

**FACTORS INFLUENCING THE USE OF CERTAIN AGRICULTURAL  
EXTENSION TEACHING METHODS FOR INCREASED ADOPTION  
OF INNOVATIONS IN MVOMERO AND  
MOROGORO DISTRICTS**

**BY**

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REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN  
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**ABSTRACT**

Specifically, the objectives of the study were to identify the commonly used extension-teaching methods by ALEOs, to examine criteria that ALEOs used to select certain extension-teaching methods, and to assess factors that hindered ALEOs to select certain extension methods. The population included all ALEOs working in the selected wards of Morogoro and Mvomero districts and smallholder farmers. Total numbers of respondents were 50 ALEOs, 25 from Mvomero and 25 from Morogoro District selected purposively, and 100 farmers, where 50 were from Mvomero and 50 from Morogoro District selected using table of random numbers. Data were collected using personal interviews, non-participant observation, and focus group discussions. Descriptive statistics such as frequencies, and cross tabulations were used to explain and compare field information. Combination of individual and group agricultural extension teaching methods was commonly used to deliver agricultural information to farmers. The commonly used methods included discussion meetings, method demonstration and result demonstrations. ALEO considered availability of funds from coordinating institution, available time for farmers to participate and cultural context when selecting extension teaching methods. Farmers suggested considering easiness for themselves to understand, cost of preparation and delivery, time spent when attending extension sessions, and farmer participation. The study found that unavailability of teaching media, lack of funds and poor working environment hindered ALEOs from selecting some agricultural extension teaching methods. This study recommends that ALEOs should incorporate various agricultural extension teaching methods, and use methodologies that increase the interactive participation of smallholder farmers.

However, it is imperative that individual countries make situational analyses of the social, political, technical, economic and cultural conditions prevalent in their areas before adopting any extension teaching method.

**DECLARATION**

1, HELLEN KOBERO, do hereby declare to the Senate of Sokoine University of Agriculture that this dissertation is my own original work, and has neither been submitted nor being concurrently submitted for degree award in any other institution.

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**Hellen Kobero**  
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**Date**

The above declaration is confirmed

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**(Supervisor)**

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**Date**

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## **DEDICATION**

This work is dedicated to Lord; Jesus Christ who's Blessings gave me physical, mental and moral strength to accomplish this important task.

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## LIST OF ABBREVIATION AND SYMBOLS

ALEOs	-	Agricultural and Livestock Extension Officers
FAO	-	Food and Agriculture Organization
GAP	-	Good Agricultural Practice
GDP	-	Gross Domestic Product
LGAs	-	Local Government Authorities
MVIWATA	-	<i>Mtandao wa Vikundi vya Wakulima Tanzania</i>
NGO	-	Non Governmental Organization
NSGRP	-	National Strategy for Growth and Reduction of Poverty
PANTIL	-	Programme for Agriculture and Natural Resource Transformation in Livelihood
PRA	-	Participatory Rural Appraisal
SPAT	-	Small Plot Adoption Techniques
SPSS	-	Statistical Package for Social Science
T and V	-	Training and Visit
TV	-	Television
UMADEP	-	Uluguru Mountains Agricultural Development Project
WOPATA	-	Women and Poverty Alleviation in Tanzania

## CHAPTER ONE

### 1.0 INTRODUCTION

#### 1.1 Background Information

Agriculture sector plays a central role in the economy of many developing countries. In Tanzania, the agricultural sector contributes more than 50 percent of the country's GDP, about 60 percent of export earnings, employs about 85 percent of the workforce, and provides raw materials for the industries (Lupatu, 1995). With the exception of few private and parastatal firms, most of farms are small averaging 1.2 hectares per household. Smallholder farmers contribute about 90 percent of the food supplies, 75 percent of export earnings and 80 percent of the value of marketed grains (Lupatu, 1995).

Despite agriculture being the backbone to Tanzania's economy, agricultural production per capita in Tanzania has been declining over the years (Lupatu, 1995; Kauzeni, 1989; Mattee, 1989). Although there has been a recent upturn in agricultural production, this has not proven to be self-sustaining and satisfactory (Mattee, 1994). Among the many factors for poor agricultural productivity, one has been due to ineffective agricultural extension services to farmers. The extension services have been perceived as being unable to enhance farmers' adoption of improved farming practices (Lupatu, 1995; Kauzeni, 1989; Mattee, 1989).

According to Van den Ban and Hawkins (1996), extension involves communication of information to help people form sound opinions and make good decisions. Extension helps farmers analyze their present and expected future situations, helps



farmers acquire specific knowledge, and increases farmers' awareness of their problems (Van den Ban and Hawkins, 1996). Moreover agricultural extension programmes can provide much-needed help in the form of practical field-advice, innovations from scientists and practitioners, and sound commodity-marketing principles (Swanson *et al.*, 1997).

According to Jones (1997) cited in Meera *et al.* (2004), agricultural extension in the current scenario of a rapidly changing world has been recognized as an essential mechanism for delivering knowledge (information) and advice as an input for modern farming. An efficient extension organization needs to develop the capability of responding to changes in relation to its environment (Vijayaragaran and Singh, 1996). According to Roling (1995) cited by Van den Ban and Hawkins (2004), extension is a professional communication intervention deployed by institutions to induce change in a voluntary behaviour among farmers.

FAO (1997) conceptualizes four new roles of extension as: to help rural families get organized that is empowerment; community organizing; human resource development; and problem solving education role. In Tanzania, the Ministry of Agriculture and Food Security reported that agricultural extension aims at improving the productivity of agricultural systems, raising the incomes of farm families and improving their life (MAFS, 2002). Rutatora and Rutachokoziwa (1995) reported that the role of agricultural extension has been and still is seen in the light of promoting increased agricultural productivity by disseminating improved agricultural technologies to farmers. Extension education is the primary

process through which the farmers can learn the reason for change, the value of change, and the results that can be achieved through change (Okunade, 2007). Extension is a type of education that is functional rather than formal and its main task is to convey meaningful information to the farmers. It is the major source for making farmers aware of alternatives from where they can choose the most desirable as well as how the different methods that exist for carrying out their farming and other operations. Extension is an on-going process of getting useful information to people. It therefore, assists the farmers to acquire necessary knowledge, skill and attitude to utilize this information or technology effectively with the ultimate aim of raising their efficiency and achieving higher level of living (Okunade, 2007).

A great deal of responsibility for bringing about farmers' change rests on the shoulders of ALEOs (Adams, 1982). Recent experience with farming systems research shows that the primary task of the ALEOs is to understand the problems, opinions, aims and aspiration of the farmers among whom they are working. Adams, 1982; Schwartz, 1994; Mattee, 1989 found that ALEOs helps farmers to increase the productivity of their farms and improve their living standards. ALEOs have many roles including an advisory role, a technician and a middleman operating between agricultural research institutions and the farm families. Is a change agent helping farmers to identify their problems and find their own solution. However, Schwartz (1994) continued to postulate that in his/her initial contacts with farmers, the ALEOs should select some simple, low cost projects which will almost certainly succeed and which will give farmers confidence in his/her ability to guide them

(e.g. more suitable crop spacing and/or timing of husbandry operations). The best ALEOs are those who are interested in farmers and want to see them succeeded in making a good living, not those who are mainly concerned with carrying out government orders. Mattee and Mvena (1988) contented that the ALEO must not only be able to recall important details, but also be able to understand the practices he/she is recommending, explaining them, and persuade farmers to adopt them. Similarly, Schwartz (1994) supported that ALEOs is the only person who can motivate farmers to adopt the new technologies and change their methods of farming. The ALEOs therefore must be able to communicate properly and convince the clientele.

The major role of extension worker in many countries in the past was seen to be transfer of new technologies from research centers to farmers (Van den Ban and Hawkins, 1996). However, currently the role of extension personnel is provision of relevant, current and sufficient information as well as linking farmers with different sources of information. Samuel (2000), cited by Lemma (2007) also support this idea that the extension agent is responsible for providing knowledge and information that will help farmers to acquire new knowledge and skills encourage them to make decisions. For this, extension agent should have good professional and technical competencies, because it is the most important and crucial inputs for the extension system (Mattee and Mvena, 1988). Furthermore, Van den Ban and Hawkins (1996), explicitly pointed out that the role of ALEOs is to help farmers form sound opinion and to make good decisions by communicating with them and providing with information they need. Rogers (1983), also has indicated that one of

the main roles of a change agent is to facilitate the flow of information from a change agency to an audience of clients. However, revolutionary changes in communication technology have dramatically increased the speed and quality of information transfer and changed the role of extension personnel (Adams, 1982). However, the failure of the extension system to influence farmers to adopt improved technologies has been pointed out as a major cause of poor performance of the agricultural sector (Mattee, 1989).

According to the Ministry of Agriculture and Food Security (MAFS, 2002), other factors contributing to poor performance of extension services include “fragmentation, duplication and overlapping messages flowing from the extension personnel, and the extension personnel lack of supervision and doing other responsibilities resulting in role conflict and dilution of efforts. The extension system has neglected certain category of producers such as youth and women, and technologies promoted by researchers in some areas have not been appropriate to farmers, which have weakened linkages between research and extension (Ministry of Agriculture and Food Security, 2002).

Principally, different authors have different ideas as to why the extension system is performing poorly. According to Belay (2002) it is due to the fact that appropriate technologies and information to be extended to farmers is not adequately available. There is shortage of extension personnel to reach large numbers of farmers in wide geographical areas and lack of transport facilities to reach farmers effectively (Belay, 2003; Habtemariam, 2004). Yet importantly, extension personnel lack

adequate practical training in communication methods and communication skills (Adams, 1982; Belay, 2003). Moreover, poor extension planning and monitoring system, inadequate participation of farmers in the process of agricultural development, focusing mainly on technology transfer and less on problem solving skills have constrained the extension system in the country (Belay, 2002; Habtemariam, 2004).

## **1.2 Extension Teaching Methods**

Farmers cannot successfully adopt new technologies unless they are aware of it and learn how to incorporate it in their farming system. There are various extension-teaching methods used for transferring technical information, skills and knowledge to farmers (Supe, 1983). No single method is better than the other and, therefore, a number of methods should be used. There are three main methods grouped according to the number and nature of the contacts inherent in their use (Supe, 1983). First, are the individual-contact methods, which include telephone calls, personal letters, farm and home visits and office calls. Here the extension worker interacts with farmers using individual methods of teaching (Supe, 1983). These methods are time-consuming, but are important for the extension workers to learn about farmers, how they think, what their needs are, and how they carry on their work. Through the use of these methods extension worker's credibility and integrity can be nurtured (Supe, 1983). These methods are widely used and have been found to be highly effective when dealing with illiterate farmers (Van den Ban and Hawkins, 1988).

According to Lewis (1980), personal contact represents the most desirable method because of face to face interchange of ideas. Rogers (1983), elaborates the importance of interpersonal methods that it is more effective in persuading an individual to adopt a new idea.

Second, the group-contact teaching methods, which are frequently used in extension work than individual methods. These include those that people or farmers are contacted in a group consisting of 20 to 25 persons. They include methods and result demonstration, national demonstrations, leader training meetings, conference and discussion meetings, workshops and field trips (Rogers, 1983). By group methods an extension worker can reach more farmers than is possible by using individual methods alone. It is easy to get feedback to the extension agent and there is also greater interaction between the farmers themselves (Rogers, 1983). Group methods have proved to be the most effective methods for improving knowledge to farmers (Keregero, 1987; Kauzeni, 1989).

Third, the mass methods such as radio, newspapers, magazines, television, and motion pictures are least expensive to carry messages to large number of people quickly. These methods are particularly useful in making large number of people aware of new ideas and practices; stimulate farmers' interest, or alerting them to sudden emergencies (Rogers, 1983 ). Rogers (1983) asserts that mass methods are all means of transmitting messages that involve a mass medium (radio, newspaper, and others), which enable a source of one or a few individuals to reach an audience of many.

Researchers found that, in Tanzania some agricultural extension teaching methods are highly used than the others. According to Monge and Contractor (1999), person to person is the dominant communication system followed by group methods and mass methods with the support of communication media, information dissemination by printed materials, radio, and Television programs. In the same line Lewis (1980) insisted personal contact to be the most desirable method because of the face to face interchange of ideas, Rogers (1983), elaborates the importance of interpersonal methods that it is more effective in persuading an individual to adopt a new idea. Whereas, mass methods are all the means of transmitting messages that involve a mass medium (radio, TV, and newspaper), which enable a source of one or a few individuals to reach an audience of many.

Empirical studies in Ethiopia reveal that extension workers have utilized different communication methods and media to communicate with farmers. For instance, extension approaches in the 1950s, due to few numbers of ALEOs, agents have been communicating with farmers through demonstration and youth clubs to provide extension services (Belay, 2003; Habtemariam, 2004). Whereas, during CCP, beside demonstration, farmers' field days and individual contact through model farmers are the dominant communication methods (Habtemariam, 2004). Currently the extension methods that have been used include individual (farm and home visits), group (mainly demonstration and field days) and mass communication methods (radio, TV, posters and newspapers) (EEA/EEPRI, 2006)

### **1.3 Problem Statement**

In Tanzania, the agricultural sector has not shown significant improvement despite the government's investment and donor's support in it. Various factors have contributed to the poor agricultural performance in the country such as the failure of extension system to influence farmers to adopt improved technologies due to poor delivery of extension services to smallholders. The other problem is less use of extension teaching methods by extension officers to disseminate innovations to the farmers and farmers have not been involved in evaluation and selection of extension teaching methods, this study enable participatory identification of appropriate extension teaching methods. In view of the above, extension officers have not used the available extension teaching methods to ensure effective learning hence adoption of new knowledge and skills by the farmers.

### **1.4 Justification of the Study**

Agricultural development is much influenced by the extension services, which has been on the forefront of transfer of modern agricultural technologies. However, much still needs to be done to promote better and more effective methods of technology transfer, in order to achieve increased output and higher incomes for small-scale farmers. Currently, extension officers have conducted little studies to identify factors that influence selection and the use of extension teaching methods, this study will assist agriculture and livestock extension planners and practitioners to recommend best extension teaching methods to use in teaching farmers for increased adoption of innovations. Moreover, knowing factors that influence the use of extension teaching methods will assist in designing effective agricultural



extension programs for increasing adoption of innovations for increased agricultural production. This study will also contribute to the national initiatives for improving extension services in line with the National Strategy for Growth and Reduction of Poverty that stipulates about increasing communication and collaboration in delivery of extension services to the farmers.

## **1.5 Study Objectives**

### **1.5.1 General objective**

This study was set to investigate factors influencing the use of certain extension teaching methods for increased adoption of innovations.

### **1.5.2 Specific objectives**

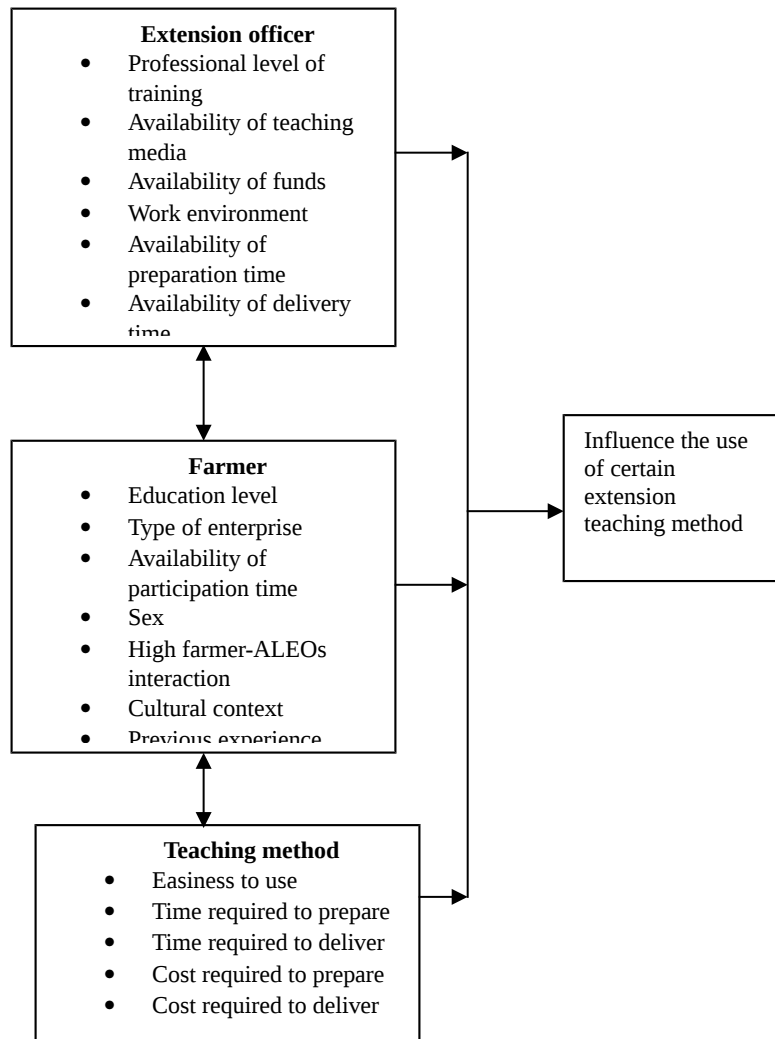
- i. To identify the commonly used extension-teaching methods by extension officers.
- ii. To examine criteria that extension officers used to select certain extension-teaching methods.
- iii. To assess factors that hinders the selection of used extension-teaching methods.

## **1.6 Hypothesis**

The use of extension teaching methods by extension officers is influenced by factors inherent within farmers, extension officers and extension teaching methods themselves.

## **1.7 Conceptual Framework**

This study conceptualizes that there are three players: the agricultural extension officers, the farmers, and the teaching methods themselves. Professional training of extension officers in agriculture, available media of delivery, availability of time to prepare, the environment and availability of funds guide the extension officers' use of certain extension methods. Also, the use of certain extension method is influenced by the teaching method itself, which depends on the time required to prepare, delivery time, cost required to prepare and deliver. At the farmers' level, the use of certain extension teaching methods is guided by education level of farmers, type and size of enterprises, availability of participation time, previous experience and cultural context of farmers (Fig. 1).



**Figure 1: Conceptual framework of factors influencing the use of certain extension teaching methods**

## CHAPTER TWO

### 2.0 LITERATURE REVIEW

#### Overview

The extension process involves information, and much of an extension officer job is to communicate agricultural information. For this reasons, extension officer must understand where and how to use various communication media and extension teaching methods available to them to reach more clients more frequently, and to give extension efforts more impact (Blackburn, 1984). Studies show that the more different extension teaching methods are used, the more people change their practice (Maunder, 1973). The more exposures per individual to a new practice the more likely the person will find his preferred method of learning (Maunder, 1973).

#### 2.1 Common Extension Teaching Methods

In achieving its broad aim, extension uses a variety of teaching methods in training the rural people with the notion that the more the variety of ways a topic is presented and practiced, the quicker the people tend to grasp the subject matter (Okunade, 2007). Extension teaching methods therefore are tools used by the extension workers to achieve their set goals or objectives as a teacher. These are special tools needed to appeal to the desire of farmers to change (Okunade, 2007). Gaforth (1993), classified extension teaching methods into three broad classes in terms of area of coverage as follows: (a) Individual method; (b) Group method; and (c) Mass method. Individual contact methods usually are superior for conviction and action because of face-to-face relationship of teacher and learner, for example farm and home visits, office calls, and telephone calls. [Farm](#) and home visits

constitute the direct or face-to-face contact by an extension officer with the farmer or the members of his family. During these visits, information is exchanged or discussed. The visits may be to get acquainted with the problems of the farmers, or to organizational purposes. Such visits provide an opportunity for a two-way communication (Okunade, 2007; Gaforth, 1993). Experience of Kenya shows that, the individual approach has been most favored in the past and has been used often with progressive farmers. Where manpower and other resources were abundant, the individual approach was most suitable (Schwartz and Kampen, 1992).

Group contact methods are usually well suited to bringing specific information about practices, helping to move the individual through the desire for conviction and sometimes to taking action. Examples are method demonstration, Small Plot Adoption Techniques (SPAT), result demonstration, general meeting, lectures, group discussion and excursions (William *et al.*, 1984; Okunade, 2007; Gaforth, 1993). Result demonstration is an educational test to prove the advantages of recommended practices and to demonstrate their applicability to the local condition. It is conducted by a farmer under the direct supervision of an extension worker. Result demonstration is designed to teach others, in addition to the person who conducts the demonstration. It helps the farmers to learn by seeing and doing. This method can be used to show the superiority of practices of seeds. Method demonstration is used to show the technique of doing things or carrying out new practices. e.g. preparing a nursery-bed, treating seed with [insecticides and fungicides](#), line-sowing, taking a [soil](#) sample, and grafting fruit trees. Method demonstration is usually used for groups of people (William *et al.*, 1984; Okunade,

2007; Gaforth, 1993). In Tanzania, evaluation of the training activities for urban farmers in Dar es Salaam revealed that seminars on simple adaptive technologies are useful element in urban horticulture; demonstration plots create awareness and interest in urban agriculture and should be in place well in advance of seminars so that farmers may learn from practical experience (Suzuki, 2000). Group discussions; since all the farmers cannot be contacted by extension workers individually because of their large number, it is convenient and feasible to contact them in groups. Group discussions are used to encourage and stimulate the people to learn more about the problems that concern the community through discussion. It is a good method of involving the local people in developing local leadership and in deciding on a plan of action in a democratic way (William *et al.*, 1984; Okunade, 2007; Gaforth, 1993).

Exhibitions, is a systematic display of information, actual specimens, models, posters, photographs, and charts in a logical sequence. Exhibitions are organized for arousing the interest of the visitors in the things displayed. It is one of the best media for reaching a large number of people, especially illiterate and semi-illiterate people. Exhibitions are used for a wide range of topics, such as planning a model village, demonstrating improved irrigation practices, [soil](#) conservation methods, showing high-yielding varieties of seeds and [plants](#), new agricultural implements and the best products of village industries. According to William *et al.* (1984), Okunade (2007), and Gaforth (1993) another type of group extension teaching method is general meetings, these are usually held for passing on certain information to the people for future action. Extension workers give lectures to the

people on certain pre-selected items of work. Tours and [field](#) days, they are used to convince farmers and to provide them with an opportunity of seeing the results of new practices, demonstration skills, and new implements and to give them an idea regarding the suitability and application of these things in their own area. Such tours may also be arranged to enable the rural people to visit places and institutions connected with the problems of rural life, such as research institutions, training institutions, [agricultural universities](#), model villages, areas of advanced developments, leading private [farms](#), exhibitions, and agricultural and cattle fairs (William *et al.*, 1984; Okunade, 2007; Gaforth, 1993). Motion-pictures (movies) are effective tool for arousing interest among the people, because they involve seeing, hearing, and action. Cultural programmes, such as folk-songs and dramas, are used as an effective medium of communicating the message of development programmes. Dramatization of a theme or story creates a lively interest among the audience. Folk-songs and dances related to the subjects of local interest and importance, when acted on the stage, bring them home more forcefully, message is understood by the audience hence adoption of innovation (Okunade, 1999; William *et al.*, 1984).

Zimbabwe Fertilizer Company Private Limited succeeded to improve farmers' awareness and adoption of technologies in Zimbabwe through group extension teaching methods such as farmer group meetings, farmer training, demonstrations, and field days. In the other hand, Zimbabwe University used on-site studies, workshops, on-farm trials and field days to increase the productivity, efficiency, viability and sustainability of agricultural enterprises (FAO, 2003).

Another group extension teaching method is the use of trained farmers to deliver information to fellow farmers. Experience from Asia shows that, during the 1970s and '80s, the Training and Visit system (T and V) was introduced by the World Bank where existing organizations were merged into a single national service. Regular messages were delivered to groups of farmers, promoting the adoption of "green revolution" technologies that resulted into good results. Other group extension methods used were compact area group approach (CAGA), it was an innovative extension approach developed by Kareem, to combat problems like coconut eryophyid mite in states like Keral in India (Jones and Gaforth, 1997).

Moreover, Schwartz and Kampen (1992) suggest farmer field schools to be effective as applied in Kenya because allowed members to interact freely irrespective of age or social status, members come to understand more of their own environment, members learn by doing so illiteracy was not a hindrance, members become more inquisitive and choose what they need to learn. In the other hand, a report released by World Bank in 30<sup>th</sup> June, 1999 claimed that the performance of the T and V system as applied in Kenya has been disappointing (World Bank, 1999). The system has been ineffective, inefficient, and unsustainable. While the projects helped improve the system's coverage, research-extension linkages, and the skills of extension staff, the overall outreach and the quality of interaction between extension agents and farmers have been well below expectations (Njoroge, 2003).

A study conducted in Kenya by Schwartz and Kampen (1992) revealed that, according to the economic situation prevailing in East Africa, the group approach



would make better use of severely restricted resources. The paper examined these methods in relation to a number of situations in Kenya and concluded that in many instances the individual and group approaches could be profitably combined.

Mass media methods attract attention and stimulate the interest and desire for further information, are the methods used to reach many people at the same time at different locations. Examples are campaigns, bulletins, circulars, letters, leaflets, radio, television and cinema. The effectiveness of these methods is measured by their ability to change a static situation into a dynamic one. Experience from India shows that radio is the best method to communicate information to farmers, there are 38 stations of All-India Radio broadcasting regular rural programmes (Okunade, 2007). Radio is a mass medium of communication and can reach a large number of people at any given time involving the least expense. In India, Extension workers use the radio for communicating information on new methods and techniques, giving timely information about the control of crop pests and [diseases](#), [weather](#), and market news. For this purpose, talks, group discussions, folk-songs, dialogues and dramas are usually organized (Okunade, 2007).

Television is another mass method commonly used in India and had been one of the most powerful media of communication. It combines both audio and visual impact and is very suitable for the dissemination of agricultural information. It is more useful in teaching how to do a specific job. A beginning has been made for example in India for using this medium for development programmes since 1967, and it is expected that its use will become more extensive in the coming years (Jibowo, 1997; Okunade, 2007; Gaforth, 1993).

Tanzania experience shows that most of mass methods were expensive to use for delivering extension knowledge, only farmer networking was found to be less expensive and highly used. Farmer networking was found to be important tool that brought farmers together for discussion, sharing knowledge and experience, operated up to regional and national levels where farmers communicated and shared experiences (Shenduli, 1998). MVIWATA and UMADEP in the districts mobilized the use of farmer networking at divisions and ward levels which enabled farmers, local leaders in villages and other expertise to interact; they met once in every month to discuss the progress of activities undertaken during the period. ALEOs had been using this forum to pass short extension messages or passing information to prepare for workshops, seminars, exchange visits or any other extension sessions (Shenduli, 1998).

When properly applied to deliver information to farmers, a combination of extension teaching methods take farmers into several stages of attitude change, hence change of normal old ways of doing things. The change process mainly involved two processes that is diffusion and adoption, the diffusion process refers to the spread of new ideas from the original source to the ultimate users; it is the process by which new farm practices or innovations are communicated from sources of origin, usually researchers and practices adopted from advanced countries. The adoption process is a mental process through which an individual passes from first hearing about a new idea to its final adoption (Rolling, 1988).

**Adoption process**

Adoption process starts with awareness stage, at this stage the individual is exposed to the innovation but lacks complete information about it and is not yet motivated to seek further information. The primary function of the awareness stage is to initiate the sequence of later stages that lead to eventual adoption of the innovation (Rolling, 1988). There after interest stage follows where the individual becomes interested in the new idea and seeks additional information about it. The individual favors the innovation in a general way, but he has not yet judged its utility in terms of his own situation. The function of the interest stage is mainly to increase the individual's information about the innovation. The cognitive of 'knowing' component of behavior is involved at the interest stage. The individual is more psychologically involved with the innovation at the interest stage than at the awareness stage. Previously, the individual listened or read about the innovation; at the interest stage he actively seeks information about the idea. His personality and value, as well as the norms of his social system or groups may affect where he seeks information, as well as how he interprets this information about the innovation (Rolling, 1988).

Evaluation stage, the individual mentally applies the innovation to his present and anticipated future situation and then decides whether or not to try it. A sort of "mental trial" occurs at the evaluation stage. If the individual feels the advantages of the innovation outweigh the disadvantages, he will decide to try the innovation. The trial itself, however, is conceptually distinct from the decision to try the new idea. The evaluation is probably least distinct of the five adoption stages and one of

the most difficult from which to question respondents (Rolling, 1988). The innovation carries a subjective risk to the individual. He is unsure of the results, and for this reason, a reinforcement effect is needed at the evaluation stage to convince the individual that his thinking is on the right path. Information and advice from peers is likely to be sought at this point (Rolling, 1988).

The interest stage is followed by trial stage; the individual uses the information on a small scale in order to determine its utility in his own situation. The main function of the trial stage is to demonstrate the new idea in the individual's own situation and determine its usefulness for possible complete adoption. It is thus a validity test or "dry run"; the decision to use the ideas on a trial basis was made at the evaluation stage (Rolling, 1988). The individual may seek specific information about the method of using the innovation at the trial stage. Adoption Stage is the last stage, the individual decides to continue the full use of the innovation. The main functions of the adoption stage are considerations of the trial results and the decision to ratify sustained use of the innovation. Adoption implies continued use of the innovation in the future (Rolling, 1988).

These are the stages in the mental process of accepting new ideas and practices. Individuals may go through these stages at the different rates depending upon the practice itself. The complexity of the practice seems to be a major factor in determining the rate and manner with which people go through these mental stages. An innovation may be rejected at any stage in the adoption process. The individual may decide at the evaluation stage that the innovation will not apply to his situation

and mentally reject it. The innovation may be rejected at the trial stage, where the individual decides that the rewards expected from adoption will not outweigh the cost and effort of doing so. In order for these stages of innovation adoption to succeed, best extension teaching methods are required to deliver information to farmers, to attain this some sensitive criteria inherent within farmers, ALEOs and teaching method itself should be taken in to considerations.

## **2.2 Criteria for Selecting Extension Teaching Methods**

Teaching methods are the tools in the hands of the extension officer used to transfer new idea (Supe, 1983). According to Lionberger (1968), the method chosen will depend on the goal, resources, clientele relationship, and skills of the extension officers on the one hand, and on the size and educational level of the target group on the other hand. For instance, if extension officers lack the skills to organize and facilitate group meetings, then they will shy away from their use. Or if extension officers do not have vehicles, then they may not be able to conduct farm visits as frequently as might be desired or needed. Also, if the extension officer's constituency is very large, then it may become impractical to depend too much on individual visits.

Okunade (1999) asserts that, many situations and factors affect the choice of extension methods to be used. Examples are nature of subject matter, amount of time the extension worker intends to devote to the method and the time the farmers can devote, reinforcement, steps in extension teaching, materials and possible teaching situation available, preference and ability of the extension worker to

perform successfully the various methods and evaluation performance. It is therefore imperative that agricultural extension agents cannot bring about any significant change in the knowledge, skill and attitude of the farmers without employing the right mode of these extension teaching methods (Okunade, 1999). There are considerations to be kept in mind while selecting the best combination of methods, and are inherent within the extension officers, farmers and teaching methods themselves.

### **2.2.1 Considerations inherent within the extension officers**

Factors inherent of the extension officers that guide the selection of extension teaching methods includes educational level, level of training, availability of teaching media, environment, availability of funds, preparation and delivery time. The level of education that extension officer attained has effect on skills and knowledge hence range of methods available to him or her (Supe, 1983). The extension officer with high education level and or who has attended several extension trainings is likely to have a wide range of methods to use when disseminating information to large number of farmers spread over a large area, and who have numerous problems which can only dealt with by an efficient extension officer meant for that purpose (Supe, 1983).

However, Supe (1983), pointed out that high-level trained personnel staff with graduate and post graduate degrees were expected to have an increased capacity for professional development which an individual developed the power to perform the functions specialized in extension. Further, he emphasized that specialization for

ALEOs was necessary in the fields such as extension, irrigation, land use planning, agro-mechanization, production and veterinary services. In Tanzania, most of the ALEOs are specialized in different fields, but they are found providing general agricultural extension services and forced to master everything in agriculture. In a way, this generally has reduced their provision of agricultural information efficiency.

Availability of teaching media is another factor that determined the use of extension methods in India; media are different devices that help to combine different channels to provide signals like visual, tactile and audio. There had been a variety of media used in teaching farmers, such as like filmstrips, puzzles or cross words, motion pictures, multimedia presentation, hand cards, overhead presentations, newspaper, magazines and radio (Blackburn, 1984). According to Umali and Schwartz (1994), teaching media refers to channels used in disseminating knowledge or innovations to farmers. They include newsletters, leaflets, newspapers, booklets, meetings, seminars, workshops, videos, radios and drama. The media available dictates the teaching method to be used, as some of them are not adaptable to large groups, for example, photographs and puppets, others can be used individually, for example, puzzles, office calls and farm visits (Blackburn, 1984).

In Tanzania, availability of funds and working environment has been detecting the use of extension teaching methods. The government funding of extension services has been on the decline since the 1980s making it difficult for extension officers to travel and meet farmers and learn about farmers' problems in the field. However, this has caused adverse poor job performance of ALEOs (Rutatora and Rutachokoziwa, 1995). Moreover, poor organizational policy, supervision, salary, and working conditions can cause job dissatisfaction (Van den Ban and Hawkins, 1996). Similarly, Riggs (1993) cited by Sonoko (2001) found that agents with high job satisfaction were satisfied for the six components of overall job satisfaction which included job itself, salary, fringe benefits, authority to run programs, supervisors and opportunity for growth. In order to be effective ALEOs has to be facilitated and supported in one way or another. Rutatora and Rutachokoziwa (1995) found that logistic support and job satisfaction had an impact on job performance of ALEOs and motivated staffs were able to achieve organizational goal. According to Rutatora and Rutachokoziwa (1995), these include good pay, security and good working conditions, which increased morale, as there was a positive correlation between morale and job performance.



On the other hand inadequate resources, lack of transport, housing facilities to ALEOs led to ineffective transfer of technologies and improved agricultural technologies. Transport facility is important in order to move around farmers, especially in remote areas, ALEOs with reliable transport facility is likely to reach more farmers when delivering extension services. Mwandry (1992), found that ALEOs at village level lacked transport to enable them to move conveniently and enhance their job performances. Researchers in Tanzania insist that, enough funding is important for smooth running of agricultural extension services; inadequate funding affects the provision of agricultural information to smallholder farmers by ALEOs, which largely contribute to their low productivity (Rutatora, 2001b). Availability of preparation and delivery time determines the use of extension teaching methods at large, some teaching methods involve application of media, which requires much time to prepare, and deliver information (Blackburn, 1984). For example, newspapers magazines and pamphlets where others like meeting and visits take short time to prepare and deliver information (Maunder, 1973). In the other hand extension officers' works are within a planned time/work frame, hence their selection of the teaching method should meet their work schedule.

### **2.2.2 Considerations inherent within the farmers**

Ritter and Welch (1988), asserts that when selecting extension teaching methods farmers' situation should be considered, otherwise the extension program will bear no fruitful results. Ritter and Welch (1988) also insist that, when targeting our audiences, we are better able to select appropriate learning strategies and choose delivery methods for a program delivery system appropriate to the educational

objectives of that audience. Research findings on clientele usually want to receive specific information targeted directly to clientele needs; also, they prefer learning opportunities delivered through methods with which they are familiar. Ritter and Welch (1988) generally suggest methods that provide personalized, interactive contact between the agent and client on a specific subject. From a listing of 66 program delivery methods, those preferred most include personal visits, meetings, newsletters, demonstrations, workshops, videotapes, bulletins and pamphlets, field days, on-farm tests, seminars, fact sheets, lectures, tours, and telephone contacts. Clientele also prefer educational methods that provide learners opportunities to see and practice what is being taught.

Educational objectives for specific audiences must be considered when choosing program delivery methods. Extension teaching methods should coincide with those that clientele prefer and consider relevant for meeting their information needs (Ritter and Welch, 1988). If the objective is only to create awareness of a subject, delivery methods such as radio, television, newspapers, and other mass media are appropriate. If the objective is to provide educational inputs for clientele who are interested in trying or testing new information that they have already considered and regard as interesting and potentially useful, delivery methods such as demonstrations, tours, workshops, interactive meetings (such as symposiums or forums), audio cassettes with an accompanying fact sheet, videotapes, and other similar "how-to" methods are likely to be of greater value (Ritter and Welch, 1988).

When the targeted audience is quite knowledgeable about a subject, the objective may be to provide information on the latest developments or innovations related to that subject. These users are usually capable of receiving, processing, and using this information effectively to enhance their knowledge of the subject. Under these circumstances, delivery methods that may be used efficiently include computer programs or computer networks, data analysis, fax transmissions, seminars, panel discussions, conferences, videotapes, fact sheets, newsletters, bulletins, and other similar means of delivering highly specific and detailed information (Ritter and Welch, 1988).

However, in our audience targeting efforts, we should take into account the important characteristics of the people we are targeting and assure that we deliver information in a manner that provides adequate opportunities for learning to occur. Learning that is practiced and integrated into the client's prior knowledge base is more likely to be retained and used (Boldt, 1987). Selecting delivery methods that provide desirable learning opportunities at the level needed for specific audiences is the task of the Extension officer. By understanding our targeted audiences, including their present and needed knowledge levels, we can more effectively design a program delivery system that provides appropriate and desirable learning experiences for our clientele, and we can select the teaching methods most useful for achieving our educational objectives (Boldt, 1987).

According to Nkonoki (1994), factors inherent with farmers such as level of education attained by farmers, type of enterprise and size, availability of participation time and annual income determines selection of extension methods.

Education level of farmers determines the teaching method to be used, for illiterate farmers it is not appropriate to use news papers, posters, folder, leaf lets and others which require reading skills, instead, demonstration, meetings, visits and radio which requires observing and listening should be employed (Maunder, 1973).

According to Ritter and Welch (1988), the type and level of educational input of specific audiences can influence the receptiveness of individuals to different levels and systems of educational input. In some cases, the purpose of educational input may simply be to create awareness of a new practice, product, or situation among members of the targeted audience. In other situations, audiences may be targeted for more intensive educational input that seeks to change the knowledge and actions of audience members. For these two differing objectives, the program delivery methods chosen would be quite different. For example, well educated, specialized farmers are predictably receptive to learning about new practices. These farmers readily seek information from primary sources such as the Extension Service, consultants, businesses and industries, and other similar sources to help them assess the utility of new practices for their farming operation.

This situation contrasts significantly with that of less-well-educated farmers and those with small, generalized farm operations. Those individuals are generally less receptive to new ideas or innovations, and they usually obtain information through secondary sources such as family members or neighbors rather than directly from primary sources. The less educated farmers also tend to be reluctant to attend educational events, especially those that require travel beyond their immediate

surroundings. Naturally, these identifying characteristics can be quite useful in choosing methods for providing education to these distinctly different audiences

According to Supe (1993), economic activities undertaken by farmers determine the information or skills to be imparted, thus in selecting the method one should consider economic activities such as livestock keeping, marketing and crop cultivation. Effective method should relate and fulfill the need of the enterprise (Ames, 1998). Yet, farmers prefer not to travel more than one hour for educational meetings and they perceive to have little time to participate in educational programmes (Ames, 1998).

Studies conducted by several researchers in Tanzania revealed that, most of the farmers are poor and can not contribute for extension services provided. According to Bagachwa (1994), poverty in Tanzania is overwhelming pervasive in rural areas where over 59 percent of the rural inhabitants live in household where the adjusted household income is below the poverty line. Over 59 percent of the farmers are poor and about 85 percent of all poor people live in rural village and are the farmers. Due to low annual income farmers are not in position to contribute for extension services financially (Mlozi, 2001). Rogers (2003) asserts that, some new ideas are costly and require large initial outlays of capital which only wealthy units in a system can manage. Also, Adams (1982) argues that ALEOs find it difficult to communicate with poor, illiterate farmers and tend to find prosperous farmers congenial to work with, who have a more favorable attitude to change and may seek out the ALEOs. These farmers have ability to contribute for information they need hence even expensive methods are chosen to meet their requirements

(CIMMYT, 1993). Moreover, Mlozi (1994) study in the city of Dar es Salaam found that farmers with high incomes were able to facilitate ALEOs by providing them vehicles to attend to their projects. Poverty among Tanzanian farmers limits the use of teaching methods which are expensive, for example, methods that involve traveling (visits, tours).

One also needs to consider the cultural context of farmers when selecting agricultural extension teaching methods. Mvena and Mattee (1988) suggested that cultural innovation interactions have been neglected in many adoption studies and hence a need to look on how such socio – cultural factors interact with other factors and their overall influence to the cessation of the different innovations developed.

### **2.2.3 Considerations inherent within teaching methods**

Teaching methods mostly preferred are those which require little and cheap resources and simple enough for the subject to be understood (Supe, 1983). A good method should have less expense, carry messages to large number of people quickly and should have ability to stimulate farmers' interest toward the new knowledge (Supe, 1983). Generally teaching methods which allowed farmers to be contacted by ALEOs when in groups were better as compared to other approaches (Gaforth, 1993).

According to Gaforth (1993) and Odel (1986), extension programmes should direct their efforts towards group approaches due to the following reasons:

- (i) The group approach provided the potential to cover a larger proportion of the target population than would normally be possible under the

individual techniques of extension. Hence, it was potentially a more efficient method of extension.

- (ii) The group approach also provided a more effective learning environment. Farmers were often reluctant to co-operate individually with an external change agent out of fear of being rejected by the rest of the pears for trying something new. On the other hand, if a new idea was offered to a group of farmers, the group provided mutual reinforcement and gave chance for everyone to participate in decision making; thus group pressure was created against rejection of a new idea or practice. Decisions made as a result of group processes were more binding, especially where group pressure enforces the decision.
- (iii) The group format also provided good environment and greater opportunity for joint action. Many of the new ideas and practices being advocated by extension services required decisions at community level, which means that such new ideas had better chance of being accepted when presented to a group of farmers than to an individual farmer. Decisions made collectively had greater chance of protecting individuals' rights, secured better use of scarce resources and ensured economic security of all participants.
- (iv) The group approach made effective use of expertise which was limited in most developing countries. Roling (1988) noted that activities based on local working with grassroots group of farmers were given more emphasis than visits by ALEOs to individual farmers.

- (v) The group approach provided an environment conducive to local participation to demand higher quality extension services (FAO, 1990; Roling, 1988).
- (vi) Forming rural people into groups provided a voice and a forum which enabled them to become conscious of their situation and condition, provide the opportunity to explore the possibilities of various solutions to their problems (Gaforth, 1993; Roling, 1988).

These arguments suggested that it was easier to induce social change by involving groups of people than attempting it through individual contact.

## **CHAPTER THREE**

### **3.0 RESEARCH METHODOLOGY**

#### **3.1 Description of the Study Area**

The research was done in two Districts namely Morogoro and Mvomero District; they are among the five Districts of Morogoro Region. The others are Kilosa, Ulanga and Kilombero. The study was conducted in all wards where extension services were available, which included Kisemu, Mvuha, Mikese, Kinole, Mkuyuni, Tawa, Mtombozi, Kibungo Juu, Mngazi, and Bwakira Chini for Morogoro District. For Mvomero District, it included Turiani, Hembeti, Mlali, Mzumbe, Mvomero and Kikeo. The choice of the districts as the area of study was justified by the financial and time constraints faced by the researcher, easy accessibility by road to various villages and the existence of projects, which had special training and logistic support components to field extension officers.



## **3.2 Research Design**

The study employed a cross sectional design and a survey method, where questions were asked to a representative sample of the population at a single point in time. According to Babbie (1990) this method is suitable for a descriptive study like this one.

## **3.3 Study Population**

### **3.3.1 Population**

The population of the study included all ALEOs working in Morogoro Rural District and Mvomero District and all farmers being served by these ALEOs.

### **3.3.2 Sampling frame**

A list of all ALEOs was obtained from the District Agricultural and Livestock Development Office of Mvomero and Morogoro Rural District, and from other private providers registered by the office as providing extension services in the district namely, UMADEP, WOPATA and MVIWATA. Also a list of all farmers in each ward under the study was obtained from respective ward ALEOs.

### **3.3.3 Sampling technique**

Purposive sampling technique was used to select 50 extension officers being one category of respondents, 25 from Mvomero and 25 from Morogoro District. Purposive sampling technique was also used to select ten ALEO officials, five from each District and 20 village leaders, ten from each district. Table of random numbers was employed to select 100 farmers, where 50 were from Mvomero and 50 from Morogoro District.

Researcher used purposive sampling to select ALEOs and village leaders as they are a particular subset of people to provide information that suit the purpose of the research. ALEOs are the ones involved in selecting and using extension teaching methods in their day to day activities, in the other side village leaders were found to be potential subset as were likely to be accessible to extension services. The samples included people of interest and exclude those who do not suit the purpose.

### **3.3.4 Pre –testing of the instrument**

In order to test the validity and reliability of study instruments (questionnaires), pre-testing was done at Mkambarani, Mkuyuni and Mlali wards involving ten extension officers and 20 farmers who were selected randomly.

### **3.3.5 Data collection**

Main data collection methods used were personal interviews, non–participant observation (the researcher observed what ALEOs and farmers did without participating), and focus group discussions. A structured questionnaire for both ALEOs and farmers was used as the main instrument for data collection. The questionnaire mainly comprised of closed and open-ended questions.

### **3.3.6 Data analysis**

Data collected from primary sources was coded, and analyzed using the Statistical Package for Social Science (SPSS) computer program. Descriptive statistics such as frequencies, and cross tabulations were used to explain and compare information collected from the field. Secondary data were used for comparison purpose where the researcher compared results found in this research to the data previously found by other researchers to enrich the research.



## **CHAPTER FOUR**

### **4.0 RESULTS AND DISCUSSION**

This chapter discusses findings of the study, background characteristics of respondents interviewed are shown in Table 1 and 2, and the parameters included sex, education level of farmers and ALEOs, family size and economic activities of farmers, current employer and number of working years of ALEOs. Number of male and female was almost the same to farmers while there was greater difference in the number of male and female ALEOs respondents, most of farmers had attained standard seven level of education where most of the ALEOs attained diploma in various agriculture fields. The study also found the number of people in farmers' households to be one to five and agriculture was found to be their major economic activity. Moreover ALEOs respondents were characterized by serving a total number of six to ten villages per one ALEO, having 11 – 20 working years and most of the ALEOs respondents were employed by the LGA.

This study specifically wanted to find out the commonly used agricultural extension teaching methods (Table 3, 4, 5, 6a, 6b, and 7), criteria used to select agricultural extension teaching methods (Table 8) and factors that hindered ALEOs to select certain agricultural extension teaching methods (Table 10) and that hindered farmers from selecting agricultural extension teaching methods (Table 11). Findings showed that a combination of individual and group methods were commonly used, and among various criteria used to select agricultural extension teaching methods, ALEOs ranked availability of funds from coordinating institution, available time for farmers to participate and cultural context to be highly considered. Also the study found some criteria pointed out by farmers to be considered when selecting agricultural extension teaching methods, those were easiness to understand, low cost methods, consuming short time, high chance for farmers to participate, appropriate to enterprise, high farmer-ALEOs interaction, and high farmer-ALEOs contact. As mentioned earlier that some agricultural extension teaching methods were highly used than others, the study found shortage of time, unavailability of teaching media, lack of funds and poor working environment contributed to failure of ALEOs from selecting some agricultural extension teaching methods. Farmers also failed to select some agricultural extension teaching methods due to shortage of cash, not involved by ALEOs, did not have skills, their opinion were not valued, they were not aware of various methods, had shortage of time, and believed on the methods selected by ALEOs. Detailed discussion of study findings will be found as going through the text.

#### 4.1 Some Respondents' Characteristics

Table 1 shows gender balance in that male respondents did not differ much with those of female respondents. Of all the 120 respondents from both districts, 28 (46.7%) were males and 32 (53.3%) were females out of the 60 respondents in Morogoro rural district, while of the 60 respondents in Mvomero district 35 (58.3%) were males and 25 (41.7%) were females. The difference was not significant at  $p < 0.2$ , it was due to the fact that selection of respondents aimed to have almost equal number of male and female respondents. In the case of ALEOs, of the 29 ALEOs from Morogoro district male respondents were 23 (79.3%) and females were six (20.7%), while there were 23 (74.2%) males and 8 (25.8%) females out of the 31 from Mvomero district, the difference was not significant at  $p < 0.6$ . The portrayed imbalance in sex distribution of ALEOs was due to the existing situation that there were very few female ALEOs compared to males. Women ALEOs were fewer because of their small numbers who attended diploma and higher agricultural professional courses.

**Table 1: Distribution of farmer respondents' characteristics (N=120)**

<b>Variable</b>	<b>Morogoro rural</b>	<b>Mvomero</b>	<b>Total</b>	<b>X<sup>2</sup>-value</b>	<b>p-value</b>
<b>Sex</b>	n=60	n=60	N=120	1.64	0.21
Male	28(46.7)	35(58.3)	63(52.5)		
Female	32(53.3)	25(41.7)	57(47.5)		
<b>Level of formal education</b>	n=60	n=60	N=120	10.6	0.07
No formal education	0(0.0)	7(11.7)	7(5.8)		
Std iv	6(10.0)	10(16.7)	16(13.3)		
Std vii	41(68.3)	33(55.0)	74(61.7)		
O-level	11(18.3)	9(15.0)	20(16.7)		
A-level	1(1.7)	1(1.7)	2(16.7)		
<b>Number of people in the household</b>	n=60	n=60	N=120	2.6	0.26
1-5	38(63.3)	30(50.0)	68(56.7)		
6-8	18(30.0)	22(36.7)	40(33.3)		

Above 8	4(6.7)	8(13.3)	12(10.0)		
<b>Major economic activities</b>	n=60	n=60	N=120	14.9	0.04
Agriculture	23(38.3)	36(60.0)	59(49.2)		
Goat keeping	1(1.7)	0(0.0)	1(0.8)		
Pig keeping	2(3.3)	0(0.3)	2(1.7)		
Chicken keeping	2(3.3)	0(0.0)	2(1.7)		
Agriculture and goat keeping	7(11.7)	0(0.0)	7(5.8)		
Village leader(Agriculture)	7(11.7)	7(11.7)	14(11.7)		
Village leader(Agriculture and livestock keeping)	3(5.0)	3(5.0)	6(5.0)		

About 21 (72.4%) of the 29 respondents from Morogoro district, and 18 (51%) of the 31 from Mvomero district had attained diploma in the field of agriculture and livestock and few, five (17.2%) of the 29 from Morogoro rural had attained degrees, while it was 13 (41.9%) ALEOs of the 31 respondents from Mvomero. Those with certificates were few (Table 2). There was statistical significant difference of means between professional qualification of ALEOs at  $p < 0.04$ . In 1970's and 1980's certificate level graduates in agriculture and livestock courses were upgraded in the 1990's and 2000's to diploma levels. ALEOs holding degrees were found at the district offices and some were employed by NGOs. These individuals worked as coordinators and most preferred NGOs because of financial incentives and better work conditions. In rural areas, at least certificate level in agriculture was mandatory for a person to be an ALEO. The fact that majority of the ALEOs had diploma implied that it affected their selection and use of extension methods. Observation showed that most used simple agriculture extension teaching methods, which did not require complicated procedures in preparing and presenting. In the same line, Supe (1983) argued that lower levels of education and professional qualification of ALEOs resulted to limited range of agricultural extension teaching

methods available to them, which resulted to their failure to incorporate different or various methods when disseminating information to the farmers.

Of the 60 respondents in Morogoro rural district, 41 (68.3%), and 33 (55%) in Mvomero district, indicated to had attained standard seven level of education. Such a reasonably literacy rate of respondents was necessary in facilitating the task of communicating agricultural innovations to rural people by ALEOs. Shenduli (1998) and Mandara (1998) found that knowing how to read and write for farmers was enough in adoption of innovations when it involved use of posters, extension leaflets, and newsletters. On the other hand, Machumu (1995) and Msuya (1998) found that although attaining standard seven could enable farmers to read and write, it might not be helpful in the adoption of technologies that required comprehension of written materials which demanded skillful training.

The problem of most ALEOs having low educational qualification levels was also reported in Iran by Pezeshki-Raad and Diamond (1998), who found that the educational qualifications of extension agents in most developing countries, including Iran were low in relation to the assignments and responsibilities that they were expected to carry out. According to Buford *et al.* (1995) possession of an advanced degree had become a recommended minimum qualification for extension personnel in developed countries.

Major sources of incomes for respondents are presented in Table 1, which shows that most depended on farming. Of all the 60 respondents in Morogoro rural and



Mvomero districts, 23 (38.3%) and 36 (60.0%) depended on agriculture, respectively. Only one (1.7%) respondent from Morogoro district depended on agriculture and goat keeping, two (3.3%) on local chicken keeping, and two (3.3%) on pig keeping. Table 1 show that there were statistical significant differences of the means between economic activities of respondents at  $p < 0.04$  in the two district, respondents in Mvomero district were involved in farming than those in Morogoro district.

Over half of the 29 ALEOs respondents, 15 (51.7%) in Morogoro district had worked for a period between 11 - 20 years, while ten (32.3%) of the 31 in Mvomero district indicated so (Table 2). There was statistical significant difference of means between number of working years of ALEOs at  $p < 0.01$ . Majority of ALEOs respondents constituted LGA employees who were employed on permanent terms and others were seconded to NGOs. NGOs, however, in most cases were short-lived, and these ALEOs had work contracts lasting from one to three years.

LGA policy required that each ALEO serves one village. However, this study found that one ALEO served from four to six villages and due to understaffing, majority of ALEOs had between one to five villages as it was mentioned by nine (31.0%) of the 29 ALEOs respondents in Morogoro rural districts and 14 (45.2%) of the 31 ALEOs in Mvomero district. However, 11 (37.9%) of the respondents in Morogoro rural districts and five (16.1%) in Mvomero districts indicated to serving between six to ten villages, while four (13.8%) in Morogoro and four (12.9%) in Mvomero

reported to serving 11 to 15 villages (Table 2). The study found that ALEOs complained that there were few and each supervised about 100 villages.

The LGAs employed more ALEOs as 26 (89.7%) of the 29 respondents in Morogoro rural district indicated of all 29 respondents in the district, while ten (32.3%) of the 31 in Mvomero district were LGAs employees. Three (10.3%) and ten (32.3%) of the ALEOs respondents in Morogoro and Mvomero districts reported to had been employed by NGOs, respectively. There was a statistical significant difference of means between current employer at  $p < 0.04$  (Table 2). NGOs were voluntary institutions, which assisted the government to address development issues, although they saved few people.

**Table 2: Distribution of ALEOs respondents' characteristics (N=60)**

<b>Variable</b>	<b>Morogoro rural</b>	<b>Mvomero</b>	<b>Total</b>	<b>X<sup>2</sup>-value</b>	<b>p-value</b>
<b>Sex</b>	n=29	n=31	N=60	0.2	0.6
Male	23(79.3)	23(74.2)	46(76.7)		
Female	6(20.7)	8(25.8)	14(23.3)		
<b>Professional qualification</b>	n=29	n=31	N=60	6.7	0.04
Certificate	3(10.3)	0(0.0)	3(5.0)		
Diploma	21(72.4)	18(58.1)	39(65.0)		
Degree	5(17.2)	13(41.9)	18(30.0)		
<b>Current employer</b>	n=29	n=31	N=60	10.6	0.07
Government	26(89.7)	21(67.7)	47(78.3)		
NGO	3(10.3)	10(32.3)	13(21.7)		
<b>Number of working years</b>	n=29	n=31	N=60	12.8	0.01
1-10	<b>5(17.2)</b>	<b>12(38.7)</b>	<b>17(28.3)</b>		
11-20	15(51.7)	10(32.3)	25(41.7)		
21-30	3(10.3)	9(29.0)	12(20.0)		
31-40	6(20.7)	0(0.0)	6(10.0)		
<b>Number of villages served</b>	n=29	n=31	N=60	21.6	0.33
1-5	9(31.0)	14(45.2)	23(38.3)		
6-10	11(37.9)	5(16.1)	16(26.7)		
11-15	4(13.8)	4(12.9)	8(13.3)		
16-20	0(0.0)	1(3.2)	1(1.7)		
Above 20	5(17.2)	7(22.6)	12(20.0)		

## 4.2 Commonly Used Extension Teaching Methods

Of the 29 respondents in Morogoro rural and 31 in Mvomero districts, half 33 (55.0%) and 37 (61.7%), respectively reported that ALEOs used group together with individual extension methods. However, for farmer respondents, 12 (38.7%) of the 60 in Morogoro rural, and 14 (48.3%) of the 60 in Mvomero district reported to have obtained agriculture information through group methods. Table 3 shows that there were no statistical significant differences of means observed for commonly used agricultural extension teaching methods in the two districts at  $p < 0.8$  for farmers and at  $p < 0.2$  for ALEOs. Due to large numbers of farmers that one ALEO served in the study area, group methods were mostly preferred in passing on agricultural information, leaving behind individual methods. The low rate of adoption of new ideas in the area might be due to poor follow-ups of individuals at farms or homes. Amin and Stewart (1994), also found that a combination of individual and group extension methods were effective than the use of group methods alone. However, in villages use of meetings and conferences to deliver extension messages were found not effective.

**Table 3: Respondents' opinions about the commonly used agricultural extension teaching methods (N=120 for farmers and 60 for ALEOs)**

Method	Morogoro Rural	Mvomero	Total	X <sup>2</sup> -value	p-value
<b>Farmers</b>	n=60	n=60	N=120	0.76	0.8
Individual	8(13.3)	8(13.3)	16(13.3)		
Group	17(28.3)	13(21.7)	30(25.0)		
Individual and group	33(55.0)	37(61.7)	70(58.3)		
Group and mass	2(3.3)	2(3.3)	4(3.3)		
<b>ALEOs</b>	n=31	n=29	N=60	4.5	0.2
Group	4(12.9)	8(27.6)	12(20.0)		
Individual and group	12(38.7)	14(48.3)	26(43.3)		
Group and mass	3(9.7)	2(6.9)	5(8.3)		

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Individual, group and mass	12(38.7)	5(17.2)	17(28.3)
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Farinde (1991) reported that group and individual contact methods were mostly employed in teaching farmers' improved agricultural practices and that to create awareness of new farm technologies farm visits, and group meetings were employed. It was also revealed that skills are better acquired through group contact methods; these methods have the nature of practical demonstration which helped the farmer from desire stage through convictions and probably into taking action. Group contact methods also ranked highest in acquiring attitude. This was also possible because the methods brought specific information about practices and proved that practice brings benefits locally. All these prompted farmer to take action which invariably led to a change in attitude (Ogunwale, 1991).

Another study conducted by Okunade (2007) on the effectiveness of agricultural extension teaching methods in acquiring knowledge, skill and attitude by women farmers showed different results where individual contact method and mass method ranked highest in the order of acquiring knowledge. This may be as a result of the characteristic nature of the methods of giving information and deeper understanding of the innovation concerned. The individual method enhanced interaction which might enhance much emphasis on the technology thereby enhancing better understanding; also, the mass media methods arouse the interest and the desire for more information which enabled farmer to have better understanding of the innovation.

#### 4.2.1 Distribution of ALEOs by the commonly used agricultural extension teaching methods based on selected characteristics

Table 4 shows that ALEOs served many farmers because they were few and farmers were widely dispersed. This led to ALEOs failing to use varieties of agricultural extension teaching methods which were useful, especially in making follow-ups. Findings show that ALEO who served few villages (one to five) mostly used individual and group methods as compared to those who served many villages. Of the 21 ALEOs who used group together with individual methods, 11 (47.8%) served one to five villages, seven (43.8%) served six to ten villages, and three (25.0%) served 16 – 20 villages. The level of using individual and group methods increased to 25 from zero for ALEOs serving 16 – 20 villages because this group was composed of ALEOs at the district coordinating office that had motor cycles. Moreover, among ALEOs who used the three types of agricultural extension teaching methods: individual, group and mass methods, of the 17 respondents six (35.3%) declared to serving fewer villages (one to five) the number dropped to two (11.7%) for ALEOs serving many villages (11 to 15), then shoot up to four (23.5%) to ALEOs who served 16 to 20 villages. There were no statistical significant difference of means at  $p < 0.2$ .

**Table 4: ALEOs' opinions on the commonly used agricultural extension teaching methods based on selected characteristics (N=60)**

	Group	Individual and group	Group and mass	Individual group and mass	X <sup>2</sup> -value	p-value
<b>Number of village served</b>						
1-5	n=12 5(41.0)	n=21 11(52.4)	n=9 1(11.1)	n=17 6(35.3)	15.2	0.2

6-10	4(33.3)	7(33.3)	0(0.0)	5(29.4)		
11-15	2(16.7)	0(0.0)	4(4.5)	2(11.7)		
16-20	1(8.3)	3(14.3)	4(4.5)	4(23.5)		
<b>Current employer</b>	n=12	n=25	n=5	n=18	2.5	0.5
Government	8(66.7)	21(84.0)	5(100.0)	13(72.2)		
NGO	4(33.3)	4(16.0)	0(0.0)	5(27.8)		
<b>Professional qualification</b>	n=12	n=26	n=5	n=17	7.0	0.3
Certificate	0(0.0)	2(7.7)	0(0.0)	1(5.9)		
Diploma	5(41.7)	19(73.1)	4(80.0)	11(64.7)		
Degree	7(58.3)	5(19.2)	1(20.0)	5(29.4)		

Of the 18 ALEOs respondents who indicated to using all agricultural extension teaching methods, it included five (27.8%) ALEOs who worked in NGOs and 13 (72.2%) worked in LGAs. This implies that ALEOs working in LGAs mostly used all the three agricultural extension teaching methods when delivering agricultural information and messages. The study also found that ALEOs mostly used a combination of individual and group agricultural extension teaching methods were working in LGAs as of the 25, 21 (84.0%) said so (Table 4). Results had no statistical significance difference at  $p < 0.5$  despite the LGAs ALEOs constituting high percentage, these findings were contributed by the factor of having many ALEOs employed by the LGAs (47) as compared to those employed by the NGOs (13) of all the 60 ALEOs respondents.

Other researchers reported differently, a study conducted by Rwenyagira and Mattee (1994) found that NGOs flexibility in choosing their subject area, the source of information, the vehicle of communication and their clientele gave them a potentially important and independent role in information exchange. Also, when compared to ALEOs working for LGAs, NGOs ALEOs employed all agricultural extension teaching methods for delivering agricultural information due to better

work environment. Moreover, findings show that, based on their professional qualifications ALEOs with diploma were leading in using combinations of individual and group agricultural extension teaching methods and a combination of individual, group and mass agricultural extension teaching methods, for which 19 (73.1%) of the 26 and 11(64.7%) of the 17 respectively witnessed using the methods when delivering agriculture information and messages. Degree holder ranked second in using a combination of individual and group agricultural extension teaching methods and a combination of individual, group and mass agriculture extension teaching methods, for which five (19.2%) of the 26 and five (29.4%) of the 17 used the methods, certificate holder ranked last where only two (7.7%) of the 17 and one (5.9%) of the 17 witnessed using a combination of individual and group agriculture extension teaching methods and a combination of individual, group and mass agricultural extension teaching methods respectively. Results showed no statistical significant difference at  $p < 0.3$ .

#### **4.2.2 Farmer respondents views on the commonly used individual extension teaching methods**

Individual agricultural extension teaching methods involved an ALEO meeting with a farmer and interacting when passing on agricultural information. These methods are important for effective knowledge transfer to farmers. Of the 60 farmer respondents in Morogoro rural and 60 in Mvomero districts 31 (51.7%) and 53 (88.3%) reported that ALEOs used individual agricultural extension teaching methods through being visited in their home and at farms. Farmers declared to hear new innovations through farmer to farmer farm visits practiced in the area that also pushed them to trial stage when their fellow farmers got best results. This practice

was highly practiced at Kinole in the innovation of contour pineapple planting in mountains, initially; only early adopters accepted it and had best results. Then other farmers learned from them and started to try in their farms hence adopted the innovation. Findings revealed that few ALEOs used personal letters to farmers as of the 120 farmer respondents in the two districts, 88 (73.3%) indicated to had not received letters, and of these 38 (63.3%) and 50 (83.3%) of the farmer respondents were from Morogoro and Mvomero, respectively. There was statistical significant difference of means between use of personal letters at  $p < 0.02$ . Farm and home visits was used to make follow-up after farmers having attended other training through group methods like group discussions, seminars and workshops, Letters were mainly used for invitation and not to deliver agricultural information

**Table 5: Farmer respondents' views of the commonly used individual extension teaching methods (N=120)**

Variable	Morogoro Rural	Mvomero	Total	X <sup>2</sup> -value	p-value
Farm and home visit	n=60	n=60	N=120	23.1	0.00
Never used	14(23.3)	7(11.7)	21(17.5)		
Used	31(51.7)	53(88.3)	84(70.0)		
Frequently used	15(25.0)	0(0.0)	15(12.5)		
Personal letter	n=60	n=60	N=120	7.9	0.02
Never used	38(63.3)	50(83.3)	88(73.3)		
Used	18(30.0)	10(16.7)	28(23.3)		
Frequently used	4(6.7)	0(0.0)	4(3.3)		
Telephone calls	n=60	n=60	N=120	5.3	0.07
Never used	38(63.3)	49(81.7)	87(72.5)		
Used	21(35.0)	10(16.7)	31(25.8)		
Frequently used	1(1.7)	1(1.7)	2(1.7)		



Recently, telephone calls using cellular phones (hand-held sets) have become important in complementing the use of personal letters for inviting farmers to meetings, passing agricultural information and messages, but in this study only 21 (35.0%) of the 60 in Morogoro and ten (16.7%) of the 60 farmer respondent in Mvomero  $p < 0.00$  and use of personal letter was statistically significant at  $p < 0.02$ . Normally, ALEOs called a farmer's group leader or one of the group members and gave the information/message who delivered information to other farmers who prepared themselves for an extension session. However, problem latter encountered included poor network coverage, few people managed to buy and cover costs of cellular phone charge voucher and lack of electricity in rural areas for charging their mobile phones. Similar findings were reported by Okunade (2007) who conducted a study to determine agricultural extension teaching methods used to deliver information to female farmers of Osun state in Nigeria where Farm and Home visit ranked highest followed closely by office calls.

#### **4.2.3 Farmer respondents' views on the commonly used group extension teaching methods**

Individual extension teaching methods are expensive and time consuming, and thus ALEOs prefer to use group methods to reach more farmers with little cost and shorter period of time. Group methods refer to extension teaching methods in which farmers gathered in groups from ten to 50.

This study found that group agricultural extension teaching methods were mostly used compared to other two because they reached many farmers with relatively low cost and were especially effective in moving people from the interest stage to the trial stage of innovation adoption. Among other group methods, agriculture

discussion meetings was mostly used as revealed by 33 (55.0%) of the 60 farmer respondents in Morogoro rural and 33 (55.0%) of the 60 in Mvomero district (Table 6a). ALEOs arranged special interest meetings to serve educational needs of groups such as gardening, chicken, goat, pig keeping and farming, which allowed more interaction among farmers themselves and with ALEOs. Meetings were held in singly or in series over a period of time, attendance was voluntary thus everyone who attended was presumed to be interest. Participatory Rural Appraisal was promoted in delivering agricultural services thus farmer groups were the key tools. Monthly meetings were used to raise interest of farmers and for making follow up because it had been difficult for ALEOs to visit individual farmers. Method demonstration was used to show the steps to undergo the process of using new innovations during the stage of trying innovations; this was revealed by 28 (46.7%) farmer respondents of the 60 respondents in Morogoro rural, and 30 (50.0%) farmer respondents of the 60 respondents in Mvomero district.

**Table 6 a: Farmer Respondents' views on the use of group extension teaching methods (N=120)**

<b>Group extension methods</b>	<b>Morogoro rural</b>	<b>Mvomero district</b>	<b>Total</b>	<b>X<sup>2</sup>-value</b>	<b>p-value</b>
<b>Method demonstration</b>	n=60	n=60	N=120	17.1	0.00
Frequently used	14(23.3)	0(0.0)	14(11.7)		
Used	28(46.7)	30(50.0)	58(48.3)		
Never used	18(30.0)	30(50.0)	48(40.0)		
<b>Result demonstration</b>	n=60	n=60	N=120	8.7	0.01
Frequently used	10(16.7)	1(1.7)	11(9.2)		
Used	25(41.7)	34(56.7)	59(49.2)		
Never used	25(41.7)	25(41.7)	50(41.7)		
<b>Agriculture discussion meetings</b>	n=60	n=60	N=120	2.3	0.31
Frequently used	6(10.0)	25(41.7)	8(6.7)		
Used	33(55.0)	33(55.0)	66(55.0)		
Never used	21(35.0)	2(3.3)	46(38.3)		
<b>Seminars</b>	n=60	n=60	N=120	12.4	0.00
Frequently used	5(8.3)	0(0.0)	5(4.2)		
Used	33(55.0)	21(35.0)	54(45.0)		
Never used	22(36.7)	39(65.5)	61(50.8)		

<b>Folk media</b>	n=60	n=60	N=120	6.5	0.05
Frequently used	5(8.3)	0(0.0)	5(4.2)		
Used	15(25.0)	21(35.6)	36(30.3)		
Never used	40(66.7)	38(64.4)	78(65.5)		

**Table 6 b: Farmer Respondents' views on the use of group extension teaching methods (N=120)**

<b>Group extension methods</b>	<b>Morogoro rural</b>	<b>Mvomero district</b>	<b>Total</b>	<b>X<sup>2</sup>-value</b>	<b>p-value</b>
<b>Farmer exchange visits</b>	n=60	n=60	N=120	13.2	0.01
Frequently used	1(1.7)	0(0.0)	1(0.8)		
Used	31(51.7)	13(21.7)	44(36.7)		
Never used	28(46.7)	47(78.3)	75(62.5)		
<b>Workshops</b>	n=60	n=60	N=120	13.9	0.00
Frequently used	3(5.0)	1(1.7)	4(3.3)		
Used	31(51.7)	13(21.7)	44(36.7)		
Never used	26(43.3)	46(76.7)	72(60.0)		
<b>Study tours</b>	n=60	n=60	N=120	17.1	0.00
Frequently used	3(5.0)	0(0.0)	3(2.5)		
Used	28(46.7)	10(16.7)	38(31.7)		
Never used	29(48.3)	50(83.3)	79(65.8)		
<b>Farmer animating</b>	n=60	n=60	N=120	6.3	0.04
Frequently used	2(3.3)	0(0.0)	2(1.7)		
Used	13(21.7)	24(40.0)	37(30.8)		
Never used	45(75.0)	36(60.0)	81(67.5)		

ALEOs used Result demonstrations to compare new and old practices, for example dusting for fleas and no dusting of chickens, results were presented for all to see and judge, this made farmers anxious, hence adopted incase of good results, this was the fourth mostly used method as witnessed by 25 (41.7%) farmers respondents of the 60 farmer respondents in Morogoro rural, and 34 (56.7%) farmers respondents of the 60 farmers respondents in Mvomero district. Results shows that there were statistical significance difference between the use of method demonstration at  $p < 0.00$ , and result demonstration at  $p < 0.01$ . In the study area, demonstration plots were used by ALEOs to show farmers stages of new practice for better production. Innovations adopted include contour pineapples planting in mountainous areas,

growing crops organically; farmers in Kinole ward shifted from using industrial fertilizers to the use of green manure, animal and plant wastes. Method demonstration also moved farmers from trial stage of innovation to adoption of terrace cultivation of vegetables in Mgeta ward, solar drying of vegetables and fruits at Mkuyuni and organic production of spices at Kinole. In some areas the method did not help much because demonstrations were not continuous. In order for this method to be effective to achieve desired change, demonstrations should be well designed, cover several seasons, involve farmers, and focus on behavioral change as an outcome.

Moreover other group extension teaching methods were mentioned as important, in Mvomero district included seminars, 39 (65.5%) of the 60 respondents and farmer exchange visits, 47 (78.3%) respondents of the 60 respondents.

Study tours were not used in both districts as 29 (48.3%) of the 60 respondents and 50 (83.3%) of the 60 respondents in Morogoro and Mvomero districts, respectively said so. Results showed there was statistical significance difference of means between commonly used agricultural extension teaching methods in the two districts at  $p < 0.0$  for seminars,  $p < 0.01$  for farmer exchange visit,  $p < 0.00$  for study tour,  $p < 0.05$  for folk media and at  $p < 0.00$  for workshops.

Few farmers that admitted to have few study tours declared that it helped them to create awareness of new innovations and arose their interest toward new innovations. The innovations included improved banana husbandry practice and

banana varieties (Uganda green, William and Cavendish), improved spice husbandry, and traditional irrigation canal, obtained from tours done at Arusha, Amani Tanga, and Same respectively. Moreover, the study found that farmer animators (promoters) were trained by MVIWATA and UMADEP in Mvomero district and Morogoro rural, but they rarely performed their duties as animators. Study results found that the method was not used in both districts where of the 60 respondents in each district 36 (60.0%) from Mvomero district and 45 (75.0%) from Morogoro district said so (Table 6 b). Promoters were not motivated to undertake their duties, farmers did not trust them, as they felt them to be incompetent compared to the ALEOs. Few were given bicycles though they also demanded allowances to work, there was statistical significance difference of means for use of animators at  $p < 0.04$ . A research conducted by Hulls (1975) in Scotland found differently, he reported that informal contacts and interaction with neighbours and friends were regarded as important media in agricultural information dissemination. The study conducted by Chizari *et al.* (1998), in the Province of Eesfahan, Iran found that the most appropriate teaching methods as perceived by ALEOs were result demonstrations, method demonstrations, formal group meetings, and informal discussions. Where as Gamon *et al.* (1994) found meetings to be a less effective means of delivering educational programs to farmers. Results of the study that evaluated the effectiveness of agricultural extension teaching methods used in disseminating improved agricultural technologies in Lagos state showed that the farmers ranked method demonstrations and lectures first and second respectively among others. They recommended a combination of teaching methods that would involve the participation of farmers rather than reading materials when teaching

farmers with little or no education (Farinde, 1991). A study conducted in Osum state by Okunade (2007) on the use of agricultural extension teaching methods found that method demonstration ranked highest next is result demonstration followed closely videotape and slides. Another study conducted by Chizari (1991) in Province of Esfahan, on obstacles facing ALEOs in the development and delivery of educational programs for adult farmers in the province of esfahan, iran revealed that ALEOs ranked result demonstrations the most effective method for teaching adult farmers.

The second most effective method identified by ALEOs was method demonstrations that involved processes of showing farmers how to implement or perform a particular agricultural practice; the least rated agricultural extension teaching methods was lecture/instructor. Amin and Stewart (1994) found the training and visiting approach to be effective in increasing crop yields, however, using meetings and conferences to deliver extension programs found not to be effective (Gamon *et al.*, 1994). However, lecture, discussion and questioning methods were the predominant methods of instruction in pesticide applicator training (Martin, 1987).

Moreover, Martin (1988), at Iowa State University found that respondents determined the use of various agricultural extension teaching methods for delivering agricultural information to farmers. In Iowa State, lecture, extension meetings, group discussions, video, and panel discussions rated at a lower level on the scale. While teaching strategies such as method demonstrations, field visits, tours, and exhibitions received higher ratings.

#### **4.2.4 Farmer respondents' views on the commonly used mass extension teaching methods**

Table 7 shows that of the 60 farmer respondents (farmers) in Morogoro rural 30 (50.0%) indicated that they received agriculture extension information through leaflets, and 43 (71.7%) through brochure. In Mvomero district, 24 (40.0%) of the 60 farmer respondents reported that they received agriculture extension information through leaflets, and 40 (66.7%) through brochures. Leaflets and brochures helped farmers of Kinole, Mgeta, Mvomero, Mkuyuni and Tawa in creating awareness of various innovations. For example the method did well in creating awareness of commercial production of sunflower at Mlali division where farmers had great interest after they received information and showed positive response toward the innovation. There after farmers moved to the third stage of innovation adoption where they were given seeds and started trials in their farms; they continued season after season with great interest because they had readily available market (small processing industry) for squeezing oil which was readily sold to the nearby areas and among themselves.

However, in both districts, the NGO district coordinating offices made leaflets and brochures, which ALEOs collected and distributed to farmers, sometimes when out of date and not relevant. Such a phenomenon was reported by Mbwana (1995), that the contents of some of the printed materials are not relevant to farmers, while some are written in English, which many farmers do not understand. Poster displays were not used to pass on agriculture extension information as witnessed by 31 (51.7%) in Morogoro rural and 44 (73.3%) in Mvomero district of all the 60 farmer

respondents. Of the 60 farmer respondents, 29 (48.3%) in Morogoro rural and 44 (73.3%) in Mvomero district indicated that ALEOs did not use exhibitions to pass information because they were expensive. Rarely the government and NGOs supported farmers to attend annual farmers exhibitions held annually in the eighth day August in Morogoro Municipality, commonly known as “*nanenane*”.

Also farmers rarely attended organized exhibitions in far away places when invited by different organizations. The study revealed statistical significance difference of means for farmer exhibition at  $p < 0.02$ . Exhibitions though rarely practiced, helped to improve performance of Mkuyuni farmers in drying fruits and vegetables using solar, they gained confidence through attending exhibitions at ‘nanenane’. Initially they hesitated to adopt the innovation fearing lack of market of dried products; exhibitions exposed them to market and hence moved them from trial stage of innovation to adoption stage.

Further, of the 60 farmer respondents 46 (76.7%) in Mvomero district and 40 (66.7%) in Morogoro rural indicated that never used video shows and films as agriculture extension teaching methods. In the same line, Martin (1988) rated video show, television, and radio lower on the scale in his study to determine use of various agricultural extension teaching methods for delivering agricultural information to farmers in Iowa State. The possible explanation is that these teaching tools were not available or rarely had been used by the respondents.

**Table 7: Farmer Respondents’ views on the use of mass extension teaching methods**

Extension method	Morogoro Rural	Mvomero	Total	X-value	p-value
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<b>Leaflets</b>	n=60	n=60	N=120	4.7	0.09
Frequently used	4(6.7)	0(0.0)	4(3.3)		
Used	32(53.3)	30(50.0)	62(51.7)		
Never used	24(40.0)	30(50.0)	54(40.0)		
<b>Brochures</b>	n=60	n=60	N=120	2.8	0.2
Frequently used	2(3.3)	0(0.0)	2(1.7)		
Used	15(25.0)	20(33.3)	35(29.2)		
Never used	43(71.7)	40(66.0)	83(69.2)		
<b>Poster display</b>	n=60	n=60	N=120	6.0	0.01
Frequently used	0(0.0)	0(0.0)	0(0.0)		
Used	29(48.3)	16(26.7)	45(37.5)		
Never used	31(51.7)	44(73.3)	75(62.5)		
<b>Farmer networking</b>	n=60	n=60	N=120	1.8	0.4
Frequently used	30(50.0)	24(40.0)	54(45.0)		
Used	9(15.0)	14(23.3)	23(19.2)		
Never used	21(35.0)	22(36.7)	43(35.8)		
<b>Farmer exhibitions</b>	n=60	n=60	N=120	7.9	0.02
Frequently used	29(48.3)	4(6.7)	11(9.2)		
Used	24(40.0)	12(20.0)	36(30.0)		
Never used	28(46.7)	44(73.3)	73(60.8)		
<b>Video show</b>	n=60	n=60	N=120	4.6	0.1
Frequently used	4(6.7)	0(0.0)	4(3.3)		
Used	16(26.7)	14(23.3)	30(25.0)		
Never used	40(66.7)	46(76.7)	86(71.7)		

Respondents thought that traditional teaching methods were effective because of the culture and the fact that most farmers were illiterate. Stephen and Mabusa (2008) reported differently, his study to determine the commonly used agricultural extension teaching methods in Botswana found that among mass extension teaching methods radio was mostly used to disseminate agricultural extension information. Similarly, Williams (1978) found out that radio was among the top teaching equipment that can be used to support information dissemination in Africa.

During the study, video sets and film cameras were observed in the UMADEP offices of Mgeta, Mlali, Mkuyuni and Matombo divisions. Tapes were not used due

to lack of electricity and there were no fund to purchase fuel to run the available generators. Also, films were not used to disseminate extension information, but mostly kept for documentation purposes. Photographs taken during training and other knowledge dissemination events were kept in the offices as references. Most of mass methods were expensive to use for delivering extension knowledge, only farmer networking was found to be less expensive and highly used as revealed by 30 (50%) of 60 farmers in Morogoro and 24 (40%) of 60 farmers in Mvomero district . Farmer networking was found to be important tool that brought farmers together for discussion, sharing knowledge and experience, operated up to regional and national levels where farmers communicated and shared experiences. MVIWATA and UMADEP in the districts mobilized the use of farmer networking at divisions and ward levels which enabled farmers, local leaders in villages and other expertise to interact; they met once in every month to discuss the progress of activities undertaken during the period. ALEOs had been using this forum to pass short extension messages or passing information to prepare for workshops, seminars, exchange visits or any other extension sessions. Due to problems that ALEOs faced when using various agricultural extension teaching methods, certain agricultural extension teaching methods were selected based on some criteria which are discussed below.

#### **4.3 ALEOs' Opinions on Criteria Used to Select Certain Extension Teaching Methods**

The study found that there were certain criteria that ALEOs considered when selecting extension teaching methods (Table 8a and 8b). Factors that ALEOs

considered highly included, availability of funds from coordinating institutions, available time for farmers to participate and cultural contexts. Other factors considered important were available time for preparation and deliver, cost of preparation, availability of teaching media and previous experiences of farmers. There was a statistical significant difference of means to some criteria which were cost of preparation at  $p < 0.02$ , availability of extension teaching media at  $p < 0.05$ , and available time to prepare at  $p < 0.02$ . ALEOs preferred to use agriculture extension teaching methods that had low cost of preparation since they had not enough funds, they selected methods that required easily obtained teaching media, that are locally found. They also selected methods that required less time in preparing.

Rollins and Golden (1994) found that the best type of agriculture extension teaching methods to use depended on the audiences' maturity, educational level, background and objectives. Many situations and factors affect the choice of agriculture extension teaching methods to be used. Examples are nature of subject matter, amount of time the ALEOs intend to devote to the method and the time the farmers can devote, reinforcement, steps in extension teaching, materials and possible teaching situation available, preference and ability of the ALEO to perform successfully the various methods and evaluation performance. It is therefore imperative that ALEO cannot bring about any significant change in the knowledge, skill and attitude of the farmers without employing the right mode of these agricultural extension teaching methods (Okunade, 2007). Cano and Garton (1994) suggest adopting agricultural extension teaching methods that will be effective with all the learning preferences. Additionally, for teachers to be effective, clientele need to

have knowledge of what educational delivery method works best for them (Cano and Garton, 1994; Torres and Cano, 1994).

**Table 8a: ALEOs' opinions on criteria used to select certain extension teaching methods (N=60)**

Factor to consider	Use of extension teaching methods			
	n	%	X <sup>2</sup> -value	p-value
<b>Available time for farmers to participate</b>			7.0	0.03
Highly considered	42	70		
Considered	18	30		
Not considered	0	0		
<b>Available Time for ALEO to prepare</b>			15.8	0.03
Highly considered	22	36.7		
Considered	34	56.7		
Not considered	4	6.7		
<b>Cost of preparation</b>			11.3	0.02
Highly considered	19	31.7		
Considered	30	50.0		
Not considered	11	18.3		
<b>Cultural context of farmers</b>			11.4	0.02
Highly considered	25	41.7		
Considered	26	43.3		
Not considered	9	15.0		

Adoption rates also depend on the number of farmers who receive the information. Available time for farmers to participate in educational sessions was highly considered as revealed by 42 (70.0%) of the 60 ALEOs respondents, was statistical significant at  $p < 0.03$ . This study found that farmers preferred to use weekdays for attending extension meeting, which they used for leisure activities like for traditional dances, drinking, and going to churches. However, they preferred extension meetings that lasted for 2-3 hours and this was mentioned by 93 (77.5%) of the 120 farmer respondents (Table 9). Another research conducted by Suvile (1996) in Western Nepal recommended that, to make all expected farmers participate in agricultural extension sessions, the ALEOs should make sure that regular tasks such as caring for livestock or children are fitted in between classes.

And separating classes for men and women be done at different times of day depending on participants' daily routines.

**Table 8 b: ALEOs' opinions on criteria used to select certain extension teaching methods (N=60)**

Factor to consider	Use of extension teaching methods			
	n	%	X <sup>2</sup> -value	p-value
<b>Previous experience of farmers on the method</b>			12.4	0.01
Highly considered	16	27.1		
Considered	30	50.8		
Not considered	13	22.0		
<b>Availability of funds</b>			11.8	0.02
Highly considered	43	71.7		
Considered	13	22.0		
Not considered	4	6.8		
<b>Availability of teaching media</b>			9.41	0.05
Highly considered	25	41.7		
Considered	28	46.7		
Not considered	7	11.7		

Methods which require low costs are preferred as many institutions/organizations that provided extension services have limited budgets. For example materials that required buying, designing, typing, printing, were less used. Of the 60 ALEOs, 30 (50.0%) reported that the cost of preparing and delivering agricultural information was an important one to consider and it was statistically significant at  $p < 0.02$ . Suville (1996) was in the opinion that, farmer field trips, especially taking farmers from less developed areas into more developed ones was beneficial, but could be done only where funding from the coordinating institution is available. Also, distribution of written material is appropriate not only where literacy skills are common but also where funding is available. Another aspect was the cultural context of communities which of the 60 ALEOs respondents, 26 (43.0%) reported that they considered it when selecting agricultural extension teaching methods (Table 8a). It was statistically significant at  $p < 0.02$ . Culturally, male ALEOs were

not allowed to have meetings with female farmers otherwise community members judged them as having sexual relationships and could result to husband-wife conflicts. Thus in the study area ALEOs used methods that brought many farmers together to prevent being suspected of ill doing. Moreover in the study area, women took care of the family, especially children and household chores. Because of this, most could not stay outdoors for long periods of time, which affected their attendance to seminars, workshops, going for study tours and exhibitions that took place far away from their villages.

Farinde (1991) had similar opinions as he reported that the compatibility of the transferred technology and methods used to transfer depended on the physical, psychological and cultural attributes of our farmers. However, little has been done on this. Further, previous experiences of farmers based on extension teaching methods was important to consider and these included local methods of communicating agricultural information. The study found that of the 60 ALEOs, 30 (50.8%) considered it important, and was statistically significant at  $p < 0.01$ . Farmers reported what method they used, and ALEOs modified using new methods. ALEOs avoided discouraging farmers to use indigenous methods, rather they maintained them with slight changes when need arose, which attracted farmers' interest. FAO (1989) had similar opinions, that the level of familiarity of learners with the subject matter and the method used to present it affected the treatment of the information. A low level of familiarity required more thorough treatment and learners needed to refer back to the material a number of times to master it. A high level of familiarity required a less detailed coverage, potentially favoring different media. Also, Black

(2000) said that with the increasing importance of small-scale growers in Australia's forestry sector, ALEOs approaches to extension need to add value to, rather than replace, the considerable local or indigenous approaches. In the same line, Suville (1996) argued that ALEOs must realize that local methods have developed over time for a reason and cannot be simply dismissed and replaced with modern methods.

Moreover, Krishan (1968) was in the opinion that, old people's valuable and wise ideas, knowledge and experiences are important and can help ALEOs to disseminate agricultural innovations in villages. Yet, Table 8a shows distribution of responses according to their consideration on available time for ALEOs to prepare extension sessions, and 34 (56.7%) of the 60 considered the factor useful, and was statistically significant at  $p < 0.03$ . ALEOs, especially those working with NGOs found themselves bound with deadlines to accomplish certain activities and reporting otherwise they did not get funds for the next planned activities. On the other hand, ALEOs worked with the LGA complained that they received funds late when the first trimester was over. Others said that the received funds had a lot of bureaucracy before used in the field, hence delaying the implementation of planned activities in a year. All these problems led them to have shortages of time for proper preparation and implementation of extension teaching sessions. Availability of funds was highly considered when selecting various extension teaching methods as of the 60 ALEOs respondents 43 (71.7%) said so, it was statistically significant at  $p < 0.02$  (Table 8a). Coordinating institution allocated insufficient funds to extension service thus ALEOs were forced to use less expensive methods like agriculture discussion

meetings and failed to use other methods like study tours, seminars, exhibitions, method and result demonstration due to shortage of funds. Similar findings were reported by Rutatora and Rutachokoziwa (1995), that the government funding of extension services had been declining since the 1980s making it difficult for extension officers to accomplish their tasks. Additionally, Table 8 shows the distribution of ALEOs respondents according to their consideration on the availability of extension teaching media, where 28 (46.7%) of the 60 ALEOs respondents reported that they considered the factor as important when selecting extension teaching methods. This factor was statistically significant at  $p < 0.05$ .

#### **4.4 Farmers' Opinions on Criteria for Selecting Extension Teaching Methods**

As far as agricultural innovation transfer is concerned farmers are key players. They are objects to be evaluated if at all the process has good progress, and therefore their opinions towards selection of extension teaching methods are crucial. This implies that, for effective extension performance, one should, first ask farmers what kind of information they need. Then the ALEOs gain their confidence by offering them relevant, reliable, and usable information. This study, therefore, obtained some criteria pointed out by farmers as appropriate as described hereunder. Simple innovations that are easily understood are likely to attract farmers' attention (Table 9). Thus extension teaching methods chosen should be simple. Of the 120 farmer respondents in the study, 111 (92.5%) indicated that this was an important factor to consider and they were in the opinion that understanding was important to initiate the first stage of innovation adoption (interest). The factor was statistically



significant at  $p < 0.05$ . Radhakrishna *et al.* (1994) had similar opinions as they reported that the extension agents should use the educational methods preferred most by farmers such as visiting their farm, and making available relevant extension publications and other resources to farmers. These should be easy to read and apply in view of the age and educational status of the average farmer. Furthermore, Msuya (1998) reported that adoption is significantly associated to complexity of the innovation.

Of 120 farmer respondents, 102 (85.0%) reported that cost of an extension teaching method was appropriate, and was statistically significant at  $p < 0.00$ . The innovation that had low cost attracted interested farmers to undergo trial stage (third stage of innovation) as compared to expensive technologies which led to some interested farmers to withdraw the trial process that had already started!. Due to their low incomes, farmers preferred low cost methods that did not involve traveling, accommodation costs, purchasing stationery. FAO (1998) reported that, learner factors which could influence media selection included the cost to students, for example a video cassette may be cheaper to purchase than a large printed text book. The cost of equipment necessary to utilize the media must also be considered. In the same line, Machumu (1995) found that technologies with minimum demand on monetary investment had higher chances of being sustained and cost of input and credit availability were found to influence adoption negatively.

Farmers are also sensitive with time spent when attending extension sessions. This study found that farmers preferred to spend more time attending extension sessions

if at all they were paid allowances, otherwise attended for short time and then left to attend other duties. A method selected, therefore, enabled presentation of intended message straight forward in 2-3 hours without wasting farmers' time. Of the 120 farmer respondents, 93 (77.5%) indicated that time of presentation was important to consider, and was statistically significant at  $p < 0.02$  (Table 8). Formal education teaching is mainly vertical and authority rested within a teacher, while extension education provides information to adults and information is shared horizontally among farmers and ALEOs, and authority rested within farmers, thus ALEOs used methods that took short time. Cole (1981) had different opinion, he contended that improving "knowing how" knowledge to farmers required more time-consuming methods. In the same line, Martin and Omer (1988) contended that, for enhancing the use of appropriate and effective instructional methods and tools in conducting specific adult education programs in agriculture ALEOs needed to spend more time with the processes of education.

In the study area, most, 104 (86.7%) farmer respondents reported that farmer participation was an important one to consider in extension teaching, and it was statistically significant at  $p < 0.02$  (Table 9). Participation of farmers in extension sessions gave them an opportunity to discuss and work out their own problems rather than being given ready made solutions. This enabled farmers to create self confidence and learn more, hence increasing their adoption to a given innovation. For example, in the study area farmers participated in market survey of beans at Tandale market in Dares Salaam, pineapple and banana market survey at Marogoro and tomato and sunflower market survey at Dodoma and Arusha. This resulted to market linkages that enhanced farmers to adopt new innovation of producing

commercially. Similarly, Cole (1981) reported that criteria to select a particular demonstration method (or any other educational technique) involved several factors, including type of knowledge to be transferred, degree of participation by clients, and type of impact desired.

Yet, for an extension education to be of value it was necessary for it to meet needs and interest of farmers. This was possible only when the content and teaching methods used were appropriate to the enterprise of farmers. Of the 120 respondents, 92 (74.7%) indicated that enterprise was an important factor to consider and it was statistically significant at  $p < 0.01$ . Similarly, Ritter and Welch (1988) assert that, methods of program delivery should consider the type of audience and be relevant to their activities for meeting their information needs.

**Table 9: Farmer respondents' opinions on criteria used to select extension teaching methods**

Criteria	Use of extension teaching methods			
	n	%	X <sup>2</sup> -value	p-value
<b>Easiness to understand</b>				
Not appropriate	6	5.0	9.20	0.05
Appropriate	111	92.5		
Do not know	3	2.5		
<b>Low cost methods</b>			11.82	0.00
Not appropriate	10	8.3		
Appropriate	102	85.0		
Do not know	8	6.7		
<b>Consuming short time</b>			12.29	0.02
Not appropriate	13	10.8		
Appropriate	93	77.5		
Do not know	14	11.8		
<b>High chance for farmers to participate</b>			11.98	0.02
Not appropriate	10	8.3		
Appropriate	104	86.7		
Do not know	6	5.0		
<b>Appropriate to enterprise</b>			13.3	0.01
Not appropriate	11	9.2		
Appropriate	92	74.7		
Do not know	17	14.2		
<b>High farmer-ALEOs interaction</b>			9.86	0.04
Not appropriate	14	11.7		
Appropriate	89	74.2		

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Do not know	17	14.2
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Further, this study found that farmers liked to interact with ALEOs and were more comfortable when they met them to exchange ideas and explain their problems encountered in their daily activities. On the other hand, farmers lost hope and sometimes ignored what they had started to built interest on when there was no opportunity to discuss with ALEOs. Of the 120 farmer respondents, over two third, 89 (74.2%) reported that they preferred methods which allowed farmer-ALEOs contacts and interaction. This variable was statistically significant at  $p < 0.04$  (Table 9). Agricultural extension require greater interaction and an open dialogue between farmer and ALEOs, and acknowledges the farmers' often lifelong expertise in identifying and solving problems and selecting options for improvement (Gaforth and Harford, 1997). This enables scientists and ALEOs to gain knowledge from farmers and discover what problems the farmers are facing and thereby hopefully try to solve the discovered problems in collaboration with the farmers (Scarborough *et al.*, 1997).

#### **4.5 Factors Hindering ALEOs to Select Extension Teaching Methods**

In the study area, there were various problems that hindered ALEOs to select certain agricultural extension teaching methods. These problems prevented ALEOs to meet information dissemination needs, which could be incorporated various teaching methods for better farmer adoption of innovations. Generally all ALEOs of LGA and NGOs faced similar problems regardless of their employer, what differed was the severity and the available means for solving it.

Shortage of time was found to be most prominent hindering factor for ALEOs working with NGOs than those with the LGA, as 12 (92.3 %) of the 13 NGOs ALEOs and 37 (78.7 %) of 47 LGAs ALEOs reported (Table 10). The former reported to having a lot of activities and enough funds, but had strict work schedule, which were time bound. LGAs ALEOs indicated to having few activities and their work schedule not strict. Moreover, NGOs ALEOs were being fully sponsored by donors, but were also required to submit detailed reports on specific periods making them busy over the year.

**Table 10: Distribution of ALEOs by the factors hindering selection of certain agricultural extension teaching methods (N = 47 for Government and 13 for NGO ALEOs)**

Factors	Fail to select		Do not fail to select	
	n	%	n	%
<b>LGA</b>				
Shortage of time	37.0	78.7	10.0	21.3
Lack of funds	46.0	97.9	1.0	2.1
Working environment	43.0	91.5	4.0	8.5
Unavailability of teaching media	47.0	100.0	0.0	0.0
<b>NGO</b>				
Shortage of time	12.0	92.3	1.0	7.7
Lack of funds	9.0	69.2	4.0	30.8
Working environment	9.0	69.2	4.0	30.8
Unavailability of teaching media	9.0	69.2	4.0	30.8

Agricultural teaching media are supporting materials, which alone can not generate learning. These tools help to do a job in a better way. The study found that unavailability of teaching media was critical in LGA offices, as of the 47 (100) ALEOs respondents working in the LGAs, all reported so. They reported to not

having funds to buy flip charts, marker pens, notebooks, ball pens, and television sets. Other things were filmstrips, bulletin boards, models, cultural programmes, flash cards and posters. Also LGA employed ALEOs reported that they had no funds to maintain demonstration plots for extending knowledge to farmers. Further, their offices had no computers to view CD-ROMS, prepare PowerPoint presentations, displays, and listen to audiotapes. Because of all these inadequacies LGAs employed ALEOs taught farmers theoretically with few demonstrations, which not well cared for farmers' interest. NGOs faced similar problem where of the 13 NGOs ALEOs, six (69.2%) witnessed to face the problem. Similar findings were reported by Van den Ban (1988) where lack of teaching equipment and facilities was found to be an obstacle hampering the delivery of an effective adult educational program in developing countries.

Among many problems hindering ALEOs from selecting appropriate agricultural extension teaching methods, lack of funds was found to be a serious one as it was revealed by 46 (97.9%) of the 47 ALEOs respondents ,nine (69.2%) of the 13 NGOs ALEOs. The study found that both NGOs and LGA employed ALEOs faced this problem despite their different funding sources and area covered. However, NGOs covered small areas, while the LGA ALEOs worked in many villages trying to reach many farmers. Apart from allocating little funds, government funds were also used for other non agricultural extension activities including covering day to day running costs of the District office. Therefore, both NGOs and LGA ALEOs were forced to select agricultural extension teaching methods based on the amount of funds at their disposal.

Generally, cost is the major investment similar to the time, reprinting course manuals involves layout, paper, printing and distribution costs which increases with the number of farmers. Hence with many farmers there are increased expenses and much time is spent resulting to ALEOs using simple, and low cost methods to reach many scattered farmers (Gottschalk, 1996). Such a phenomenon was also reported by Mbwana (1995), that most of the printed materials were not adequately produced and distributed to farmers due to financial constraints. The price of some of the materials is beyond the reach of rural farmers.

Of the 13 and 47 respondents, nine (69.2%) and 43 (91.7%) of the NGO and LGA ALEOs respectively reported that poor work environment hindered them from selecting proper agricultural extension teaching methods. The problem was severe for LGA ALEOs than for NGOs and those ALEOs seconded to work with NGOs. The poor working environments observed during the study included unreliable transport. For example, of the 60 ALEOs 40 (80%) used public transport, few, 20 (20%) had motorcycles but had no fuel. Motorcycles were the most important vehicles as they improved work efficiency as ALEOs attended many scattered villages and farmers. For example, some villages were 20 km apart from one another, and some were found in mountainous areas. Also, stationeries were a problem, especially to ALEOs working for the LGA. ALEOs used own funds to buy stationeries and could not claim refund, which again took a long process. However, most of the LGA ALEOs had no offices and most shared offices with ward executive officers who did many other chores in the offices including arbitrating minor civilian cases. These offices did not have sufficient furniture, stationeries, telephone as ALEOs used own mobile phones to communicate to farmers. There

were no other extension media facilities like television, radios, and other documentary materials like video tapes.

Similarly, Mwandry (1992) found that ALEOs at village level lacked transport to enable them to move conveniently and timely. Also, a study conducted by Chizari *et al.* (1991) to determine obstacle hampering use of extension methods in delivering extension programs found that lack of teaching equipment and facilities was an obstacle hampering the delivery of effective agricultural adult educational program. Almost three-fourths of ALEOs reported that dispersion among farmers was an obstacle followed by lack of linkage between research centers and ALEOs, the two least rated items were illiteracy among farmers and lack of up-to-date information to present to farmers. In a related study of agriculture educators' perceptions in delivering adult education programs, lack of time, funds, and motivators were found to be major obstacles in delivering adult education programs (Chizari, 1991).

However, Ogunwale (1991) found lack of in-service courses, lack of means for upgrading or increasing educational qualification, lack of confidence among farmers, lack of job security, having no extra pay, bonus, or incentives for teaching rural population, rapid changes in agriculture, poor attendance of farmers, having insufficient administrative support and illiteracy among farmers contributed to not selecting certain agricultural extension teaching methods.



#### **4.6 Factors Hindering Respondents' Selection of Agricultural Extension Teaching Methods**

In the study area farmers were not involved in selecting agricultural extension methods, which could be a chance for them to propose methods they thought to be better. Instead ALEOs selected them according to what they believed to be best for farmers. Due to national economical problems, ALEOs choose extension teaching methods that did not require funds. Respondents indicated that they wanted to participate in selecting extension teaching methods, but were not involved as ALEOs did not value their opinions. Also, respondents were perceived to not being aware of the various extension teaching methods, and had no time (Table 11).

The study found that shortage of money among respondents was an important factor for not selecting extension teaching methods, as of the 70 respondents, 38 (54.3%) indicated so and not statistical significant. Respondents were not able to pay for extension services and thus had no choice on the appropriate extension teaching method to be used. They waited for ALEOs to say on an extension teaching method to be used. Similarly, Chan and Norm (2003) study in Malaysia found that good agricultural practice (GAP) required extra cost for the farmers to comply and in a way hindered the farmers' participation. For example, under the GAP Certification Program farms were required to have proper chemical stores, proper housing and clean water for the workers and proper packaging area to avoid contamination of produce. The facilities/requirement needed added on farmers' costs of production and did not get premium prices for their produce; hence most did not join the program.

**Table 11 a: Factors hindering farmers to select agricultural extension teaching methods (N=120)**

Factor	Extension teaching methods					X <sup>2</sup> -value	p-value
	Individual methods	Group methods	Individual and Group	Group and Mass	Total		
<b>Shortage of time</b>	n=16	n=30	n=70	n=4	N=120	16.4	0.01
Not sure	6(37.5)	14(46.7)	16(22.9)	2(50.0)	38(31.7)		
Important	7(43.8)	10(33.3)	50(71.4)	1(25.0)	68(56.7)		
Not important	3(18.8)	6(20.0)	4(5.7)	1(25.0)	14(11.7)		
<b>Shortage of cash</b>	n=16	n=30	n=70	n=4	N=120	1.7	0.26
Not sure	10(62.6)	18(60.0)	38(54.3)	2(50.0)	68(56.7)		
Important	1(6.3)	8(26.7)	24(34.3)	1(25.0)	34(28.3)		
Not important	5(31.3)	4(13.3)	8(11.4)	1(25.0)	18(15.0)		
<b>Not involved by ALEOs</b>	n=16	n=30	n=70	n=4	N=120	16.9	0.01
Not sure	5(31.3)	6(20.0)	13(18.6)	3(75.0)	27(22.5)		
Important	3(18.8)	8(26.7)	36(51.4)	1(25.0)	48(40.0)		
Not important	8(50.0)	16(53.3)	21(30.0)	0(0.0)	45(37.5)		

The study found that respondents had no capacity to lobby or demand for participating in selection of extension teaching methods they desired, as ALEOs did not involve them in selecting them. Of the 70 respondents, about half, 36 (51.4%) reported that they were not involved, and this factor was statistically significant at  $p < 0.01$  (Table 11a). In the study area, ALEOs considered farmers as empty baskets which they had to fill with agricultural information (top down approach), and had no idea on the agricultural extension teaching methods thus did not involve them in selecting the methods. Similar findings were reported by Black (2000) who explained that the linear top-down approach to extension was based on the assumption that new agricultural technologies and knowledge are typically developed and validated by research scientists, and that the task of extension agencies is to promote the adoption of these technologies by farmers, thereby increasing agricultural productivity (Rogers, 1983).

Also reported that the notion that farmers were thirsty recipients of any scientific information and who operated in an intellectual vacuum had some currency even up until the 1980s. On the other hand, Gaforth *et al.* (1997) are in the opinion that local villagers should be involved in all decisions concerning the use of demonstration plots for better participation in agricultural extension sessions. Also, Carr (1997) study in Australia insisted to involve farmers so that they take ownership of both problems and solutions ideally, creating viable methods that are adapted to the local context rather than implementing practices that are generic across them.

Not having knowledge on various extensions teaching methods also hindered respondents' ability to select combination of individual and group methods. This aspect was indicated by 44 (62.9%) of the 70 respondents, and was statistically significant at  $p < 0.05$ . This implied that smallholder farmers needed training to empower them in selecting extension teaching methods. Other researchers (Cano and Garton, 1994; Torres and Cano, 1994) also advocate that clientele need to have knowledge of what educational delivery method works best for them, hence be able to select them. Similarly, Stephen and Mabusa (2008) study conducted in Botswana found that materials and equipment that involved the ability to read and write such as the use of chalkboard, flannel board, satellite, slides and computer aided instructions were seldom used by the extension workers, indicating that the low level of skills of farmers in Botswana, just as in many other African countries might have contributed to farmers not selecting agricultural extension teaching methods.

Also, of the 70 respondents, 35 (50.0%) who used a combination of individual and group extension teaching methods said that their opinions on what type of methods to be used were not valued, which was statistically significant at  $p < 0.05$  (Table 11b). Findings implies that farmers' opinions on the type of extension teaching methods to be used were not valued thus did not participate in selecting them. According to Mlozi (1994) farmers with low income were denied similar access to knowledge and skills about farm productivity simply because they cannot materially attract ALEOs, In view of this, obviously their opinions were not valued. Moreover, over two thirds, 50 (71.4%) of the 70 respondents who indicated using individual and group extension teaching methods, reported that they did not select the methods because they were not aware of the various methods, and it was statistically significant at  $p < 0.01$ . Also, respondents failed to select appropriate extension teaching methods because they did not know the differences between the methods, an aspect reported by 39 (55.7%) of the 70 respondents. Respondents reported that they were familiar with few extension teaching methods including group discussions, meetings, demonstrations and seminars.

**Table 11 b: Factors hindering farmers to select agricultural extension teaching methods (N=120)**

Factor	Extension teaching methods					X <sup>2</sup> -value	p-value
	Individual methods	Group methods	Individual and group	Group and mass	Total		
<b>Not having knowledge</b>	n=16	n=30	n=70	n=4	N=120	11.9	0.05
Not sure	2(12.5)	8(26.7)	16(22.9)	2(50.0)	28(23.3)		
Important	7(43.8)	12(40.0)	44(62.9)	1(25.0)	64(53.3)		
Not important	7(43.8)	10(33.3)	10(14.3)	1(25.0)	28(23.3)		
<b>Opinions not valued</b>	n=16	n=30	n=70	n=4	N=120	11.9	0.06
Not sure	0(0.0)	6(20.0)	10(14.3)	2(50.0)	18(15.0)		
Important	6(37.5)	10(33.3)	35(50.0)	0(0.0)	51(42.5)		
Not							

important	10(62.5)	14(46.7)	25(35.7)	2(50.0)	51(42.5)		
<b>Not aware of various methods</b>	n=16	n=30	n=70	n=4	N=120	17.1	0.01
Not sure	1(6.3)	7(23.3)	9(12.9)	2(50.0)	19(15.8)		
Important	7(43.8)	13(43.3)	50(71.4)	1(25.0)	71(59.2)		
Not important	8(50.0)	10(33.3)	11(11.7)	1(25.0)	30(25.0)		
<b>Don't know difference between extension teaching method</b>	n=16	n=30	n=70	n=4	N=120	4.2	0.6
Not sure	3(18.8)	9(30.0)	20(28.6)	2(50.0)	34(28.3)		
Important	9(56.3)	13(43.3)	39(55.7)	2(50.0)	63(52.5)		
Not important	4(25.0)	8(26.7)	11(15.7)	0(0.0)	23(19.2)		

Respondents' shortage of time in selecting extension teaching methods was reported a problem by 50 (71.4%) of the 70 respondents, and was statistically significant at  $p < 0.01$ . Respondents reported that an extra time was required in negotiating with ALEOs on the appropriate extension teaching method to be used.

## CHAPTER FIVE

### 5.0 CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 Conclusions

##### Overview

The objective of the study was to investigate factors influencing the use of certain agricultural extension teaching methods for increased adoption of innovations and specifically the study identified the commonly used agricultural extension teaching methods by ALEOs, criteria that ALEOs used to select certain agricultural extension teaching methods and factors that hindered selection of certain agricultural extension teaching methods. The population of the study included all ALEOs working in Morogoro Rural District and Mvomero District, and farmers served by

those ALEOs were interviewed to get their opinions. Generally, the study realized the following;

- ALEOs mostly used a combination of individual and group agricultural extension teaching methods followed by group teaching methods. The commonly used individual extension teaching methods were farm and home visits and agriculture discussion meetings. Method demonstration and result demonstrations were also used in areas with demonstration plots, which were few in the study area. Farmer networking was also used especially in Morogoro rural district.
- Criteria that were highly considered by ALEOs to select certain agricultural extension teaching methods included easiness to use the method, availability of funds from coordinating institution, available time for farmers to participate, and cultural context. The study also identified that time required to deliver and cost of preparation and delivery were not highly considered. On their side, farmers suggested some factors to be considered when selecting agricultural extension teaching methods, they included easiness to understand, low cost methods, consuming short time, appropriate to enterprise, high farmer-ALEOs interaction and contact.
- The study identified factors that hindered ALEOs to select some agricultural extension teaching methods, these included shortage of time, lack of funds, poor working environment, and unavailability of teaching media. In the other hand farmers said they were not in position to select teaching methods

due to various reasons which were out of their control like shortage of time, shortage of cash, did not know difference between methods, not having skills, and ALEOs did not involve them in selecting the methods, yet they believed that ALEOs selected best methods for them.

## 5.2 Recommendations

- If extension service is to achieve a real impact on technology adoption which will increase farm productivity hence improved farmer livelihoods, new methodologies for dissemination of information have to be developed or adapted. The main direction of reform in agricultural extension is towards learning rather than teaching paradigm. This learning approach should incorporate new methodologies and approaches that are demand-driven and increase the real, interactive participation of local people at all levels of decision making in an extension delivery network. These methods require that the roles and responsibilities of ALEOs, and local people be re-defined and shared. However, it is imperative that individual countries make situational analyses of the social, political, technical, economic and natural conditions prevalent in their areas before adapting any method, approach, or strategy. An integrated approach (comprising of different methods) is recommended in diverse socio-cultural, economic and political situations in order to achieve the desired goals. Generally, a sound agricultural extension policy is indispensable to achieve success in transferring knowledge to farmers.

- Extension personnel need to have a deep understanding of not only farming systems but also the interaction between agriculture and the cultural, physical and socio-economic environment. Thus Training extension personnel need to be in line with changes taking place in the society time to time and with characteristics and values of various farmers and not provided with generalized extension knowledge this will ensure sustainability of extension information delivered to farmers by ALEOs.
- Gender issue pervades all aspects of extension activity. There were implications for women farmer led extension for the timing, location and language of extension activities. This implies that farmers should not be treated as a group, female farmer sex roles should be taken care of otherwise will be left behind towards access to innovation information.
- Farmer organizations need to be empowered so that can have a wider focus in all aspects that affects them including extension methods and not stick to marketing of farm products only. A strong structure of farmers' organizations will ensure the opportunity for greater efficiency, effectiveness and equity of innovation information delivery and access. They can also be a vehicle through which farmers contribute for what kind of information they require and through which methods, need to become actively involved in the planning and management of extension, and act as a voice for their members, in getting services which meet their needs.



- Adequate training must be given to the extension agents as regards the proper manipulations of extension teaching methods to bring out the desired result. Extension agents must have adequate knowledge of the characteristics of each of the extension teaching methods as well as know the characteristics of the respondents. These will enable them to use appropriate methods for appropriate group of farmers.

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## APPENDICES

### **Appendix 1: Questionnaire for farmers**

The following questions aim at collecting information about factors that influenced the use of certain agricultural extension teaching methods by agriculture and



livestock extension officers (ALEOs) when providing agricultural information to smallholder farmers. Such information may be useful in strengthening the agricultural extension services in Morogoro and Mvomero districts and elsewhere. There is no right or wrong answers. Please write or tick where appropriate.

### **Background information**

1. What is your name?.....
2. What is your sex?
  1. Male
  2. Female
3. How many people are in your family?.....
4. What is the name of your District?.....Ward?.....  
village?.....
5. Please circle the level of your formal education
  1. Not attended formal education
  2. Standard IV
  3. Standard VII
  4. O' level
  5. A' level
  6. Certificate
  7. Diploma
  8. Others (Specify).....
6. What is your major economic activity?
  1. Agriculture
  2. Cattle keeping

- 3. Goat keeping
- 4. Pig keeping
- 5. Chicken keeping

**B. Identify commonly used agricultural extension teaching methods**

7. Which teaching method (s) among the following is commonly used to disseminate agricultural information to you?

- 1. Individual
- 2. Group
- 3. Mass
- 4. A combination of 1 and 2
- 5. A combination of 2 and 3

8. The following is a list of extension teaching methods commonly used by agriculture and livestock extension officers (ALEOs) to pass information to smallholder farmer. Please, rank them 1, 2, 3, and 4 where 1-Never used, 2-Rarely used, 3- moderately used, 4-frequently used.

<u>Method</u>	<u>Ranking</u>
Farm and home visits	.....
Personal letters	.....
Telephone calls	.....
Method demonstration	.....
Result demonstration	.....
Agricultural discussion meetings	.....
Seminars	.....
Folk media	.....

Leaflets	.....
Brochures	.....
Video shows	.....
Film	.....
Posters display	.....
Farmers exchange visits	.....
Workshops	.....
Study tours	.....
Farmer exhibitions	.....
Farmer networking	.....
Farmer animating	.....

**C. Criteria used to select extension teaching methods**

9. Why do you recommend for some extension teaching methods to be frequently used by ALEOs to pass information to smallholder farmer? Please, rank them 1, 2, and 3 where 1-Very important, 2- Moderate 3- Not important.

- 1. Easiness to understand .....
- 2. Have high farmer-ALEOs interaction and contact .....
- 3. Consume little time .....
- 4. Cheap .....
- 5. Effective to my enterprise .....
- 6. Gives farmers chance to participate .....

10. What time does you recommend that agriculture and livestock extension officer use to pass information to smallholder farmer?

- 1. Less than 1 hour

2.1 - 2 hours

3.2 - 3 hours

4. above 3 hours

**D. Factors hindering the selection of extension teaching methods**

11. The following is a list of factors hindering you from selecting some extension teaching methods. Please, rank them 1, 2 and 3 where 1-Very important, 2-Moderate 3- Not important.

- Shortage of cash .....
- Not involved by ALEOs .....
- Not aware of the factors .....
- Shortage of time .....

***Thank you for your cooperation***

**Appendix 2: Questionnaire for Agriculture and Livestock Extension Officers  
(ALEOs)**

**Introduction**

The following questions aim at collecting information about factors influencing the use of certain agricultural extension teaching methods by agriculture and livestock extension officers (ALEOs) when providing agricultural information to smallholder farmers. Such information may be useful in strengthening the agricultural extension services in Morogoro and Mvomero districts and elsewhere. There is no right or wrong answers. Please write or tick where appropriate.

**A: Background information**

1. What is your name? .....
2. What is your sex
  - 1.Male
  - 2.Female
3. Name the village.....ward.....and district.....you are working with.
4. Who is your current employer?(tick one)
  - 1.Local Government Authority (LGA)
  - 2.NGO
- 5 .What is your formal education
  - 1.Primary education
  - 2.Certificate
  - 3.Diploma
  - 4.University degree
  - 5.Others (specify) .....
- 6.How long have you been working as Agriculture and Livestock Extension Officer? .....years.
- 7.How many villages do you serve .....

B. To identify the commonly used extension teaching methods by extension officers

8. The following is a list of common extension teaching methods. Circle 'Y' for the ones you are mostly using and 'N' for the ones you are not using and 'R' for the ones you are rarely using.

- 1. Farm and home visits .....Y/N/R
- 2. Personnel letters .....Y/N/R
- 3. Telephone calls .....Y/N/R
- 4. Method and result demonstration.. .....Y/N/R
- 5. Agricultural discussion meetings.....

Y/N/R

- 6. Seminars .....Y/N/R
- 7. Folk media .....Y/N/R
- 8. Leaflets/brochures.....Y/N/R
- 9. Film/video shows .....Y/N/R
- 10. Posters display .....Y/N/R
- 11. Farmers exchange visits .....Y/N/R
- 12. Workshops .....Y/N/R

9. What are the reason(s) for using the selected methods in question 7 above?

(Circle the chosen option).

- 1. Cheap
- 2. Take less time to prepare
- 3. Take less time to deliver information
- 4. Lessons are easily understood
- 5. Farmers centered
- 6. Many people are taught in time
- 7. Others (specify)  
.....

10 (a) Is there any problem you face when using the selected methods?

- 8. Yes
- 9. No

(b) If yes mention them

- 1. ....
- 2. ....

- 3. ....
- 4. ....
- 5. ....

**C. Criteria that Agriculture and Livestock Extension Officers (ALEOs) use to select certain extension teaching methods**

11. Do you sometimes fail to use some teaching methods because you don't have time?

- 1. Yes 2.No

Give out reasons for your answer.

.....  
 .....

12. Do you sometimes fail to use some teaching methods because you don't have funds?

- 1. Yes 2.No

If yes what are those teaching methods

.....  
 .....

**D. Factors that hinder selection of certain extension-teaching methods**

13. What are the reasons for not using some extension teaching methods?

(Circle the selected options (s))

- 1. Low level of education that farmers have
- 2. There is no favourable work environment
- 3. There is no fund to purchase required materials
- 4. Media required are not available
- 5. Consumes long time to prepare and deliver
- 6. Others (specify).....

.....

***Thank you for your cooperation***