THE ROLE OF CREDIT IN THE SUSTAINABILITY OF AGRICULTURAL EXTENSION SERVICES: THE CASE OF ULUGURU MOUNTAINS AGRICULTURAL DEVELOPMENT PROJECT

BY

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ABSTRACT

The lack of sustainability of adopted agricultural extension innovations by smallholder farmers has been caused partly by lack of capital. Rural banks initiated by the Uluguru Mountains Agricultural Development Project (UMADEP) have been important source of credit in rural areas to improve smallholder farmer's productivity. The study investigates the role of credit in the sustainability of agricultural extension services in the Uluguru Mountains. Four Rural Banks in two Districts, namely, Morogoro and Mvomero districts in Morogoro Region were selected. The study consisted of smallholder farmers who under UMADEP project, included those who received, not received credit from Rural Banks. Ward Extension Officers, Village Executive Officers, UMADEP staff, and Rural Bank staff were the key informants. A questionnaire and interview schedule were used in data collection. The study revealed that 89% of the respondents were aware of the innovations disseminated by the project. The innovations adopted included new agronomic practices, use of terraces for conservation of water and soil fertility. The respondents also adopted new goat and pig breeds and crossed with their respective local breeds to improve their performance. Housing, vaccination and treatment of the domestic animals were promoted. Age, marital status, family size, land ownership, and land size were the most important socio-economic factors associated with rural bank credit access in both Districts. The study found that the credit resulted in a significant at 1%, ($p = 0.001$) increase in number and value of dairy goats, pigs and fruits, hence the annual income of the household. Credit enables the farmers to increase the use of new innovations and hired labour for their farm activities According to the results, 88% of the respondents will continue with the adopted technologies, and few (6%) said they still needed UMADEP assistance. The use of credit

DECLARATION

I, ESTHER NATAI MUFFUI, do hereby declare to the Senate of Sokoine University of Agriculture that this dissertation is my original work and has not been submitted for a higher degree in any other University.

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The above declaration confirmed

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will reduce the capital constraints. Therefore, farmers should be encouraged to use bank credit facilities.

DEDICATION

This work is dedicated to my dearest late father Samwel Elinewinga Natai and my mother Catherine Magdalena Sanga who made a lot of effort in laying down the foundation for my education.

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LIST OF ABBREVIATIONS

BACAS	Bureau of Agricultural Consultancy and Advisory Services
CIMMYT	International Wheat and Maize Research Institute
CRDB	Co-operative and Rural Development Bank
DAEE	Department of Agricultural Education and Extension
FFIs	Formal Financial Institutions
ESEE	European Seminar of Extension Education
ESRF	Economic and Social Research Foundation
FAO	Food and Agriculture Organization of the United Nations
FINCA	Foundation for International Community Assistance
FYM	Farm Yard Manure
IIRR	International Institute for Rural Reconstruction
IITA	International Institute for Tropical Agriculture
IRDPs	Integrated Rural Development Projects
MEs	Micro- Enterprises
NEPAD	New Partnership for Africa's Development
NBC	National Bank of Commerce
NGOs	Non Governmental Organizations
NMB	National Microfinance Bank
PRIDE	Promotion of Rural Initiative and Development Enterprise
SEDA	Small Enterprise Development Agency
SIDO	Small Industries Development Organization
SG 2000	Sasakawa Global 2000
SPSS	Statistical Package for Social Sciences

SUA	Sokoine University of Agriculture
UNDP	United Nations Development Programme
UMADEP	Uluguru Mountains Agricultural Development Project
UMHODEP	Upper Mgeta Horticultural Development Project
URT	United Republic of Tanzania
WEO	Ward Extension Officer
VEO	Village Extension Officer

CHAPTER ONE

INTRODUCTION

1.1 Background information

Various strategies and projects have been implemented in rural areas, aimed at improving the standard of living of the people. Among those projects is the Uluguru Mountains Agricultural Development Project (UMADEP), which has been operating in Mgeta, Mvomero and Mkuyuni Divisions since 1993. The project works as an integrated agricultural development programme using a multidisplinary approach and is implemented as a collaborative effort between the Department of Agricultural Education and Extension, Sokoine University of Agriculture, and the District Councils of Mvomero and Morogoro Districts (Temu *et al.*, 2000).

The project aims at consolidating the rural society in its complexity to constantly play an active role for its betterment in changing the overall socio- economic environment. Specifically, the purpose of the project is to improve the productivity of small scale farmers in a sustainable manner, to associate, through a long-term communication process, Sokoine University of Agriculture (SUA) with the rural communities in order to promote the emergence of small scale farmers movement, and to train change agents (including farmers, students and professionals) to develop a methodology that constantly links action to reflection (Temu *et al.*, 2000). The main objective of UMADEP is empowerment of the people living in the villages in order for them to take a leading role in planning for their development. One of the activities initiated by UMADEP is the establishment of rural banks in the following wards: Tawa, Kinole, Mkuyuni, Bunduki, Langali, Tchenzema, Mvomero, Mzumbe, Hembeti, Mlali, and Kiroka all in Mvomero and Morogoro Districts. The rural banks have an average of 118 members and over 250 customers each, who get

services through the village / rural banks. The project started savings and credit banks for the purpose of promoting agricultural production through credit. Since its establishment UMADEP has tried to develop together with farmers more sustainable agricultural practices which will increase the productivity of land and labour while conserving the soil and the little natural vegetation left.

The main agricultural extension messages promoted under UMADEP include improved fruit tree varieties production, processing and marketing, drying using solar driers, pineapples production, bananas and vegetable production, plums to make fruit wine and pickle making (Mattee, 1994). Moreover, UMADEP helps to improve livestock keeping activities (dairy-goats and piggery), assists to establish rural banks, constructing rural banks, training for operators of the rural banks, promotion of environmental conservation activities, developing appropriate cropping systems, and practices for soil and water conservation (UMADEP, 1996).

1.1.1 Link of rural banks with farmers

The project has been able to initiate the establishment of rural banks in the rural areas in Morogoro Rural District where farmers are concentrated, which aimed at improvement of the productivity and income for smallholder farmers in the project area through the introduction of improved or new varieties of crops such as tomatoes, green beans, and promotion of organic farming practices (Temu *et al.*, 2000; Mwankemwa, 2004). The rural banks provide credit to smallholder farmers to buy agricultural inputs such as fertilizer, seeds and veterinary drugs. Farmers have increased earnings from the sale of milk and live goats and the nutritional status of their families especially those of infants has improved (Muhikambele *et al.*, 1995). Access to credit is one way to improve farmers' access to new

production technology and increase productivity. Farmers' ability to purchase inputs such as improved seeds and fertilizer is particularly important (Kashuliza, 1993).

The first bank started in 1998 with 42 members and a capital of Tshs 210 000/=. Up to March 2002, it had grown to the capital of Tshs 11 000 000/= and the number of members has increased to 144 and it saves 411 customers in a season on average. Since the establishment of the rural banks, smallholder farmers have been assisted in increasing agricultural productivity. The rural banks contribute to the sustainability of agricultural extension services (UMADEP, 1996). Currently, there are 12 banks which are operating in the project area having 2,868 members with total shares of Tshs 73 464 000 and savings of Tshs 320 577 000. Others have been formed but not yet operational (Mbaga, Y.M personal communication, 2006).

1.2 Problem statement and justification

Many studies indicate that various agricultural extension services have been given to farmers through development projects (Rutatora, 2002; FAO, 1999; CATAD, 1989). However, sustainability and adoption by smallholder farmers in rural areas is limited. The failure to sustain adopted agricultural extension services has partly been caused by lack of capital. The general feeling is that credit facilities have been seen as paramount in improving smallholder farmers' productivity. The Government of Tanzania and donors have responded to this need by supporting the provision of rural financial services (credit) through rural banks. Studies done by Luhasi (1998) and Mangasin (2001), recommended that there was a need for a detailed study on the role of credit institutions in smallholder farmers' adoption of technologies and sustained use of new innovations. Previous experience shows that most agricultural extension services cease once the project

supporting them comes to an end. Hence, it is not clear whether the credit will enable the farmers to sustain agricultural extension services and what will happen when the UMADEP project comes to an end. Therefore, the major task of this research was to explore the role of credit in the sustainability of agricultural extension services, and how various actors, including beneficiaries themselves, can support the extension services, so that they can continue to perform at the expected level in future.

1.3 Objectives

1. 3. 1 General objective

To investigate the role of credit in the sustainability of agricultural extension services.

1. 3. 2 Specific objective

(i) To identify agricultural extension innovations that have been promoted by UMADEP in the study area.

(ii) To determine the socio-economic factors that are associated with farmers' access to credit.

(iii) To evaluate the role of credit in the adoption of agricultural innovations.

(iv) To determine the attitude of farmers towards the continued use of adopted agricultural practices after the UMADEP project comes to an end.

1. 3. 3 Research questions

(i) What are the agricultural innovations that have been promoted by UMADEP?

(ii) What are the socio-economic factors that are associated with farmers access to credit?

(iii) What is the role of credit in the adoption of agricultural innovations?

(iv) What is the attitude of farmers towards the continuation of adopted agricultural innovations?

CHAPTER TWO

LITERATURE REVIEW

2.1 The role of UMADEP in promoting improved agricultural production

The UMADEP project is responsible for promoting all aspects of agricultural development for the Uluguru Mountains. The establishment of this project is in accordance with 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 standards of people in Uluguru Mountains in a sustainable manner.

The project has been able to initiate the establishment of rural banks in the following wards in Morogoro and Mvomero districts: These rural banks as shown in Table 1, include Kinole (Kinole Ward), Mkuyuni, Bunduki (Bunduki Ward), Tawa (Tawa Ward), Matombo (Matombo Ward), Langali (Langali Ward), Tchenzema (Tchenzema Ward), Mvomero (Mvomero Ward), Hembeti (Hembeti Ward), Mlali (Mlali Ward), (Mzumbe Ward). Others are Mkuyuni (Mkuyuni Ward) and Kiroka (Kiroka Ward). Currently, the rural banks have an average of 287 members per Ward (those who have acquired shares). The rural banks have a set up of a network which is expected to graduate into a community bank. The role of the project has been to provide training for operators of the rural banks, to support procurement of office materials, to provide safe boxes and to assist with institutionalization of the necessary regulations (UMADEP, 1996). According to IIRR (1998), credit enables poor members of society to acquire what they would not otherwise be able to, with their limited resources. When properly done and successful, the community members are

empowered because they have added to their assets and are able to manage other forms of credit. The process thus develops the community's capacity to organize itself for particular activities (IIRR, 1998). It has also been found that credit programmes can be run in any community where credit can help solve problems. Credit is an important factor in increasing agricultural productivity; farmers use credit to purchase inputs such as seeds, fertilizers and farm equipment which are the major means of effecting agricultural growth and development (Kashuliza, 1993).

2.2 Rural banks

The term "rural bank" refers to a formal financial institution established for the purpose of assisting smallholder farmers to access agricultural credit in rural areas. These banks bring about sustainable increase in incomes, assets and food security of poor rural households through enhancing the capacity of the rural poor to mobilize savings and credit to invest in agriculture and other income generating activities. The institutions provide savings and credit and /or other financial products in small amounts to primarily poor customers conventionally believed not to have the capacity to save, as well as considered unwilling and unable to pay higher interest rates required to cover credit transaction costs (Srnec and Hejkrlik, 2005). Rural banking is a more modern technique for providing savings and credit services to rural areas. Some of these techniques, in particular village banking, are forms of micro-credit. Micro-credit was started over 25 years ago in parts of rural Asia and has since then spread in other developing countries.

2.3 The evolution of rural banks in Tanzania

Before the economic reforms the major sources of farm credit were the state owned commercial banks- National Bank of Commerce (NBC) and Co-operative and Rural

Development Bank (CRDB). These banks lent to Co-operative Unions and Crop Boards to purchase seasonal inputs such as fertilizers and to buy crops from farmers. Failure to purchase crops was compounded by poor management and sometimes embezzlement of finances. Subsidies became a heavy burden to the government and farmers lost trust in these institutions, and the difficulty in obtaining working capital increased (Howlett and Nagu, 2001). The gravity of these problems became more apparent and pessimism grew until in the late 1980s when major donors began to abandon agricultural credit efforts and instead increasingly focused on rural finance. In 1991 public banks were re-structured and designed to be closer to farmers. Operational costs were made lower than those of the commercial banks, and farmers could borrow due to the small interest rate of 10% (Howlett and Nagu, 2001).

Rural banks were developed during the 1980s as an alternative to commercial banks in rural areas. They were established for the purpose of supplying credit to smallholder farmers that commercial banks were generally not prepared to finance (Kashuliza *et al.*, 1998). The purpose was to organize informal banks which could use a line of credit from a financial intermediary to provide non- collateralized loans to members, a place to invest savings and promote social solidarity (Srnec and Hejkrlik, 2005). Rural banks in rural areas have more difficulty in building trust and solidarity. In rural areas they suffer from large numbers leaving (for reasons not yet understood) and low levels of literacy not enabling all members to have the same control over the organization and sometimes requiring prior literacy training.

2.3.1 Sustainability of the rural banks in Tanzania

In order for any financial institution to be sustainable, it ought to have good organization and a structure that maintains performance in spite of changes. Sustainability is defined as the ability to repeat performance in future. Sustainability also refers to the ability of a financial institution to supply financial services on a continuous cost-recovery basis without external subsidies (Schreiner, 1996). It is desirable as it gives temporary access to loans that produce some benefits; also it creates long term sustainable financial relationships that provide opportunities for future benefits. An institution with increasing outreach of its services, serving a growing number of people over time indicates sustainability and the impact of the institution is viewed as positive. This was the idea to boost agricultural extension services and economic development of Tanzania.

Profit might lead to increased access to subsidized resources and can promote repayments and permanence in social welfare benefits to rural population. Smith (2001), Schreiner (1996), and Rao (1998), observed that most microfinance organizations are not profitable since their prices are too low and their running costs too high in rural areas than in urban areas for many credit providers. This makes many organizations to depend on donors since they can not pay their expenses with revenue from their operations. Sustainability for these organizations in many cases is questionable after the donor withdrawal from their operations.

As sustainability means permanent performance, socially sustainable microfinance organizations ought to maximize expected social value less social cost discounted through time. Schreiner (1996) indicates that sustainability includes net gains to users from loans

and deposits, profits or losses of the microfinance organization and the social opportunity cost of the resources used.

2.3.2 The impact and sustainability of rural banks

Sustainability of rural banks has a greater impact on agricultural productivity (Sonoko, 2001; FAO, 1999). The issue of sustainability arises because of the declining public funding for public services, and the recognition of the necessity of alternative financing mechanisms, including the possibility of beneficiaries meeting part of the costs of the services (URT, 2000). CATAD (1989), argues that the analysis of sustainability should take into consideration the direct or indirect impact (or side effects) of all aspects of the living conditions of the target population. An institution with increasing outreach of its services, serves a growing number of people over time. This indicates that sustainability and the impact on the institution is viewed as positive. This is the reason for boosting agricultural extension services and economic development of Tanzania. Profit might lead to increased access to subsidized resources and can promote repayments and permanence in social welfare benefits to rural population.

Sustainability refers to an outcome that exists for a prolonged period of time. As adopted by FAO (2002b), and Lovell (1992), the term sustainability with regard to development programmes is the ability of the local community to meet the costs of the programmes. It means that benefits flowing from a development programme and the ability of the local community to meet the programme costs in order for the programme to continue, and it will be able to be maintained after external interventions or donor funding has been withdrawn. In relation to UMADEP, in these terms, sustainability depends upon increase of agricultural production, hence improving their standards of living. Sustainability is

dependent on the degree of self- reliance developed in target communities and on the social and political commitments in the developed progammes. The small farmers have to commit their own resources voluntarily to the developed programme and should be involved in the decision making process. Sufficient resources have to be invested in agricultural productivity. This will improve the wellbeing of the people's future generations. According to UNDP studies, and FAO (2002a), sustainability can be achieved primarily by capacity development on the clientele at individual, social, institutional and system levels. The evaluation done by Integrated Rural Development Projects (IRDPs) revealed that no progress can be made without training, but training alone is not enough to bring about a substantial change on the part of the farmers. It was realized that training activities needed to be supplemented by infrastructure and financial support (ESEE, 2001). Rural banks have impact on sustainability of extension services, since they enable them to be self–generating in terms of funding, staffing and clientele support to allow it to function at a constant level of activity (Mattee, 1997).

2.4 The role of rural banks in smallholder farming

A study by Rao (1998), showed that the commercial banks location were highly concentrated in metropolitan cities and in industrial, business and trade areas, until 1966 and 1968 when various developing countries suggested that rural banks should be created to fill up the credit gap in the rural areas. Credit is provision of loans by a bank or other organizations. The loan can be in cash or in kind (e.g. seeds, livestock, fertilizer) (IIRR, 1998). Rao (1998) adds that the rural banks should work for the provision of credit coupled with extension services in the rural areas for rural people, as such they must be located in rural areas so as to understand the rural economic environment. In order to improve production, farmers need access to financial capital. Buying seeds, fertilizers and other

agricultural inputs often requires short-term loans, which are repaid when the crops are harvested. Installing major improvements, such as irrigation pumps, or acquiring new technologies that increase future yields is impossible without access to long-term credit (Crosson and Anderson 1993).

Similarly, FAO (1999) and Haverkort (1991), argue that if farmers are to increase food production and food security, they need better access to agricultural support systems, such as credit, technology, extension services and agricultural education, as well as to the rural organizations that often channel other services. Both men and women smallholder farmers have frequently been cut off from these essential agricultural support systems, which seldom take into account the different responsibilities and needs of men and women farmers. In spite of their enormous potential and their crucial roles in agricultural production, women in particular have insufficient access to production inputs and support services (Kashuliza,1993).

2.5 Factors that influence farmers' access to credit

A study done by Kashuliza *et al.* (1998), reveals that a number of factors affect credit access for some farmers. The factors include personal characteristics such as age, education and sex of the recipients, resource endowments such as the family size, available labour, value of assets, value of crops (of previous season), land ownership, credit use characteristics such as credit form required and preference, history of credit use and repayment and levels of interest rates charged.

2.5.1 Age

There is an argument that as an individual grows older, he/ she might find it too risky to be involved in activities that are uncertain. But also he/she might be able to take risk due to experience and security (in terms of capital) (Kashuliza and Kydd, 1996, and Contado 1989). On the other hand, young farmers in most cases might not be involved in some activities due to lack of experience, less security and socio- economic circumstances (Yazdan and Gunjal, 1998). Yet, they can easily take risky decisions due to their aggressiveness and motivation to accomplish their life goals earlier. Age was then thought to be a factor that might influence individuals' decisions to join financial institutions.

2.5.2 Family size

Large family size might bear a burden to the household head or bread winner hence might render his/her decision of adopting credit as a strategy for producing more to feed household members. Yazdan and Gunjal (1998), and Temu (1994) suggest that household size reflects higher demand for funds to meet family financial obligations. Furthermore, Vaessen (2001) urges that larger family size have enough labour capacity to take loan and repay back. Thus large family size are expected to use credit once they have sufficient capital to earn revenue to meet family expenses and for future reinvestments.

2.5.3 Education

Farmers with relatively high education are expected to have better knowledge on importance of many innovations at their disposal. Kashuliza and Kydd (1996) hypothesized that farmers with better knowledge on the role of innovations, credit and credit procedures are more likely to be users of savings and credit services than those without education who might be ignorant or skeptical to use financial services. Other

studies point out lack of skills on procurement and use of credit productively might hinder access of ignorant farmers to credit (Mwankemwa, 2004; Vaenssen, 2001).

2.5.4 Sex

In a related study, Kashuliza and Kydd (1996), mention sex of client to be an important factor influencing credit accessibility. Other important determinants of credit access are awareness of farmers on available credit facilities in their areas, history of having credit before, and degree of contact with extension agents. Smallholder farmers particularly women, often face difficulties in obtaining credit. This is a direct consequence of their lacking access to land, participation in development projects and extension programmes, and membership in rural organizations, all of which are important channels for obtaining loans and credit information. In several countries of sub - Saharan Africa where women and men farmers are roughly equal in number, it is estimated that women farmers receive only 10% of the loans granted to smallholder farmers and less than 1% of the total credit advanced to the agricultural sector Nikos (1997); Kashuliza (1986) and Temu (1994) point out that rural women face gender – specific barriers. Poor rural women lack assets that can be used as collateral; they do not own wealth/ property which can provide the banks guarantees; and worse, they frequently suffer from resistance and interference by males when they want to access loans.

2.5.5 Land ownership

The majority of farmers in rural areas are described as small holding farmers because their cultivated land is about 1.5 acres. Thus, they expect to use improved technologies in increasing the commercialization of farming operations, thus accelerating the growth of food production in sub- Saharan Africa (IITA, 1988). Land owning farmers have adequate

access to credit because they can provide collateral; they also have access to information and in general they have better understanding of the procedures for security credit. Increased access to credit is a promising way to increase economic opportunities for the poor, but access to land can also increase the productivity and income of the poor (World Bank, 1996). Almost the contrary is the case for landless farmers who fail to participate in credit markets usually because of the collateral requirement (Temu, 1994).

Large scale farmers can easily obtain credit, information, and other inputs that enhance adoption of technical innovations. It is also expected that farmers falling under different farm size categories would have different attitudes towards different extension approaches or messages brought to them. Farm size is a common factor for determining adoption (CIMMYT, 1993).

2.5.6 Income

In most cases, farmers with more income are early adopters of technology or are able to take advantage of innovations or new technologies. Mdemu (2000) contended that many farmers who do not adopt, may complain of lack of cash or credit as the principal factor limiting their adoption. Maswaga (2001), pointed out that farmers with more commercial orientation who sell a large proportion of their harvest are the ones more likely to access credit in order to adopt particular technologies. Farmers with more income take advantage of their wealth to practice new technologies or adopt new extension approaches and technologies as opposed to farmers with low income. This is because farmers with more income take advantage of their wealth to practice new technologies or adopt new extension approaches (Bwana, 1996).

2.6 Importance of credit in agricultural development

The importance of credit in agricultural development can not be over-estimated. Studies by Maswaga (2001) and Sonoko (2001), on adoption and sustainability of agricultural innovations by smallholder farmers in Tanzania indicate that failure of farmers to use modern techniques is due to high cash requirements in terms of purchasing and operating costs. Ponte (2002), after studying the trend of smallholder farmers under Sasakawa Global 2000 (SG 2000) project in Dodoma Rural District, concluded that credit was one of the most important components for the success of SG2000 project because it enabled farmers to adopt most of the technologies that led to tremendous increase in productivity and that the withdrawal of credit left most farmers unable to buy costly inputs and hence a drastic drop in the adoption of insecticides and fertilizers. Credit is, therefore, an essential instrument for enabling farmers to acquire improved agricultural techniques and thus speed up the adoption of new technologies. Kashuliza (1986) argues that the demand for credit exists because farmers do not have access to all inputs required at the beginning of the season.

If the smallholder farmers get access to credit facilities not only will they increase agricultural production, but also their capacity to repay the loans. Agricultural credit is therefore, an important component in the development of the agrarian sector of the economy. Much of its success, however, will depend on the way in which the farmers gain access to credit facilities and the degree of supervision during the utilization of the credit. As Punia (1989), emphasized, farmers require not only credit but also guidance in the planning of their agricultural operations.

The impact of credit use, as found by Kashuliza *et al.* (1998), indicated that the credit users had significantly higher crop yields and farm incomes than non-credit users. This implies that the use of credit plays a positive role in sustainability of adopted extension practices. Credit enables the users to cultivate large farm areas and use farm inputs and implements which would otherwise be difficult or impossible to access. Furthermore, improved crop harvests (yield) implies some improvement in food security of borrower households in comparison with non- borrowers.

Furthermore, according to Makombe *et al.* (1999), small holders development strategies based on improved labour – using technology could generate increased rural employment and incomes and thus help ensure that the rural majority has access to food. Widespread increases on production among a country's small farm units can also have a multiplier effect in expanding opportunities for productive employment increase, purchases of inputs and consumer goods from other sectors of the economy, helping reduce income differentials and slowing the rate of rural – urban migration.

In order to improve production, farmers need access to financial capital. Buying seeds, fertilizers and other agricultural inputs often requires short term loans which are repaid when the crops are harvested. Installing major improvements such as irrigation pumps or acquiring new technology that increases future yields is impossible without access to long term credit (EESE, 2001).

The importance of credit provision to farmers lies on the argument that credit is expected to enable farmers to acquire more modern agricultural inputs for creating employment and other economic opportunities (Mbata, 1991 and Ponte, 2002). Different studies which used

different approaches in trying to address how credit can have impact on farmers' adoption of modern technologies and input use found that there was significant difference in use of modern agricultural inputs between borrowers and non-borrowers (Mbata, 1991).

2.6.1 Credit and extension services

A study by Kauzeni (1989), shows that in many parts of the developing world, millions of farmers are not yet being reached by agricultural extension services. Representing the largest segment of the farming population, most of them are small-scale, subsistence and resource- poor men and women farmers whose farm production is lower than the national average and the production levels achieved in experimental stations and farm trials because of low levels of education, their farming practices and technologies are inefficient and productivity consequently low (FAO, 1999). Maswaga (2001) observed that extension services motivate farmers to access credit. Trained farmers will definitely utilize their credit on farm production.

2.7 Limitations of agricultural credit services in rural areas

Although agricultural credit is important and the major sources of rural finance include financial intermediaries and semi-formal financial institution, smaller farmers still receive no or inadequate credit services from these sources. Limited access to rural financial services is attributed to a number of factors which vary with the source of rural finance.

2.7.1 Limitations of agricultural credit from formal financial institutions (FFIs)

Formal finance is applied to all transactions, loans and deposits occurring within the regulation of the central monetary authority (Alexandratos, 1995; Kashuliza *et al.*, 1998). Due to the need of central monetary authority regulation, formal finance is operated

by Formal Financial Institutions (FFIs) such as CRDB, National Microfinance Bank (NMB) and other private banks such as Citibank, and Standard Chartered Bank, which are licensed banks, and non – bank financial intermediaries such as PRIDE, FINCA, SEDA, SIDO etc.

Formal financial institutions are characterized by being urban based and urban biased; and thus have failed to reach the rural people. Banks such as CRDB that were meant to serve the rural people require collateral to borrow from those banks. Generally, the FFIs are characterized by centralized operations, demand for collateral when issuing loans and bureaucratic procedures (Alexandratos, 1995). All these characteristics discriminate smallholder farmers from financial services and especially credit services.

2.7.2 Limitations of agricultural credit services from informal sources

Informal finance, according to Kashuliza *et al.* (1998) and Temu (1999), is applied to all transactions, loans and deposits occurring outside the regulatory framework of the central monetary authority and is the main source of finance for the rural people. Although there have been some allegations that informal lenders are exploitive, recent studies have shown that there is very little evidence of exploitation in informal credit (Alexandratos, 1995). While a greater number of financial intermediaries operate in the informal financial markets, friends and relatives are the most common sources of informal credit in rural areas. In informal financial arrangements, repayment conditions are very flexible and transaction costs are low. In most cases, no interest or collateral is involved, thus benefiting the poor such as the landless or those without land titles (Alexandratos, 1995). According to Kashuliza (1993) and Bagachwa (1995), loan repayment in informal credit is higher than in formal credit because of personal nature of the finance and credit

transactions, which, in most cases are conducted on the basis of trust and intimate knowledge of customers. In view of the limited outreach of the non- governmental and public credit schemes, it could be argued that the informal credit sources play a complementary role in the delivery of micro- finance services in rural and urban areas (Ndanshau, 2000).

However, with all the good qualities of informal finance, loans from informal finance sources are not targeted to specific activities; are dominated by consumption purposes and are too small to justify remarkable development. These are the major limitations of agricultural credit from informal financial sources.

2.7.3 Credit defaults and problems associated with credit

Literature explains that credit default is extensive, and causes of default vary among countries and credit programmes. Most of small credit programmes have been affected by serious defaults. High default rates which range from 50% to 80% have been reported in small credit programmes in Africa, Asia and Middle East (Letona,1982; Kashuliza, 1986). Some causes of defaults include the unprofitability of the recommended production techniques, viability of income arising from crop failure in case of farm credit due to natural calamities like drought and floods, crop destruction due to fire, theft or other hazards (Mwachang'a, 2000). Reasons put forward describe the point that poor clients in environments with high general business risk and lack practice in the rules of formal finance. It is suggested that poor clients are risky clients (Chiduo, 2001). Poor market structures, economic recession, deficient business practices or clients misallocation of loan funds into consumption activities rather than on intended activities by the credit institutions have been observed by Zeller (1998), as the problems that lead to credit defaults.

With such a situation of credit defaults, the development and survival of micro- enterprises is still questionable. Levitsky (2000), noted that lending to small enterprises is perceived as being risky and the mortality rate of small businesses is indeed high. For example, a survey conducted in the Philippines indicated that the mortality rate was over 4% a year. In developed countries the figures are even higher, for example in the United States, 20% to 50% of new small enterprises fail within the first one or two years of operation. various studies have shown that small and micro – enterprises are less credit worthy than larger enterprises. But even though the operators of these enterprises may take great pains to repay their loans in order to maintain the credit worthiness, in expectation of increased borrowing the enterprises depend on a single –owner manager. This makes them more vulnerable to what might happen to managers. Biseth (1987), is of the opinion that credit programmes supported by funds from external aid agencies often encounter loan repayment problems simply because both the borrowers and lending institutions take loan recovery rather lightly. The author observed inappropriate lending terms, which result into the fixing of repayment schedules that do not synchronize with generation of income from the investment. Biseth (1987), further observed the unwillingness to impose sanctions by the lending institutions by allowing willful defaulters to do so because the respective organizations cannot press the borrowers to meet their loan repayment obligations.

In most cases, the general indicator of the success of micro-enterprise credit programmes is the loan repayment rate. This indicates that the borrowers are able and willing to repay. It says virtually nothing about the impact on enterprise operations. Clearly, micro-enterprise credit cannot be assumed to improve MEs' performance just because it is characterized by high repayment rates (up to 100%) of level of outreach (Ramli, 1988; Buckley, 1997). Mosley and Hulme (1998), argued, therefore, that in order for the very poor to benefit from

loans and repay them promisingly there has to be a technology of lending to them that is through proper lending methods that reduce the rate of credit defaults.

2.8 Credit arrangement in rural areas

A study done by Robin (2003), shows that informal savings and credit institutional arrangements are largely determined by the range and frequency of consumption and investment needs in a village and access to such arrangements often depends upon one's social and economic arrangements that together form part of complex livelihood strategies in the village. Where agriculture is risky, people save in cattle and other farm animals. Also, Hella (1987), added that sustainability of agricultural extension services which are assisted by credit depends on sustainability of financial institutions. Repayment of loans makes continuation of the rural banks; if the loan repayments is poor the programme fails to be sustainable.

Credit in some rural areas is rarely obtained from banks and other formal institutions. Cash mainly needed in small amounts for expenditures associated with emergencies (death, illness) and festival occasion is borrowed from relatives, friends and neighbors. There is also borrowing for land preparation, and quite often for purchasing food, especially at times of famine (Robin, 2003).

Similar to the mutual assistance institutions, these arrangements function as joint liability groups and are based on social relations of trust, reciprocity, and obligation. Repayment by the borrower is tied to reputation and social standing – one's "social collateral" for future loans. Likewise, wealthier village members are expected to lend money and food to needy villagers as a means to maintain their good standing and reputation in society. Flexibility to

borrow small amounts, quickly, with minimal transaction costs, is vital in adverse environment with frequent drought, harvest failure and sickness. Cash poor farmers may borrow cash for land preparation and repay at harvest time. These arrangements also avoid the need of disaster selling of prized savings for every cash need. Formal credit and savings institutions are absent in most of rural villages throughout the world and in any case the terms and requirements are not appropriate for the need of the poor. Under traditional arrangements, the poor can participate as long as they have good social standing (Robin, 2003).

2.9 Element of sustainability

The elements of sustainability are well known. They involve strengthening political commitment; diversifying sources of income, reforming institutions, and ensuring that extension services give priority to promoting widely – shared growth and the adoption of environmentally sound technologies (NEPAD, 2003).

2.9.1 Political commitment

According to NEPAD (2003), Africa's research and extension services will not be sustainable without strong political support of a broad coalition of stakeholders. Without the support of stakeholders adequate funding will not be forthcoming; difficult institutional reforms will not be undertaken; and the effectiveness of agricultural generation and adoption will not increase.

2.9.2 Financial factors

The financial sustainability of agricultural extension services depends on diversification of their sources of income (Temu, 1994). In future, both research and extension services will

have to become demand-driven and generate more income from producers, consumers, agribusiness and other stakeholders who benefit directly from the services. Levies on the sale of commodities and income from patents are likely to be important (NEPAD, 2003). Donor support is also important in helping mechanisms for long term financial sustainability of extension services (BACAS, 1997).

2.9.3 Institutional factors

Wide-ranging reforms are required to achieve institutional sustainability of extension services. With due attention to the diversity of Africa's countries and their capacity to cope with reforms that depend on assumed presence or speedy emergency of the private sector, extension services have potential to be opened to more providers to increase competition and thus improve the quality and cost effectiveness of services (Chambers *et al.*, 1989). Strengthening linkages among researchers, extension agents, educators and farmers is critical to increase the relevance of research and extension and to facilitate the quicker adoption of better technologies by farmers. Linkages can be strengthened by involving farmers, agribusinesses and other stakeholders in setting priorities for the research agenda and in executing and evaluating programmes. Decentralizing extension services to local governments and communities and reorienting incentive systems so that providers are accountable to farmers rather than to the central authorities will help. Bringing research closer to and into farmers' fields will also build ties between research, extension and farmers (NEPAD, 2003).

2.10 Indicators of sustainability

An indicator is a means by which the outcome of the project can be understood and in one form or another, measured or explained (Mvella, 2000). Some of the indicators of

sustainability include economic soundness of the beneficiaries and active involvement of local authorities or organizational members and gender sensitive project cycle management and capability of the intervention with social-cultural environment of the primary stakeholders (ILO, 1990). Sustainability of rural development project has several aspects. These include; organizational capacity, environmental soundness, institutional development and economic viability (FAO, 1993 cited by Mvella, 2000).

CHAPTER THREE

METHODOLOGY

3.1 Description of the study area

The study was conducted in Morogoro and Mvomero Districts in Morogoro Region. The two Districts were formerly one District called Morogoro District. Other Districts in Morogoro Region include Kilosa, Ulanga and Kilombero. The Region is located in the mid- eastern part of Tanzania Mainland. Morogoro and Mvomero Districts are located in the north-eastern part of the Region. The Districts border with Tanga Region to the north, Coast Region to the east, Kilosa District to the west and Kilombero District to the south. The two Districts together have an area of 19 250 square kilometers, which is 26.5% of the total area of Morogoro Region which is 72 973 square kilometers. The annual rainfall in the study area ranges between 600 mm in the low lands to 1200 mm in the high plateau. The average annual temperature varies from 18°C on the mountain tops to 30°C in river valleys, but in most parts it is around 25°C. In general the two Districts can be divided into three geographical zones: the highland (mountainous), lowland (semi-mountainous) and savannah zones. The highland zone covers the Uluguru Mountains whose altitude ranges from 1200 to 2000 meters above sea level. This zone covers about 25% of the two Districts. Mvomero District lies within an altitude of 400 m to 2000 m above sea level. The District has a total area of 19 056 km^2. Within this area the potential arable land is 6 635 km^2. The District is divided into 4 Divisions, 17 wards and 101 villages. According to the 2002 census, the District has a total population of 260 525 of which 131 257 (50.4%) are male and 129 268 (49.6 %) are female. The District has about 58 314 households with an average family size of 4.5 persons. The District has a bi-modal type of rainfall namely, short rains from October to December and long rains from February to May with an annual

average of 600 – 2000 mm. About three quarters (73%) of the population resides in rural areas whereas 27% reside in urban centers.

According to the 2002 population census, Morogoro Rural District has a population of 263 012 of whom 128 697 (49%) are male and 134 315 (51%) are female. More than 85% of the people living in the study area depend on agriculture and livestock as their major economic activities.

Table 1: List of rural banks in the study area

District	Ward	Bank name
Mvomero	Mvomero	Mvomero rural bank
	Hembeti	Hembeti rural bank
	Langali	Langali rural bank
	Tchenzema	Tchenzema rural bank
	Bunduki	Bunduki rural bank
Morogoro	Mkuyuni	Mkuyuni rural bank
	Kinole	Kinole rural bank
	Mlali	Mlali rural bank
	Mzumbe	Mzumbe rural bank
	Kiroka	Kiroka rural bank
	Tawa	Tawa rural bank
	Matombo	Matombo rural bank

3.1.1 Human activities in the study area

Agriculture forms the mainstay of most people in Morogoro and Mvomero Districts. It is essentially done for commercial purposes. The climate of the study area is subtropical which allows the production of a wide range of vegetables, temperate and tropical fruits. 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 are the most important cash crops in the area and include cabbage, cauliflower, peas, lettuce, parsley and leeks. Tropical fruits like pineapples, bananas and oranges are grown for

commercial purposes while temperate fruits such as peaches, plums and apples are also grown in the area.

Livestock keeping in the study area was not a traditional practice in the past. During colonial period and with the influence of missionaries, pigs were introduced. The weather condition in study area favored pig keeping and majority (more than 60%) of households in study area keep pigs mainly as source of income, meat as animal protein in the area and farm yard manure. Although animal protein 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 dairy 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 farm yard manure for their crops. In 1992 the Department of Animal Science completed their research and trial and UMADEP took over the promotion activities of dairy goat farming in Mgeta in 1993 till today.

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

3.2 Research design

This study adopted a cross-sectional survey design. According to Babbie (1986), this design allows collection of data at a single point in time. It employed a survey method. This design is suitable for determination of relationships between and among variables.

3.3 Sampling procedures

Checklists were used to collect information from key informants, who included Village leaders, Village Extension Officers, Ward Extension Officers, UMADEP staff and Rural Bank staff.

The population consisted of all rural bank members who are credit users and non- members who are non credit users. Single stage sampling procedure was adopted. The sampling frame were rural bank members who do access the credit and non-rural bank members who do not access credit. For the rural bank members the names were obtained from the membership lists, whereby for non-rural bank members the names were obtained from the village rosters. Individuals were selected randomly by using a table of random numbers, where each individual in the population had an equal chance of being selected (Creswell, 1994). All Ward Extension Officers (WEOs), Rural bank staff and UMADEP staff working in randomly selected wards were interviewed. Tchenzema, Mvomero and Langali rural banks in Mvomero District, and Kinole rural bank in Morogoro District (Table1) were purposively selected due to easy accessibility and the fact that the banks have many farmers who were using their services.

3.3.1 Sample size

The study covered four rural banks which exist in the four wards of the study area. These Wards were Mvomero, Kinole, Langali, and Tchenzema. Fifteen rural bank members were picked from each bank making a total of sixty rural bank members. From non-rural bank and non- credit users ten farmers were picked from each of the four wards, making a total of forty members. The total sample was 100 farmers.

3. 4 Instrumentation

A structured questionnaire was designed and used for data collection in the study area. Close and open ended questions deemed relevant to the study, were used in developing the questionnaire to assess the role of credit in sustainability of agricultural extension services. Index scale was used to measure attitude of farmers towards continuation of adopting innovations at the end of the project.

3. 5 Pre-testing of the instrument

Pre-testing of the questionnaire was done to ensure validity. Ten randomly selected farmers were interviewed for pre-testing the questionnaire. Farmers who were interviewed during questionnaire pre-testing were not included in the actual survey.

3.6 Data collection

3.6.1 Primary data

A reconnaissance visit was conducted to explain the objectives of the study to the Ward leaders, to explain the sampling selection of farmers for the interviews and to establish rapport with the ward communities in general. Primary data were collected from the

sampled respondents by using a structured questionnaire. Moreover questionnaires for key informants was used to interview Rural Bank staff, UMADEP staff and local leaders.

3.6.2 Secondary data

Information on the type of innovations disseminated by the UMADEP project was collected from Sokoine University of Agriculture Library (SNAL), UMADEP offices in the Department of Agricultural Education and Extension (DAEE), Mvomero and Morogoro District, unpublished reports, and personal correspondence concerning background of study area. In the case of UMADEP offices data obtained included the current number of rural bank members being 2868, savings which is currently Tshs. 320 575 000 and shares of Tshs.73 464 000. Other secondary data obtained from the UMADEP office were the information on present rural banks.

3.7 Data analysis

Quantitative data were analyzed using the Statistical Package for Social Sciences (SPSS) computer programme, where responses from the questionnaire were coded, summarized and analyzed. Descriptive statistics were used which included cross tabulation, calculations of frequency and Chi- square to determine relationships, t-test was used to determine the significant difference between credit users and non credit users.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Description of the UMADEP project

UMADEP 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 as a successor to the Upper Mgeta Horticultural Development Project (UMHODEP) that dealt only with horticultural crops development in the western parts of the Uluguru Mountains in Nyandira Ward. Unlike UMHODEP, UMADEP is responsible for promoting all aspects of agricultural development for the 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 wellbeing 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 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 (UMADEP, 2001).

Previous efforts by UMADEP in 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.

4.2 Awareness of the innovations that were introduced by the UMADEP project

Majority of farmers responded that they were aware of the innovations introduced by the UMADEP project; the majority adopted more than one innovation introduced by the UMADEP project. Introduction of tomato crop in Upper Mgeta which is currently used as cash crop is replacing maize production. The respondents adopted the use of disease resistant varieties, use of modern agronomy practices such as mulching to prevent fruit disease decay and stalking, spraying of pesticides and fungicides which results in high yields and good market in Dodoma, Dar es Salaam and Morogoro Regions.

Dairy goats production were introduced into Mgeta Division in 1988 by the Department of Animal Science and Production. Provision of credit through rural banks which was introduced by UMADEP project enabled smallholder farmers to adopt improved technology such as modern housing, proper feeding, treatment and diseases control at earlier stage thereby improving their productivity, income and food security. The project was therefore, monitoring the breeding programme including the encouragement of farmers to cross the exotic breeds with the local breeds in minimizing the possibility of inbreeding.

Terracing is another technology, which was adopted from UMADEP project in pineapple production to control erosion and conservation of the soil fertility. The original emphasis of the project was on horticultural production (fruits and vegetables). A lot of success has been achieved in this area through farmers' adoption of new varieties of fruit and vegetables, learning new propagation techniques, etc. Since then, there has been a continued soil conservation measures in mountain agriculture, many respondents, for example, showed much awareness of contour strip cropping of pineapples. The major vegetables grown for the market are cauliflower, peas, carrots and tomatoes, which are grown in significant amounts. The respondents adopted these exotic varieties of vegetables because buyers from Dar-es –salaam, Morogoro and Dodoma depend on these producers. Due to such market the production of vegetables will continue without project support.

Local chicken is kept by the majority of households, the respondents adopted modern husbandry that was mainly vaccinations, supplementary feeding and treatment of diseases. Each household kept an average of 9 chickens. The local chicken breeds were more tolerant to diseases, pests and adverse climate. They are usually raised in extensive systems and in these systems birds were reared with little land, labour or capital that can be accessed by even the poorest in the rural areas. They are of great importance to women and food security, especially in female headed households.

The management of cabbage before the project was poor hence, the low yields, farmers adopted the innovation controlling of serious disease e.g. club roots by using ash to reduce soil acidity, which was due to continued use of artificial fertilizers. The project introduced disease resistant varieties like *Gloria* F_1 and *Kibo*, and since the farmers adopted the technology the yield has increased.

Farmers adopted crop rotation and proper storage of Irish potato seeds by the use of simple structures. Before the UMADEP project, seeds were locally retained in the soil until the growing season. However, after the adoption of new storage methods, farmers were sure of getting good seeds for the following growing season. Farmers also adopted new varieties which are resistant to bacterial and fungal diseases.

Pigs were kept traditionally for several purposes including for their credit security (in case of low yield pigs are sold for credit repayment), and manure in intensive system. The UMADEP project introduced the exotic breeds to cross with their local breeds however, good management such as housing, feeding, treatment and control of diseases and parasites was very important aspect to ensure better health for the animals.

In Mkuyuni Division, farmers grow bananas as cash crop, initially the crop was grown as a perennuial without proper management. The management adopted from the project include planting suckers in $1m^3$ holes, desuckering to allow enough light and air, adoption of new varieties like *Uganda green, Lakatan, Goldfinger Granine, Williams, Paz, Chinese,* and *Cavendish.*

The management of pineapple crop includes strip cropping contour planting to control erosion and to conserve soil fertility. Before the UMADEP project innovation, the yield was 500 fruits per acre, since the farmers adopted the practices the yields have increased to between 7 000 and 10 000 fruits per acre.

Spices have been adopted by few farmers who now own nursery beds for black pepper and also they produce cloves although at low level.

4.3 Socio-economic factors influencing farmers accessing credit

The relationship between credit access and social economic factors is shown in Table 2. Age, marital status, family size, land ownership, and land size shows significant relationship with rural bank credit access in Mvomero and Morogoro Districts. Middle age is an active age for agricultural production because people in this range of age easily take on risky decisions due to their aggressiveness and motivation to accomplish their life goals earlier. Therefore, age was thought to be a factor that might associate individuals' decisions to join financial institutions. Table 2 shows significant relationship at 0.05% ($p = 0.027$). Age was taken as a criterion to exclude youths and children who are yet to be heads of household. Adults are well experienced and have wisdom and knowledge so, one can learn from them and consider their ideas (Rwambali, 1990). Literature, for example Nanai (1993), shows that young people are less conservative than old people: hence they are more likely to participate in development programmes. The decline in participation by respondents aged over 40 years could be attributed to their older age.

Table 2: Chi - square test results for socio- economic factors and credit access

Variables tested	Chi-square value	Degrees of freedom	Significance (P-value)
Age of respondent	16 651	9	0.027**
Education level	6 969	12	0.430ns
Marital status	8 149	6	0.113*
Family size	19 755	9	0.019**
Land ownership	5 001	3	0.086*
Annual income	5 443	6	0.244ns
Land size	50 398	42	0.088*
Sex of the respondent	1 628	3	0.326ns

** = Significant at 0.05
* = Significant at 0.1

Marital status has significant influence on access to credit. Unemployed women participate more in income generating activities at household level.

Land ownership and land size have significant influence on access to credit at 1% ($p = 0.086$), land owners have adequate access to credit because they can provide collateral, they also have access to information and better understanding of the procedures for credit security. Majority of farmers in rural areas are described as smallholder farmers because their cultivated land is about 1.5 acres (Temu, 1994). Thus they expect to use improved technologies in increasing the commercialization of farming operations, thus accelerating the growth of food production in sub- Saharan Africa (IITA, 1988). Increased access to credit is a promising way to increase economic opportunities for the poor, but access to land can also increase the productivity and income of the poor (World Bank, 1996). Almost the contrary is the case for the landless, as according to Temu (1994), farmers fail to participate in credit markets usually because of the collateral requirement.

Family size shows significant influence at 5% ($p = 0.088$). A large family size might present a burden to the household head or bread winner hence might render his/her decision of adopting credit as a strategy for producing more to feed household members, thus large families are expected to use credit once they have sufficient capital to earn revenue to meet family expenses and for future reinvestments. Yazdani and Gunjal, (1998) suggested that a large family size reflects higher demand for funds to meet family financial obligations. Furthermore, Vaenssen (2001), urged that larger families have enough labour capacity to take and repay loans. Thus large families are expected to use credit once they have sufficient capital to earn revenue to meet family expenses and for future reinvestments.

Education level, annual income and sex of the respondents in the study have no significant association with credit access (p=0.430). Kashuliza and Kydd (1996), hypothesized that farmers with better knowledge on the role of innovations, credit and credit procedures are more likely to be users of savings and credit services than those without education who might be ignorant or skeptical on use financial services. Other studies show that education level increases the ability of an individual to understand, interpret and integrate development issues, but in this study it has been found that education has no significant relationship at 1% (p = 0.430) on credit accessibility.

Women spend more time in family matters and lack access to development information such as credit information. Smallholders particularly women, often face difficulties in obtaining credit. This is a direct consequence of their lacking access to land, participation in development projects and extension programmes and membership in rural organizations, all of which are important channels for obtaining credit information (Kashuliza and Kydd, 1996).

In most cases, farmers with more income are early adopters of technology or are able to take advantage of innovations or new technologies. Mdemu (2000), contended that many farmers who do not adopt, may complain of lack of cash or credit as the principal factor limiting their adoption. Maswaga (2001), pointed out that farmers with more commercial orientation who sell a large proportion of their harvests are the ones more likely to access credit in order to adopt particular technologies. This is because farmers with more income take advantage of their wealth to practice new technologies or adopt new extension approaches (Bwana, 1996). The findings from this study however, show no significant relationship (p = 0.244) between income and accessibility to credit.

4.4 The use of credit obtained through rural bank

The current study shows that a large proportion (76.7 %) of farmers used the credit obtained from rural bank for agriculture that is the credit obtained through rural banks assisted them in buying agricultural inputs such as fertilizers, improved seeds, herbicides and pesticides. More than one tenth (13.3 %) of the respondents used credit for buying animals e.g. dairy goats, pigs and local chickens, other farmers said they used the credit as capital for other businesses (8.3 %) and very few (1.7 %) respondents used credit for house construction. Table 3 below shows that majority (61.7%) of respondents who use credit took once during the growing season, one third of the respondents used the credit twice and very few (5.0 %) used the credit more than once in the year.

It is believed that rural banks were developed during the 1998 as an alternative to commercial banks in rural areas. They were established for the purpose of supplying credit to smallholder farmers that commercial banks were generally not prepared to finance (Kashuliza *et al.*, 1998). It has been widely shown by many studies that farmers use credit to purchase inputs such as seeds, fertilizers and farm equipment which are the major means of effecting agricultural growth and development (Kashuliza, 1993; Temu, 1994).

Table 3: The distribution of the respondents on various uses of credit (n = 60)

Use of credit	Frequency	Percent
Agriculture e.g. buying artificial fertilizers, seeds, pesticides, herbicides and animal manure.	46	76.7
Buying animals	8	13.3
Business capital	5	8.3
Housing	1	1.7
Frequency of borrowing from the rural bank		
Once per season	37	61.7
Twice per season	20	33.3
More than twice per season	3	5.0

4.4.1 Changes in production levels

Table 4 shows that most of the farmers (50 %) in the survey responded that production has increased since they started borrowing from rural bank, compared to very few farmers (10%) who responded that their yields have remained the same even after they started borrowing. This could be because of some of the farmers not targeting the credit for production purposes instead the credit was used to solve intermediate family problems such medical services, education, housing etc, similar findings were observed by Ndanshau (2000), in his study.

Table 4 gives the reasons accounting for increased productivity. The availability and assurance of getting credit at the right time (growing season) was reported to be the main reason for production increase as was indicated by 71.7% of the respondents. In UMADEP project there were training activities on various aspects including proper use of credit in agricultural production. Therefore, training was associated slightly with increase in production mentioned by 20.0% and the ability to use agricultural inputs mentioned by 8.3% of the respondents. In the context of UMADEP project, production means the amount of produce from crop plants (e.g. fruits, tubers, grains and leaves); livestock products (milk, number of calves, size of chicken flock, and kilograms of meat).

Table 4: Distribution of the respondents according to changes in production levels (n = 60)

Changes in production levels	Frequency	Percent
Increased yields, e.g. vegetables and fruits per acre, goat milk per number of goats, etc.	50	83.3
Remained the same	10	16.7
Reasons		
Assurance of getting credit on time, during the growing season	43	71.7
Knowledge obtained on uses the credit	12	20.0
Managed to use agricultural inputs	5	8.3

4.4.2 Repayment of credit obtained through rural banks

The majority of the respondents used crop sales to repay credit obtained for agricultural production (73.3 %) (see Table 5). Stability of agricultural production enables individuals to sustain regular payments to the rural banks thereby avoiding default. Fifteen percent of the respondents used returns from business to pay back the credit. Others, 8.4% repaid their credit from the sales of their animals or animal products; and very few (3.3%) repaid their credit through the sale of local brew.

In order to avoid defaulting, the animals were being kept commercially and were only being disposed of when there was a need for cash for emergencies. This was an ideal method of saving. Livestock, particularly cattle, were also found to be a means of saving in the study by Temu (1994).

Table 5: Repayment of credit obtained through rural banks (n = 60)

Source of cash to repay credit	Frequency	Percent
Selling crops	44	73.3
Business	9	15.0
Selling animals	5	8.4
Selling local brew	2	3.3

Source: Survey data 2006

4.4.3 Defaulting and reasons for defaulting

Majority (66.7 %) of the respondents reported that there were no major problems of default. However, the defaulters were only 33.3 % which was associated with various reasons, 13.3 % of the defaults were caused by drought problems which lowered production, 11.7 % failed to repay the credit due to illness which occurred in the family and 8.3% of the respondents reported losses in their businesses which made them fail to

repay their credit. Leaders reported that delays were the major problem to the farmers but defaulting was not, because delaying the credit with emergency reason or family problems attracted a fine, while defaulters were dismissed from the bank membership.

A similar study by Letona (1982), found that although credit has been very useful for smallholder farmers, repayment was a problem facing bank officials due to unwillingness of customers to repay, even though they earned enough income to pay back their loans. The second main cause, accounting for delays was unforeseen natural factors such as droughts, floods and other natural phenomena. For example, the ratio of defaults increased in other seasons due to unreliable rainfall, pests and diseases which destroyed crops. Other causes were identified as low producer prices and deficiencies in marketing. Finally, other causes of default were late loan disbursements, deficiencies in loan planning, and diversion of loans to other uses.

Table 6: Defaulting and main causes of default on credit (n = 60)

Have you ever defaulted since you started borrowing through the rural bank	**Frequency**	**Percent**
Yes	20	33.3
No	40	66.7
Reasons that caused default		
Never happened	40	66.7
Low yield (unreliable rainfall)	8	13.3
Illness in the family	7	11.7
Got loss in the business	5	8.3

4.4.4 Benefits of credit to farmers

Table 7 shows the benefits that the respondents obtained through borrowing, the majority (86.7%) of respondents agreed that they have obtained benefits since they started borrowing through rural bank, while few respondents (13.3 %) said that they have not seen any changes contributed by the credit. The majority who agreed were also members of

rural bank, who joined the bank some 3 – 5 years ago said one of the respondents. The benefits obtained through borrowing include improving standards of farmer's life e.g. housing, health access (40%), others managed to hire labour (20%), 16.7% of respondents managed to use improved practices such as use of fertilizers, improved seeds, use of pesticides, construct terrace and animal treatments, 13.3% responded that they have not seen any changes, 6.7 % of respondents managed to educate children and, only 3.3% managed to use their own ox – plough. Majority of farmers in the rural area have standard seven education, due to low education very few people consider the use of credit for educating their children.

Mvomero farmers reported that the credit obtained through rural banks assisted them in adopting various innovations introduced by UMADEP project that changes the livelihood of the majority, people managed to have improved houses, send children to school, to have other businesses, manage to repay their credit on time. Howlett and Nagu (2001), contend that credit is an important factor in increasing agriculture productivity, farmers used credit to purchase inputs such as seeds, fertilizers, hire labour, pay for extension services and buying farm equipments. Haverkort (1991), added that the use of those inputs significantly improved the productivity of small-holder farmers.

Table 7: Distribution of credit benefits to farmers (n=60)

Benefit of credit	Frequency	Percent
Improves standard of living e.g. housing, health services	24	40.0
Managed to hire labour	12	20.0
Able to use improved practices such as use of fertilizers, improved seeds, terrace, pesticides, treatments of animals,	10	16.7
Managed to educate children	4	6.7
Use my own oxen-plough	2	3.3
No changes	8	13.3

4.4.4.1 Impact of credit on yields

The responses of the yield value obtained after credit were compared to those before credit use in some animal products and crop yields obtained per household in the study area (Table 8). The difference was significant at 1% (p= 0.000). The results confirm that credit had a significant increase in numbers and value of dairy goat, pigs and fruits. Ducks value was significantly increased at 10% (p= 0.064) hence the annual income of the households.

The impact of credit use, as investigated by Kashuliza *et al.* (1998), indicated that credit users had significantly higher crop yields and farm incomes than non-credit users, which implies that the use of credit is playing a positive role in sustainability of adopted extension practices. Credit enables the users to cultivate large farm areas and use of farm inputs and farm implements, which would otherwise be difficult or impossible to access. But for the case of Kinole, Langali and Mgeta in the study area, the size of the farms remained the same, while the change was the increase in yield per cultivated area due to improvement cultural practices. Furthermore, improved crop yield implies some improvement in food security of borrowers households in comparison to non- borrowers.

Table 8: T-test results on yield before and after credit

Commodity	Mean value before (Tsh)	Mean value after (Tsh)	t-value	p-value
Oxen	8000.00	6000.00	1.000	0.320 ns
Cows	95800.00	103310.00	0.680	0.498 ns
Dairy goats	6490.00	91370.00	-5.698	0.000**
Sheep	12200.00	18650.00	-0.658	0.512 ns
Pigs	16550.00	86050.00	-5.550	0.000***
Local chicken	18650.00	17812.00	0.295	0.768 ns
Ducks	660.00	3260.00	-1.875	0.64*
Vegetables	636.00	429.41	1.468	0.151 ns
Fruits	13072.10	131832.00	-4.234	0.000***

*** =significant at 0.01 * =significant at 0.1 ns = not significantly different

4.4.5 Access to credit for agricultural inputs

Study findings show that 47% of the respondents indicate that they were using agricultural inputs such as artificial fertilizers, herbicides, pesticides and animal manure before they secured credit while 53% did not use before credit. The use of credit increased the percentage of agricultural inputs users to 56%. The percentage increased in use of artificial fertilizers was 159.4%, improved seeds increased slightly by 5% after credit use. Farmers indicated that credit assists them to purchase agricultural inputs like artificial fertilizers and improved seeds, which they can not afford with their limited resources. There was no increase in pesticides and animal manure use. However, there were few cases of farmers in the rural area who did not actually depend on credit for their inputs. Table 9 shows the percentage increase of purchasing of sprayers (400%), while credit increased the ability to hire labour by 66.7%.

The study pointed out that before the introduction of the UMADEP project, agricultural practices were of traditional type due to lack of money for buying agricultural inputs, in 1993 the project introduced new technologies to improve production status of the farmers until now farmers are still using the new technologies. Similar findings were noted by Lyatuu (1994), that credit facilities assist farmers in the adoption of agricultural technologies by increasing farmer's capability to purchase inputs such as fertilizers and seeds that would otherwise not be affordable to them.

Ponte (2002), argued that the increasing shortage of credit for input purchase to farmers aggravates farmer's difficulties in getting access to agricultural inputs, due to that shortcoming farmers instead rely on informal, semi-informal and formal financial arrangements to access production credit, or to accumulate savings. Lack of information on

available funding sources and the lack of intensive investment plans is another factor cited as limiting farmers access to credit (ESFR, 1999).

Table 9: Distribution of farmers according to use of agricultural inputs before and after credit

Input use	Before credit n=100	%	After credit n=60	%	% Increase
Type of agricultural inputs					
Artificial fertilizers	18	18	28	46.7	159.4
Improved seeds	12	12	8	13.3	10.8
Herbicides	9	9	5	8.3	-7.8
Animal manure	5	5	10	16.7	234
Pesticides	3	3	6	10.0	233
Not input user	53	53	3	5.0	-90.4
Type of implements /tools possessed					
Hand hoes	90	90	43	71.7	-20.3
Ox ploughs	4	4	2	3.3	-17.7
Sprayers	5	5	15	25.0	400
Tractor	1	1	0	0	-100
Major source of labour					
Family members	24	24	24	40	66.7
Hired	36	36	28	46.7	51.9
Family members and hired labour	39	39	8	13.3	-65.9
Use own ox plough	1	1	0	0	-100

4.4.5.1 Comparison of value of agricultural inputs used before and after credit

In comparing costs of agricultural inputs used before and after credit, the costs were much different between those used before and after credit and that they differed much based on their contribution to yield increase. These findings were subjected to by t-test which shows significant difference at 1% ($p =<0.000$) between the costs of fertilizers, improved seeds, and pesticides used before credit and after credit (Table 10).

Table 10: t-test results of agricultural inputs used before and after credit

Variables compared	Mean costs used before credit (Tsh)	Mean costs used after credit (Tsh)	t- value	p-value
Implements	87532.00	12600.00	9.36	0.352ns
Fertilizers	9721.00	42732.00	-8.667	0.000***
Seeds	6139.00	34695.00	-6.428	0.002***
Pesticides	3698.00	15495.00	-2.958	0.004***

*** = Significantly different at 0.01%

ns = Not significantly different

4.6 Attitude of farmers towards the continued use of adopted agricultural practices after the project ends

Majority (88%) of the respondents agreed that they will continue with the adopted agricultural technologies such as terracing, production of tomatoes, dairy goats. vegetables, local chicken, piggery, pineapples, bananas, Irish potatoes and storage of grain and marketing after the end of the project. This implies that the innovations will be sustainable after the end of the project, 6% did not agree and 6% they didn't know if they can really continue with the adopted technologies. Out of 88% of the respondents who will, continue with the project activities, 70% of them said they will continue with the innovations adopted because they have enough knowledge obtained from UMADEP project concerning the innovations. Ten percent will continue with the innovations because they have seen their benefits, 8% agreed to continue with the innovations because they have increased yields of their produce since they adopted the innovations. Six percent said they were not aware of the project and 6% of the respondents will still need UMADEP assistance. According to the few respondents they seem to be unaware of the project because they were not residing in the project area during the introduction of the project and some of them were still too young to be involved in farm activities.

Table 11: Attitude of farmers towards continued use of adopted agricultural technologies after the project (n=100)

Will continue using innovations	Frequency	Percent
Yes (Innovations involved were terracing, the production of dairy goats, vegetables, pineapples, tomatoes, local chicken etc).	88	88.0
No	6	6.0
I don't know	6	6.0
Reason for continuation		
Have the knowledge	70	70.0
Have seen benefits	10	10.0
Have increased yields	8	8.0
Reason for not continuing		
Not aware of the project	6	6.0
Still need UMADEP assistance	6	6.0

4.7 Sustainability of UMADEP innovations

The sustainability of the UMADEP innovations was determined using an Index scale as described in the methodology section. The scale comprised eight statements implying perpetuation of innovations. The maximum score was 5 to 10 points in each statement, in 5 points statement each mentioned item scored 1 point and made a total of 5 points, in 10 points statement each mentioned item scored 2 points and made a total of 10 points, the index had overall score of 60 points, each respondent obtained scores according to how he/she answered the questions, for zero point this implied that the respondent did not know anything about the innovations, for those who scored 1 point had low knowledge on project innovations, 3 points were rated as maximum average score, for 5 points, while for 10 points statement those who scored 2 points had low knowledge on project innovations, 6 points were rated as average score. The individual scores obtained were divided by 60 i.e. maximum score for an individual and then multiplied by 100 in order to obtain the percentage score of the respondent, those who obtained more than 50% score had higher chances of continuing with the innovations or practices while lower than average had lower chances of continuations of innovations or practices, that implied the lower chances of

sustainability of the introduced innovations, while the respondents obtained above 50% score implied higher chances of sustainability of innovations introduced by UMADEP project.

Table 12: Indicators of sustainability

No	Statements (Indicators)	Above average score (50%)	Below average score (50%)
1.	What are extension innovations initiated by the UMADEP project (n= 100)	91	9
2.	How many are they (n= 100)	56	44
3.	Which of the above are still continuing (n= 100)	79	21
4.	Since when did you start to practice them (n=100)	73	27
5.	What practices do you think will continue without project support (n=100)	96	4
6.	What practices do you think will continue to get project support (n=100)	65	35
7.	Were you practicing those modern technologies before the project (n=100)	92	8
8.	What do say about the innovations (n= 100)	82	18

In accordance with the aspect used in assessing sustainability, the majority of farmers under the UMADEP project promised of being sustainable because majority 91 % of over all respondents scored overall more than fifty percent. On the other side, minority of the respondents 9% of the overall respondents scored overall were less than fifty percent. Majority 71% of the respondents reported the innovations which will continue without project support are pineapple and banana production, vegetables, Irish potatoes and fruits production, goat, piggery, and local chicken production, furrow irrigation, terracing, fruits and vegetable processing and grain storage. The farmers reported that the mentioned innovations are likely to be sustainable because they have seen their benefits also the cost of adopting is not very high especially where credit facilities are available.

The number of years since farmers started practicing the innovations initiated by UMADEP was another indicator of sustainability of extension services, majority (74%) of the respondents joined the project some 4 to 6 years ago. More than a half (65%) of the respondents reported the innovations which will not continue without project support being the use of oxen, flower production and spices because the cost of adopting the oxen use is high and some of the geographical location are not favorable. The adoption of innovation depends on the returns, flowers seem to have low returns compared with other innovations, it takes long time to harvest. Other indicators used to assess sustainability of the innovations was the number of years since the farmer started to practice those innovations and the study shows 70% of the respondents had 4 and 5 years since they started to practice the innovations.

Sustainability of innovations that have been adopted from UMADEP will be high when project comes to an end; the farmers responded that this is because they can manage to run their activities. Self determination of the farmers is the key component that contributes to sustainability, as well as capacity building whereby members were trained in different innovations to avoid or minimize the external technical dependence. If farmers are well trained and equipped in various fields they become the source and also recipient of the key indicators for sustainability (FAO, 1986).

Sustainability of the project is measured by assessing farmers' ability to continue with the project activities, comparison of costs and returns, and uptake of technologies. Majority of farmers said the innovations which they can afford is easy for them to adopt compared to the expensive ones or those with high investment costs. Examples include the anti-erosion contours which were constructed to reduce water run- off and depletion of agricultural

soils, which will lead to a sustainable recovery in yields and thus raise incomes of small holder farmers. A study by Chambers *et al.* (1989), revealed that key to sustainability is that interventions help people to meet their priorities and are fully compatible with local culture that farm people can built on them independently by means of their objectives and reject what does not. This requires a reversal of the one-sided relationship between specialists and farmers, so that specialists learn from farmers, with mutual learning and exchange of ideas, skills and knowledge.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The following are the major conclusions drawn from the findings of this study:

(i) The study identified innovations promoted by the UMADEP project, awareness and adoption of most of the innovations promoted were found to be high. However awareness and adoption of ox-plough and spices production was found to be low. Farmers most likely adopt new technologies if they are aware of their existence and realize their benefits.

(ii) Credit access is closely associated with several factors including age of the farmers, marital status, family size, land ownership and land size. While education level, annual income of the respondents did not have any relationship with farmers' access to credit.

(iii) Rural banks have successfully increased the use of agricultural inputs such as herbicides, artificial fertilizers, improved seeds, and sprayers hence sustainability of agricultural practices adopted through UMADEP project. The use of credit has increased the ability to hire labour for farm activities. Credit can therefore, increase yields of their crops, which will in turn facilitate the repayments of the loans.

(iv) The results of this study show that farmers have positive attitudes towards sustainability of adopted innovations from UMADEP project. The farmers have

realized the benefits of the innovations they have adopted and they have the knowledge. In view of this therefore, the use of credit will enable respondents to continue with the project activities after the end of the project.

5.2 Recommendations

(i) Credit obtained through rural banks reduces the capital constraints. In view of this therefore, farmers should be encouraged to use bank credit facilities.

(ii) Sensitization through training is still needed in some rural areas to create awareness of improved agricultural practices to the farmers who are not aware.

(iii) There is need for educational training and awareness creation on the proper utilization of credit acquired by the farmers through rural bank in the district.

(iv) Rural banks influence sustainability of agricultural practices introduced in the rural areas. The Government should ensure that there is adequate coordination among the various financial institutions dealing with smallholder farmers.

(v) There is a need for further research on similar comparative study to be conducted in other areas in the district.

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APPENDICES

Appendix 1: Role of Credit in the sustainability of agricultural extension services: the case of UMADEP

FARMERS QUESTIONNAIRE

NUMBER OF RESPONDENT:.....

DIVISION:.....

WARD:.....

DATE AND TIME:.....

GENERAL

1. Sex of respondent.
   (1) Male
   (2) Female
2. Age of the respondent.(If he/she does not know, estimate age group).
   (1) 15 – 20 years
   (2) 21 – 30 years
   (3) 31 – 40 years
3. The marital status of the respondent.
   (1) Single
   (2) Married
   (3) Divorced
   (4) Widowed
   (5) Separated
4. How many people, including yourself live and eat in the this household?
   (1) Less than 4
   (2) 5 – 7
   (3) 8 – 10
   (4) greater than 10
5. What is the highest education level you attained?
   (1) Adult literacy
   (2) Primary school

(3) Secondary school

(4) Collage and above

6. What is your source of income?

(1) Livestock

(2) Agriculture

(3) Carpentry

(4) Trade

(5) Employment

(6) Others (mention)

The role of credit in adoption of agricultural innovations. (to be answered by rural bank members and credit users only).

7. What is your annual income.....

8. What is your annual expenditure.....

9. Do you have your own land?

(1) YES

(2) NO

10. How big is your farm (cultivated area) before getting the credit?

11. How big is your farm (cultivated area) in season 2004/ 2005.....acres

12. Are you a member of rural bank

(1) YES

(2) NO

13. Do you manage to save money to buy agricultural inputs from your annual income?

(1) YES

(2) NO

14.Where do you get the capital?

(1)Rural bank

(2) Borrowing from relative, friends

(3) Others (specify).....

15. Since when you joined rural bank how is your crop /livestock production per acres/ kgs/ lts?.....

(1) Increased

(2) Just the same

(3) Decreased

16. If Increased what was the reason.....

17. If Decreased what was the reason.....

18. Have you ever defaulted since you started borrowing through the rural bank?

(1) YES

(2) NO

19. If YES what reason caused that default.....

(If YES continue with question number 21).

20. What action was taken by the rural bank staffs

(1) Sent to court

(2) Surrendered some of the properties

(3) Fined

(4) Counseled from the bank membership

21. Does the bank charge any interest on loan recovery?

(1) YES

(2) NO

22. Are you satisfied with interest charged

(1)YES

(2) NO

23. If NO give the reasons

24. How often do you request for the loan?.....

25. How do you spend the money obtained through rural bank?

(1) Buying fertilizer

(2) Buying seeds

(3) Paying school fees

(4) Buying animals

(5) Housing

(6) Others (specify).....

26. How do you recover the credit obtained through rural bank?

(1) Selling of crops

(2) Selling animals

(3) Selling of local brew

(4) Others (specify).....

27. How many times have you requested for credit?

(1) Once

(2) Twice

(3) More than twice

Agricultural and livestock production: Use of inputs

28. Do you use agricultural inputs?

(1) YES

(2) NO

29. If YES, which ones were used before getting credit?

30. Artificial fertilizers (types used) and cost

1) Type..... Cost.....

2) Type..... Cost.....

3) Type..... Cost.....

4) Type..... Cost.....

31. Improved seeds (of which crop) and cost

1) Crop..... Cost.....

2) Crop..... Cost.....

3) Crop..... Cost.....

32. Insecticides/ pesticides (types used)

1) Type..... Cost.....

2) Type..... Cost.....

3) Type..... Cost.....

33. Which agricultural inputs are used after getting credits?

Artificial fertilizers (types used) and cost

1) Type..... Cost.....

2) Type..... Cost.....

3) Type..... Cost.....

4) Type..... Cost.....

34. Improved seeds (of which crop) and cost

(1) Crop..... Cost.....

(2) Crop..... Cost.....

(3) Crop..... Cost.....

35. Insecticides/ pesticides (types used)

(1) Type..... Cost.....

(2) Type..... Cost.....

(3) Type..... Cost.....

36. If NO give reason for not using agricultural inputs.....

.....

37. What agricultural implements did you possess before getting the credit?

(1) Implement..... Cost.....

(2) Implement..... Cost.....

(3) Implement..... Cost.....

38. Have you purchased any agricultural implement after getting credit?

(1) YES

(2) NO

39. If YES what implements

(1) Implement..... Cost.....

(2) Implement..... Cost.....

(3) Implement..... Cost.....

40. What is the number and type of livestock owned before and after getting credit?

S/No	Before credit			After credit		
	Type of livestock	Number	Value (Tshs)	Type of animal	Number	Value (Tshs)
1	Oxen (Maksai)					
2	Donkey					
3	Cows					
4	Goats					
5	Sheep					
6	Pigs					
7	Poultry					

41.What was your major source of labor before credit?

(1) Family members

(2) hired

(3) both

42. Are there any changes after getting credit?

(1) YES

(2) NO

43. What are the changes?

1) The production has increased

2) Hired labour

3) Use my own oxen plough

4) Able to use new technologies

5) Others (specify).....

Sustainability of extension services

44. The following are the indicators of sustainability. (Index score)

S/No	Indicators of sustainability	Max score	Actual score
1.	What are extension innovations initiated by the UMADEP project	5	
2.	How many are they	5	
3.	Which of the above are still continuing	10	
4.	Since when did you start to practice them	5	
5.	What practices do you think will continue without project support	10	
6.	What practices do you think will not continue without project support	10	
7.	Were you practicing those modern technologies before the project	5	
8.	What do say about the innovations	10	
	TOTAL	60	

45. Do you share the cost in getting technology (innovation) in your area?

46. Aspect in which in which the cost is shared.....

47. Which extension services rendered or delivered by UMADEP are you paying?

(1)

(2)

48. What is the situation of the market for your produces (vegetable, meat, milk, cereals, flowers

(1) Very good

(2) Good

(3) Fair

(4) Not good

49. Which constraints are you facing in your farming activities? (answers are more than one)

(1) Lack of capital

(2) Lack fertilizer

(3) Lack of animal drugs

(4) Others (explain)

50. Do you think that you will go on using innovations that were introduced by UMADEP after the withdrawal of the project support.

(1)YES

(2) NO

51. If YES or NO (in the above question, give the reasons.

(1) Have the knowledge

(2) Have seen benefits

(3) Have increased the production

(4) Others (specify)

FARMERS WHO ARE NON- CREDIT USERS (only)

52. What is your major source of income?

1. Selling of crops
2. Selling of animals
3. Business
4. Borrowing from relatives and friends
5. Others (specify)

53. What are the major agricultural activities done before and after the credit and what is your income per year?

Agricultural activities (tick)	Total production with credit (bags/kgs)	Cost (Tshs)	Income per year (Tshs)	Total production without credit (bags/kgs)	Cost (Tshs)	Income per year (Tshs)
Vegetable production						
Local chicken production						
Tree nursery production						
Dairy goat production						
Bean production						
Pig production						
Marketing of dried products						
Maize production						
Others (specify)						

54. If not rural bank source, why?
    (1) They charge high interest rate
    (2) Does not improve income
    (3) Gender discrimination
    (4) Others (specify)

Agricultural and livestock production: Use of inputs

55. Who perform farm activities in your household
    (1) Children
    (2) Hired labour
    (3) Family members
    (4) Others (specify) .....

57. Do you use agricultural inputs?
    (1) YES
    (2) NO

If YES, which inputs are you using?

58. Artificial fertilizers (types used) and cost

1) Type..... Cost.....

2) Type..... Cost.....

3) Type..... Cost.....

4) Type..... Cost.....

59. Improved seeds (of which crop) and cost

1) Crop..... Cost.....

2) Crop..... Cost.....

3) Crop..... Cost.....

60. Insecticides/ pesticides (types used)

1) Type..... Cost.....

2) Type..... Cost.....

3) Type..... Cost.....

61. Are you able to save money to buy agricultural inputs from your annual income?

(1) YES

(2) NO

62. What is the use of your savings in promoting extension innovations initiated by UMADEP?

(1) To buy services

(2) To buy technology

(3) To buy agricultural input

(4) Others (explain)

THANK YOU FOR YOUR COOPERATION

Appendix 2: Checklist of questions for rural bank staff

A. GENERAL

1. Ward location.....
2. Sex.....
3. Age.....
4 Level of education .....
5. Qualifications.....
6. What are objectives of rural bank?.....
7. What type of customers do you serve.....
8. How many members does the ward have?.....
9. How many members do you target to have ?.....
10. How many non-members do you serve?.....
11. How many members do you serve ?.....
12. Is there any contract between the bank and customers?

    1 YES..... 2 NO.....
13. If YES what kind of contract exists between the bank and customers (Mention the contracts)
14. What happens if the customers default or fail to fulfill the contract? (explain).....
15. Who are likely to default in rural banks borrowing

    Majority are men ( ) 1

    Majority are women ( ) 2

    Both of them ( ) 3
16. What criteria are used to determine the credit disbursement to the customers?.....
17. What are the collateral requirements that the borrower must fulfill before securing the credit?.....
18. Mention the credit modalities used to ensure effective repayments

    1..... 2.....
19. What are the incentives used to enable the farmers borrowing to the rural bank?.....

    .....
20. Do you think credit provided by rural bank can influence sustainability of extension activities introduced by UMADEP project, when project comes to an end.....

Appendix 3: A checklist of questions for UMADEP Staff and village leaders.

1. For how long have you been working in this ward/ UMADEP project.....
2. What are the extension activities were performed by farmers before the project (Mention them) .....
   .....
3. What extension activities initiated by the UMADEP project which are still continuing (mention them).....
   .....
4. In your own opinion do you think rural bank can influence the sustainability of those activities initiated by UMADEP when the project comes to an end?
   1.YES 2.NO
5. If YES give reason.....
6. If NO give reason.....

7. If YES or NO (in above question) give the reasons.
   (1)
   (2)
   (3)

THANK YOU FOR YOUR COOPERATION