education* (8th ed.). USA: Allyn and Bacon.

Biggs, S., & Smith, G. (1998). Beyond methodologies: Coalition-building for participatory technology development. *World Development, 26*(2), 239-248.

Bindlish, V., Evenson, R., & Gbatibouo, M. (1993). *Evaluation of T&V-Based Extension In Burkina Faso.* World Bank, Washington, D.C.

Black, K. (2010). *Bussiness Statistics: Contemporary Decision Making* (6th ed.). New York, USA: John Wiley and Sons.

Bonk, K., Griggs, H., & Tynes, E. (1999). *The Jossey-Bass guide to strategic communication for nonprofit organizations.* San Francisco: Jossey-Bass, Inc.

Bown, L., & Okedara, J. T. (1981). An introduction to the study of adult education. *Ibadan University Press, 12*, 36-47.

Budke, W., & Paddie, P. (1994). Relationship Between Supervisory Techniques of Extension, Supervisory and Organisational Outcomes in Uganda . *Association for International Agricultural and Extension Education: 10th Annual Conference Papers.*

Bunker, B. B., & Alban, B. T. (1997). *Alban Large Group Interventions. Engaging the Whole System for Rapid Change.* San Franscisco: Jossey-Bass Publishers.

Byres, F. C., & Byres, K. (1977). *Agricultural Extension and Education in Developing Countries, Rural Development in a Changing World.* New York: John Wiley and sons, Inc.

Byrnes, J. H. (1978). *Literature Review of Research Methodology on the diffusion and adoptioll of innovations in fertiliser-related agricultural production technology in the developing countries.* Alabama: IFCD.

Campbell, D. A., & Barker, C. (1997). Selecting appropriate content and methods in programme delivery. In FAO, *Improving agricultural extension: A reference manual.* Rome, Italy.

Castello, R. D., & Braun, P. M. (2006). *Framework on effective rural communcation for development.* Rome: F.A.O and GTZ.

Celis, F. (1971). Training of Agricultural Extension Workers in Mexico. In *Extension Review of Selected Developments in Extension and Rural Youth Activities.* Rome, Italy: FAO.

Cernea, M. (1981). Sociological Dimensions of Extension Organizations: the Introduction of the T and V System in India. In Grouch, & S. Samala (eds), *Extension Education and Rural development 2.* Chichester, New York, USA: John Wiley and sons, Inc.

Cernea, M. M. (1995). *Putting people first* (2 ed.). Oxford: Oxford University Press.

Chamala, S. (1983). Australian farmers' attitudes towards, information exposure to, and use of commercial and soil conservation practices. *Tillage Systems and Social Science, 3*(1), 1-4.

Chapman, R., Blenech, R., Berisarljevic, G., & Zakariah, A. (2003). *Rural radio in agricultural extension: The example of vernacular radio programmes on soil and water conservation in Northern Nigeria.* Paper N° 127. Agric. Res. Ext. Network.

Chizari, M., Lindner, J., & Lashkarara, F. (2001). Perceptions of Lurestan Province, Iran wheat farmers with respect to sustainable agricultural practices. *Journal of International Agricultural Extension Education, 8*(03), 65-71.

Chizari, M., Pishbin, A. R., & Lindner, P. K. (1997). Self perceived professional commpetencies needed and possessed by agricultural agents in Fars province of Iran. *J. Ext. Sys., 13*, 146-154.

Christophos, I. (2010). *Mobilizing the potential of rural and agricultural extension.* Rome, Italy: FAO.

CIDA. (2003). *Knowledge, ITCs and Developement Agency.* Canadian International Development Agency, Quebec. Retrieved on 12 June 2009 from http://www.acdi-cida.ga.ca/ict=pdf.

Cidro, D., & Radhakrishna, R. B. (2006). Farmers' and Extension Agents' Perceptions of the Philippines Hybrid Rice Program. *Journal of International Agricultural Extension Education, 13*(03), 19-32.

Cleaver, F. (1999). Paradoxes of participation: Questioning participatory approaches to developement. *Journal of International Development, 11*, 597-612.

Colton, D., & Covert, R. W. (2007). *Designing and constructing insturments for social research and evaluation.* San Francisco, USA: John Wiley & Sons, Inc.

Cooke, B., & Kothari, U. (2001). The case for participation as tyranny. In B. Cooke, & U. Kothari (eds), *Participation: The New Tyranny?* (pp. 1-15). London, UK: Zed Books.

Cronbach, L. (1951). Coefficient alpha and the internal structure of tests. *Psychomerika, 16*, 297-334.

D'Emden, F. H., Llewellyn, R. S., & Burton, M. P. (2006). Adoption of conservation tillage in Australian cropping regions: An application of duration analysis. *Technological Forecasting & Social Change , 73*, 630-647.

Dankwa, J. B. (2004). *Farmers' and extension staff perceptions of factors affecting the effectiveness of agricultural extension delivery in the Ashanti region of Ghana.* A thesis submitted in partial fulfillment of the requirement for the degree of Doctor of Philosophy in Agricultural Extension, University of Cape Coast.

Das, M. D. (1995). *Improving the relevance and effectiveness of agricultural extension activities for women farmers.* Rome, Italy: FAO.

Davies, D. R., & Sparrow, P. R. (1985). Age and Work Behaviour. In N. Charness (ed), *Aging and Human Performance.* New York, USA: Wiley.

Dawson, C. (2007). *A practical guide to rearch methodology: a user-friendly manual for mastering research techniques and projects* (3rd ed.). How to Content.

Donnellan, L. M., & Montgomery, F. S. (2005). Rethinking Extension Communications: Is Issues Programming the Key? *Journal of Extension [on-line], 43*(2), Available at: http://www.joe.org/joe/2005april/a2.php.

Drysdale, A. M., & Shute, C. (1989). Efficiency and effectiveness of agricultural extension services in Indonesia: A case study. *J. Ext. Sys., 5*, 45-59.

Dulle, F. W. (2000). The extension triad approach in disseminating agricultural infortmation to extension workers: some experiences from the Southern Highlands Dairy Developement Project, Tanzania. *Journal of Information Science, 26*(2), 121-128.

Düvel, G. H. (2000). Towards an appropriate extension approach for agriculturaland rural development in South Africa. *South African Journal of Agricultural Extension, 29*, 10-23.

FAO. (1975). *Production Year Book.* Rome, Italy: FAO.

FAO. (1987). *"The Archers" – An Everyday Story of Country Folks.* Rome, Italy: FAO.

FAO. (2001). *Politiques et strtégies de communication pour le développement au Burkina Faso.* Rome, Italy:FAO.

FAO. (2011). *FAO Expert Consultation on 'Communication for Development: Meeting today's agriculture and rural development challenges'. 14–16 September 2011.* Rome, Italy: FAO.

Fournier, A. (1991). *Phénologie, croissance et productions végétales dans quelques savanes d'Afrique de l'Ouest. Variation seoln un gradient climatique.* Paris, France: ORSTOM.

Franckel, & Wallen. (1990). *How to design and evaluate research in education.* University of South Carolina.

Frempong, A. F. (2005). *Factors Constraining the Development and Adoption of Information and Communication Technologies among Agricultural Extension Agents in Ghana.* PhD Thesis, University of Cape Coast, Cape Coast, Ghana.

Georges, D., & Mallery, P. (2003). *SPSS for windows step by step: Asimple guide and reference* (4th ed.). Boston: Allyn`and Bacon.

Girard, B. (2001). The challenges of ITCs and rural radio. *First International Workshop on Farm Radio Broadcasting*, (pp. 19-22). Rome: Italy.

Glenn, D. I. (1992). *Determining Sample Size.* Florida, USA: IFAS, University of Florida. PEOD-6.

Gravetter, F., & Wallnau, L. B. (1991). *Statistical for the Behavioural Sciences.* New York, USA: West Publishing Company.

Guijit, I., & Shah, M. K. (1998). Waking up to power. In I. Guijit, & M. K. Shah (eds), *The Myth of Community: Gender Issues in Participatory Development* (pp. 1-23). London, UK: Intermediate Tchnology Publications.

Guijt, I. (1991). *Perpectives on participation. An inventory of institutions in Africa.* London, UK: International Institute for Environment and Development.

Guinko, S. (1984). *Végétion de la Haute Volta.* Thèse d'Etat ès Sciences Naturelles, Université de Bordeaux III.

Hailey, I. (2001). Beyond the formula: Process and practice in South Asian NGOs. In B. Cooke, & U. Kothari (eds), *Participation: The New Tyranny?* (pp. 88-101). London, UK: Zed Books.

Hornik, R. C. (1988). *Development Communication: Information, Agriculture, and Nutrition in the Third World.* Lanham, M.D.: University Press of America.

Howell, J. L., & Hebron, G. B. (2004). Agricultural landowners lack of preference for internet extension. *J. Ext., 42(6). retrieved Augustl 1 2012 from http://www.joe.org/joe/2004december/a7.php.*

Hurley, D. (2000). *!ncome generation schemes for the urban poor. Development guidelines n° 4.* Oxford, UK: OXFARM.

Igodan, C. O., Gawry, M., & Ekpere, J. A. (1990). Critical skills and competency needs of extension agent: Evidence from Nigeria. *J. Ext. Sys., 6*, 100-107.

Isaac, S., & Michael, W. (1984). *Handbook in research and evaluation* (2nd ed.). California, USA: San Diego.

Israel, G. D., & Wilson, K. M. (2006). Sources and channels of information used by educational program clients. *J. Appl. Comm., 90*(4), 55-78.

James, T. (2009). Co-Orientation Theory. In W. L. Stephen, & A. F. Karen, *Encyclopedia of communication theory* (pp. 203-204). SAGE Publications Inc.

Jamison, D., & Moock, P. R. (1984). Farmer education and farm efficiency in Nepal: The role of schooling, extension, and cognitive skills. *World Developement*, 67-86.

Javied, M. I., Khan, S. A., Chaudhry, K. M., & Malik, N. H. (1990). Evaluation of extension of extension activities of livestock and dairy development in Department in districtnToba Tek Singh. *Pak. J. Agri. Sci., 27*(8), 98-101.

Karim, A. M., & Mahboob, S. G. (1993). Subject matter officers under T&V system in Bangladesh: Influence of job-related and attitudinal factors on job performance. *J. Ext. Sys., 9*, 74-85.

Khan, M. (1991). *An analysis of the impact of extension work of hill farming development project of maize production in Tehsil Muzaffarabad, Azad Jammu and Kashmir* . M.Sc. Rural Sociology Thesis, Univ. of Agri., Faisalabad.

Khan, M. L. (2003). *Communication for Sustainable Development.* IUCN. Northern Areas Programme. Karachi, Pakistan: Rosette Printers.

Koning, N. B., Bindraban, P. S., & Essers, A. J. (2002). *Wageningen Views on Food Security.* Wageningen, Netherlands: Plant Research International.

Kothari, C. R. (2004). *Research Methodolgy: Methods and Techniques* (2nd ed.). New Delhi, India: New Age International Publishers.

Kothari, U. (2001). Power, knowledge and social contraol in participatory development. In B. Cooke, & U. Kothari (eds), *Participation: The New Tyranny?* (pp. 139-152). London, UK: Zed Books.

Krejcie, R. V., & Morgan, D. W. (1970). Detreminig sample size for research activities. *Educational and Psychological Measurement*, 607-610.

Kroma, M. (2003). Participation and Social Learning: Supporting Farmer, Innovation in Central Ghana. *Journal of International Agricultural and Extension Education, 10*(1), 43-51.

Kumar, R. (1999). *Research Methodology: A step-by-step guide for beginners.* Thousand Oaks - New Delhi, London: SAGE Publicatios.

Kumi, J. A. (2004). *Factors affecting attitudes of cocoa farmers towards replanting and decisions to replace cocoa with other crops in the Kwaebibirem district, of the Eastern Region, Ghana.* A thesis submitted in Partial fulfillment of the requirement for the degree of doctor of philosophy in Agricultural Extension, University of Cape Coast.

Lee, L., & Stewart, W. H. (1983). Land ownership and the Adoption of Minimum Tillage. *American Journal of Agricultural Economics, 65*(2), 256-264.

Leeuwis, C. (2004). *Communication for rural innovation: rethinking agricultural extension* (3rd ed.). Oxford, UK: Blackwell Publishing Ltd.

Lewis, T. (1998). Evolution of farm management information systems. *Computers and Electronics in Agriculture, 19*, 233-248.

Lionberger, H. F. (1968). *Adoption of new ideas and practices.* Iowa, USA: Iowa State University Press Ames.

Lucia, A. D., & Lepsinger, R. (1999). *The art and science of competency models: Pinpointing critical success factors in organizations.* San Francisco, usa: Jossey-Bass.

Lynne, G., Casey, C. F., Hodges, A., & Rahmani, M. (1995). Conservation technology: Adoption decisions and the theory of planned behavior. *Journal of Economic Psychology, 16*(4), 581-598.

MAHRH. (2010). *Le Système National de Vulgarisation et d'appui Conseil Agricoles.* Ouagadougou: MAHRH.

Malik, N. H., A., K. S., Chaudhry, K. M., Akbar, J., & Ahmad, M. (1991). Education as a significant variable in the application of extension methdos with special reference to demonstration techniques. *Pak. J. Agri. Sci., 28*(3), 252-254.

Mario, A., Marzia, P., Cleofe, T., & Mari, S. T. (2004). *Communication for rural development: Source book.* Rome, Italy: FAO.

Marra, M., Pannell, D. J., & Abadi Ghadim, A. (2003). The economics of risk, uncertainty and learning in the adoption of new of the new agricultural technologies: where are we on the learning curve? *Agric. Syst., 75*(2/3), 215-234.

Martin, R., & Sajilan, S. B. (1989). Teaching competencies needed by extension workers in transfering agricultural technology to farmers. *Journal of Agricultural Education*(2), 68-72.

Matson, F. W., & Montagu, A. (1967). *The human dialogue: Perspectives on communication.* New York, USA: Free Press.

Maunder, A. H. (1972). *Agricultural Extension: A reference manual.* Rome, Italy: FAO.

McMillan, J. H., & Schumacher, S. (2001). *Research in education. A conceptual indroduction* (5th ed.). New York, USA: Longman.

Meera, S. N., Jhamtani, A., & Rao, D. (2004). *Information and communication technology in agricultural development: A comparative analysis of three projects from India.* Agricultural Research & Extension Network Paper n° 135.

Mefalopulos, P. (2003). *Theory and Practice of Participatory Communication: The case of FAO Project 'Communication for Development in Southern Africa'.* PhD diss., University of Texas.

Mefalopulos, P. (2008). *Development communication sourcebook: broadening the boundaries of communication.* Washington, DC, USA: World Bank.

Mensah, K. (2006). *The dissemination and adoption of cocoa prodcution technologies in Ghana.* A thesis submitted in partial fulfillment of the requirement for the degree of Doctor of Philosophy in Agricultural Extension, University of Cape Coast.

Michels, S. (2001). *Considerations for developing acommunication plan for HIV prevention and AIDS mitigation in Sub-Saharan Africa.* Rome, Italy: FAO.

Miller, K. (2002). *Communication Theories: Pesrpectives, Process, and Contexts.* Texas: Texas A & M University.

Misra, D. C. (1997). Monitoring agricultural extension programme and resources. In B. E. Swanson, R. P. Bentz, & A. J. Sofranko, *Improving Agricultural Extension: A Reference manual.* Rome, Italy: FAO.

Mohammad, S. A. (2008). New Professionalism: Implications for Iranian Extension Agents Toward Environmentally Sound Agriculture. *Am-Euras. J. Agric. & Environ. Sci., 4*(3), 343-348.

Mohsen, T., & Reg, D. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education, 2*, 53-55.

Moose, D. (2001). People's knowledge participation and patronage: Operations and representations in rural development. In B. Cooke, & U. Kothari (eds), *Participation: The New Tyranny?* (pp. 16-35). London, UK: Zed Books.

Muhammad, S., Garforth, C., & Malik, N. H. (1995). Competence of extension field staff in using various communication channels for effective extension work. *Pak. J. Agri. Sci., 32*(4), 266-269.

Muijs, D. (2004). *Doing quantitative research in education with SPSS.* London, UK: SAGE publications Ltd.

Mundy, P. G. (1992). *Information sources of agricultural extension specialists in Indonesia.* PhD Thesis, University of Wisconsin-Madison.

Munyua, C. N., Adams, P. F., & Thomson, J. S. (2002). Designing effective linkages for sustainable agricultural extension information systems among developing countries in sub saharan Africa. *AIAEE 18th Annual Conference.* Durban, South Africa.

Nagy, G. S., Ohim, W. H., & Sawadogo, S. (1990). A case study of the purdue University Farming System Project. In H. S. Feldstein, & V. S. Poats, *Working Together. Gender analysis in Agriculture* (Vol. 1). Wageningen, The Netherlands: Kumarian Press.

Nayayan, D. (1993). *Focus on participation: Evidence from 121 rural water supply projects.* Washington, D.C., USA: World Bank.

Neufeld, V., & Norman, G. (1985). Historical perspectives on clinical competence. In N. V. Neufeld, & G. R. Norman, *Assessing clinical competence.* New York, USA: Springer.

Newcomb, T. M. (1953). An approach to the study of communicative acts. *Psychological Review, 60*, 393-404.

Njoku, J. (1990). *Determinants of Adoption of improved Oil Palm Technologies in Imo State of Nigeria.* Research Report number 10, Winrock International, Virginia, USA.

Nubkupo, K., & Galiba, M. (1999). Agricultural Intensification in West Africa: Insights from SG2000's Experience. *Agricultural Transfonnation.* Nairobi.

Nweke, F., Ezumah, H., & Spencer, D. S. (1998). *Cropping Systems and agroeconomic performance of improved cassava in a humid forest ecosystem.* RCMP Research Monograph 2. Ibadan, Nigeria: IITA Ibadan.

Oakley, P. (1991). *Projects with People: the practice of participation in rural development.* Geneva, Italy: International Labour Office.

Ocheing, O. O. (1999). The Development of Community Media in Uganda. *Promoting Community Media in Africa*, (pp. 128-240). Kampala, Uganda.

Odell, M. J. (1986). People , power and a new role for agricultural extension: Issues and options involving local participation and groups. In G. E. Jones (ed.), *Investing in Rural Extension: Strategies and Goals* (pp. 169-178). London, UK: Elsevier Applied Science Publishers.

Ofuoko, A. U., Olele, N. F., & Emah, G. N. (2008). Determinants of Adoption of Improved Fish Production Technologies among Fish Farmers in delta State, Nigeria. *J. Agric. Edu.& Ext., 14*(4), 297-306.

Ofuoku, A. U., Egho, E. O., & Enujeke, E. C. (2009). Integrated Pest Management (IPM) Adoption among Farmers in Central Agro-Ecological Zone of Delta State, Nigeria. *Advances in Biological Research, 3*(1-2), 29-33.

Ofuoku, A., Emah, G., & Itedjere, B. (2008). Information utilization among rural fish farmers in central agricultural zone of Delta State, Nigeria. *World Journal of Agricultural Sciences*, 558-564.

Ogunwale, A., & Laogan, E. (1998). Analysis of sources of farm infromations and improved technologies used by farmers in Nigeria agricultural development programmes. *J. Ext. Sys., 14*, 72-83.

Okunade, E. O. (2006). Factors Influencing Adoption of Improved Farm Practices. *J. Hum. Ecol., 19*(1), 45-49.

Okwu, O., & Daudu, S. (2011). Extension communication channels' usage and preference by farmers in Benue State, Nigeria. *Journal of Agricultural Extension and Rural Development, 3*(5), 88-94.

Oladoja, M. A., & Olusanya. (2007). Adoption of Coccidiosis Vaccines by Poultry Farmers in Ijebu Area of Ogun State, Nigeria. *International Journal of Poultry Sciences, 6*(12), 883-887.

Olawoye, J. E. (1993). Gender prioritties and issues in agricultural extension delivery. *National Conference of the Society for Agricultural Extension of Nigeria, 24 - 26 February 1993.*

Olorunnipa, Z. I. (1993). African Women and agricultural technology. *African technology forum, 6*(1), pp. 25-26.

Olowu, T. A., & Yahya, M. K. (1997). Determination of aricultural information needs of women sources: A case study of north-central Nigeria. *J. Ext. sys.*(13), 39-54.

Onyewaku, C. E. (1988). Rural development through stimulating the adoption of improved farm practices among farmers. In U. M. Igbozurike (ed), *Critical Issues in Rural Development* (pp. 206-218). Owerri: Harto Press.

Owusu, A. O., Zinnah, M. M., & Frempong, A. F. (2000). Profesionnal commpetencies of agricultural extension agents in Ghana: Perceptions of extension agents, and their supervisors in the central northen regions,. *2000 Conference proceedings confremi Bro ceenly of AIEE 16th Annual March 29 - April 1st 2000.* Virginia, USA: Arlington.

Palmer, I. (1985). *The impact of agrarian reform on women. The Population Concil West Hartfort.* Wageningen, The Netherlands: Kumarian Press.

Pathak, S., & Majumdar, A. K. (1986). Communicators' attributes: Determination of communication fidelity. *J. Ext. Sys., 3*, 55-59.

Patterson, T. (1991). *Tomorrow's Extension-learner, communicator, systemicist.* Retrieved 08 15, 2011, from http://www.joe.org/joe/1991spring/fut1.html

Perlmutter, M., & Hall, E. (1992). *Adult Development and Aging.* New York, USA: John Wiley and Sons, Inc.

Phillips, B. S. (1976). *Social Research. Strategies and Tactics.* (3rd ed.). New York, USA: Macmillan Publishing Co. Inc.

Polson, R. A., & Spencer, D. S. (1992). The technology adoption process in subsistence agriculture: the case of cassava in South western Nigeria. *IITA Research no 2*, 12-16.

Pretty, J. N. (1995). Participatory Learning for sustainable Agriculture. *World Development, 23*(8), 247-263.

Purcell, J. N., & Anderson, J. R. (1997). *Agricultural Extension and Research: Achievements and Problems in National Systems.* World Bank Operations Evaluation Study. Washington, DC, USA: World Bank.

Quispe, A. (1997). Towards privatization of agricultural extension: a case study of the Veracruz Self-Management System of production, Mexico. , 4 (03). *Journal of International Agricultural Extension Education, 4*(03), 47-54.

Raad, G., Yoder, E., & Diamond, J. (1994). Professional competencies needed by extension specialist and agent in Iran. *Journal of International Agricultural and Extension Education, 1*(1), 45-53.

Radhakrishna, R. B., & Thomson, J. S. (1996). Extension Agents' Use of Information Sources . *Journal of Extension.*

Radtke, J. (1998). *Strategic communication for nonprofit organisations: Seven steps to creating a successful plan.* New York, USA: John Wiley & Sons.

Randavay, S., & Vaughn, P. R. (1991). Self-perceived professional competencies needed and possessed by agricultural extension workers in the western region of Thailand: A multivariate technique approach. *The Informer Association for International Agriculture and Extension Education, 7*(1), 19-26.

Reynar, R., & Bruening, T. (1996). Agricultural extension issues: Perceptions of Bangladesh T&V extension personnel. *Journal of International Agricultural and Extension Education, 3*(1), 53-62.

Rogers, E. M. (1983). *Diffusion of Innovations* (3rd Ed. ed.). New York, USA: Free Press.

Rogers, E. M. (1995). *Diffusion of Innovations* (4 ed.). New York, USA: Free Press.

Röling, N., & Engel, P. (1991). IT from a knowledge perspective: concepts and issues. *Knowledge in society: The journal of Knowledge Transfert, 3*, 6-18.

Rolling, N. (1984). Appropriate opportunities as well appropriate technology. *FAO. Review on Agricultural and Development, 97*(17), 15-19.

Rutatora, D., & Rutachokozibwa, V. (1995). *An overview of the dissemination and utilization of agricultural technical information in Tanzania.* Avebury, USA.

Sabihi, M. (1978). *Perceived Professional Education Training Needs of Extension Specialists and Agents in Selected Provinces of Iran.* Columbus, USA: The Ohio State University.

Sagna, A., & Holmes, G. (1988). Perceptions of rice farmers of the national agricultural extension programme in the Casamance, Senegal. *Journal of International Agricultural Extension Education, 5*(03), 23-29.

Savile, A. H. (1965). *Extension in Rural Communities.* Oxford, UK: Oxford University Press.

Scrank, H., & Warring, J. (1983). Aging and Work Organizations. In M. Riley, B. Hess, & K. Bond, *Aging in Society.* Hillsdale,N.J.: Lawrence Erlbaum Associates.

Sekaran, U. (2003). *Research methods for business: Askill building approach* (4th ed.). New York: John Wiley and Sons INc.

Shannon, C., & Weaver, W. (1949). *The mathematical theory of communication.* Urbana, USA: University of Illinois Press.

Siddiqui, B. (1991). *A study into the adoption behaviour of apple (Melous sylvestris) growers with regard to recommended horticultural practices in tehsil Quetta.* M. Sci. (Hons.) Agri. Ext. Thesis, Univ. of Agri., Faisalabad.

Singh, A. S., & Masuku, M. B. (2014). Sampling techniques and determination of sample sizein applied statistics research: An overview. *international journal of Econmics, Commerce and management*, 1-22.

Stanovich, K. (2007). *How to think straight about psychology.* Bosto, MA: Pearson.

Stephen, L. (2009). Information Theory. In W. L. Stephen, & A. F. Karen, *Encyclopedia of communication theory* (pp. 512-513). London, USA: SAGE Publications Inc.

Sudman, S. (1976). *Applied Sampling.* New York, USA: Academic Press.

Sukaryo, D. G. (1983). Farmer participation in the training and visit system and the role of the village extension worker experience in Indon The. In M. M. Cernea, J. K. Coulter, J. F. Urussel, & T. W. Bank (Ed.), *Agricultural Extension by Training and Visit. The Asian experience.* Washington DC, USA.

Supe, S. (1998). *An introduction to extension education.* New Delhi, India: Oxford and IBH Publishing Co.Pvt. Ltd.

Swanson, B. (1984). *Agricultural Extension: Research Manual* (2nd ed.). Rome, Italy: FAO.

Swanson, B., Farner, B., & Bahal, R. (1990). The Current Status of Agricultural Extension Worldwide. In FAO, *Global Consultation on Agricultural Extension.* Rome, Italy: FAO.

Thomas , M. S. (2009). Definitions of Communication. In W. L. Stephen, & A. F. Karen, *Encyclopedia of communication theory* (pp. 295-299). London, UK: SAGE Publications Inc.

Umali, D. L., & Schwartz, L. (1994). *Public and Private Agricultural Extension: Beyond Traditional Frontiers.* World Bank Discussion Paper 236. Washington, D.C, USA: World Bank.

Umar, M. I., Lawrance, D., & Hock, K. J. (1987). Fijian radion programme: most effective in promoting agricultural development. *Journal of Extension Systems, 3*, 56-61.

UN. (2009). *11th UN Inter-Agency Round Table on Communication for Development. Washington DC, 11–13 March 2009.*

Van den Ban, A. W., & Hawkins, H. (1996). *Agricultural Extension* (2 ed.). Oxford, UK: Blackwell Science Ltd.

Vijayarajaran, K., & Singh, Y. P. (1997). Managing Human Resources with Extension. In FAO, *Improving Agricultural Extension: A Reference Manuel* (pp. 127-134). Rome, Italy: FAO.

Vikram, B., & Priya. (2009). *Business communication.* New Delhi, India: New Age International Publishers.

Warwick, D., & Lionberger, C. (1975). *The Sample survey: Theory and practice.* New York, USA: McGraw Hill Book Campany.

Weidemann, C. (1987). Designing agricultural extension for women in developing countries. In W. M. Rivera, & S. G. Schram (eds), *Agricultural Extension Worldwide: Issues, Practices and Emerging Priorities* (pp. 175-198). London, UK: Croom Helm.

Weisbord, M. R., & Janff, S. (1995). *Future Search. An Action Guide to Finding Common Ground in Organizations and Communities.* San Francisco, USA: Berrett-Koehler Publishers.

Wete, F. (1991). New technology for transferring agricultural information. In W. M. Rivera, & D. J. Gustafson (eds), *Agricultural extension worldwide: Institutional evolution and forces for change.* Amsterdam, the Netherlands: Elsevier Science publications.

Wijeratne, M. (1989). Knowledge storage and retrieval: Two important processes in dissemination system. *J. Ext. Sys., 5*, 54-59.

William, F. E. (2009). *Twenty-first Century Communication: A reference Handbook.* Washington DC: SAGE Publications Inc.

Willis, S., & Dubin, S. (1990). *Maintaining Professional Competence.* San Francisco, USA: Jossey-Bass.

Yahaya, M. K. (2001). Integrated multi - media strategy for development support communication: Lessons from Nigeria. *Journal of Development Communication, 1*(2), 53-72.

Yahaya, M. K. (2003). *Development Communication: Lessons from change and social engineering projects.* Ibadan, Nigeria: Corporate Graphics Limited.

Zijp, W. (1996). *Promoting pluralism. Presentation to the extension workshop: Alternative mechanisms for funding and delivering extension.* Washington, DC, USA: World Bank.

Zijp, W. (1998). Extension: Empowerment through communication. In I. R. Wallace (ed), *Rural knowledge systems for the 21st century: Rural extension in western, central and eastern Europe.* UK: AERDD, The University of Reading.

Zijp, W. (1998). *Unleashing the Potential. Changing the Way the World Bank Thinks about and Supports Agricultural Extension.* Washington, DC: USA: World Bank.

APPENDICES

Appendix A: Questionnaire for Agricultural Extension Agents

A. Personal information

1. Name of the respondent (optional)_____
2. Position held_____
3. Age of the respondent (years)_____
4. Sex of the respondent: Male:_____Female_____
5. What is your total job experience as agricultural extension agent? (in years)__
6. Please indicate your professional level achieved?
   - (1) Technician or Technician agent
   - (2) Superior Technician
   - (3) Superior Specialised Technician
   - (4) Engineer
   - (5) Others (please specify)
7. What is your highest degree earned in formal education?
   - (1) CEP
   - (2) BEPC
   - (3) BAC
   - (4) DEUG
   - (5) Licence
   - (6) Maîtrise
   - (7) Ingeneer
   - (8) PhD
8. What is your family background? Farming_____Non farming_____
9. Did you aspire during student life to be an agricultural agent?
   Yes____No___
10. If no what was your aspiration at that time?_____
11. What is your rural/urban background? Rural_____Urban_____
12. Do you have any personal experience in farming at your personnel credit?
    Yes_____No_____
13. If yes please indicate the number of years in farming_____
14. Please indicate your field of specialisation
    - (1) Crop Science
    - (2) Animal husbandry
    - (3) Forestry and environmenial science
15. Did you attend any training/refresher course during your job as agricultural agent? Yes_____No_____
16. If yes, how many trainings/refresher courses did you attend? Please indicate number_____

17. What was the probable time duration on an average training/refresher course? _____
18. What was/were this/these training(s) about?_____

B. Importance and characteristics of sources of information

19. What is the importance of different sources of information in disseminating innovative knowledge? Use the following scale 1=Very lowly important, 2=Fairly important, 3=Important, 4=Very important, 5=Extremely important.

Sources of information	Rating				
	1	2	3	4	5
Professional journals (domestic)					
Field trips					
Colleague in your field					
Courses/seminars					
Specialist books					
Scientists					
Professional journals (foreign)					
Extension authority					
Publications of extension journals					
Chambers of agriculture					
Superiors					

20. How would you rate relationship with others shareholders in the extension system?

	Rating				
	Poor	Fair	Satisfactory	Good	Excellent
Farmers					
Colleagues					
Superiors					
Other development partners					

C. Professional and technical information

21. How would you rate the efficacy of extension messages you communicate to the farmers?

Extension messages	Rating				
	Very Low	Low	Moderate	High	Very High
Relevant					
Specific					
Meaningful					
Simple					
Attractive					
Comprehensive					
Problem oriented					
Timely					
Applicable					
Technically correct					
Complete					
Concise					
Conveyed in local language					
Presented in a logical sequence					

22. How would you the extent of use of the following communication methods? Use the following rating scale 1=Very lowly frequent, 2=Lowly frequent, 3=Moderately frequent, 4=Highly frequent, 5=Very highly frequent.

Communication techniques	Rating				
	1	2	3	4	5
Farm visit					
Home visit					
Methods demonstration					
Result(s) demonstration					
Lecture meetings					
Discussions meetings					
Radio					
Television					
Exhibitions					
Campaigns					
Office calls					
ICT					

23. How would you rate the following communication techniques on the basis of their effectiveness in terms of achieving yours in extension delivery? Use the following rating scale 1=Very lowly effective, 2=Lowly effective, 3=Effective, 4= Highly effective, 5=Very highly effective.

Communication techniques	Rating				
	1	2	3	4	5
Farm visit					
Home visit					
Methods demonstration					
Result(s) demonstration					
Lecture meetings					
Discussions meetings					
Radio					
Television					
Exhibitions					
Campaigns					
Office calls					
ICT					

24. What are the points, which you consider important for the improvement of effectiveness of communication techniques?

Communication techniques	Suggested points for technique improvement
Farm visit	
Home visit	
Methods demonstration	
Result(s) demonstration	
Lecture meetings	
Discussions meetings	
Radio	
Television	
Exhibitions	
Campaigns	
Office calls	
ICT	

25. What are the points, which you consider important for the improvement of the communication interventions of AEAs with farmers?

a) _____

b) _____

c) _____

26. How would you rate farmers' participation in extension activities?

Communication techniques	Rating scale				
	Very Low	Low	Moderate	High	Very High
Farm visit					
Home visit					
Methods demonstration					
Result(s) demonstration					
Lecture meetings					
Discussions meetings					
Exhibitions					
Campaigns					

27. What are the reasons for low participation of farmers in extension activities?

a) _____

b) _____

c) _____

28. Do you need refresher course or training to better perform you job?

Yes No

29. List the areas of competence you need training or refresher course

a) _____

b) _____

c) _____

Thanks for your valuable contribution to the study!

Appendix B: Interview schedule for farmer respondents

A. Socio-economic characteristics

1. Name of the respondent (optional).....
2. Name of the department.....
3. Age of the respondents (in years).....
4. Sex.....

(3) Level of education (1) Primary___(2) Secondary____(3) university_____
(4) Non formal education_____(6) Other_____

5. Years of experience in farming.....
6. Social status (1) Native_____(2) Migrant_____
7. Marital status
   - (1) Married
   - (2) Single
   - (3) Widow/widower
   - (4) Divorced
8. Tenure of land (1) Owner__(2) Tenant__ (3) Both owner and tenant____
9. Ethnical group.....

B. Information Communication Sources

10. How would you rate the extent of use of these information communications sources? Use the following 1=Very lowly frequent, 2=Lowly frequent, 3=Moderately frequent, 4=Highly frequent, 5=Very highly frequent.

Sources	Rating Scale				
	1	2	3	4	5
AEAs					
Private agencies					
Fellow farmers					
Radio					
Television					
Printed material					
Any other (specify)					

C. Effectiveness of Information Communication Methods

11. How would you rate your level of satisfaction of extension messages received from AEAs? Use the following scale 0=Not at all satisfactory, 1=Slightly satisfactory, 2=Moderate satisfactory, 3=Satisfactory, 4=Very satisfactory, 5=Extremely satisfactory.

Message aspects	Rating Scale				
	1	2	3	4	5
Language					
1. Easy to understand					
2. Simple to understand					
3. Clear					
4. Use of local language					
Contents					
1. Timeliness					
2. Completeness					
3. Correctness					
4. Applicability					
5. Technicality appropriate					
6. Concise					
Presentation					
1. Persuasive					
2. Use of gestures					
3. Sequence of information					
4. Step by step presentation clearly and slowly					
5. Ends with summarising of the message					

11. How would you rate the extent of use of the following communication methods/media used by AEAs? Use the following scale 1=Very lowly frequent, 2=Lowly frequent, 3=Moderately frequent, 4=Highly frequent, 5=Very highly frequent.

Communication methods/media	Rating Scale				
	1	2	3	4	5
1.Farm and home visit					
2.Methods demonstration					
3.Result(s) demonstration					
4.Lecture meetings					
5.Discussions meetings					
6.Radio					
7.Television					
8.Exhibitions					
9.Campaigns					
10. Signboards/slogan					
11. ICT					

12. How effective are the following communication methods/media used by AEAs to meet your goals of farming? Use the following scale 1=Very lowly effective, 2=Lowly effective, 3=Effective, 4= Highly effective, 5=Very highly effective.

Communication methods/media	Rating Scale				
	1	2	3	4	5
1. Farm and home visit					
2. Methods demonstration					
3. Result(s) demonstration					
4. Lecture meetings					
5. Discussions meetings					
6. Radio					
7. Television					
8. Exhibitions					
9. Campaigns					
10. Signboards/slogan					
11. ICT					

D. Competencies in the use of various communications methods

13. How would you rate the competencies of AEAs in the communication of extension information? Use the following scale 1=Poor, 2=Fair. 3=Satisfactory, 4=Good, 5=Excellent.

Sources	Rating Scale				
	1	2	3	4	5
1. Technically competent					
2. Professionally competent					
3. Honest					
4. Dedicated					
5. Intelligent					
6. Knowledgeable					
7. Flexible in the delivery					
8. Adaptability of information to farm situation					
9. Ambitious to the delivery					
10. Self confidence					
11. Sociable					
12. Trustworthy					
13. Credible					

14. How would you rate the communication methods/media used by AEAs with regard to the basic principles observed by them? Use the following scale 1=Very low, 2=Low, 3=Moderate, 4=High, 5=Very high.

Communication methods/media	Rating Scale				
	1	2	3	4	5
I. Farm and home visit					
Choice of appropriate time					
Choice of appropriate place					
Made with specific purpose in mind					
Farmers are informed in advance					
Arrangement of all the needed materials/ equipment are made					
Punctuality is observed while conducting the visits					
Friendly relationships developed with farmers					
Farmers' problems are discussed					
Feasible solutions of the problems are suggested					

Farmers are giving freedom in decision making					
Farmers interest is maintained throughout					
Achievements of the visit are recorded					
Unsolved problem are noted down					
Demands (if any) of the farmer are recorded					
Proper follow-up of the visit					
II. Methods demonstration					
Choice of appropriate time					
Choice of appropriate place					
Arrangements about needed materials/equipment					
Briefing about the demonstration before its conducts					
Step by step demonstration clearly and slowly					
Use of simple and clear words for explanation					
Provision of opportunity of farmers to practice					
Distribution of supplemental materials among the participants					
Summarising the demonstration at the end					

III. Result(s) demonstration					
Choice of appropriate time					
Choice of appropriate place					
Arrangements about needed materials/equipments					
Cooperation of the demonstrator					
Competence of the demonstrator					
Involvement of farmers at planning period					
Participation of farmers at different stages					
Arrangements of farmers' meetings at the time of comparison					
Summarising the demonstration at the end					
Publication of results					

IV. Lecture meetings					
Choice of appropriate time					
Choice of appropriate place					
Based on the subject of interest to the audience					
Familiar and correct word are used					
Verbal message is completed with gestures					
Lecture is well organised and presented in logical sequence					
Distribution of supplemental materials among the participants					
Its ends by giving a summary and drawing conclusion					
V. Discussion meetings					
Selection of suitable time					
Selection of appropriate place					
Use of audio-visual equipment (if needed)					
Availability of subject matter specialist					
Involvement of participants in discussion					
Not dominated by few influential farmers					
Seating arrangements allow all the participant to see the expressions of each other					
Discussion key points summarised at the end					

VII. Radio					
Agri. Programmes are broad-cast at proper time					
The duration of broad-cast is appropriate					
Radio broadcast are relevant to farmers' problems					
Radio broad-cast provide complete and comprehensive information to the farmers					
Radio broad-cast avoid unnecessary details					

VIII. Television					
Agri. Programmes telecast through television are relevant to problems of audience					
Farmers get complete and comprehensive information through television					
Unnecessary details are avoided					
Programmes are telecast at proper time					
Appropriate duration of agricultural programmes					
Skilful and competent use of gestures					
Consideration of visual aspects and colour contrast					
Visuals are explained slowly, simply and clearly					

IX. Exhibitions					
Arranged at proper time					
Choice of most appropriate time					
Always focused on farmers' real needs					
Time, venue and purpose known before					
Adequate arrangements are made about necessary materials and equipment					
Exhibits are arranged in a proper sequence					
All relevant agencies are involved					
Information in the form of literature is available to distribute among the visitors					

X. Campaigns					
Time of campaigns is suitable					
Appropriate duration of campaigns					
Local farmers involved in planning and execution of campaigns					
Farmers informed about campaigns activities					
Most appropriate teaching methods are used					
Needed materials and equipment arranged well in time					
Trained and competent staff are involved in the campaigns					

XI. Signboards/slogans					
Are well prepared and attract the people					
Displayed at suitable place					
Conveyed latest / needed information					
Message conveyed is clear and easy to understand					
Colour scheme is unique and attractive					

C. Farmers acquaintance and interaction with AEAs

15. What is the nature of your acquaintance with AEA working in your areas?

    b. Only by name
    c. Only by face
    d. Both by name and face
    e. Neither by name nor by face

16. Do you report your problems relating to extension to AEA?
    Yes__No___

17. If yes, how often?

Frequency of contact	
1. Weekly	
2. Fortnightly	
3. Monthly	
4. Quarterly	
5. Twice a year	
6. Yearly	
7. More	

18. If No, what are the reasons?

a.....

b.....

c.....

19. How would you rate the AEA on the basis of their cooperation extended to solve your problems? 1=Poor, 2=fair, 3=satisfactory, 4=good, 5=excellent

D. Awareness Participation and Adoption

20. Awareness and adoption of recommended agricultural practices

	Awareness	adoption	Raisons for non adoption
Use of improved varieties			
Land preparation			
Sowing practices			
Farm management practices			
Plant protection practices			
Harvesting practices			
Post-harvesting practices			
Selection of suitable of land			
Use of irrigation			
Use of fertilizer			
Animals breeding methods			

21. How would you rate your participation in different extension activities undertaken by AEA? Use the following scale 1=Very low, 2=Low, 3=Moderate, 4=High, 5=Very high.

Activities	Rating Scale				
	1	2	3	4	5
1. Farm and home visit					
2. Methods demonstration					
3. Result(s) demonstration					
4. meetings					
5. Discussions meetings					
6. Exhibitions					
7. Campaigns					
8. Signboards/slogan					

22. How would you rate the AEA of your area in general? Use the following scale 1=Poor, 2=Fair, 3=Satisfactory, 4=Good and 5=Excellent.

Characteristics	Rating Scale				
	1	2	3	4	5
1. Personality					
2. Knowledge level					
3. Communication skills					
4. Attitude towards farmers					
5. Self confidence					
6. Dutifulness					
7. Leadership qualities					
8. Decision making					

23. What measures would you suggest to improve the communication interventions of AEAs?

_____

_____

_____

24. Are you satisfied with your existing yield level? Yes_____No_____

25. If not satisfied with the existing yield level which of the following factors are responsible for low yield?

Factors	Tick one or more
High cost of fertiliser	
Low price of produce	
Poor soil	
Lack of financial resources	
Non availability of chemicals	
Inadequate technical skill	
Inefficient communication	
Poor cooperation of AEAs	
Inappropriate time of conducted extension activities	
Poor of awareness of technologies	
Lack of interest in conducted extension activities	

End of the schedule!

Appendix C: Davis Convention for describing magnitude of correlation co-efficient

	Magnitude of Correlation Co-efficient	Description
1	1.0	Perfect
2	0.7 - 0.99	Very High
3	0.50 - 0.69	Substantial
4	0.30 - 0.49	Moderate
5	0.10 - 0.29	Low
6	0.01 - 0.09	Negligible

Source: Davis (1971).