THE CONTRIBUTION OF FARMER'S TRAINING FOR IMPROVEMENT OF HOUSEHOLD INCOME: A CASE STUDY OF UMADEP IN MGETA DIVISION MOROGORO, TANZANIA.

BY

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A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE DEGREE OF MASTER OF ARTS IN RURAL DEVELOPMENT OF SOKOINE UNIVERSITY OF AGRICULTURE. MOROGORO, TANZANIA.

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ABSTRACT

Farmer training is essentially an agriculture extension educational service for training and influencing farmers (and their families) to adopt improved practices in crop and livestock production. This study examined the contribution of farmer training to farmer's household income. More specifically the study examined the influence of the training to farm production. The study was carried out in Tchenzema, Bunduki and Langali wards in Mgeta division. A cross section design was adopted where structured questionnaires were administered to both trained and non-trained farmers and project workers. A representative sample of 86 respondents (40 trained farmers, 40 non-trained farmers and 6 project workers) was drawn from a sampling frame. The Statistical Package for Social Science (SPSS) software was used for data analysis. The study showed that farmer training had an influence on farmers household income. Unlike non-trained farmers, trained farmers were found to be more knowledgeable on improved crop and husbandry practices. The training received had improved their skills, farm production and the income derived from farming. As a result of increased income, their general living standards had improved as well. Some of the trained farmers have taken their children to secondary schools; construct good houses and few own valuable assets like milling machines. The success of trained farmers has brought impact on neighbouring farmers and now few of the non-trained farmers have adopted the improved techniques from their friends. It was then concluded and recommended that continuous delivering of training to farmers (extension) has social and economic influence to farmer's life. Furthermore, training needs assessment should be conducted and recommendations given should consider farmers socio-economic and ecological condition. The study further deduced that for increased agriculture productivity which is targeting the improving farmers' household income, other agriculture

development processes such as marketing, credit services, policy frameworks and physical infrastructure should be given priority and taken as of great importance.

DECLARATION

I, Djalou Franco, do hereby declare to the Senate of Sokoine of University of Agriculture that this dissertation is my own original work and has never been submitted for higher degree awarded in any other University.

Signature ..... D Franco .....

Date ..... 9/11/05 .....

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DEDICATION

To my beloved mother without whom I would not have been who I am now.

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LIST OF ABBREVIATIONS

ASMP	-	Agricultural Sector Management Project
BTC	-	Belgium Technical Cooperation
CFA	-	Center for Farmers and Agriculture
DAEE	-	Department of Agricultural Education and Extension
DALDO	-	District Agricultural and Livestock Development Officer
DCO	-	District Co-operative Officer
DOS	-	Danish Orthonological Societies
FAO	-	Food and Agriculture Organization
LITI	-	Livestock Training Institute
MAC	-	Ministry of Agriculture and Cooperative
MATI	-	Ministry of Agriculture Training Institute
M.a.s.l	-	Meter above sea level
MVIWATA	-	Mtandao wa Vikundi vya Wakulima Tanzania
NAEP	-	National Agriculture Extension Project
NALERP	-	National Agriculture and Livestock Extension Rehabilitation Project
NGO	-	Non- Governmental Organization
PEDP	-	Primary Education Development Programme
SACCOS	-	Serving and Credit Cooperative Society
SNAL	-	Sokoine National Agriculture Library
SHERFSP	-	Southern Highland extension and Rural Financial Service Project
SPSS	-	Statistical Package for Social Sciences
SUA	-	Sokoine University of Agriculture
UMADEP	-	Uluguru Mountain Development Project
UMHODEP	-	Uluguru Mountains Horticulture Development Project

URT - United Republic of Tanzania

CHAPTER ONE

INTRODUCTION

This chapter presents the general background of the study by discussing the meaning agriculture extension, UMADEP approaches, problem statement, justification of conducting the research and objective of the of the research.

1.1 Background information

Farmer training is essentially an agricultural extension education. Jones (1997) defined it as educational service for training and influencing farmers (and their families) to adopt improved practices in crop and livestock production. The concern of what is not only with teaching and securing adoption of a particular improved practice, but also with the outlook of the farmer to the point where he will be receptive to and on his own initiative, continuously seek means of improving his farm business and home (Arnon, 1987). This non formal education which include agricultural extension have had a special attraction in that they promise immediate pay off in terms of changed attitudes and skills which would have direct impact on production.

Extension is a non-formal function that applies to any institution that disseminates information and advice with the intension of promoting knowledge, attitudes, skills and aspirations (FAO, 2003). When systematically and effectively provided, extension is known to enhance social and economic development. Technological changes and the knowledge systems that underpin it, are a critical factor for development. The technology utilization encompasses the users of the agricultural technology, mainly farmers. User awareness, adaptation and adoption of improved technology from various sources affect

farm- level productivity and profitability and ultimately economic growth at national level (Peterson, 1997).

Effective agricultural production means using factors of production, land, labour, capital and managerial ability to get marketable production with the least expenditure of productive resources and human effort. The task is complicated by the continual changes taking place in the technology of production, processing and distribution. To cope with such changes, farmers are continually required to make adjustment in farming practices. Thus extension education is generally the main, if not the only, agent for farmer education in developing countries, and is in other words, a specialised form of the broader concept of adult education (Kauzeni, 1989).

In most developing, countries agricultural production is predominantly for subsistence. It is dominated by small-scale farmers relying on traditional methods of production, notwithstanding the tremendous advancement in agricultural technology that has been made elsewhere in the twentieth century. This does not imply that farmers are traditionalist by choice, but they cannot normally adopt technological innovations unless the circumstances in which they operate are first changed (Arnon, 1987).

Most farmers own a small piece of plot, which cannot provide a decent standard of living because income derived from it is small. Investment in agricultural production is insignificant because of financial constraints and uncertainty of success. The average farmer is illiterate, which in part explains his reluctance to reject traditional beliefs, attitudes and practice that contribute to this resistance to change (Kauzeni, 1989).

The increased environmental degradation that had been due to population pressure and agricultural intensification had resulted to low land productivity, therefore availability of farm technical advice is essential for effective performance of agriculture production (Arnon, 1987).

According to Anderson and Feder (2003) many studies have demonstrated the high economic returns of investment in agricultural extension despite the difficulty of isolating its impact on agricultural productivity and growth from other factors. Investment in agricultural research and extension is thus a crucial input of agricultural growth. In a developing country like Tanzania, agriculture forms the main stay for the majority of its people in rural areas and the national economy at large. Therefore, focusing on improving viable farm production technologies to smallholder farmers and livestock keepers as a matter of priority will help to raise farm profitability and encourage the adoption of new technologies (URT, 2003).

Successful field examples have been achieved in Guatemala and South Africa where improved rural agriculture information delivery systems have contributed to improved farm production and household income (FAO, 2003). Faced with a decline in government extension services, there are examples throughout the world where private extension provision has shown positive results. However, the problem has been that few resource-poor farmers are able to pay for this private extension. As a result it has generally been directed at larger commercial farmers (FAO, 2003). There is also a small but growing number of extension approaches that better complement smallholder farmers' needs.

The fact that agriculture is the main stay of the country's economy underscores the important role that SUA will have to play in enhancing the nation's economic development. During its inauguration ceremony in 1984, SUA was challenged by its first Chancellor, Mwalimu J.K. Nyerere to: (i) expand its functions to include adult education, farmer training, extension work and dissemination of research work to serve the community as a whole; (ii) give education and training appropriate to peasants agriculture; and (iii) answer the needs and solve the problems of Tanzanian agriculture and rural life (Nyerere, 1984) cited by Wambura (1993). To respond to this challenge, Sokoine University of Agriculture through the Department of Education and Extension extended its activities through UMADEP.

Since the early-1990s, Uluguru Mountain Development Project (UMADEP), a non-governmental development organisation, has been working in farming communities in Mgeta and Mkuyuni Divisions with the overall objective of improving agricultural productivity and the general socio-economic conditions of the small-scale farmers in the project area.

The major approach had been through participation with farmers using innovation that enable efficient utilisation of the available natural resources, and in a suitable way for development activities. The existence of UMADEP in Mgeta has improved farmers' skills and knowledge. This has been through raising awareness, change of farmer's attitude towards traditional farming and introduction of new innovations through stakeholders' participation. This study asserts that human capital building has significant effect on farm productivity. The study attempts to look into the role of agricultural extension education that is farmer training, in influencing farm productivity with a view of identifying

problems and recommending more sustainable ways of technology transfer in Mgeta Division.

1.2 Problem statement

Sustainable agricultural systems are essential for poverty alleviation and rural development. Most smallholder farmers in the world (including Tanzania) experience low level of living involving absolute or relative poverty (Dillion and Hardeker, 1993 cited by Isinika and Mdoe 2001). This is largely due to their inability to attain a certain level of income from their productive activities because of low productivity and subsequent low income derived from farming. There are many technological innovations that are yet to be adopted by the majority of small farmers, such as improved seeds, storage facilities and animal breeds. In many cases, these are not adopted because they are unknown to smallholder farmers or there are no effective delivery systems in place.

Thus if agricultural development is to occur, small farmers must be provided with some additional techniques, knowledge and information that is how to reach and effectively train small farmers who possess little or no education which is one of the major problem. This study therefore seeks to examine and compare household welfare and productivity between trained and non-trained farmers in Mgeta Division.

1.3 Justification

According to Anderson and Feder (2003) many studies have demonstrated the high economic returns of investment in agricultural extension inspite of the difficulty of isolating its impact on agricultural productivity and growth from other factors although it is

recognized that, Investment in agricultural research and extension is thus a crucial input of agriculture growth.

UMADEP have been providing techniques and institutional support in Mgeta division, yet the majority of the households (more than 80%) live a subsistence life. Their average annual income is still very low (about Tshs.200 000) despite the opportunity of training provided by UMADEP in the area (UMADEP, 2003).

No study has been done to examine the influence of farmer training provided by UMADEP into farm productivity and consequent farmer income particularly in Mgeta division. This study would assist in revealing the impact of farmer training in agricultural productivity and the factors that hinder adoption of new innovation. Furthermore, the findings would contribute towards developing more effective technical and sustainable agriculture extension development programmes.

1.4 Objectives

1.4.1 General objective

To examine the influence of farmer training on farm productivity and household welfare of farmers.

1.4.2 Specific objectives

1. To identify the source of household income generating activities.
2. To identify type of training that farmers have been receiving.
3. To examine changes in farming behaviour that have been attributed due to adopted technologies.
4. To compare the social-economic status of project and non-project beneficiaries.

1.4.3 Hypothesis

1.4.3.1 Null hypothesis (Ho)

There is no statistical significant difference in farm productivity hence income levels between project and non-project beneficiaries.

1.4.3.2 Alternative hypothesis (Ha)

There is a statistical significant difference in farm productivity hence income levels between project and non-project beneficiaries.

CHAPTER TWO

2.0 LITERATURE REVIEW

This chapter describes literature related to this study. The first section gives an overview of UMADEP project, the concept of agricultural extension, evolution of agricultural extension worldwide and in Tanzania, the importance of extension education to farm productivity and the problem of agricultural extension in Tanzania. The other section explains the training approaches adopted by UMADEP and the socio- economic indicators of household welfare.

2.1 Background information of Uluguru Mountain Development Project (UMADEP)

This section covers in detail all information in relation to UMADEP background information; project collaborating partners and donors, goals and objectives, capacity, project activities in the study area and its goals, mission and approaches adopted by UMADEP in delivering agriculture extension services.

2.2 UMADEP background information

UMADEP is an acronym for Uluguru Mountain Agriculture Development Project. The project is based at Sokoine University of Agriculture (SUA) and operates under the Department of Agricultural Education and Extension. The project was established in 1993 to succeed the Upper Mgeta Horticulture Development Project (UMHODEP) that dealt only with horticultural crops development in the western parts of the Uluguru Mountains in Mgeta division. Unlike UMHODEP, UMADEP is responsible for promoting all aspects of agricultural development for the entire Uluguru Mountains.

The establishment of this project is part of the SUA's mission to address the needs and solve the problems of agriculture and well being in rural communities. In this way, it strengthens the linkage between expertise from SUA and communities in the Uluguru Mountains. UMADEP has taken the initiative to participate in intervening by incorporating innovations that aim at improving the living standards of the people in Uluguru Mountains in a sustainable manner. After its establishment, UMADEP diversified UMHODEP operations from horticulture crops development to other farm production systems in the area, livestock production, income generating activities micro financing and support to local initiatives. The project area covers two districts in Morogoro region that is Morogoro rural and Mvomero. UMADEP works in ten wards of Mkuyuni, Mgeta and Mvomero division. The project plans to extend its operations to Mlali and Matombo divisions (UMADEP, 2001).

2.2.1 UMADEP collaborating partners and donors

UMADEP is implemented as a collaborative effort between the Department of Agricultural Education and Extension (DAEE) of Sokoine University of Agriculture, District Agriculture and Livestock Office, District Cooperative Office and farmers' groups in Mgeta, Mkuyuni, and Mvomero divisions who are connected to the national farmers' networks, MVIWATA. The District office provides agricultural experts who work with farmers in the project areas. This also includes experts from District Agriculture and Livestock Development office (DALDO) and District Co-operative office (DCO). The Agricultural Field Officers and Co-operative Officers are the professionals who are entrusted with the monitoring of the activities. The officers heading departments (DALDO and DCO) are part of the UMADEP technical committee. The project has continued its activities with the financial support from several financing partners for specific activities

and/or specific location and specified time limits. These partners include Itermon, Christian AID, Japaneses Food Aid Counterpart Fund, Danish Orthonological Societies (DOS) and French Food Aid counterpart Fund.

2.2.2 UMADEP goals and objectives

The overall aim of the project is to consolidate the rural society in its complexity to constantly play an active role for its betterment in changing the overall socio-economic environment. More specifically the project has the following objectives

i) To improve the productivity of the labour of the small-scale farmers in the Uluguru Mountains in a sustainable way.

ii) To associate, through a long-term communication process, SUA to the rural communities in order to promote the emergence of a small-scale farmers' movement.

iii) To train change agents (farmers, students, professionals) to develop a methodology that constantly links actions to reflections.

2.2.3 Project capacity

UMADEP has two functional organizations; there is a steering committee and a project team. The steering committee is the supreme functional organ of UMADEP. The committee has 12 members; these include the Head of DAEE, the Project Coordinator, Assistant Project Coordinator, four members one from each of departments of Animal Science, Soil Science, Food Sciences and Technology and Agricultural Economics and Agribusiness of Faculty of Agriculture of SUA. The role of the steering committee is to review all project activities and also facilitates coordination of multidisciplinary and multi-sectoral programmes. The projects also have vehicles for facilitating transport from town

to the villages, owns Centres for Farmer and Agriculture (CFA) in Mgeta and Mkuyuni. Field agricultural officers are equipped with motorcycles to facilitate fieldwork.

2.2.4 UMADEP activities in the study area

Previous efforts by UMADEP in the north -eastern zone of the division concentrated on improving land management practices (mountain agriculture), agronomic practices for horticultural crops, livestock husbandry, diversification and improvement of crop varieties. UMADEP also promotes organic farming techniques as sustainable alternatives to industrial inputs; improves traditional irrigation practices and enhancing the capacity of the communities for investment, access to markets and input supply, and access to technology (UMADEP, 2003). As a result of these efforts, new crops such as tomatoes, potatoes, flowers (carnation) and improved varieties of temperate fruits have been introduced into the farming system in the project area. Over 10,000 tons of vegetables and fruits are produced in the area and supplied (Mgumia and Ruheza, 2001).

2.2.5 UMADEP approaches and mission

UMADEP works as an integrated agricultural development programme using participatory and multidisciplinary approach. The project uses participatory approaches and Participatory Rural Appraisal in the identification of the areas that need intervention and to develop appropriate innovations, which can be widely disseminated and therefore contribute to the improvement of household livelihood security. The project facilitates the formation of action groups with common interests and provides training on relevant topics such as group dynamics, project planning and management, savings and credit schemes.

The project also creates awareness on key issues and opportunities available by using posters, leaflets and video shows. It does not advocate ready - made solutions or technical

innovations to farmer, rather it relies on constant dialogue among farmers themselves and with various researchers and extension agents through provocation of endogenous technology. It assumes that adoption and the diffusion of the extension messages is faster if communication exists among farmers (Mattee and Lassale, 1995).

Each project activity is supported with an appropriate training programme. It is based on the following principles, use of farmer group and network to facilitate innovation and communication among farmers, on farm development where farmers participate in development of innovations by use of trials and demonstration and empowerment of farmers through training (Mgumia and Ruheza, 2001).

2.3 The concept of extension

Extension is a term, which is open to a wide variety of interpretations. Each extension agent probably has his own understanding of what extension is. This understanding will be based on past experience and the particular type of extension service in which the agent is working. In other words, there is no single definition of extension which is universally accepted or which is applicable to all situations. Furthermore, extension is a dynamic concept in the sense that the interpretation of it is always changing. Extension, therefore, is not a term which can be precisely defined, but one that describes a continual and changing process in rural areas.

Extension is an informal educational process directed toward the rural population. This process offers advice and information to help them solve their problems. Extension also aims to increase the efficiency of the family farm, increase production and generally increase the standard of living of the farm family. The objective of extension is to change

farmers' outlook toward their difficulties. Extension is concerned not just with physical and economic achievements but also with the development of the rural people themselves. Extension agents, therefore, discuss matters with the rural people; help them to gain a clearer insight into their problems and also to decide how to overcome these problems. Extension is a process of working with rural people in order to improve their livelihoods. This involves helping farmers to improve the productivity of their agriculture and also developing their abilities to direct their own needs.

From the above explanation one can get a clear picture that extension is a process that occurs over a period of time, and not a single, one-time activity. They also all underline extension as an educational process, which works with rural people, supports them and prepares them to confront their problems more successfully.

2.3.1 Elements of extension information

Four main elements make up the process of extension this is knowledge and skills, technical advice and information, farmers' organization, and motivation and self-confidence.

2.3.1.1 Knowledge and skills

Although farmers already have a lot of knowledge about their environment and their farming system, (local/indigenous knowledge) extension can bring them other knowledge and information, which they do not have. For example, knowledge about the cause of damage to a particular crop, the general principles of pest control, or the ways in which manure and compost are broken down to provide plant nutrients are all areas of knowledge that the agent can usefully bring to farmers.

The application of such knowledge often means that the farmer has to acquire new skills. For example, technical skills to operate unfamiliar equipment, organizational skills to manage a group project, the skill to assess the economic aspects of technical advice given, or farm management skills for keeping records and allocating the use of farm resources and equipment (Everson, 1997).

The transfer of knowledge and skills to farmers and their families is an important extension activity that requires the extension agent to prepare themselves thoroughly well. They must find out which skills or areas of knowledge are lacking among the farmers in their areas, and then arrange suitable learning experiences through which the farmers can acquire them.

2.3.1.2 Technical advice and information

Extension also provides advice and information to assist farmers in making correct decisions for action. This can example, be information about prices and markets, or about the availability of credit and inputs. The technical advice will probably apply more directly to the production activities of the family farm and to the action needed to improve or sustain this production. Much of this technical advice will be based upon the findings originating from agricultural research. In many instances, however, farmers are also sources of valuable advice and information for other farmers, and agents should always try to establish a farmer-to-farmer link (Everson, 1997).

2.3.1.3 Farmers' organization

Farmers also need some form of organization, both to represent their interests and to give them means of taking collective action. Extension, therefore, should be concerned with

helping to set up, structure and develop organizations of local farmers. This should be a joint venture and any such organization should only be set up in consultation with the farmers. In the future, these organizations will make it easier for extension services to work with local farmers, and will also serve as a channel for disseminating information and knowledge (Peterson, 1997).

2.4 Evolution of agricultural extension

As explained in the introductory part of this study, farmer training is essentially an agricultural extension function, which is closely interlinked concepts and they will be used interchangeably throughout the study. This inter-linkage is reflected in the fact that agricultural extension officers in the course of disseminating technical information and knowledge to improve skills, in a way influences farmers attitudes.

The importance of disseminating knowledge to farmers cannot be underestimated. It started back in England in 1867 when the first practical attempt was made in what was designated as "University extension". It was derived from the urge to serve the education needs, near to their homes, of the rapidly growing populations in the industrial, urban area. The objective of agricultural extension was "imparting useful information to all classes of the community, particularly to such as are unable to avail themselves of experienced teachers, or may prefer learning by themselves" (Jones, 1994 cited by Jones (1997).

In Europe, the exchange of ideas and information among farmers started in mid-eighteenth century. Progressive landowners and their agents along with some men of "science" were the main proponents of agricultural clubs or societies. Landowners and leading farmers exchanged ideas and information and discussed in improvement farming. These societies

sought to alter radically the traditional mode of farming by initiating experiments, arranging demonstrations, disseminating information, and advocating the adoption of innovations through publishing their proceedings and reporting their meetings in newspapers (Hudson, 1972 cited by Jones 1997).

During the past quarter century the work of extension services has often become more diversified. In the less develop countries, the main focus was on cash crop production and extension services focussed much on progressive farmers than the whole farming community. In the 1990s, there was a growing recognition of the need to reach, influence and benefit the multitude of small, resource poor farmers. Today the organizations and personal engagement in agricultural extension encompass a diverse range of sanctioned and legitimate activities in society which seek to enlarge and improve the ability of farmers to adopt more appropriate and often new practices and to adjust to changing conditions and societal needs (Jones, 1997). Different countries pursue the overall goals of technology transfer and human resource development adopted different approaches.

2.5 Agricultural extension in Tanzania

Farmer training is not a new phenomenon in developing countries. In Tanzania, farmer training existed before the colonial era. Farmers had their own informal way of sharing agricultural knowledge. During the colonial era, the colonial administrators were responsible for providing extension services. The main extension approach was the focal point approach. It was a one-way flow of information and farmers did not participate in decisions that conceived their farming problems and their life in general. Farmers were regarded as the passive recipient of technology and agricultural officers were seen as doctors who gave prescription on farmers' problems. Human capital development was not

regarded to be important by it-self but only as a way to production improvement. To ensure high returns "focal point" which concentrated in high potential areas in the north and western part of the country was adopted.

After independence, different agricultural extension delivery systems were adopted, which includes transformation, modernization and improvement approaches. In these approaches, the work of extension officers was to help farmers to access credits, technical information and acquire inputs. However, decisions were centrally made and farmers were there to implement. Since the mid 1980s, Tanzania has undertaken a number of reform programmes in various sectors including agriculture underpinned by implementation of structural adjustment programmes. Governments in most developing countries adopted a pluralistic mode of delivering extension service. More participatory approaches that aimed at increasing farmers' participation, human capital development, extension-research linkages, needs based assessment were adopted. Commodity approach, Television, and most recently participatory approaches were adopted. Participatory approach has been adopted by UMADEP as well in the delivery of agricultural extension services. Current there are many providers of agricultural extension services, UMADEP inclusive.

At present however, agricultural extension services in developing countries are grossly under funded to undertake the activities required for achieving food security while protecting the productive resource base in order to keep up with population and economic growth (FAO, 2003).

2.6 Importance of agriculture extension in Tanzania

Promoting agricultural production is essential in developing countries like Tanzania, where about 80% of the population live in rural area and depend on farming as a major means of livelihood (URT, 2002). The agricultural sector is the main stay of the national economy accounting for about half of the national income, three quarters of merchandise exports and is a major source of employment to Tanzanians. Thus the importance of agriculture cannot be overstated especially to the rural community. Evidence shows that it is the backbone of the rural economy and the nation at large (URT, 2002).

Enhancing the sustainability and productivity of agricultural systems is a key to the conservation of natural resources and reduction of rural poverty. In Tanzania, as is the case for most developing countries, long-term agricultural development requires increased agricultural efficiency by improving farming systems, livestock management and management skills and techniques of farmers, rather than by merely increasing the acreage land under production (Kauzeni, 1989). Agricultural economists have maintained that greater concentration on small farmers leads to faster growth rates of both aggregates economic output and employments (FAO, 2003).

2.7 Problems of Agriculture extension in Tanzania

Agricultural education and extension has faced major drawbacks since mid 1980s.These problems have been underpinned by implementation of structural adjustment programmes which have since redefined the role of government as retaining responsibility only for policy, regulation, and public good service.

2.7.1 Inadequate funding

As the consequence of removing agricultural subsidies, the use of agricultural inputs declined as private trade rises. Agricultural extension has yet to fill the vacuum left by government and collapsed co-operatives. (Price remains uneconomical for key inputs such as fertilizers). Other constraints to improving agricultural services provision are the large geographical distribution of clients' access to whom is hampered by the poor transport and communication infrastructure, the weak marketing systems and limited bargaining power of producers that acts to dampen demand for services and technology, the limited access to finance for rural producers, the generally weak private sectors presence in input supply, production and marketing, especially for food crops.

2.7.2 Inadequacy of extension staff

The country's extension services have been severely criticised for being ineffective in bringing about improvement in the agricultural sector, especially with respect to encouraging farmers to adopt improved agricultural practices. While this criticism may be justified to some extent, there are valid reasons why the performance of the extension services has been less than expected. To be fair there are also several other factors, which have led to the slow adoption of improved agricultural practices by small-scale farmers. Within the agricultural extension services, two factors limit the ability of the services to fulfil its mandate satisfactorily; these are the inadequate number of extension staff and the inadequate facilities for these staff. Important factors outside the control of the extension services, which have affected adoption of improved practices, include lack of credit for purchasing inputs and absence of profitable markets for agricultural products.

Under the Public Service Perform, extension services have been decentralized to the Local Government Authorities (District Councils), and the sector ministries (including the Ministry of Agriculture and Food Security (MAFS), Ministry of Water and Livestock Development and the Ministry of Cooperative Development and Marketing) have been streamlined and their roles re-defined. As a consequence of this institutional reform, the ministries have been down-sized. For example, from 19522 employees in 1994/95, to around 5 000 employees in MAFS. This also involved the transfer of most of the zonal and regional agricultural staff, from the MAFS to the respective District authorities (MAC, 1999).

2.7.3 Inadequacy of extension facilities

The problem of inadequate staff is compounded by the lack of adequate facilities for extension work. These include office supplies, transport and extension kits for training farmers. Although some of these facilities have been provided through specific projects like NALERP, NAEP, SHERFSP and other NGO-supported projects, generally, such facilities do not meet the needs. For example the Capacity Needs Assessment Study for Selected Councils undertaken in 2000 under NAEP II found that out of the 18 vehicles, which had been provided to 14 Districts for extension work, only 3 were in good working conditions, and out of 157 motorcycles available, only 45 were working, and only 197 out of 464 bicycles were still on the road. The study also noted that there were acute shortages of office rooms and staff quarters, with requirements being 1 478 office rooms and 1,496 staff quarters for the 14 Districts. This is typical for the rest of the country. The lack of working facilities and working tools has meant that even the present few extension staff are less effective, and so the extension services cannot be expected to have much impact on increasing agricultural and livestock productivity (MAC 1999).

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exhaustion; food insecurity and altered economic conditions also necessitated the initiation of it (FAO, 2003).

Agricultural extension has now been recognized as an essential mechanism for delivering information and advice into modern farming. It contributes towards socio-economic growth by providing farmers with modern technologies that enhance their production and on the way assuring longer term welfare of farmer and their families (Jones, 1997). It has been seen that the extension agent's task is an educational one. Farmers and their families need to learn new skills, knowledge and practices in order to improve their farming and other productive activities. In doing so, they develop new attitudes toward farming and the new practices, and to extension itself. This in turn influences their future behaviour (adoption) and hence farm productivity (Everson, 1997).

2.9 UMADEP Training approaches

These are training techniques that are being used by the UMADEP extension personnel to deliver relevant technique and information to farmers. There are various methods one can use in order to facilitate learning and communication. Approaches used by UMADEP in training activities include seminars and workshops, short courses, exchange visits and tours and publications. Farmers themselves identify training needs. Farmers' needs for training are picked from farmers in various ways including visiting demonstration plots or field days, and from network meetings, seminars and workshops.

Sometimes project staff may organize training for the purpose of rectifying recommendations of innovation already practiced by farmers. This usually happens if project staff identify some farmers who have picked incomplete recommendations or when

exhaustion; food insecurity and altered economic conditions also necessitated the initiation of it (FAO, 2003).

Agricultural extension has now been recognized as an essential mechanism for delivering information and advice into modern farming. It contributes towards socio-economic growth by providing farmers with modern technologies that enhance their production and on the way assuring longer term welfare of farmer and their families (Jones, 1997). It has been seen that the extension agent's task is an educational one. Farmers and their families need to learn new skills, knowledge and practices in order to improve their farming and other productive activities. In doing so, they develop new attitudes toward farming and the new practices, and to extension itself. This in turn influences their future behaviour (adoption) and hence farm productivity (Everson, 1997).

2.9 UMADEP Training approaches

These are training techniques that are being used by the UMADEP extension personnel to deliver relevant technique and information to farmers. There are various methods one can use in order to facilitate learning and communication. Approaches used by UMADEP in training activities include seminars and workshops, short courses, exchange visits and tours and publications. Farmers themselves identify training needs. Farmers' needs for training are picked from farmers in various ways including visiting demonstration plots or field days, and from network meetings, seminars and workshops.

Sometimes project staff may organize training for the purpose of rectifying recommendations of innovation already practiced by farmers. This usually happens if project staff identify some farmers who have picked incomplete recommendations or when

is particularly a powerful method to use with farmers who are illiterate or semi illiterate. A demonstration will give farmers the opportunity to observe, at first hand, the differences between a recommended new crop practice and traditional practices. The strength of the demonstration should lie in its simplicity and its ability to present the farmers with concrete results (Jones, 1997). UMADEP have established demonstration plots at its working stations and Centers For Agriculture (CFA) to facilitate easy understanding and practices for farmers.

2.9.3 Study tours

This is one of the common methods that have been used by UMADEP for training purposes. Farmers like to visit farms in other districts to see how they work, what they grow and what kinds of problems the other farmers face. A tour is a series of field demonstrations on different farms, or at different centers, and can often attract a lot of interest from local farmers. The tour should give local farmers a chance to see how other farmers cultivate their land, and to exchange ideas and experiences with them.

It is important, therefore, that the area to be visited be in some way similar agriculturally to that of the visiting farmers. Farmers from Mgeta and outside have been moving out and coming to Mgeta for study tours. Through MVIWATA farmers have been collaborating and paying visits to different parts of Tanzania as well as outside the country. These include SUA, Kitulo Njombe, Mbinga, Kenya and many other places. This method steers up farmers' enthusiasms for adoption of improved technologies.

2.10 The social economic indicators of household welfare

According to URT (1999), Welfare implies the level of or standard of living of an individual, household or community. Furthermore welfare is defined as household command over resources in terms of food, property, heath, schooling, working condition, housing, security against crime, means of transport and communication and liberty.

The welfare of an individual or household can be monitored using indicators that reflect stagnation, progress or deterioration in a particular situation be it literacy, economic, health status or poverty over time. There are many factors, some natural and some man-made that can bring about changes on a situation over time. Improvement in welfare could result from favorable weather condition, which allows increased production of food and cash crops, improvement in technology, good economic and social policies and favourable local market. These factors reinforce each other to bring about improved welfare through increased incomes, supply of goods, services and peaceful environment.

2.10.1 Education

Education is essential for combating poverty. Lack of education, is considered to be a manifestation of poverty. Primary school education has an influence on improving the livelihood of people. In this study ability to pay for user charges was compared among the respondents in order to assess household welfare. Out of the above mentioned welfare indicators the researcher chooses the following for comparison between the two groups of farmers.

2.10.2 Housing

Housing is one of the basic human needs, and influences immensely the health status. Good quality housing reduces mobility, leading to improvement in the quality of life of people. In this study housing condition was evaluated by looking on the type of the roofing material, wall and floor.

2.10.3 Food security

Food security can be defined by access by all people all the times to nutritional diet (URT 2001). The number of meals per day taken by an adult person can be used to measure the food security status of a person. The recommended meals are 3 meals per day for an adult person. The study used food security to compare household welfare since agricultural extension as explained by FAO (2003) improves farm production and hence ensures food accessibility.

CHAPTER THREE

METHODOLOGY

This chapter covers the methodology that was used in the study. It includes the description of the study area, which encompass the geographic characteristics, population and the economic situation. The description further talks about the research design, sampling procedure, data collection, instrumentation and measurement of variables. Data processing and analysis, and limitation are described at the end of the chapter.

3.1 Description of the study area

The study was conducted in Mgeta Division in Morogoro region. Morogoro region is in the eastern part of Tanzania situated on the slopes of the Uluguru Mountains. Mgeta division is one of the 4 divisions in Mvomero district; it lies on the western side of Uluguru Mountains fifty kilometers away from Morogoro town. Three wards Tchenzema, Langali and Bunduki were covered during the survey.

Due to high altitude, the climate is sub-tropical with low temperature, which may go down to 10^0C. The area experiences long dry periods of about 5 months in a year. It also receives Bi-modal rainfall pattern with annual average rain ranging from 1800mm to 2000mm depending on the alleviation from see level. The place is generally rich in stream water originating from the forest reserves. The Mgeta river originates from the north western side of the forest reserve and collects majority of water from streams draining through Mgeta division. The river joins the Ruvu river east of the Uluguru Mountains.

The division is distinctively divided into two agro-ecological zones named northeastern and south western. Due to the mountainous nature of the area transport is always difficult especially during the rain season. Recently, there have been efforts to overcome this problem where the main road that connects Morogoro town and the division is constructed to facilitate easy transportation under the supervision of MVIWATA. The north-eastern zone of the division commonly referred to as the Upper Mgeta, covers Bunduki, Langali and Tchenzema wards. It borders with the Uluguru forest reserves at the altitude ranging from 1200-2000 m.a.s.l.

3.2.1 Human activities in the study area

Agriculture forms the main stay of most people in Mgeta. It is essentially done for commercial purposes.

3.2.1.1 Crop production

The climate in north-eastern zone of Mgeta division is subtropical which allows the production of a wide range of temperate fruits and vegetables. Maize is the major food crop grown for home/domestic consumption although the production does not satisfy the demand for food in the area. Horticultural crops form the most important cash crops in the area such as cabbage, cauliflower, peas, lettuce, parsley and leeks. Temperate fruits such as peaches, plums, pears and apples are also grown in the area.

3.2.1.2 Livestock keeping

Livestock keeping in Mgeta division was not a traditional practice in the past. During colonial period and with the influence of missionaries, pigs were introduced in the division. The weather condition in Mgeta favored pig keeping and majority (more than

60%) of households in Mgeta division keep pigs mainly as source of income, meat as animal protein in the area and FYM. Although animal protein in Mgeta was not a major source of protein, availability of milk was still a problem.

In 1988 the Department of Animal Science at SUA conducted research on viability of daily goat keeping in Mgeta. And in 1988 dairy goats were introduced in Mgeta. Farmers considered diary goats as an alternative source of income through sale of milk and goats and source of FYM for their crops. In 1992 the Department of Animals Science completed their research and trials phased out and UMADEP took over the promotion activities of dairy goat farming in Mgeta in 1993 till today.

Other non-farm activities like small business, lumbering, local brewing are also done to supplement household income. The selection of the study areas was based on the fact that farmers in this area have been receiving a number of agricultural training through UMADEP project since 1994.

3.3 Research design

A cross-sectional research design was used during the study. According to Bernard (1994), the design allows data to be collected at a single point in time since it employs a survey method and can be used for descriptive study as well as determination of relationship between variables. Due to limited resources such as time the selection of this research design was found necessary.

3.4 Sampling procedure

3.4.1 Sample unit and sample size

A household was preferred as the ultimate sampling unit of analysis because a household is considered as the basic unit for assessing welfare of the society (Bernard, 1994). In this study, a household comprised of both trained and non-trained farmers. The total sample size was 100 respondents comprised of 50 trained farmers, 50 non-trained farmers and six project workers. During the survey, only 80 respondents were reached (40 trained and 40 non-trained). For this study, a trained farmer is referred to as the one who has been receiving agricultural training to enhance his/her production skills. The choice of this sample size was necessitated by the limitation of resources and need to ensure precision.

3.4.2 Sampling Technique

In order to obtain the desired population sample, purposive sampling technique was used to obtain divisions, wards and lastly respondents. The three wards of Tchenzema, Langali and Bunduki were covered during the survey. These wards have been working closely with UMADEP projects and hence have the majority of its farmers trained. Six villages were purposively selected, two from each ward.

Simple random sampling technique was found to be convenient for the study since it allows direct focusing to the intended subject. Thus selection of villages took into account the presence of farmers cultivating the same types of crops for the purpose of comparison. Using a list of trained farmers that was prepared by UMADEP project field officers of respective villages, simple random sampling was employed to obtain representatives from the trained group and non-trained respondents from villages that were not project beneficiaries, Six project workers were also included in the interview during the survey.

3.5 Data collection process

3.5.1 Primary data

In this study, primary information was obtained by using two types of structured questionnaires, one for farmers and the other for project workers. The questionnaires were designed in such a way that they captured all relevant information with regard to farmers access to and influence of the agriculture training to the farming behaviour and hence household welfare. Both open and closed ended questions were included in the questionnaire in order to allow respondents to fully express their perceptions and their opinion as can be seen in appendices 1 and 2.

The data collection instrument was fist pre-tested to representatives from both groups of respondents. The same type of questionnaire was administered to 5 trained and 5 non-trained farmers. On the other hand, a second type of questionnaire was administered to 2 project workers. Two villages, Nyandila and Tchenzema, were included during the pre-testing exercise. Thereafter, necessary amendments to take care of omission, restructuring, and addition of some questions were made in order to ensure validity and reliability of the instrument. Personal observations were also made in order to supplement information in conjunction with the study specific objectives.

3.5.2 Secondary data

Secondary data were obtained from various sources including Sokoine National Agricultural Library (SNAL), Mvomero District Council, Development Studies Institute's resource Center at Sokoine University of Agriculture and Uluguru Mountain Development Project (UMADEP) Library and government bookshop.

3.6 Measurements of variables

Variables to be measured were categorized into three groups, that is the background variables which included age, marital status, respondents education level, occupation, housing quality, children's educational level, land holding and household income of the respondents. Some of the variables showed to have an association with the dependent variable. Others were sorely meant to describe the social and economic characteristics of the sample population.

Independent variables included access to agricultural training that is knowledge, skills and technology acquired and change in farmer behaviour, covered change in field size, adoption of the new technology, input use and change in yield per unit area of production. Dependent variable included household income derived from estimated farming activities.

Then household's welfare of the two groups was compared. The ability of the farmers to meet their basic needs like pay for secondary school education, housing quality, food security and quality, yields per unit of production and the estimated income derived from it. The researcher adopted the use of household welfare measurement since it is difficult to measure directly per capital income from non-wage income. Usually most farmers in rural areas had no habit of keeping records of their income.

3.7 Data processing and analysis

The collected data were cleaned, coded and summarized prior to analysing using the Statistical Package for Social Sciences (SPSS) computer software in line with the study objectives. Descriptive statistics such as frequencies, percentages, means, and histograms were used to summarize information for univariate analysis. A Chi-squared ($\chi 2$) test was

used to assess the relationship between categorical variables of the trained and non-trained farmers. T-test was also employed to compare and find whether there were significant differences in means of some quantitative variables such as yield per unit of production, household income and total land holding in order to test the hypothesis.

3.8 Limitation of the study methodology

During this study the researcher encountered the following problems

i) The major limitation during data collection was the difficulty to reach respondents due to the topographical nature of the study area. The area is mountainous and villagers are scattered. This cost much time and energy since some areas were unreachable by motorcycles. The researcher fell sick especially during the early days as the body was trying to readjust with the environment resulting to work behind the schedule.

ii) Most farmers were reluctant to pre-empt information on sensitive issues like household income and hence the researcher was obliged to use too much time trying to convince respondents at least to estimate income. Arrogant answers like "I don't remember! or What does that have to do with you?" were given especially from non-trained farmers.

iii) In some cases respondents were unwilling to cooperate unless they were paid some cash because of the previous experience from other researcher especially foreigners. They claimed up Tshs 1000 per person, which the researcher did not have.

iv) Inability of most respondents to estimate their land holdings in acres and poor record keeping on yields and income were also major drawbacks. Most fields are positioned on hills and thus cannot be easily measured. The common name

used is *Vibusta* (a fragment of land for cultivation) so a researcher was forced to estimate according to the size of small or big *kibusta*. The criteria adopted were, a small kibusta was estimated to be equal to a quarter of an acre and a big one not more than half an acre.

v) Community events like open market day, village meetings and other non- farm activities but important village development activities such as roads construction interfered with the survey exercise

CHAPTER FOUR

RESULTS AND DISCUSSION

This chapter presents the general findings of the study and it is divided in the following sections. General characteristics of the sample, farmer training, changes in farmer behaviour and mean comparisons in household welfare between project and non project beneficiaries. The chapter also covers discussion of the findings.

4.1 General characteristics

These general characteristics represent a sample from both trained and no-trained respondents. The general characteristics that were examined in the study-included age, sex, education, occupation, estimated annual income derived from different sources.

4.1.1 Age

The age of respondent from both trained and non- trained farmers ranged from 20 to 75 years. implying that all selected individual were mature enough to understand the training offered and put into practice. The results in Table 1 show that the majority of the respondent's ages ranged from 30- 39.

Table 1: Distribution of respondent by age

Age (Years)	Trained farmers		No-Trained farmers	
	Frequency	Percentage	Frequency	Percentage
20-29	6	15.0	12	30
30-39	15	37.0	18	45
40-49	9	22.0	7	17
50-59	6	15.0	1	3
60 ≥	4	10.0	2	5
Total	40	100	40	100

This age group represents 37% and 45% of the trained and no-trained respondent respectively, implying that majority of respondent are in the productive age. Furthermore, the results from Table 1 show that 22.5% and 17% of the trained and non-trained farmers respectively belonged to an age group of 40- 49 years, with a small proportion of respondent concentrated in an age group between 50 and above accounting for 10.0% and 5% for trained and non- trained farmers respectively.

4.1.2 Sex

The majority of the respondents from both trained and non- trained farmers were men, despite of the fact that selection of respondent was regardless of sex. The data from Table 2 show that the proportion of women interviewed was less compared to men. The proportion of men was more than half the total respondent in the two sub-groups. Although the criterion for providing training was not sex biased, most women were non-trained. The results show that women had no access to education including informal education complying with URT (2003). Despite the fact that women comprise the largest provider of agricultural labour in Tanzania. The proportion of male and female accounted for 72.5% and 27.5% for trained farmers respectively. On the other hand, the proportion of male and female for the non-trained farmers were 57.5% for the former and 42.5% for the latter. This has an implication on the adoption of the improved technology since the people who are informed are men while the main actors are women. In Tanzania and elsewhere in developing countries research findings suggest a correlation between literacy among farmers and improvement in farm productivity. Especially, literacy among women has a considerable impact on poverty reduction (URT, 2001).

Table 2: Distribution of respondents by sex

Sex	Trained farmers		Non- trained	
	Frequency	Percentage	Frequency	Percentage
Male	29	72.5	23	57.5
Female	11	27.5	17	42.5
Total	40	100	40	100

4.1.3 Education status

Education here was regarded as the level of education attained regardless of the number of years one had been to school especially at primary level. All respondents who have been at school were regarded to have attained primary education regardless of complete standard seven. During this study, it was found that majority of the respondents (98%) have attained at least primary education, implying that the universal primary education and education for all campaigns as a strategies to fight against poverty had succeed. This facilitates easy communication and following of instruction during the workshops and seminars. Farmers could easily take notes, read booklets, leaflets, posters as explained by project workers. The results further show that only one person had attained post – secondary education. This gives a clear picture of the fact that access to secondary education in a rural community is limited.

Table 3: Distribution of respondents by education status

Education level	Trained farmer		Non-trained	
	Frequency	Percentage	Frequency	Percentage
None	-	-	1	2.5
Primary	39	97.5	39	97.5
Post-secondary	1	2.5	-	-
Total	40	100	40	100

4.2 Farmer training

This section gives results on the different types of the training farmers received, accessibility of extension services, condition for receiving training, methods of conducting training, benefits derived from these training, and factors contributing to adoption and failure of the technology provided.

4.2.1 Type and conditions for receiving training

In this section discussion on the type of training farmers received, condition for receiving training and methods of conducting training are discussed. The study found that farmers received various types of training in relation to horticultural crops production (vegetables and fruits propagation), soil conservation, banking and leadership, marketing of crops and transportation, curflower and production and livestock keeping. However it was clear that not all farmers received all training. Most farmers admitted to receive training frequently in tomato and potato production and dairy goat keeping. In the case of crops the training focused on proper spacing, use of fertilizers, pesticide uses and irrigation, while for animal keeping, training offered was on animal feeds, diseases, milking, record keeping and animal husbandry.

Most farmers admitted that there were no strict conditions that were imposed for one not to receive training rather simple conditions. The information from project workers also complies with farmers. Project workers also admitted that training was provided non-conditionally. However, both farmers and project workers responded that in order to make the best use of the information and ascertain adoption of the technology farmers who were hard working and group members were considered.

Various ways were used to offer training such as seminars, workshops, field visit, study tour and the use of demonstration-plot. In most of the time both techniques were used in combination in which practical, theory, and participatory learning facilitated quick understanding and dissemination of knowledge. Responses from both farmers and project workers show that in the course of training farmers took notes while posters, leaflets and booklets were distributed for them to read.

4.2.2 Access to agricultural information

Respondents were required to mention various sources of information with regard to modern farming technology. All trained farmers admitted to be aware of extension officers who are working with UMADEP.

During the survey, only three government agricultural extension officers were found in the whole division. Of them two were attached to work with the UMADEP project. About 80% of non-trained farmers reported to be un-aware of the presence of agriculture extension officers. On the other hand, farmer-to-farmer information delivery was found to be a major source of information to farmers where friends, relatives and neighbour were reported to be the main information sources among farmers. This has also been documented by (Lupanga, 1986, Hillbur, 1996) cited by Isinika and Mdoe (2001).

4.2.3 Importance of training on farming practices

Training was found to be of great importance by all trained and non- trained farmers. Results from Tables 4 show that 65.0% reported that training had enabled them to improve their farm skills, 52.5% household income, 52.5% expansion of production farms 32.5%, and yield increase (45.0%). However not all technologies offered were adopted. Reasons

given for less adoptions included lack of water, shortage of land, little returns and long time taken before returns can be realised, limited time, unconducive environment and inaccessibility to inputs (fertilizers, improved seeds and pesticides).

Table 4: Distribution of respondent by importance of training (n=40)

Importance of training	Frequency	Percentage
Improved skills	26	65.0
Increased household income	21	52.5
Increased yield	18	45.0
Expanded production	13	32.5

- Since some of the respondent gave more than one option, percentages were calculated within option types.

4.2.4 Things that farmers were able to do as a result of improved income

Training was found to have a positive impact on farmer's life in general. Trained farmers reported to benefit a lot from the knowledge that was provided. The survey data revealed that the three of the most important things that farmers were able to do as result of increased income were taking their children to secondary school, farm or field expansion and construction/renovation of their houses. Expansion of field under cultivation was sorely meant for increasing yields. Moreover, most farmers were also producing for business which increased there capital for transportation. Transportation here mean farmers were able to take there crops to distance markets like Kariakoo in Dar es Salaam instead of selling them at the local open markets hence receive good prices. Few farmers admitted to have diversified their livelihood to opening of a milling canters, restaurant, expanding there activities by buying and selling of crops from fellow farmers.

4.2.5 Suggestions for successful training

Some of the opinions given by respondents are relevant for future considerations. The most burning issues were regular provision of training, establishment of demonstration plots on farmers' field instead of on station trials and provision of credits. Respondents admitted to have received some of the training on dairy goat rearing long time back. But respondents indicated that regular training was basic since they admitted forget that the rate of and that technology is dynamic and changing all the time. Other recommendations were diversification of the training to other agriculture related field like marketing, and packaging, credit provision to ensure adoption as other training packages are money demanding.

4.3 Source of household income and estimated annual income from different sources

Respondents were asked to mention their main source of household income. Data shows that 75% of the respondents earned their living through farming and 25% also involved in non-farm activities, of which 19% were trained and 9% non-trained farmers.

Furthermore, respondents were asked to mention the estimated annual income from farm and non-farm activities. Results show that the minimum income recorded was Tshs.80 000 with a maximum of Tshs.1 000 000. The mean annual income for trained farmers was Tshs.312000 and 112 500 for farm and non-farm income respectively. The mean annual income for non-trained farmers was Tshs.124 375 and Tshs.66 325 for farm and non-farm income respectively.

Table 5: Distribution of respondent by mean contribution of farm and non-farm income (Tshs) n=80

Estimated annual incomes	Trained farmers		Non-Trained farmers	
	Mean	Percentage	Mean	Percentage
Farm income	312 000	73.5	124 375	63
Non-farm income	112 500	26.5	66 325	37
Total	424500	100	19700	100

The results further show that farm income contributes to 73% and 63% for trained and non-trained farmer respectively. On the other hand results show that non-farm income contributes to 26.5 and 37% for trained and non-trained income. This collaborates the initial finding that farm activities contribute much to household incomes. Moreover, the results also show that trained farmers earn more income from farm activities than non-trained farmers.

4.4 Change in farmer behaviours

This section gives results on indicators of changes in farmers behaviour resulting from adopted technology.

4.4.1 Land ownership

Land is the major means of production in most developing countries whose majority of its people depend for their sustenance. Land was considered as the most valuable assets that farmer had and it was the symbol of wealth within a community. The results from Table 6 show the distribution of landholding by trained farmer. The results indicate that training had influence on size of land holding the person has. The average landholding per household was higher about 4.5 acres for trained farmers and 3 acres for non-trained

farmers. The significant difference is attributed to the ability to increase field size after farm yields and household income had increased as a consequence of training, since most trained farmers began to look for opportunities after they have adopted modern technologies and skills.

Table 6: Distribution of respondent by landholdings (acres)

Land holding	Number	Mean	T-statistics
Trained	40	4.5	3.36**
Non-trained	40	2.8	
Total	80	3.7	

** Significant at (P< 0.01)

4.4.2 Use of farm inputs

This was examined with regard to use of improved seeds, use of agrochemicals such as inorganic fertilizers and pesticides. Due to continuous cultivation, most soils had become exhausted and have low fertility. Application of industrial fertilizers and farmyard manure were necessary in order to supplement soil nutrients. The survey found that use of farmyard manure was almost negligible with the exception of the use of small wastes collected from guinea pigs and goats. Respondents were requested to say how often they used pesticide and industrial fertilizers for horticultural crop production. The use of pesticide was necessary to prevent pest and diseases.

However, there was a significant difference in use of industrial fertilizers and pesticides. Majority of the non-trained farmers (80%) have reported great losses of tomatoes due to inability to purchase pesticides. (85%) of trained farmers reported using farm inputs for their level best to spray their plants whenever necessary to prevent loses. A number of factors explain these differences including high cost of chemicals and unavailability of

inputs and lack of credits. However, detailed discussion with non-trained farmers revealed that inadequate knowledge on type of diseases and their treatments, poor management practises and inaccessibility to credits contributed much to reduced use of inputs. Although among the non-trained farmers some tried to adapt some of the modern practices through advice from their fellow farmers.

4.4.3 Change in farm productivity

A comparison of yield per unit of production was made between the two groups of farmers. Tomato and potatoes were the major vegetables grown as cash crops by most farmers and therefore selected as unit for comparing change in farm production. The main reason for selection was due to their significance in the income of most farmers in the area. Farmers were asked to mention the yield of potatoes and tomatoes received in the last season. Then the average yield in kilograms per acre was eventually recorded. The yield of potatoes, tomatoes and income of non trained farmers were regarded as a situation of farmers before receiving training. The survey result in table 7 reveal the fact that there is significant difference in average yield of potatoes, tomatoes and hence household income derived from them. The mean yield of tomatoes, potatoes and household income of trained farmers was significantly high as compared to those of the non-trained farmers. This collaborates data in table 5,which shows that farm income contribute more to the total household income of the trained farmer (73.5%) compared to non trained farmers (63%). This also indicates the fact training has more influence on farm productivity and eventually household income. Therefore the null hypothesis that says that there is no significance different in farm productivity and hence household income was rejected.

Table 7: Distribution of respondent by farm productivity and estimated annual income (Tshs)

Variables	Farmers	Number	Mean	t. statistics
Yield of tomato (kgs)	Trained	40	216950	3.6**
	Non –trained	40	140123	
Yield of potato (kgs)	Trained	40	126900	3.3**
	Non-trained	40	79500	
Estimated annual income from potato and tomato	Trained	40	294750	4.06**
	Non –trained	40	146000	

** Significant at (P< 0.01)

4.5 Comparison of social economic status of farmer

According to URT (1999), Welfare implies the level of or standard of living of an individual and household or community. Further more welfare is defined as household command over resources in terms of food, property, heath, schooling, working condition, housing, security against crime, means of transport and communication and liberty.

4.5.1 Housing quality

In order to verify this, individual households were assigned score according to the quality of the material used for constructing housing such as walls and roofs. The materials were then assigned varying scores according to their value. The added scores ranged from two to six with three being the cut-off point. Households scoring three or less were rated poor quality (houses constructed with sun dried muddy blocks and grass thatched roof) and those scoring above three were rated good quality houses (constructed with cement blocks and corrugated iron roofs). The results in Table 8 show that more than 80% of the trained farmer had good quality houses and only 59% of the non-trained farmers had good quality houses. The quality of the house is the indication of the household income levels.

The Chi-square test shows that there is significant association ($P<0.05$) between household quality and farmer training. Trained farmers are more likely to improve their living environment including houses. A formal discussion with the majority of the trained farmers indicated that most farmers shifted from sun dried muddy blocks and grass thatched roofed houses to good quality houses or renovated one after their income had improved.

Table 8: Distribution of respondents by house quality

House-hold score	Trained farmers		No-trained farmers	
	Frequency	Percentage	Frequency	Percentage
1-3	4	10.3	9	41.0
>3	35	89.7	13	59.0
Total	39	100.0	22	100.0

N did not add to up to 80 because almost half of the non-trained farmers depend on their relatives houses for shelter.

4.5.2 Food security and food quality

Food is the basic need for all people. It is also one of the indicator and measure of household welfare. Food security refers to accessibility by all people at all times to enough food for an active and healthy life (URT, 1999). Access depends upon income available to the household, the distribution within the household and the price of the food. Food security was accessed by indicating number of meals taken by the household members per day in a day preceding the survey as proposed by URT (1998) and used by Katunzi (2000). Respondents whose family took two meals and less were regarded as food insecure while those who took three meals and above were regarded as food secure.

The results from Table 9 show that there is significant difference in number of meals taken per day between trained and non-trained farmers. The average number of meals taken per

day was three for trained farmers and two for non-trained farmers. This indicates that low-income people could go up to two or one meal especially in dry season when food is scarce and food price goes higher.

4.5.3 Access to quality food

Quality food provides the body with high calorific value. In this study milk, meat and rice were chosen as high valued food, although these were not regularly consumed by an ordinary family as reported by respondents. In rural areas most farmers are not in a position to purchase animal protein except for plants sources like beans and pigeon peas. Moreover rice is an expensive staple food mainly consumed by high-income families. Respondents were asked to list number of days the three types of food were taken a week preceding the survey. Then the total scores were recorded for each family. The added scores ranged from zero to twenty-one with a cut off point of 6. Respondents consuming these foods less than six times per week were regarded as low-income families and those consuming six times and more were regarded as high-income families.

It was observed that there was significant difference on number of days per week a family ate meat, rice, drank milk. However the significance was increasing gradually from days of eating meat to days of eating rice. This was due to the fact that almost all farmers in the area keep pigs thus the price of pork is low compared to other places. Moreover, the presence of the dairy goat project had facilitated availability of fresh goat milk that was sold at high price of Tshs.400. The results show that the average milk drinking days was 3 for trained farmers versus 2 for non-trained farmers. This indicates that trained farmers had more access to milk than non-trained farmers because most of the trained farmers keep dairy goats unlike non-trained farmers who keep local goats.

Table 9: Distribution of respondents by food security and access to quality food

Variables	Farmers	N	Mean	t statistics
Number of meals per day	Trained	40	3.00	2.36*
	Non-trained	40	2.88	
Number of days a family eat meat in a week	Trained	40	2.95	2.60*
	Non-trained	40	2.35	
Number of days a family drink goat milk in a week	Trained	40	2.63	3.45**
	No-trained	40	1.90	
Number of days a family eat rice in a week	Trained	40	2.85	5.27***
	Non-trained	40	1.55	

* Significant at (P< 0.05)
** Significant at (P< 0.01)
*** Significant at (P< 0.001)

A highly significant difference was observed on number of days a family eats rice. The mean days that a trained family ate rice were almost twice as much for those of a non-trained family. The reason given in a formal group discussion for such a difference was due to the fact that rice is never produced in such high land area so it is extremely luxurious and was consumed by well of families. In general the average number of days trained farmers eat quality foods was higher compared to non trained farmers.

4.5.4 Children's education status

Information on education attainment of children from individual household was obtained by asking the education levels of every child of the respective respondent. The results are presented in Figure 1. The results show that more than 50% of all children have finished primary school level. This is likely a reflection of a success of the campaigns on universal primary education, which was introduced by the government of Tanzania in the 1977 and the recent Primary Education Development Programme. This programme provides equal opportunity for all children to attain primary education freely. The different in primary

school level was due to presence of tuition fee before the Primary Education Development Programme (MEM), which was introduced early 2002.

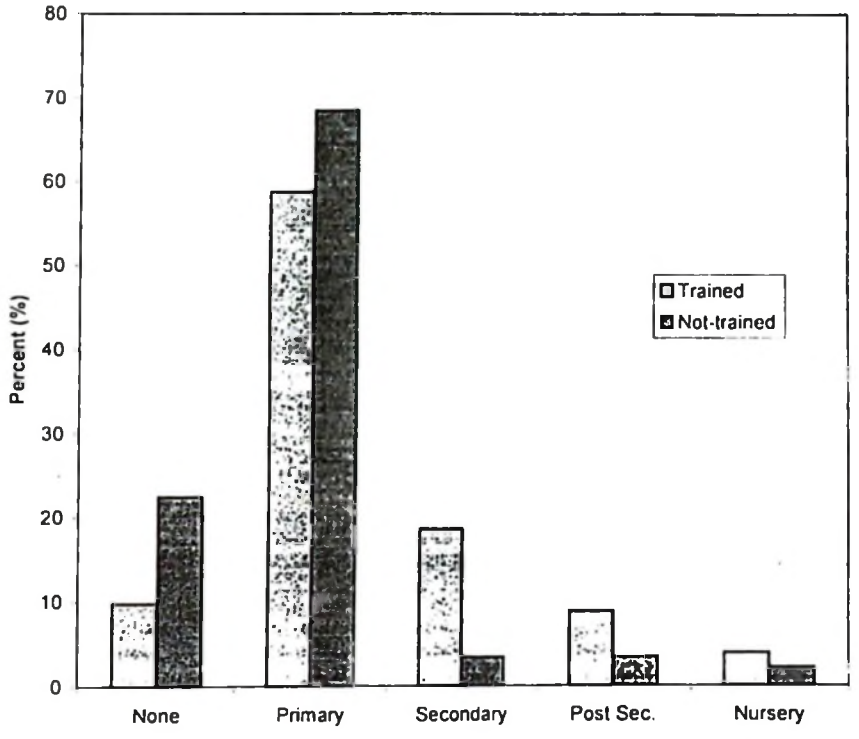

Figure 1: Children's education status

The result further show that 18.6% of the trained farmers children had attained secondary education, 8.9% attained post secondary education. On the other hand, 3.4% of the non-trained farmers children hag attained secondary and post secondary education. This great difference in the children education level might also indicate the difference in household income and thus the ability to access secondary education that requires cash to pay for school fees and maintenance allowances.

4.5.5 Access to agriculture credits

Financial support is one among the many factors that may influence farmers to adopt a certain type of technology. Farmers in Mgeta were enabled to form community development banks through farmer groups mobilization. Through Savings and Credit Co-operation Societies (SACCOS) (Bunduki SACCOS,and Nyandila SACCOS), farmers were given credits in terms of cash or goods like dairy goats, Irish potatoes seeds or any other services related to agriculture. The SACCOS usually issued credit to members and customers who paid up their shares and opened their savings accounts. However, there were pre-requisites for individuals to fullfill in order to becomes a bank member.

The survey found that more that 50% of the trained farmers had access to credit while only 15% of the non-trained farmers had access to credit meaning that 85% of the non-trained farmers had no access to credits, which contributes to their inability to purchase improved seeds, fertilizers and pesticides.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

This chapter gives a summary of the study and makes recommendations for further consideration arising out of the research findings. Farmers' training is essentially an agriculture extension function. In this study farmers received various type of training in relation to vegetable production, fruit production, cut flower production, marketing, banking and group management. With regard to the training, no conditions were imposed for farmers to access training. However hard working farmers who have joined in groups were most likely to secure training. Training was offered through seminars, workshops, study tours, and demonstration plots. During the training section farmers were taking notes and reading learning materials because majority of them are literate. Majority of the respondents were youth believed to provide labour for agricultural activities in farming.Although women in Tanzania work the land most, very few have access to education including agriculture training.

Farmer training has proved to have a positive impact in the life of the small-scale farmers in general. It has been found out that, there is a significant difference in terms of awareness, knowledge and practice of modern farming and husbandry practices between trained and non-trained farmers. Access to improved crop and animal husbandry practices, and other agriculture related information like marketing and credit support resulted in the improved productivity. Farmers responded that training improved their skills, enhances their yield and improved the income derived from crop production and livestock keeping.

As a result of training farmers have increased the size of the land for cultivation. It shows that, trained farmers have access to inputs more because first they have access to credits and have marc knowledge on crops and animal husbandry. Majority of non-trained farmers have no access to credits and the inadequate knowledge on crop husbandly reduces their input use capability. Furthermore farming was found to form the main stay of people in Mgeta. The study shows that farm activities contributed much to the total household income of the individual. It was found that there was significant difference in income levels and yield of potatoes and tomatoes between trained and non-trained farmers. Tomatoes and potatoes were the crops chosen for measuring the influence of training on farm productivity. As a result of increased income trained farmers improved their living standard and diversified their livelihood activities. They were able to build new houses, take their children to secondary school and invest in other non-farming activities like shops, milling machines, transport product to distance markets.

It can be concluded that agricultural extension has a potential in improving farm productivity and hence income derived from it. This income contributes into improving farmers' household welfare. Policy makers and development planners should focus more into reaching large communities in rural areas so as to provide them with technological information that would have profound impact in farm production. However support services like credits, market, transport should also be developed.

5.2 Recommendations

1) Although farmer training is an important factor for increasing production, other agriculture supporting services should be provided to foster adoption of the improved technology. These include increased access to credits, proper roads and predictable price of products.

2) Training should be provided regularly so as to keep farmers well informed of day-to-day updates of technology.

3) The Farmers suggested use of farmer field's for demonstration rather than conducting on station field trials. At least one farmer each village should have a demonstration field so that other farmers can easily learn from their fellows.

4) Build capacity of farmers by providing marketing informations weather forecast informations and introduction of farmer fields schools approach, which had proved to be easiest way for farmers to adopt agricultural technologies by discovery learning between farmers themselves.

With the above recommendations put in practice, farmer training in Mgeta will have more influence on social economic conditions of farmers and farm production. There fore these recommendations are directed to UMADEP for successfully implementing the project in the study area.

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APPENDICES

Appendix 1: Contribution of farmer training for improvement of household income

QUESTIONNAIRE FOR FARMER INTERVIEW IN MGETA

Location

Date of interview.....

Name of interviewer.....

Village.....Ward.....Hamlet.....

Division.....District.....

1 Back ground information

a) Name of the interviewee

b) Age

c) Level of education

1) None
2) Primary
3) Secondary
4) Post Secondary
5) Adult Education

d) Marital status 1) Single
2) Married
3) Divorced
4) Widow
5) Separated

e) Occupation

Occupation	Full Time	Part Time
1 Farmer		
2 Civil servant		
3 Self employed (explain)		
4 Unemployed		

f) How many children do you have.....

g) Are they all schooling

1) Yes

2) No

If yes what is the level of there education and there sex and age

Children	Age	Sex	Class Level
1			
2			
3			
4			
5			

h) If no explain why.....

.....

i) Do you own your own house.

1) = Own 2) = rent 3) = inherit

What is the material used to build your own house

Floor	Yea=1 No=2	Walls	Yes=1 No=2	Roofs	Yes=1 No=2	Doors	Yes=1 No=2
Earth/sand		Sun-dried bricks		Grass		Wood	
Finished floor: -Cement -Stone		-Bunt-bricks -Concrete block -Plastered		Corrugated iron		Corr.iron sheets	
Rudimentary wood planks		-Thatched walls		Others		Grass	
Others		Others				Others	

2 Source of Income

a) Give the source of income obtained by gender (Tick in the appropriate place)

Source of income	Gender		
	Male	Female	Both
Crop sales (name the crop)			
Livestock sales (name the product/livestock)			
Sales of forest product from farms (name them)			
Other sources (Specify)			

b) How much do you earn per month, year, per season .....

c) Explain how you spend your money

1).....

2).....

3).....

4).....

d) How many times per day do you eat food

1) Once per day 2) twice per day 3) Twice per day 4) others, specify

c) How many days in a week does yours family eat the following type of food

Type of food	Frequency (no of days per week)
Meat of fish	
Rice	
Milk	
Eggs	

3-land acquisition and use

a) Since when have been living in this village.....

b) What are the means of acquiring land (Tick appropriate one(s)

1) Purchase

2) Inherit

3) Given by village government

4) Hired

5) Clearing of forest

c) Give the amount (acreage) for the following:

i) Total land owned

ii) Land rented in

iii) Land rented out

d) Indicate farm areas devoted to crop production, forage and multipurpose trees fallow and other uses

Item	Total acreage	Ownership by gender
Crop (Name them)		
Forage (name them)		
Multipurpose trees(name them)		
Fallow		

5 Farmer training / change in farming system

a) Have you received any type of training

1) Yes

2) No

b) If yes what type of training did you receive

1).....

2).....

3).....

4).....

5.....

c) Is the training important for you, explain why.

.....

.....

d) What are the conditions for receiving training

i).....

ii).....

iii).....

iv).....

e) How often do you receive such type of training

1) Once per month
2) After three month
3) After six moth
4) Once per year
5) Seasonally
6) Other, specify

f) How are the training conducted, explain

1).....

2).....

3).....

g) What type farming system are you practicing

1) Traditional farming system
2) Modern farming system

h) What can you say about the training conducted by UMADEP

1) Satisfactory
2) Moderate
3) Not satisfactory

i) Apart from the training conducted by UMADEP what are other sources of information

1) .....

2) .....

3) .....

j) Since you have received the training what type of practice have you adopted. Put 1 if adopted and zero if not adopted

No	Technology/training	Adaptation	
1			
2			
3			
4			
5			

k) How often do you use inputs.....

l) Have you increased the farm field since you have started practicing new technology.

.....1) Field size before

.....2) field size after

m) Is there any change in productivity since you have received and adopted technologies

Type of crop/ livestock (mention them)	Yield before	Yield after
1		
2		
3		
4		
5		

n) Do you have access for credit

1) yes

2) no

o) What are the means of access inputs.

1)

.....

2)

.....

3)

.....

p) Where do you sell your product

1) at the local market

2) near by villages

3) transport to big town

q) What are the things that you were not able to do before and now you can do after being a project member, mention them

r) What should be done to make the training more successful. .....

.....

s) How have your income increased as a result of adopting new technology

1) High

2) Moderate

3) Constant

t) What are the assets that you own before and after your income earning have changed.

Asset type	Own before	Owned after
1		
2		
3		
4		

Thanks for your cooperation

Appendix 2: Questionnaires for UMADEP workers/attached extension staffs

A: Back ground information

Date of interview.....

Name of the interviewer.....

Name of the respondent.....

Ward..... Village..... Hamlet.....

Division.....District.....

1 For how long have you been working with farmers under UMADEP

2 What is your profession.....

3 What are your duties .....

.....

.....

.....

4 What are the main project activities.....

.....

.....

.....

5 How do farmers participate in the projects activities?

i) .....

ii) .....

iii) .....

6 What are the strategies that you employ to ensure full participation of farmers in the project activities .....

.....

.....

B farmer training

7 Do you train farmers in there various activities?

1) yes

2) no

8. Why do you train farmers, explain

.....

.....

9 If yes what types of training do you offer

Type of the activity/intervention	Training offered/ knowledge
1	
2	
3	
4	
5	
6	

10 Are there any conditions farmer had to fulfill in order to receive training (tick)

i) yes

ii) no

11 If yes what are the conditions for receiving training, mention them

.....

.....

12 Who determine the training need of farmers?

1).....

2).....

3).....

4).....

13 what are the training technique that you use to ensure farmer understands you

i).....

ii).....

.iii).....

iv).....

vi).....

14 How is the training conducted?

1).....

2).....

3).....

4).....

5).....

15 How do farmer participate during the training section

i).....

ii).....

iii).....

16 During the training session what is that you are delivering to farmers

i).....

ii).....

iii).....

iv).....

17 How do you monitor the adoption of the technology

.....

.....

18 How often do you provide training to farmers

i) once per month

ii) once in three month

iii) after six month

iv) per year

v) depending on the need

C: Changes in the farmer behaviour

19 has your training been successful

i) yes

ii) no

20 If no why.....

.....

21 If yes

Type of the training	Adopted one/most

22 What is the feature that shows that the training offered had contributed to changes in farmer behaviour.....

.....

.....

23 what can you say about the situation of the farmers in 3-5 year back to date

i).....

ii).....

iii).....

24 Is there any increase in productivity, how much did they harvest before and now

Type of crop/livestock	Yield before	Yield after	In case of successful adoption /yield
1			
2			
3			

25 what are the things that farmers were not able to do but now they can do, mention them

1).....

2).....

3).....

26 With regard to your experience do you think that there is a need of diversifying the trainings of farmers (Tick).

i) yes

ii) No

27 If yes explain in what area does the training need to focus.....

.....

.....

.....

28 Apart from training what other basic support farmers need to enhance their productivity, mention them.....

.....

29 Are there any problems that you have been encountering during your training sessions

i) yes

ii) no

30 if yes what solutions do you propose.....

.....

.....

31 do you think there is a need of continuing training farmers

i) yes

ii) no

32 If yes why is that so .....

.....

.....

33 What can you say about the general living standards of project beneficiaries before and after

1).....

2).....

3).....

Thanks for your cooperation