EFFECTS OF INDIGENOUS LAND TENURE TITLING ON AGRICULTURAL INVESTMENT AMONG SMALLHOLDER FARMERS IN MBOZI DISTRICT, TANZANIA

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A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN AGRICULTURAL ECONOMICS OF SOKOINE UNIVERSITY OF AGRICULTURE. MOROGORO, TANZANIA.

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ABSTRACT

This study was conducted to assess the effect of land titling on tenure security and subsequent investment on land improvement among smallholder farmers in Mbozi District, Tanzania. Specific objectives were; to determine the proportion of farmers who have formal land titles as well as the proportion of formalized land in Mbozi District, to identify how land tenure security is defined according to local criteria among farmers and determine indicators that express tenure security by land owners in the study area, to compare the level of investment on land improvement that is undertaken by farmers under each land tenure system; and to determine factors that influence smallholder farmers investment decisions under each land tenure systems. Secondary and primary data were collected from the district. The sample size of 140 respondents in which 53.6% out of the total sampled population had land titles and the remaining 46.4% had no land titles. Descriptive statistics and logistic regression model were used in the study. The study results reveal that out of interviewed respondents who had titles, 91.12% had Customary Certificate Right of Occupancies (CCROs) and 8.88% had Granted Right Occupancies (GROs). However, only 5.98% of the land was under formalized ownership. The Mean land improving investment level on titled farms was with a mean difference of 250 809 Tanzanian shillings. Factors which influence investment included farm size, distance of form from the road, respondent political status, titled plot (tenure security) and were significant at $\alpha<0.01$, access to credits was significant at ($\alpha< 0.05$) while household size and sex were significant at ($\alpha< 0.1$). The study general recommends that Government and Development partners should allocate more resources on land formalization to stimulate more land improving investment, since small holder farmers holding titled land invests more on formalized land as a result of improved tenure security.

DECLARATION

I, Ismail Juma Shimwela do hereby declare to the Senate of Sokoine University of Agriculture that this dissertation is my own original work done within the period of registration and that it has neither been submitted nor concurrently being submitted for a higher degree award in any other institution.

…… …….

Ismail Juma Shimwela Date

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The above declaration is confirmed by;

…… …….

Prof. A. C. Isinika Date

(Supervisor)

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BEST	Business Environment Strengthening for Tanzania programme
CCROs	Customary Certificates of Rights of Occupancy
CORDS	Community Research and Development Services
CORDS	The Community Research and Development Services
DILAPS	Dar-es-Salaam Institute for Land Administration and Policy Studies
FARM AFRICA	Food and Agricultural Research Management – Africa
GIS	Geographical Information System
HHH	House hold head
ILC	International Land Coalition
ILD	De Soto's Institute of Liberal Democracy
LAMP	The Land Management Programme
MKURABITA	Mpango wa Kurasimisha Rasilimali na Biashara za Wanyonge (*Tanzania/ Property and Business Formalization Programme for the Poor*)
MLHS	Ministry of Land and Human Settlement
NGOs	Non-Governmental Organizations
SNAL	Sokoine National Agricultural Library
SPSS	Statistical Package for Social Science
SRO	Statutory Right of Occupancy
Tshs	Tanzanian shillings
UCRT	Ujamaa Community Resource Trust
URT	United Republic of Tanzania
US$	United States of America Dollar

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

Land tenure is among the key aspects in land reform policies that cover land redistribution and land restitution (Chitsike, 2003). Land tenure systems play a pronounced role in shaping the manner in which economic agents make decisions in relation to land use and transfer. Awundu *et al*. (2008) argued that land tenure differences influence farmers' decisions to invest in land improvement and conservation measures. It has been claimed that the indigenous land tenure systems in developing economies are insecure, therefore impeding agricultural investments, soil conservation efforts, productivity improvement, and development of land markets (World Bank, 1975; Gavian and Fafchamps, 1996). Hence the formalization of customary land tenure systems in developing economies has been proposed as a therapy for tenure insecurity and henceforth implied to stimulate agricultural investment and evolution of land markets (Manji, 2006).

The contentions in favour of indigenous land tenure formalization have been informed by neoclassical economic theories on property rights, which posit that land tenure becomes more secure and productive under private ownership (Demsetz, 1967; Barzel, 1997; Johnson, 1972; Posner, 1986). The arguments of this theory hinges on the fact that tenure security leads to collateralizability, land ownership assurance and transferability, which provides incentives for farmers to make more medium to long-term investments on land, hence improving productivity (Feder, 1988; Besley, 1995; Roth and Hasse ,1998 and Rukuni, 2000). Reforming indigenous land tenure is further hypothesized to lower the cost and risks of land transfer; lead to reduction in land related disputes and it increases the resource using efficiency (Barrow and Roth 1990, Holden *et al.,* 2008). Similarly De Soto

(2000) postulated that indigenous land rights in developing economies limits the functioning of market mechanism in the economy. Land tenure formalization is theorized to be ideal for converting dead capital or extralegal assets (invisible) to visible, documented assets, whose ownership rights are legally recognized. Moreover Lutz *et al*. (1994), and Soule *et al.* (2000) contended that effects of tenure security on investment in land improvement and soil conservation have greater implication on smallholder farm productivity, future returns from agriculture and enhancement of sustainable agricultural production.

The land tenure system in Tanzania as in many sub-Saharan African countries is dualistic. The tenure dualism was profound in the colonial legal system that comprised common and statute law in land jurisdiction, in which colonialist relegated customary law to second-class status in most of African countries until recently (Adams and Turner, 2005). In Tanzania, customary tenure rights dominate, accounting for about seventy percent of the extra-legal properties of which only two percent have land certificates (World Resources Institute, 2010). Similarly, Sundet (2005) reported that only three percent of customary land has land certificates of ownership and only thirty percent of urban land has been registered.

Land titling initiatives in Tanzania include; (i) the Property and Business Formalization Programme (MKURABITA), which was launched in 2004 with consultation from the De Soto's Institute of Liberal Democracy (ILD) of Peru, (ii) the Business Environment Strengthening for Tanzania programme (BEST), and (iii) the land management Programme (LAMP). The three initiatives are expected to assist Tanzanians to convert land based dead capital assets (whose estimated worth is US$ 29 billion) into legal assets. In the case of indigenous land, CCROs are issued for titled customary land while granted

certificates of occupancy are issued for titled urban land and surveyed farms located in rural areas (URT, 2009).

Improved Land tenure security as well as land tenure titling, and their effects on agricultural investment and productivity is critical in land reform policies. Such reforms have been conceived in many parts around the globe. Indigenous land tenure reform has been the central focus of land reform policies in developing countries specifically in Latin America, as well as East Asia and sub Saharan Africa, as way to boost agricultural investment and attain broad-based sustainable agricultural productivity and development (Platteau, 1996).

While arguments in favour of titling are appealing, empirical studies assessing the link between land tenure security and investment in land improvement reveal mixed results. Studies by Migot-Adholla *et al.* (1991) in Kenya, Ghana, and Rwanda, Jacoby and Minten (2007) in Madagascar as well as Haachabwa *et al*. (2014) in Zambia revealed insignificant effects of indigenous land tenure reforms on smallholder farmers' land-related investments. Similarly, the study by Kahsay (2011) in Northern Ethiopia found that 67% of farmers with land certificates felt no impacts of secured land rights on soil conservation.

Moreover studies by Feder (1987), Besley (1995), Alemu (1999), Holden and Yohannes (2002), Ayalew *et al.* (2005) Ali *et al.* (2007) in Ethiopia; Dlamini and Masuk (2011) in Swaziland; Holden *et al*. (2008) in Tigray in Ethiopia; Awudu *et al.* (2008) in Ghana, Magagga and Buyinza (2013) in Mt Elgon in Uganda; Deininger *et al.* (2009) in Ethiopia and Kassa (2014) in Tanzania have underscored the significant effects of tenure security in promoting land related investments such as planting trees, manuring, fertilizer application, irrigation, soil conservation, mulching and fencing. Further, studies in some parts of the

Caribbean, Latin America and Asia elucidate that customary land tenure formalization have been a vital mechanism for realizing improved welfare of the people, improved access to credit, land investment and farm productivity (Feder *et al.* 1988; Salas *et al*. 1970; and Alston *et al.,* 1996)

Based on the neo-classical theoretical intuition and empirical studies, many countries have implemented land tenure reform programmes. In Ethiopia for example, over twenty millions parcels of land have been titled, and six millions households have benefitted from the land reform programme. Similarly in Peru, a state led land titling programme issued about 2.7 million titles (Fort, 2008; Deininger *et al.,* 2009). Clear land reform policies such as the Peruvian Urban Land Tenure Regularization Policy during the 1990s and the Rural land policy and urban land lease policy in Ethiopia, coupled with legal clarity, decentralized government institutions, gender inclusiveness, transparency and cost-effective program implementation have been said to be fundamental for a success a land titling programmes.

This study is motivated by the conflicting debates and mixed empirical results regarding the effect of land titling on land investment improvement. The study was designed to explorer and understand links of land titling and agricultural production. The study's specific focus is to investigate the effects of customary land tenure security on agricultural investment among smallholder farmers in Tanzania.

1.2 Problem Statement and Justification

In Tanzania formalization of indigenous land tenure for the purpose of stimulating investment in land, and to attain broad based economic growth through sustainable agricultural development and production, has been the focus of land tenure reform policies

and programmes since independence. After independence the government adopted the Land Ordinance No.31 of 1923 from the British regime. This ordinance embraced both customary and statutory tenure; Only a few amendments were made that included abolition of the Nyarubanja feudal tenure in Kagera Region in 1965, which also extended to Pare in Kilimanjaro and Tukuyu District in Mbeya Region (Shivji, 1999). Thereafter, the government implicitly undertook land reform by reallocating people to new villages through the villagisation programme after the Arusha declaration in 1977. During 1982 there was the village demarcation, titling and registration programme, which granted Village Councils the right of occupancy and villagers were in turn given leases from the village rights of occupancy (Benschop, 2002). This however, has been the root cause of many land conflicts in subsequent years (DILAPS, 2006). These land tenure reforms led to substantial land tenure insecurity culminating in land conflicts among smallholder farmers. This means, land tenure reform which is claimed to accelerate agricultural related medium and long term investment ended up impeding agricultural development and production (Myenzi, 2010).

To address the problem of rising land conflicts the government launched the National Land Policy of 1995, which was revised in 1997 followed by enactment of the Village Land Acts No. 4 and the Land Act No.5 of 1999 to guide land tenure formulation initiatives (Fairley, 2013). The revived current efforts to formalize indigenous land tenure systems under MKURABITA, BEST, the Ministry of Land and Human Settlement (MLHS) and various Non-Governmental Organizations (NGOs) are geared toward attaining an improved land tenure system thereby providing incentives for farmers to invest in land related improvement to increase productivity for owners and users of land (Makwarimba and Ngowi, 2012). Feder and Nishio (1999) in a study on the benefits of land registration and titling, which was done in Asia, Latin American and rural Africa

reported that reduced tenure insecurity and uncertainty with regard to land ownership, enhances the level of activities in land markets, affording in turn increase in the overall efficiency in land allocation among competing uses.

Despite ongoing land formalization projects in Tanzania, there is paucity of empirical studies to test the proportion and the actual magnitude of land tenure reforms under different levels of formality of the property right system. This information gap is also discussed by Pedersen (2010) and Kassa (2014) who contend that there is limited information regarding the effectiveness of land formalization projects implemented in the past. It is not evident whether such formalization affects land use activities and land markets in rural Tanzania as well as enhancing economic growth.

This study intended to investigate whether past and on-going customary land tenure formalization projects in Tanzania have had significant effects on improving the level of agricultural investment among smallholder farmers, specifically in Mbozi district, which is among the few and earliest districts to implement such projects in Tanzania. Also Mbozi was selected as argued by World Bank (1975) that the main economic benefits land formalization are only measurable in the long term since a gestation period is required.

1.3 Research Objectives

1.3.1 Overall objective

The overall objective of the present study was to assess the effect of land titling on tenure security and subsequent investment on land improvement among smallholder farmers in Mbozi District, Songwe Region.

1.3.4 Specific objectives

The study attempt to pursue four specific objectives as follows:

i. To determine the proportion of smallholder farmers in the study district who have formal land titles under Customary Certificate of Right of Occupancy (CCRO) as well as statutory rights of occupancy (Title deeds), and the proportion of land whose ownership has been formalized within the District.
ii. To identify how land tenure security is defined according to local criteria among farmers and determine indicators that express tenure security by land owners in the study area.
iii. To compare the level of investment on land improvement that is undertaken by farmers under each land tenure system (formalized and non-formalized land).
iv. To determine factors that influence smallholder farmers investment decisions under each land tenure systems.

1.3.5 Research questions and hypotheses

In order to achieve the objectives listed above, the study addressed a number of questions and testable hypotheses. The first and second objectives were addressed by research questions (i), (ii), (iii) and (iv) as stated below;

i. What is the proportion of farmers who hold formal land titles in the study area?
ii. What is the proportion of land that is owned by smallholder farmers which has been formalized? (land owners holding formal titles; CCRO or title deeds)
iii. How is land tenure security defined based on local criteria?
iv. Which factors, characteristics or indicators provide tenure security to a land owner in the study area?

1.3.4 Hypotheses

In relation to the third specific objectives; hypothesis as stated below were adopted.

i. **Ho:** The mean land improving investment on formalized land is significantly higher than the level of mean investment on land improving undertaken by farmers under non-formalized land ownership in the study district.

ii. **Ha:** There is no significant difference in the level of investment on land improvement undertaken by farmers under formalized and non-formalized land ownership in the study district.

In relation to the fourth specific objectives, hypothesis were adopted as follows

iii. **Ho**: Selected factors such as farm size, household size, tenure security and education, have no significant influence on the level of land improving investment among small holder farmers under formalized land tenure systems relative to non-formalized land ownership.

iv. **Ha**: Selected factors have a significant influence on the level of land improving investment among small holder farmers under formalized land tenure systems relative to non-formalized land ownership.

1.4 Organization of the Dissertation

This dissertation is organized as follows: Chapter One describes the background information whereby land reforms specifically, effects of indigenous or customary land tenure formalization on tenure security and agricultural productivity have been discussed. This chapter presents the problem statement and justification for the study. This is followed by the study objectives, research questions and hypotheses to be tested. Chapter Two presents a review of the literature and methodologies that have been used by other researchers in similar studies. Specifically the review of literature on economic theories pertaining to land titling and land improvement related investment, as well as competing schools of thought and debates on land titling, their effects on tenure security as well as on

land improvement related investment. Chapter Three provides the methodology covering a description of the study area, sampling procedures, data collection, and definition of the dependent and explanatory variables used for data analyses tools, conceptual frameworks and limitation of the study. Chapter Four presents the research findings and their discussion of the results while chapter five provides conclusions and recommendations of the study.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Land Tenure System and Tenure Security Discourse

In Tanzania the nature of land tenure systems governing land administration as in other developing economies especially in the rural economies varies across regions. Thus most of the land tenure systems are built on interacting factors of political, social, economic as well as cultural and historical background. All these factors have been adversely affecting agricultural production. For example according to McKenzie (2006) and Fort (2008) the hacienda land tenure system was dominant in most Latin American countries in the 1960s, which created rich Spanish-loyal hacendados, who ran their farms on an indentured servant model leaving numerous rural people landless. The system prompted high land tenure insecurity among smallholder farmers hence discouraged investment in land improvement, leading to low agricultural production. A study by Abdulai *et al.* (2008) in Ghana shows that the country comprises of a complex indigenous land tenure system that includes owner operated farms with full property rights, owner operated farms with restricted property rights, fixed rent and sharecropping arrangement. All these tenure system have molded farmers to operate and invest in their farms accordingly.

Meanwhile in the Federal Republic of Ethiopia land is a collective property of the state and the people of Ethiopia (Federal Democratic Republic of Ethiopia, 2002; Ali *et al*., 2007). In Uganda the constitution of 1995 classifies land into customary tenure, Mailo tenure, Freehold tenure and Leasehold tenure Kyomugisha (2008). In Tanzania there are two land tenure systems, customary tenure and granted tenure (Myenzi, 2010). According to David (1990) these variations of land tenure holding systems have great implications on tenure security, henceforth the level of incentives for investment in land improvement, soil

conservation and adoption of new technology that eventually leads to high agricultural productivity and production. Understanding the economic incentives under each land tenure system and defining the property rights of indigenous land tenure formalization is crucial in studying the effects of tenure reforms on land related investment.

2.2 Tenure Security and Land Improving Investment

Land tenure security has positive and negative effects on agricultural productivity. Place *et al*. (1993); Feder (1988) and Pletteau (1996) contended that based on the Neo-classical economic theory, increased tenure security of landed properties increases credit use through greater incentives for investment, increased land transactions and land transfers. Titling reduces tenure insecurity as well as the incidence of land disputes while raising productivity through increased agricultural investment.

According to Persha *et al.* (2010) and Porter-Bolland *et al.* (2011), the intermediate outcomes of tenure security is increased investment, which includes shifts in land use practices, more use of wage labor and other agricultural inputs relevant to both short and longer term production. Hall (2012) reported that investing resources into short term production and land improvement includes; fertilizer application, manuring, use of pesticides, and labour use. Meanwhile investment of resources into longer term production and land improvement encompasses; soil conservation, planting tree crops and fuller employment of land through leasing-out or sharecropping. Improved tenure security through tenure reform of land owned by smallholder farmers would increase investment on agricultural land (Lunduka, 2006).

Deininger and Jin (2006) reported that customary land reforms have effects both on security enhancement and improvement in productivity from land related investments. The

land security enhancement measure focuses on tree planting while productivity enhancement consists of terracing, mulching, manuring and soil erosion control.

Indigenous land tenure reforms are hypothesized to have positive effects on investment that lead to land improvement through improved security of tenure. A study in Uganda by Maganga and Muyinza (2013) shows that the nature of landscapes influence smallholder farmers' decision to invest in land improvement. For instance farmers who were operating adjacent to Mount Elgon invested more in soil improvement than those who are far from the mountain. Meanwhile Kassa (2014) reported land formalization leads to intra household conflicts which may weaken family stability that is assumed to be a crucial component in agricultural production (Jari, 2009 and Temu *et al.*, 2011).

2.3 Land Tenure Titling and Land Improvement Investment In Tanzania

The land tenure system in Tanzania has been documented since 1895 when the German emperor declared that all land in Tanganyika was vested in the German empire. Following the defeat of Germany in the First World War, and Tanganyika became a British protectorate, the British Regime enacted the Land Ordinance No.31 of 1923 which modified land administration by instituting customary and statutory tenure. These tenure systems were adopted to a large extent after independence with only a few amendments (URT, 1994; Shivji, 1999). Though many land reform programmes or acts have been established, such as the Land Acquisition Act No 47 of 1967, Village and Ujamaa Village Act of 1975, Nyarubanja Enfranchisement act of 1968 as amended in 1969 and the Local Government District Authorities Act No 07 of 1982, they all focused on land redistribution and consolidation of the dualistic land tenure system (Myenzi, 2009; URT 2004). Land tenure security was less quantified until it was exposed by report of The Presidential Commission of Inquiry into Land Matters. The Land Policy was subsequently

established in 1995 and revised in 1997. This was then followed by two land acts, the Village Land Acts No. 4 and the Land Act No.5 of 1999 as amended in 2004 (Fairley, 2013).

The past government policy reforms on land ownership and administration, such as the Villagisation Policy and Local Government Authorities Act of 1982, adversely affected security of tenure among small holder farmers, leading to low agricultural production in many parts of the country (Myenzi, 2010). The land formalization programmes in Tanzania are thought to enhance agricultural investment and productivity, lead to land market development and improved access to credit, hence contributing to poverty reduction especially in the rural economy. Deliberate efforts by the government to commercialize agriculture and reduce poverty are part of the engine for indigenous land tenure reforms initiatives in Tanzania (URT, 1997).

Since the first pilot land titling project in Mbozi District in 2004, several similar Projects have been implemented in other parts of the country. For example the programme for titling under MKURABITA as reported by Pedersen, 2010 encompasses a titling project, which was implemented titling in Iringa, Njombe, Tanga, Manyara, Kigoma, Rukwa, Mtwara, Mara Kagera, Bagamoyo, Rufiji, Nachingwea, Makete, Manyoni, Serengeti, Musoma, Mpwapwa, Mvomero and Wetedidtricts. The project extended to other districts, which included Meru, Moshi Rural, Mwanga, Masasi, Mbinga, Sikonge, Sumbawanga, Mbarali, Kasulu, Kahama, Geita, Muleba, Mkoani (Pemba) and Kaskazini 'A' (Zanzibar). These were implemented between 2005 and 2010. The BEST project implemented informal property formalization for unplanned settlement in Mwanza and Dar es Salaam. The Land management programme (LAMP) under the Prime Minister's Office executed indigenous land tenure formalization in Singida, Simanjiro, Babati and Hai districts of

Northern Tanzania. Other indigenous land tenure titling projects includes that implemented by CONCERN World Wide in Kilolo districts in Iringa Region and Mtwara districts, in Mtwara Region. The project was funded by the European Union (EU) executed in 15 Districts by district Councils that included Mbozi, Kilombero, Korogwe, Newala, Rungwe, Ileje, Karatu, Arumeru, Ngorongoro, Magu, Monduli, and Simanjiro (URT, 2007a; 2007b; 2008a). Also the Community Research and Development Services (CORDS), Ujamaa Community Resource Trust (UCRT) and Food and Agricultural Research Management – Africa (FARM Africa) are key actors facilitating land titling especially in pastoralist communities in the northern part of Tanzania Perderson (2010).

The land tenure security effects on agricultural investment and productivity generally yields controversial results. Empirical investigations show that the effect of formalizing indigenous land differs across regions in Tanzania and within regions. Empirical study by Wanjohi (2007) in Tanzania on the effects of land property rights formalization on property markets in informal settlements found no effects of formal titles in transferring land from less productive farmers/users to more productive users. However using Tanzania National Survey data Kassa (2014) revealed sizable and positive effects of land tenure titling on investment. Nonetheless (Kassa, 2014) contended that there is limited information regarding land formalization projects implemented in the past in Tanzania. Skepticism persists whether the land tenure reform projects affect land use activities and land markets in rural Tanzania and if they do whether they enhance economic wide growth or not.

2.4 Land Policy, Land Acts and Agricultural Investment

The overall objective of land policy is to promote and enhance a secured land tenure system that encourages optimum use of land resources, facilitates a broad based social and

economic development while protecting ecological systems sustainably. Among others, one specific objective of land reforms is to ensure that the rights to land for smallholder farmers and others are recognized, clarified and secure by the law. Moreover, the reforms seek to ensure that land is allocated to the most productive user in order to stimulate rapid broad based socio economic development in the country (Wanjohi, 2007)

The land policy execution in Tanzania is guided by two land acts, the Village Land Act No. 04 and Land Act 05 of 1999; the first Act administers customary or indigenous land while the later focuses on urban land. According to URT (1999[a]) the Village Land Act No.4 has given Village Councils the mandate and authority to administer village land and facilitate titling of individual plots of land within the village jurisdiction, issuing a Certificate of Customary Right of Occupancy (CCROs) to land owners. To ensure proper land use planning for sustainable development of all sectors of the economy, the government launched the National Land Policy Planning Commission in 1984. The Commission coordinates activities of all bodies and actors on land matters, such as; land use planning and facilitate cooperation among the land use actors (Tsoxo, 2006). However, since its establishment little has been done to improve land use planning at the village level, which accounts for about 70% of total land in the country (Fairley, 2013)

2.5 Land Tenure Formalization and Incentives to Invest in Land Improvement

Smallholder farmers are rational economics producers and their decision in relation to production are embedded within certain attributes of land with expectation of benefits. Feder (1999) reported that individuals or groups, in this case smallholder farmers, who utilize land in the pursuit of production or consumption activities will eventually perceive that there is merit in undertaking investments to improve the productivity of land resources they operate. It is further argued that in some cases, an initial investment is required to

improve the land or render it usable. Investments imply the commitment of resources within a planning horizon. In this regard, the degree of certainty associated with the expected stream of benefits at the end of the planning horizon is a key factor in determining the incentives of economic agents to undertake such investments.

This implies uncertainty associated with indigenous land tenure weakens farmers' incentive to invest in the land, especially in longer-term land-saving investments (Wen, 1995; Yao, 1995). Ambiguity in the definition of land rights among rural households may indirectly lead to low production since farmers may be unable to access credit since they cannot use their land for collateral purposes (Besley, 1995). The motivation of rational farmers to invest in land improvement is when there are enhanced possibilities for gains to be made from such investments. In this case land related investment may be encouraged if improved transfer rights make it easier for individuals to rent land in or out. Improved transfer rights are assumed to facilitate land transfer to more productive users, capable of investing more resources on it. Formalized customary agricultural land is therefore thought to be an ideal investment incentive for smallholder farmers operating titled farms since they enjoy more security of tenure of the land as opposed to untitled plot.

2.6 Tenure Security and Agricultural Productivity

Agricultural productivity of small holder farmers has been the focus of debates among researchers, donors, governments and development programmes in the quest to achieve agricultural development in many developing economies, specifically in Sub Saharan Countries. Enhanced tenure security resulting from titling indigenous land is purported to be a key factor that influences investment in order to improve land productivity. According to Kyomugisha (2008) the productivity of land emanates from changes in use of resources, technological use patterns coupled with investment in soil management

practices such as fertilizer use, fertilizer application rates, manure application, application of crop residues on farm, mulching and crop rotation patterns, thereby enhancing the productivity of the land.

2.7 Theories Governing Landed Property Tenure

The study was guided by the economic theory of the firm and the evolutionary theory of property rights. These theories were the focus of analysis for tenure security effects on smallholder famers' decisions concerning the efficiency of resource allocation.

2.7.1 The theory of the firm

This theory contends that the primary objective of a rational producer or a firm is to maximize profit which implicitly entails maximizing utility. Farmers make decisions by allocating resources to achieve such goals, subject to a number of constraints. The nature or type of landed property rights prevailing in the economy is part of the hindrance constraining producers' economic decisions that in-turn affect the economic behavior of producers in relation to allocating scarce resources (Libecap, 1986). According to Hayek (1945), property rights provide information and incentives that stimulate entrepreneurship, capital accumulation, and investment that efficiently allocate scarce resources and ultimately facilitate economic development. Secured tenure rights on landed property are presumed to be incentives that influence producers' decisions regarding land improvement.

2.7.2 The evolutionary theory of property rights

The theory postulates that, under the joint impact of increasing population pressure and market integration, land rights spontaneously evolve toward individualization (Pletteau, 1996). The evolution, eventually leads rights holders to press for the creation of duly

formalized private property rights, demands to which the state will have incentives to respond (Pletteau, 1996). The theory further posit that population growth, development of cash crops and changes in the cropping systems create scarcity of land that gives birth to competition for land, leading to conflicts over land. The disputes lead to higher demand for secured land rights leading further to land titling and registration, which enhances tenure security that in turn reduces land disputes and lowers transaction costs in land market. The enhanced tenure security eventually leads to increased investment on land improvement, development of credit market and high productivity among farmers (Giri, 1983).

2.7.3 The theory of property right

The study is also guided by the theory of property rights which argues that the nature of property rights in the economy affects the efficiency of resources use, thereby determining the level of environmental protection pursued by land owners and users. The primary function of property rights is that of guiding incentives to achieve a greater internalization of externalities. According to (Demsetz, 1967 and Mahoney, 2004) every cost and benefit associated with social interdependencies is a potential externality. Furthermore the theory postulates that different specifications of property rights arise in response to the economic problem of allocating scarce resources, and the prevailing specification of property rights affects economic the behavior and economic outcomes of economic agent (Pejovich, 1982, 1995 as cited by Kim and Mahoney 2005). Here insecure property rights can be susceptible to land appropriation by others and are sources of imperfections in the market (Libecap, 1989; North, 1990).

2.8 The Concept of Land Tenure and Property Rights

2.8.1 Land tenure

According to Isinika and Ashimogo (1998) Land tenure refers to the bundle of rights that an individual in this case a smallholder farmer, may possess with respect to a piece of

land. Land tenure, can be freehold, leasehold, conditional, collective, or communal. According to (Yao, 2000) Land tenure is the relationship, whether legally or customarily, among people, individuals or groups, with respect to land. It is an institution of societies with a bundle of rules that define how property rights to land are to be allocated within a society. For example bundles may specify how individuals and groups will secure access to land and related resources such as trees, minerals, pasture, and water, and who can hold and use those resources within a particular timeframe. Land tenure as far as the customary land reform is concerned becomes vital if it encompasses land tenure security as described in the next section.

2.8.2 Land tenure security

According to Boudreaux and Sacks (2009) Land tenure security refers to the right of individuals and groups of people to get effective protection from their government against forcible evictions. This means, land tenure security is an element of property rights: the right to remain on one's land and make use of that land in ways the individual or groups value the land. This study adopts the definition by Place *et al.* (1993) which states; land tenure security exist when an individual perceives that he or she has rights on a piece of land on a continuous basis, free from imposition or interference from outside sources as well as the ability to reap the benefits from labour and capital invested in that land, either in use or upon transfer to another holder.

2.8.3 Indicators of tenure security

Land tenure security indicators as per Roth *et al*. (1993) include: the breadth, duration and assurance of rights having legal and economic dimensions. The legal dimension expresses the legitimate and duration of rights in the bundles, inferring that an individual is assured of completely holding the right to the property embodied in the tenure over a longer time.

The economic dimension ascertains the value and certainty of economic benefits derived from de-facto tenure of land resources. Price incentives play a great role in this regard. The Breadth of rights of a land holder is the legitimate quantity or bundle of rights that the owner of the land property holds since more the rights held the more the economic value of the land. The land tenure that provides land owners with a greater extent, the bundle of rights will be more secure than the one that provides limited land rights. The duration of rights is the time horizon enough for the rights holder to reap the economic benefits of the resources invested on land. While assurance implies certainty regarding the duration and rights held by the land or property owner. Other key tenure security indicators are discussed in the next section

2.8.4 Performance indicators for tenure security

This is part of general tenure indicators as proposed by various scholars and donors such as the World Bank and the International Land Coalition (ILC). These indicators are argued to be project specific (World Bank, 2004). Performance indicator assesses the past performance of tenure as an indicator of tenure security for future performance. Wilusz (2010) reported that if in the past land tenure performed well in providing and protecting land owners, then land owners will continue to depend on that tenure in the future; but if tenure did not perform well, the land holder will diverge to other tenure type in future. The proportion of land holders who deviated to other land tenure provides a measure of the tenure security of that land tenure system (Hollingsworth, 2014). According to Place *et al*. (1993) observing or assessing the average quantity of inputs such as fertilizer, manure and pesticides applied and trees planted on different titled and untitled farms quantifies the level of productive and security enhancing investment. Moreover, comparing investment incidences between farms thought to have more secure tenure relative to household thought to have less secure tenure, constitute other performance indicators of tenure security. In this study, tracing the number of persons who own land under indigenous

tenure, people's perception together with the history of conflict over land, are important indicators in understanding farmers' tenure security in the study area. Moreover the study by Blarel (1994) argued the incidence of past land disputes can be used as an indicator of tenure security. The current study assumes that smallholder farmers' perception on land tenure security will be partly influenced by past government land reform practices and policies. Farmers who were exposed to actions like land grabbing and redistribution perceive more tenure insecurity compared to other farmers who did not face such negatives experiences.

2.9 Property Rights and Land Improving Investment

Understanding the concept of property rights is core in the study of landed properties as they influence land owners' economic behaviour in relation to a particular property. According to Heltberg (2002) property rights to land are crucial factor in shaping productivity, efficiency, and distribution in agrarian societies. Rights to land and their enforcement shape the security of tenure hence the incentives to undertake investment in land. Demsetz (1967) claimed that property rights give the owner, the consent of fellowmen and fellow-women, to act in a particular way.

According to Barzel (1997) Property rights are embedded within two views, economic rights and legal rights. Economic property rights encompass what people ultimately seek whereas legal view implies the means to achieve the end. In this regard, Economists define property rights as an individual's ability in expected terms to consume the good or the services of the asset directly or consume through exchange (Barzel, 1997). Legal property rights are the rights recognized and enforced by the government while economic rights are all rights owned by an individual who includes property use rights, transfer rights and alienability right based on market mechanism (Coase, 1960). In summary the study define property rights as an anticipated individual's ability to enjoy directly and

indirectly the benefit from a stream of a good or services of the asset that is recognized legally and whose rights are enforced by a legal institutional framework within the economy. For this study, smallholder farmers' economic decisions in agricultural production are assumed to be affected positively or negatively by both legal and economic aspects of property rights of agricultural land.

2.10 Land Titling Debates and Empirical Evidence

The causal link between formalization of indigenous land tenure and farmers medium and long term land related investment and economic productivity have been central arguments within the realm of economic analysis of land tenure systems (Obeng-Odoom, 2012). The debate pivots on the neoclassical economic theorists' view, which presumes individualized land rights as means for efficient allocation of land within a free market economy (Barrows and Roth, 1990).

Empirical results are mixed in relation to the economic tenet on land tenure reform in Africa. Some scholars support the policies of individualized land ownership, while others are skeptical, especially economic sociologist, anthropologist and mainstream institutional economist, who argue that the function of African land is much more complex and is not an anachronism that threatens economic progress in developing economies (Prasad, 2003). Brasselle *et al.* (2002) reported that land-related investments can enhance tenure security leading to opposite causal relationship. Meanwhile the indigenous land tenure reform is criticized by land activist and legalist that it induces intra-household conflicts and increases the risk of smallholder farmers losing land (Kassa, 2014). In light of these debates, there is need for comprehensive understanding of the ongoing land formalization projects in the Tanzania particularly to verify whether such tenure reforms influence farmer's agricultural investment decisions in the study area.

2.11 Review of Analytical Methods on land improving investment

The scope of this study is to understand the effects of indigenous land formalization on land related investments. Similar studies have been done and various analytical methods have been employed. The study by Roth *et al*. (1993) at Rujumbura in Uganda adopted a logit investment model where two models were estimated; which treated titling registration as an independent variable. Each investment variable was related as a binary factor with a value of one (1) if investment is present and zero (0) otherwise. The investment which is a dependent variable was assumed to be a function of experience, managerial skills, political status, wealth, and distance of the farm from the farmer's home. Other variables included plot and household characteristics, which may influence investment.

Another study by Hugos (2012) in Mozambique used the Maximum Likelihood Binary response probit model to estimate the perceived tenure insecurity where fear of losing land or willingness to pay for titles were used to estimate tenure insecurity. The following model was adopted

$R_i^* = \gamma' Z_i + \varepsilon_i$ …… (1)

Where (Z_i) was an exogenous variables, (γ') parameter of estimates and (ε_i) an error term while R_i^* was used as an unobserved latent variable of potential dispute and willingness to pay for titles that represent insecurity and was assumed to be a function of exogenous variables (Z_i), which included household demographic variables, asset and physical endowment variables and other village level factors such as distance to major market and population density that influence perceived tenure security. The perceived tenure security among farmers was measured using.

$P(R_i=1|Z_i) = (\gamma' Z_i)$ ……..……...…… (2)

Where (R_i) is an observed dichotomous variable to assess whether or not investments were undertaken by the famers or not based on their perceived security of land they owned.

Logistic Regression analysis

The logistic regression model is part of regression models where the regressand is a binary or dichotomous variable. The model fits well for studies that seek to estimate factors that influence choices or participation of an individual in a certain activity.

According to Gujarati (1995) and Greene (2002) Logistic regression assumes a nonlinear relationship between the regressand and regressors, but requires that the dependent variables be linearly related to the Logit of the dependent variable. O'Sullivian *et al.* (2006) argued that logistic regression assumes that the households make participation choices depending on the options that maximize their utility. Based on the assumption that household tend to choose options that maximize utility, in this case the model was used to relate the decision of the smallholder farmers who had formalized agricultural land to participate in intermediate and long term land improvement investment or not to invest. The binary logistic regression model has been employed by Roth *et al.* (1993) centered on tenure security, credit use and farm investment in the Rujumbura pilot land registration scheme in Uganda. Also, Kaduma (2006) in a study that assessed the people's perception on individualized land tenure in Njombe employed a similar regression model, which Model was specified in general form as:

Logit (L_i) = ($X_1, X_2, X_3, X_4, X_5, X_6$, ……$X_n$) ……..……(3)

Where;

$X_{1=}$ Age,

X2= Farm Size,

X3= Land Size,

X4= Education of the house hold head,

X5= Distance of the farm from the household.

X_n = is the nth variable

The econometric specification of the decision to invest or not to invest as a result of improved tenure security was estimated by the following typical logistic regression model.

Model

Logit (L_{ik}) = In($\frac{P_i}{1-P_i}$) $= \alpha_0 + \sum_{k=1}^{n} \beta_n X_n + e_i$ ……………………………….………………..(4)

Where

Li is the dependent variable for smallholder farmer choice/ probability that an individual *i* will choose the k^{th} choice.

Independent Samples t-test

The independent t-test is used to compare the mean of two separate groups when the population mean and standard deviation are unknown. The t- test is founded on the assumptions that the observations within each sample must be independent so that they do not influence each other, the test statistic also assumes normal distribution of scores in each population and homogeneity of variance, implying each of two populations must have equal variances. This t- test also has been used by researchers in many studies for example Yadollahi *et al.* (2013) employed the independent sample t-test to determine the effect of gender on ownership of physical asset while Gómez-Limón and Riesgo (2008) used the tool to measure differences in the global agricultural sustainability, comparing farmers under Small-medium full-time commercial farmers and large part-time conservative farmers' groups in different policy scenarios. The analysis revealed that large part-time conservative farmers were more sustainable than small and medium full-time commercial farmers for all policy scenarios. The current study used this analytical tool to compare investment levels between farmers who operate titled and untitled farms.

2.12 Conceptual Frame Work

The conceptual framework in this study presents an economic intuition about economic agents' decisions patterns regarding the allocation of scarce resources on landed properties. It describes the way tenure security may influence agriculture investment and farm operators expectations of returns from their investment within a certain time frame. According to Feder (1988) the incentive to undertake complementary investments is affected considerably by expectations regarding the length of the horizon over which the investor may reap the benefits. The expected streams of economic benefits for the investors depend on the level of risk they perceive over the land they operate or own.

Increased security of tenure resulting from titling indigenous land has potential effects on the demand side and supply side for land; representing incentives to farmers and to lenders respectively (Alchian and Demsetz, 1973). Improved tenure security influences farmers to demand more medium and long term land improvement on titled land. Greater tenure security also increases the likelihood that smallholder farmers will reap returns from such investment. Meanwhile the expected reduction of conflicts over farm land resulting from titling customary land frees resources which would have been used for litigation. Also titling indigenous land increases the land's collateral value as well as improving the creditworthiness of the land owners. Indigenous land titling is assumed to had increased access to credits by smallholder farmers leading to significant positive effects on investment for land improvement, additionally such improvement are assumed to have also been undertaken by smallholder farmers in Mbozi District using their savings as well as by utilizing resources freed from litigation.

Following the formalization of indigenous land tenure, titled land is expected to improve farmers' land tenure security and the legal documents can be used as collateral for

acquiring credit as well as facilitating land transferability among competing users. The assumed reduced risks of dispossession or appropriation of the landed properties, in combination with other household and plot level characteristics, provide incentive for farmers to make more land productivity improving investments.

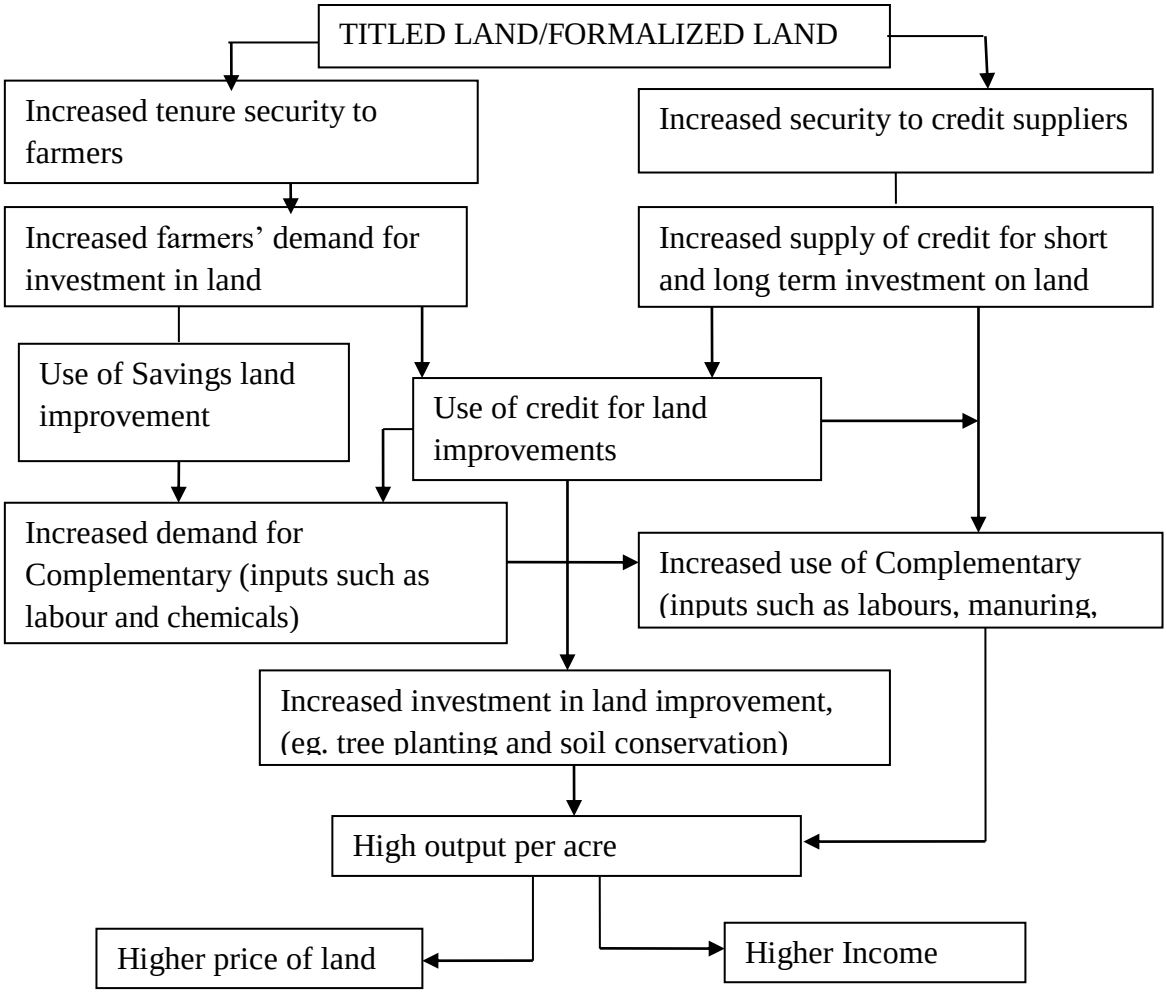

Figure 1: The Conceptual Frame work of the study

Source: Adapted, with modifications from Feder *et al*. (1988) and Place *et al*. (1993)

CHAPTER THREE

3.0 METHODOLOGY

3.1 Description of the Study Area

3.1.1 Location

The study was conducted in Mbozi District found in Songwe region in the Southern Highlands of Tanzania. The district was purposively selected for the study, because it is among the first districts where land tenure titling was done, way back in 2001, and is said to the most successful land tenure reform project in Tanzania (Pedersen 2010, Makwarimba and Ngowi, 2012). The World Bank (1975) argued that the main economic benefits of customary land titling programmes are only measurable in the long term since a gestation period is required. A similar study by Wanjohi (2007) on the effects of property rights formalization on property markets in informal settlement found no noticeable effects of property rights formalization on property market and instead a study was suggested for more studies for some few years to come. In this regard, a span of fourteen years since the implementation of titling in Mbozi is considered to be long enough for expected outcomes and impacts of titling to be felt including investment in land improvement.

According to URT (1997; 2013) Mbozi District is located in the South Western corner of Songwe Region, between Latitudes 8^{o} and 9^{o} 12" South of the Equator and Longitudes 32^{o} 7' 30" and 33^{o} 2' 0" East of Greenwich Meridian. The District lies between 900 – 2 750 meters above the sea level. On average, it receives rainfall between 1 350 mm and 1 550 mm per annum; while temperature ranges between 20°C to 28°C. In the southern part the district is bordered by Ileje district, to the east, Mbeya Rural District to the North, extending to Lake Rukwa where it is bordered by Chunya District and in the West it

shares borders with Momba District. Mbozi district consists of 4 divisions, 18 wards and 118 villages that cover a total of 23 404 Square Kilometers equivalent to 340 400 hectares. There are 255 300 hectares suitable for agriculture accounting for 75 percent of total district land size but only 175 974 hectares are cultivated representing 68 percent of the cultivatable Land

3.1.2 Climate and topography

Mbozi District lies at attitudes of 900- 2 750 meters above sea level, consisting two Agro ecological zones; the high land and lowland. The highland agro ecological zone covers the eastern part of the district with attitude ranging from 1 400 to 2 750 meters from the sea level. This zone is characterized by hills, rivers and gently sloping hills. The temperature is moderate with high rainfall. Major crops grown in the zone include maize, beans, coffee and banana. The lowland agro ecological zone covers the western part of the district between 900-1 400 meters above sea level. It is characterized by deep-well drained volcanic soils. The zone is relatively hot with temperature ranging 25°C -28°C. Paddy, beans and fruits are the main crops cultivated within this zone.

3.1.3 Economic activities in Mbozi district

Agriculture is the most important sector for the development of Mbozi District. Due to its high agricultural potential, of the district was given a priority for customary land titling, to facilitate agricultural commercialization and development. Pedersen (2010) argued that Mbozi was purposively selected for titling indigenous land as it was deemed to have potential commercial farming. The report shows that the agricultural sector in the district employs more than 90% of all residents who own and use land under customary land tenure. The food crops cultivated are rice, Maize, cassava, legumes (beans etc), banana while cash crops include coffee and groundnuts.

3.2 Research Design

A cross section research design was used since it allows data collection from different groups of respondents at a single point in time without repetition. For this study the data were collected from smallholder farmers whose land was titled as well as those owning non-titled land. Other respondents were interviewed as key informants at different levels comprising, Land Officers, Agricultural officers, Planners, Forest officer and GIS Members, which is a special task force of fourteen members for customary land tenure titling in the District. Other key informants who were Village leaders were also interviewed as key informants.

3.2.1 Analytical model

Descriptive statistics were employed to characterize the plot features and households' socio- economic features. Descriptive statistics was used to determine the proportion of smallholder farmers in the study district who have formal land titles under customary certificate right of occupancy (CCRO), as well as those who own land statutory right of occupancy (SRO). Data was also collected for land titles as well as the proportion of land whose ownership has been formalized within the district; the percentages were computed in accordance to collected data to address the first objective. Descriptive statistics were employed to identify how farmers define land tenure security according to local criteria and determine indicators that express tenure security by land owners in the study area. Based on this objective means, frequencies, percentage on criteria that define land tenure security and indicators of tenure security were analyzed to address the objective.

The Independent sample t- test was used to compare the level of investment on land improvement that is undertaken by farmers under each land tenure system (formalized and non-formalized land) by using SPSS software. Means, variances and standard deviation

were tested using the test statistic to compare the mean investment level between farmers with titled and untitled farms. The amount or value invested per hectare was used as a dependent variable while independent variables comprised of a value of one 1 if there had been land improving investment on the plot and 0 otherwise.

Logistic regression analysis was used to address specific objective four that aimed at determining factors that influence smallholder farmers' investment decisions under each land tenure system. The model generated means of covariates for influence of selected factors on the level of improving investment among smallholder farmers under formalized land tenure system relative to untitled land ownership.

While the model seemed to be ideal for this study it is subject to some limitations. The logit Model assumes nonlinear relationship between explanatory and explained variables as in ordinary least Squares (Gujarati, 1995; and Greene, 2002). The model does not require normal distribution of the variables as other choice models such as Tobit and Probit (Garson, 2006). This model was found to be ideal for this study since it assumes that not all households or farmers participate in a particular land improving investment activity as is the case under to Ordinary least Square (Nkhori, 2004). Since the study focused on understanding farmers (those operate titled and untitled farm) decision to invest or not to invest, the researcher chose to employ the Logit model rather than other related choice models.

3.3 Study Population

The study population for this study was all farmers in the study district in Songwe region of Tanzania.

3.3.1 Target population

The target population for this study was all smallholder farmers owning land under customary rights of occupancy or statutory rights of occupancy as well as farmers with untitled farms in the Mbozi.

3.3.2 Sample size and sampling procedure

Since data obtained from a sample was generalized to the whole population, the manner in which the sample units are selected was important. The study sampling focused on target population in the study area.

The Sampling procedure was done in stages. In the first stage, purposive sampling was used to select Mbozi District for reasons described earlier. The second stage involved obtaining from the District Land Office a list of wards and villages in which, 18 wards for of Mbozi District and 118 villages as well as the number of smallholder farmers in the district where obtained. After obtaining the list, the wards were stratified based on agro-ecological zones. Then simple random sampling was used to select four wards from each zone where Igamba and Nambinzo wards were selected from the lowland zone, Vwawa and Msia were selected from the high land zone. The third stage involved sampling villages using simple random sampling. Four villages including Isalalo, Zelezeta, Ivwanga and Isenzanya were selected as shown in Table 1.

The last stage involved randomly selecting 35 smallholder farmers from each village to form a sample size of 140 respondents. This number of respondents 140 was considered appropriate for the study as justified by Bless and Smith cited by Jari (2009) who argued that to get a reliable statistical sample, it should be at least 30 units. According to Bartlett (2001), sample size of at least 120 respondents is sufficient for regression analysis and

statistical inferences. In addition, 10 key informants were selected from the target population. The sample size is suitable for making statistical inferences to the wider population.

Table 1: Sampled Districts, Wards and Villages

District	Divison	Wards	Villages
Mbozi	Igamba	Igamba	Zelezeta
		Msia	Isalalo
	Vwawa	Mlowo	Ivwanga
	Itaka	Nambinzo	Isenzanya

3.3.3 Data collection

To achieve the objectives of the study both primary data and secondary data were collected as described below;

3.3.3.1 Secondary data

Secondary data were obtained from offices at the District level including Agriculture, Land, Forestry and Planning Department of Mbozi district in order to address each of the study objectives. For specific objective one the data included the district land size in hectares, land under customary tenure, size of titled land under customary and statutory tenure as well as number of farmers in the district and the number of farmers holding CCRO and those with titled deeds. Data that were collected to address specific objectives two were based on the perceived local criteria by farmers that define land tenure security. These included data on the presence of trees and tree crops, continuous farming, ownership documents, tombs and living in the village for long time, mode of land acquisition and being a descendant of the village.

Secondary data on the indicators of tenure security included the number of farmers in the district who were evicted from their land or those who were about to be evicted for various

reasons. The number of farmers who operate titled farms, in the case of objective four the data included farmers who secured loans from banks or other financial institutions using land as collaterals. Data from the internet and Sokoine National Agricultural Library (SNAL) were meant to provide insights about land titling programs in developing economies especially in sub-Saharan Africa, and their effects on agricultural productivity.

3.3.3.2 Primary data

Qualitative and quantitative primary data were collected by administering the questionnaire to household heads and to some key informants through face to face interviews. Head of the households who operated farming activities on titled farm and untitled farm were selected and interviewed. In the absence of the household head, the spouse was interviewed. In order to address the objectives one and two data included the number of trees or tree crops planted per acre and the value of trees and tree crops per area or per farm size, ages of trees and tree crops, number of ox-cart grass used for mulching, kilograms of manure and fertilizer applied.

To address the third objective which aimed at determining the factors that influence small holder farmers' investment decisions under each land tenure systems variables for data collection included; demographic data, plot level characteristics, and household level characteristics. Demographic data included; age of household head, sex, years of schooling and household size, plot level characteristics included; plot slope in degree, plot from the main road distance in kilometers, farm size in hectares and plot tenurial status while household characteristics level included; the farmers' perception regarding tenure security, income and if the household received extension services and access to credits during last five years.

Qualitative data were collected from key informants as well as from household respondents so as to have in depth insight on resources allocation and tenure security perception as a result of tenure reform. The key informants included Agricultural Officers, Forestry Officer and Land Officers at the Village and District level. These data were gathered to supplement primary data collected from smallholder farmers.

3.3.4 Data analysis

3.3.4.1 Descriptive analysis

Descriptive Analysis; means, frequencies and percentages were calculated to determine the proportion of farmers who have formal land titles, the proportional of formalized land owned by farmers as well as local criteria defining tenure security and indicators that provide tenure security were analyzed. The terms included in the formula for computation run on excel software are defined below.

The formulas below were adopted to address objective one.

Total land under formalized ownership $= \left(\frac{LF}{LT}\right) * 100 = \left(\frac{LFC+LFS}{LT}\right) * 100 \ldots\ldots\ldots\ldots (1)$

Land under CCRO as a percentage of all titled land = $\left(\frac{LFC}{LFC+LFS}\right) * 100 \ldots\ldots\ldots\ldots\ldots\ldots (2)$

The percentages of farmers who own land with formal titles $\left(\frac{TFC+TFS}{TFT}\right) * 100 \ldots\ldots\ldots\ldots (3)$

Where;

LT= Total district Land size in hectares under formalized ownership.

LF = Total formalized land size in hectares under both CCROs and Statutory

LFS= Total land formalized under statutory tenure.

LFC = Total land formalized under both CCROs and statutory title deeds.

TFS =Total number of smallholder farmers holding statutory title deeds.

TFC = Total number of smallholder farmers holding CCROs

TFT = Total number of smallholder farmers holding titles in the district.

The computation and estimation of objective one paved the way to address objective three in which the independent sample t test statistic was used as described in next section.

3.3.4.2 Independent samples t-test

An independent sample t-test was computed to test the null hypothesis which states that there was no significant difference in the level of investment on land improvement that is undertaken by farmers under each land tenure system (formalized and non-formalized land). The mean investment among smallholder farmers operating on titled land and untitled land were computed. The assumption of normality of the dependent variable was tested using Shapiro-Wilk statistic (1965). The Levenes test for normality was used for the assumption of equality of variance and means of the two population samples. Then the means for the land improvement investment among the groups were compared to observe if the difference between the mean were statistically different from zero. The hypotheses in relation to the third objective were tested as follows;

H_0: $\mu_1=\mu_2$

Ha: $\mu_1 \neq \mu_2$

Where μ_1=sample mean of the amount farmers invested in Tanzanian shillings on untitled farm and μ_2 =sample mean of the amount farmers invested in Tanzanian shillings on titled farm.

3.3.4.3 Regression analysis

Regression analysis has been widely used in a variety of fields including economics, engineering and transportation, to determine the percentage of variance of the dependent variable explained by changes in the independent variables, and to rank the relative importance of independent variables (Greene, 2002). Regression analysis is centered on

understanding the dependence of one variable on one or more other variables. The regression analysis consists of different approaches but for this study logistic regression analysis was used to estimate factors influencing land improving investment.

Logistic regression

The Logistic regression model (also known as Logit regression model) is part of qualitative regression models where the regressand is a binary or dichotomous variable; it was adopted in this study because it seemed to fit well for determining factors that influence smallholder farmers investment decisions under each land tenure system.

According to Gujarati (1995) a Logit model has a binomial distribution where P_i is the probability that a farmer will invest in land improvement and ($1-P_i$) is the probability a farmer will not invest. The derivation of the model was adopted from Gujarati (1995) as follows;

$$Pi = \frac{1}{1 + e^{-Z(\beta o + \beta_i X_i)}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (6)$$

Where Pi is the probability that farmer would invest in land improving investment

Equation (5) can be simply expressed as;

$$Pi = \frac{e^{Zi}}{1+e^{Zi}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (7)$$

Where; $Z_i = \beta_o + \beta_i X_i$, Equation represents the cumulative logistic regression function Z_i ranging from $-\infty$ to $+\infty$.

P_i ranges from 0 to 1, P_i is nonlinear relation to Z_i,

X_i follows a binomial probability distribution

P_i is the Probability of success and ($1-P_i$) is the probability of failure.

The probability of failure is represented by equation (8) below;

$$1 - \text{Pi} = \frac{1}{1 + e^{\text{Zi}}} \ldots \ldots \ldots \ldots \ldots (8)$$

Dividing equation (7) by (8) we obtained equation (10)

$$\frac{\text{P}_i}{1 - \text{P}_i} = \left[\frac{e^{\text{Zi}}}{1 + e^{\text{Zi}}}\right] * \left[\frac{1 + e^{\text{Zi}}}{1}\right] = \text{e}^{\text{Zi}} \ldots \ldots \ldots \ldots \ldots (9)$$

$$\frac{\text{Pi}}{1 - \text{Pi}} = \text{e}^{\text{Zi}} \ldots \ldots \ldots \ldots \ldots (10)$$

Introducing the natural log transformation for equation (9) and substituting $\beta_o+\beta_i X_i$ we obtained equations (10)

$$\text{In}\left[\frac{\text{P}_i}{1 - \text{P}_i}\right] = \text{In}[\text{e}^{\text{Zi}}] \ldots \ldots \ldots \ldots \ldots (11)$$

$$\text{In}\left[\frac{\text{Pi}}{1 - \text{Pi}}\right] = \text{Zi} \ldots \ldots \ldots \ldots \ldots (12)$$

$$\text{In}\left[\frac{\text{P}_i}{1 - \text{P}_i}\right] = \beta\text{o} + \sum_{i=1}^{n} \beta_i \text{X}_i \ldots \ldots \ldots \ldots \ldots (13)$$

Where Pi/(1-Pi) denotes the odds ratio in favour of the occurrence of an event. Introducing the disturbance term in equation (12) gives equation (14) which assumes the natural log of the odds ratio is linearly related to vectors of parameters having an error term with zero mean and variance equal to one (1).

$$\text{In}\left(\frac{\text{P}_i}{1 - \text{P}_i}\right) = \beta_0 + \beta_1 \text{X}_1 \ldots \ldots \beta_n \text{X}_n + \mu_i \ldots \ldots \ldots \ldots \ldots (14)$$

The fourth objective has been addressed by testing the hypothesis that selected factors have no significant influence on the level of land improving investment among smallholder farmers under formalized land tenure systems relative to non-formalized land ownership. The logit model is based on the assumption that each smallholder farmer may decides to commit his or her resources and invest or not to invest based on perceived tenure security and other factors. Tenure security is however an unobservable latent

variable that is reflected by the decision variable to (invest or not to invest), which can be observed. The decision by the household "h" to invest is a dichotomous variable taking value one, 1 (invest) or 0 (otherwise). The model further assumes the normal log of the odds ratio is linearly related to independent variables (X_i) as shown in equation (15).

$$L_i = \ln\left[\frac{Pi}{1-Pi}\right] = \beta_0 + \beta_1 X_i + \mu_1 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (15)$$

L_i denotes the odd ratio which is linear in regressors (X_i) and parameters (Bs).

The empirical model in equation 14 was used for analysis to address the fourth objectives. A similar model was also used by Kaduma (2006; Roth *et al.*, 1993; Place *et al.*, 1993). The model is thought to be ideal as it allow the researcher to capture factors that influence smallholder farmers' decisions to invest under each land tenure systems. The model is specified as follows;

$$\text{Logit } (L_i) = \text{In } \left(\frac{P_i}{1-P_i}\right) = \beta_0 + \beta_1 X_1 + \cdots + \beta_n X_{1n} + U_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots (16)$$

Where:

P_i = the probability of investing in land improvement

($1-P_i$) = the probability of not investing in land improvement

Bs and δs= coefficient of parameters and U_i= the error term

The dependent and independent variables were fitted into the specified empirical model as presented below;

$$\text{Logit(Li)} = \text{In}\left(\frac{\text{pi}}{1-\text{pi}}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 +$$

$$\beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + \delta_1 D_1 + \delta_2 D_2 + \delta_3 D_3 + \delta_4 D_4 + \delta_5 D_5 + \delta_6 D_6 \ldots\ldots\ldots (17)$$

Where all the variables are as defined in Table 2

3.3.5 Definition of independent variables

Investment for Land improvement is dummy variable that represent the dependent variable; 1 if the farmer invested in land improvement, 0 otherwise. Socio - demographic

variables included; age of the household head which is measured in years of the respondent; Sex of the household head takes a value of one (1) if the respondent is male and 0 otherwise, household size represents the number of household members in the household and the educational level of the household head measures the years of schooling. The age of the household head is expected to be negatively related to the probability of investment because older farmers are more cautious about adopting new technologies than young Shiferaw and Holden (1998).

Variables that relate to respondents (sex, household size and education level) are assumed to have a positive influence in the decision to invest in land improvement and production enhancing investment (Abebe, 2009). Though both male and female are involved in farming and investing in land improvement men are more likely to own land than women hence investing in land improvement more than women. This is because male household has a relatively higher tendency of decision making than female household in African families. The level of education is assumed to increase farmer's ability to obtain, process, and use information relevant to the investment decision in land improvement (Laper and Pandy, 1999). It is further assumed to increase farmers' ability to obtain information about the tenure system. Education is hypothesized to be positively related to tenure insecurity; it is therefore expected to increase the probability of investment. Meanwhile a household with larger household size is assumed to provide more labor that is required for land improving investment.

Variables related to plot or farm level characteristics included: the farm size, slope of the plot, tenure security status and distance of a farm from the main road. All these variables are hypothesized to have a positive relationship with investment for land improvement.

According to Shiferaw and Holden (1998); Teshome (2013) farmers having a larger farm tend to invest more than those with small sized land.

Also Laper and Pandy (1999) reported that distance of farm from household and distance of the farm from the main road are assumed to be negatively related to the probability of investments on land improvement and conservation measures, since households near the main road tend to have access to more information and are more likely to be visited by extension agents (Laper and Pandy, 1999).

Tenure security measures the perceived risk of loss of land at some time in the future and the titled plot is regarded as a proxy for the unobserved latent variable “tenure security”. Investment is undertaken when the household is assured that they will reap the benefit for a considerable time. Thus it is assumed that a household that feels insecure will not invest in land improvement. So this variable is assumed to positively influence investment. Laper and Pandy (1999) reported that the slope of the farm is an indicator of the probability of erosion on the land; the steeper the slope the more likely the land will be eroded. This variable is a dummy in which it has a value of one if the farm is on steep slope and o otherwise. It is predicted that investment will be made on steeper farms than on gentle slope, therefore being positively related to land improving investment. Duration of plot ownership, the duration in years the farm has been owned is positively related to land improving investment. Hence farmers who have owned land for a longer time would be expected to invest more than recent owners of land.

Other socio-economic variables include; access to extension services, credit, the political status of the respondent. These are presented as dummies and are assumed to be positively related to land improving investment. Makokha *et al.* (1999) reported that farmers who

have frequent contact with extension agent are positively influenced to invest. A study by place *et al.* (1993) reported that the political status of a respondent would have a negative relation to farming and land improving investment if the operation diverted time away from farming but it would be positive where there is increased control over labour in the community that is if political status favor access to resources to respondent, enhance access to inputs and acceptances of new technologies. The political status also is measured by current or past involvement in one or more political offices, while for credit it is assumed that farmers who have access to credit would investment more on land improvement than those with limited access. All these variables take the value of 1 if the household head participated in the respective activity and o otherwise. Despite the good quality of data collected and field works to address the research objectives, the research faced some limitations as described in the next section.

Table 2: Description of the Explanatory Variables used and a Priori Expectations

Variable	**Units**	**Description**	**Expected Signed**
Age	Years	Age of household head	-
Gender	Dummy	Sex of household (Male =1, Female = 0)	+
Farmsize(X_2)	Hectares	Total farm size	+
Distance (X_4)	km	Distance of farm from the road	-
Distance (X_5)	km	Distance of farm from households	+
HH size (X_6)	Number	Total number of household members	+
HH Income (X_7)	TShs	Income of household	+
Education	Years	Years of schooling	+
Ext service (D_1)	Dummy	1=yes, If accessed the service, 0 = otherwise	+
T-Security (D_2)	Dummy	1= Yes if insecure security 0 tenure security	
Farm Slope (D_3)	Dummy	1= Yes if steep slope 0 otherwise	+
Political (D_4)	Dummy	1= Yes if held political position,0 otherwise	+
Credits (D_5)	Dummy	1=Yes if accessed credit ten years 0 otherwise	+

3.4 Limitations of the Study

Data on the size of land holding from each land tenure system and data on the level or value of investment were difficult to find due to the fact that farmers do not keep records, which posed challenging during data collection. The researcher had to resort to approximation based on triangulated questions. Some of the respondents were reluctant to provide information, if they were not paid. The data were not collected from such respondents who were expected to provide crucial information for the study. For the case of value or level of investment, farmers had no records kept on the amount of resources allocated on their plots which includes fertilizer, labour, manure, costs of trees for each year. Moreover a measurement unit for manure and mulching was a big challenging. The measurement for manure and mulch was sorted out by using ox-cart which is a locally made in the study area.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

This Chapter presents results of the study, the respondents' characteristics in the study area, and the objectives specific results are detailed discussed as shown in the subsection below;

4.1 Socio - economic Characteristics of Respondents

4.1.1 Age distribution

Age of the household head is an important aspect in investment for land improvement as it determines the likelihood of farmers to take risks, which includes investment in land improvement. According to Shiferaw and Holden (1998) older farmers are more likely to be cautious before they undertake land related investment improvement, unlike relatively young farmers. Table 3 shows distribution of the sampled farmers for this study. Generally there was a large number of farmers belonging to the 40-49 and 60 and above age groups, which account for 24.8 % of all sampled smallholder farmers.

Moreover, the findings show that within the 40-49 age group male constitute 15 % of respondents while female were 10 % of the sampled farmers. The results in the Table show that in the 60 and above age group males were 14.3 % and females 10.71 % of the sampled farmers. The Table shows that there are few farmers belonging to the age group below (30 years) which is only 9.2 % in which males account for 4.3 % and females 5.0 % of the sampled farmers. The presence of only a few young farmers may be due to the fact that young people are involved in other forms of employment as alternative sources of income and livelihood.

Table 3: Distribution of Respondents by Age of the Household Head

Age groups (years)	Male		Female		Total	Total
	n	%	n	%	n	%
<30	6	4.29	7	5.00	13	9.2
30-39	16	11.43	10	7.14	26	19.1
40-49	21	15.00	14	10.00	35	24.8
50-59	21	15.00	10	7.14	31	22.0
60 +	20	14.29	15	10.71	35	24.8
Total	**84**	**60.00**	**56**	**40.00**	**140**	**100.0**

Sex of the household head

The house hold head sex also influences farmers' decision to undertake land related investment. Table 3 shows that 40.4 % of the respondents were females while 59.6 % were males. The large percentage of male farmers is consistent with the common understanding that most of the farmers' households are headed by males, as is the case in other sub-Saharan African countries and around the world (Abebe, 2009). In most tribes and clans there is unequal distribution of land ownership between males and females, whereas male are given more opportunities for holding land. In the case of Mbozi District, heads of household have influence on the decision to undertake both productive and tenure enhancement land improving investment.

Table 4: Distribution of Respondents by Sex of the Household head

Variable	Name of the ward				Total	Percent
	Igamba	Msia	Mlowo	Nambinzo	Frequency(n)	
Female HHH	11	14	15	16	56	40.4
Male HHH	25	20	20	19	84	59.6
Total	**36**	**34**	**35**	**35**	**140**	**100.0**

4.1.2 District titled land proportion and ownership

Table 5 shows that 53.6 % of the interviewed farmers had land titles while 46.4 % did not have land titles for their land. The Table indicates that out of the 75 out of 140 respondents who had land titles about 68% were males while females were only 32 %. The results show that more males have land titles than female farmers. That may be due to the fact that indigenous land tenure and the national land policy favours traditional land administration and prejudication in which the inheritance of clan land is governed by custom and tradition that provides male with exclusive power to control and make decision over landed property (URT, 1997).

Table 5: Number of Household Holding Land Titles

Response	**Male n**	**Male %**	**Female n**	**Female %**	**Total** n	**Total Percent**
Have titles	51	68	24	32	75	53.6
Do not have	44	67.69	21	32.31	65	46.4
Total	**95**	**135.69**	**45**	**64.31**	**140**	**100.0**

Knowingly the number of customary rights of occupancy (CCROs) and the statutory right of occupancy or granted rights of occupancy in the district was an important aspect envisioned to provide a snap photo of the land tenure formalization status in the district. The secondary data based on respondents at the district level as presented in Table 6 indicate that the district has 34 869 titled piece of land of which 91.12 % are under customary right of occupancies (CCROs) held under customary tenure and only 8.88 % of the land plots are titled under statutory land holding system in the district.

Table 6: District Proportion Number of Smallholder Farmers with Land Titles

Types of Land titles	Number of Titles	Percent
Number of CCROs	31 774	91.12
Number of title deeds	3 095	8.88
Total number of land titles in Mbozi District	**34 869**	**100**

Source: Mbozi district land office 2015

District land tenure categories, land size and ownership documents

Land size (in hectares) of different tenure category and District size of titled land is an important component in determining the proportion of land whose ownership have been formalized by smallholder farmers in the district. Table 7 shows that 82.36 % of the district land is held under customary tenure that is administered under the Village Land Act No 4 of 1999 while, only 0.06 % is owned under statutory land tenure which is governed by Land Act No. 5. The remaining land, which includes Forests reserves and wet lands accounts for 11.66 % of the total land in Mbozi District.

Table 7: District Land Tenure Categories, Land Size and Ownership documents

Land tenure categories and titles	Land size (Ha)	Percent
Customary untitled land hectares	280 356	82.36
Statutory titled land size in hectares	215	0.06
Customary land titled in hectares	20 146.83	5.92
Other Land in hectares (Forests and Wet Lands)	39 682.17	11.66
Total District total land size in hectares	**340 400**	**100**

District Proportion of Land with Formalized ownership

Survey results show that the District has 20 146.83 hectares of customary titled land and only 215 hectares of the district land have been titled under statutory tenure. Table 7 indicates that only 5.98 % of the total land in Mbozi district has been formalized, out of this 5.98 % of the formalized land only 5.92 % have been formalized under indigenous

land tenure titling while only 0.06 % has been formalized under statutory tenure while 82.36% have not been formalized. The higher proportion of land formalized under customary tenure is largely attributed to the government's efforts to formalize indigenous land under the Ministry of Land through MKURABITA as well as efforts by Mbozi District Council through the Land Department, particularly its special task force known as GIS Members. This team was established by District Council with the aim of fast tracking the process to indigenous land tenure reform in the district. These efforts have motivated more smallholder farmers in the district to title their farms or land and hence improve their tenure security. It is anticipated that investment for land improvement will follow especially in terms of tree planting.

4.2 Farmers Perceived and Expression of Tenure Security and its Indicators

The farmers' perception regarding the security of tenure for their land is an essential factor in determining their decision to commit resources for agricultural production. The gender disaggregated results in Table 8 indicate that 77.9 % of the smallholder farmers feel that they operate their farming activities under a secure tenure system while 22.1 % they felt current tenure system is insecure. The results also show that 47.8 % out of interviewed male smallholder farmers perceived that they operate their farming activities under a secure tenure system but only 30 % out of the interviewed female farmers felt that the current tenure system is insecure.

Table 8: Perceived Tenure Security and Tenure Status among Smallholder Farmers

Do you feel secured regarding land you farm	**Tenure status**				**Male**		**Female**		**Total**	**Total**
	Titled		**untitled**		**n**	**%**	**n**	**%**	**n**	**%**
	n	**%**	**n**	**%**						
Perceived security	59	54.67	41	37.61	67	47.8	42	30	109	77.9
Perceived insecurity	16	45.33	24	62.39	17	12.1	14	10	31	22.1
Total	**75**	**100.00**	**65**	**100.00**	**84**	**60**	**56**	**40**	**140**	**100**

Findings in Table 8 indicate that 54.67 % of the respondents who perceived land tenure to be secure had land title while 37.61 % had untitled farm. This implies that though indigenous tenure seems to be secure in the district but the customary titled land improves tenure Security of more farmers for their land compared to untitled land. This may be due to the fact that some farmers were affected by government land alienation for development programs. For example in Isenzanya village land was taken for building a school.

These results are consistent with those of Deininger *et al.* (2009) who found that farmers in Ethiopia with titles had perceived more tenure security compared to respondents who operate untitled farm. Moreover, the disaggregated gender results in table 8 shows that 47.80 % of males who perceived tenure security have land titles while only 30% of female who perceived tenure security have titles compare to 12.10 % and 10 % of male and female who felt tenure insecurity. However, according to local customs, women are not entitled to land ownership particularly in patrilineal clans which is dominant in the study district. Lunduka (2009) reported that in patrilineal descent the inheritance of land rights belongs to men.

4.3 Local Criteria Defining Land Tenure Security

Understanding the local criteria for defining land tenure security is important in land improvement investment as it gives policy intervention priorities in addressing tenure security in a specific area. Overall results in Table 9 show that most of the farmers ranked Planting coffee, banana and other trees as important criteria for defining land tenure in the study area. The ability to bequeath land ranked lowest as criterion for measuring tenure security.

Table 9: Local Criteria Defining Tenure Security among Farmers in Mbozi District

Responses	Male		Female		Total	Total
	n	%	n	%	n	%
Planting Coffee, Banana & other trees	40	47.6	30	53.6	70	50
Presence of clan graves/tombs	15	17.9	3	5.4	18	12.9
Living on land for long time	12	14.3	6	10.7	18	12.9
Frequent land use/cultivation	8	9.5	5	8.9	13	9.3
Ability to bequeath & inheritance	9	10.7	12	21.4	21	15
Total	**84**	**100**	**56**	**100**	**140**	**100**

Moreover, gender disaggregated results from table 9 indicate that 53.6 % of the female respondents ranked Planting Coffee, Banana and other trees as key criteria in defining land tenure security in the study area while 47.6 % out of the male respondents ranked the same criteria as most important key criteria for defining land tenure security. The second most important criteria for defining tenure security was ability to bequeath and land inherited 21.4 %, followed by living on the land for long time 10.7 %. The rank order was slightly different for males. The second most important criterion was the presence of clan graves 12.9 % followed by living on the land for a long time. These differences reflect the perceived security of tenure between males and female respondents.

Chi –Square test statistic was used to test whether differences in male and female responses were statistically significant from zero. More over Chi –Square test was employed to test and compare whether the percentage of male response on the rank of criteria was significant different from those of female responses. The results shown that there were statistically significantly in male response at 0.01 significant level.

Land tenure security and indicators that express farmers' tenure Security

Findings in Table 11 indicate that 98.57 % of the respondents had land use rights such as tilling and keeping livestock, only 1.43 % of respondents were found to have limited land

use rights in the study area. Gender disaggregated results from the Table depicts that 98.2 % of the Female smallholder farmers have complete land use rights, only 1.8% reported to have some limited use rights. Furthermore the Table shows that 98.8 % of male respondents have a complete land use rights, only 1.2 % have limited land use rights.

Table 10: Land Use and Transfer Rights among Farmers

Farmers responses	**Male**		**Female**		**Total**	**Total %**
Do you have complete land use right	**n**	**%**	**n**	**%**	**frequency**	
Have land use rights	83	98.8	55	98.2	138	98.57
Do not have land use rights	1	1.2	1	1.8	2	1.43
Total	**84**	**100.0**	**56**	**100.0**	**140**	**100**
Do you have complete land transfer rights						
Have Transfer Rights	42	41.6	6	15.4	49	65.0
Have no transfer rights	59	58.4	33	84.6	91	35.0
Total	**101**	**100**	**39**	**100**	**140**	**100**

However, in the case of complete land transfer rights which can be by sale or bequeath only 65.0 % of total interviewed respondents do have permanent land transfer rights while 35.0 % had no complete land transfer rights. Moreover gender the disaggregated results indicate that 84.6 % of the female interviewed female farmers had no land transfer rights, only 15.4 % of them have complete transfer rights. In comparison 41.6 % out of male interviewed respondents had complete land transfer rights and 58.4 % of the respondents had no land transfer rights. Majority of the female respondents have limited transfer rights due to the fact that customary land belongs to the family member, to use a plot/land one must have consent from the lineage or family members to transfer land. Also female in African communities are not entitled to land ownership due to traditions and customs.

4.4 Smallholder Farmers' Level of Land Improving Investment

An independent sample t-test was used to compare the level of investment on land improvement that is undertaken by farmers under each land tenure systems that is comparison between formalized and non-formalized land. A preliminary test was conducted to check for normality and equality of variance. No serious violations were noted. The Levene's test for equality of variance was F (1, 89)= 3.443 p value was 0.067 indicated that the assumption of equal variances was tenable for the sampled smallholder farmers. The two tailed test statistics for $\alpha = 0.05$ was conducted to measure level of land improving investment among the respondents.

The results in Table 12 show that there was a significant difference in the mean investment level on land improvement for farmers operating on formalized farms whose mean investment was Tshs 2 516 703 per farm while small holder farmers with untitled farms had mean investment was Tshs 2 265 894 per farm. The difference in the mean land improving investment between the two groups was Tshs 250 809 and was statistically significant from zero at $\alpha = 0.05$. The null hypothesis stating that the mean land improving investment on formalized land is significantly by higher than the level of mean investment on land improving undertaken by farmers under non-formalized land ownership in the study district was not rejected, implying that there was no sufficient evidence to reject the hypothesis.

Table 11: Mean land improvement by land ownership status in Tanzanian shillings

Respondents tenure status	n	Percent	Range	Minimum	Maximum	Mean	Std. Deviation
Titled	64	70.34	7 147 500	250 000	7 397 500	2 516 703.1	2 173 482.3
Untitled	27	29.76	5 640 500	132 000	5772 500	2 265 894.4	1 666 866.5
Total	**91**	**100**					

These results are consistent with those of Dlamini and Masuku (2011); and Teshome (2013) who found significant impact of land titling on agricultural production, agricultural investments and long-term maximization agricultural behaviour in Swaziland. Additionally, Table 12 shows that though the respondents with titled farm have a relative high investment minimum and maximum among farmers with titled farms at Tshs 250 000 and Tshs 7 397 500 respectively compared to farmers who operated untitled farmers whose their minimum and maximum investment was Tshs 132 000 and Tshs 5 772 500 respectively.

4.4.1 Levels of investment in Tanzania shillings in land improving investment on titled and untitled farms

Results in Table 13 describe the level of land improving investment in Tanzania shillings among small holder farmers in the district. The results show that 70.33 % of the amount invested in land improving investment ranged between Tshs 3 000 001 and above and was made on titled land while 29.67 % invested in untitled land. The results depict that 3.30 % of the smallholder farmers land improving investment concentrated within the range of Tshs 1 500 001 to 2 000 000 invested on titled farms while 2.20 % was invested on untitled land. Generally, the results indicate that most of farmers' with titled farms had relatively higher amount invested in land improvement compared to farmers with un-formalized farms. This may be due to the fact that the indigenous titled land generally provides security of tenure to small holder farmers in the study district.

Unexpectedly the results show that there is a relative high number of small holder farmers (29.7%) who invested on untitled land. This might be due to the fact that land ownership in the district is owned under patrilineal land inheritance systems which is said to provide assurance of flow of future stream economic benefits of the clan members belonging to the

lineage hence an incentives for investment. This is consistent with Lunduka (2006) who found out that patrilocal households in Malawi were more tenure secure and had more investment than matrilocal and neolocal households.

Table 12: Level of investment by status of ownership

Level invested in Tzs	**Amount invested**				**Total**	**Total**
	Titled farms		**Untitled farms**		**n**	**percent**
	n	**%**	**n**	**%**		
0 to 500 000	5	5.49	1	1.10	6	6.6
500 001 to 1 000 000	23	25.27	7	7.69	30	33.0
1 000 001 to 1 500 000	3	3.30	5	5.49	8	8.8
1 500 001 to 2 000 000	3	3.30	2	2.20	5	5.5
2 500 001 to 3 000 000	6	6.59	2	2.20	8	8.8
3 000 001 and above	24	26.37	10	10.99	34	37.4
Total	**64**	70.33	**27**	29.67	**91**	**100**

Correlations analysis on the relationship between household head Age and amount invested

The correlation analysis was made to further determine if there is association of age of the household head and amount invested by smallholder farmers in their respective investment categories. The findings in table 14 show a significant association between the two variables at (α 0.05) in which young household head tend to invest more in land improvement compared to older household head. This conforms to the findings by Shiferaw and Holden (1998) who reported that younger farmers invest more than older because the later are more skeptical to take risk in the course of resource allocation.

Table 13: Correlation Analysis on Relation between Age and Amount Invested

Variables	Statistics test	Age of household head in years categorized	Total Amount SHF invested in TZS
Age of household Head	Pearson Correlation	1	-.219*
	Sig. (2-tailed)		.037
	n	140	91
Amount SHF invested Tzs	Pearson Correlation	-.219*	1
	Sig. (2-tailed)	.037	
	n	91	91

Correlation is significant at the 0.05 level (2-tailed).

1.3 Factors That Influence Land Improvement Investment Among Farmers (Binary Logistic Regression Analysis Results)

Binary logit regression analysis was conducted and model stability or goodness of fit test was made in which a Pseudo R^2 of 0.58 was obtained. Gujarati (1995) argued that though the Pseudo R^2 is a secondary measure of model stability in binary models, an important measure of the model's stability are the expected signs of the regression coefficients and their statistical and/or practical significance. The Pseudo R^2 is suggested to range from 0.2 to 0.6 (Gujarati, 1995). Based on this study the model fitted the data well, moreover most of the expected coefficient signs were as prior expected. The Pseudo R^2 of 0.58 or 58% means that the independent variables included in the specified model explain 58% of the variation in land improving investment in Mbozi District.

The coefficients measure the change in the land improving investment for a unit change in the value of the given independent variable holding other regressors constant. The results in Table 15 show that some variable are not significantly different from zero and the significant variables have varying alpha levels as shown in Table 15 below;

Table 14: Binary Logistic Results for Respondents Land Investment Improvement

Explanatory variables	Expected sign	Coefficient	P>z
Constant	+/-	-13.2862	0.000***
Age of household head	-	-0.0009	0.968
Household Size	+	0.2197	0.074*
Sex of household head	+	1.2757	0.090*
Farm Size	+	0.5948	0.000***
Education of household head	+	0.1428	0.243
Distance of farm from Main Road	-	-0.2245	0.009***
Distance of farm from Household	+	0.0677	0.754
Farm experience	+	1.3084	0.17
Titled plot (Tenure security)	+	4.5366	0.000***
Access to Extension	+	0.5409	0.451
Farm slope	+	0.7219	0.245
Political Status	+	3.0716	0.004***
Access to Credits	+	2.2175	0.030**

Number of observations 140, *** = $\alpha = 0.1$; ** = $\alpha = 0.05$; and * = $\alpha = 0.001$ indicates statistical significant at a specified level of significance. Prob> chi^2= 0.0001, Pseudo R^2= 0.58.

Results in Table 14 indicate that there was a positive sign on the smallholder farmers' farm size (0.5948), and titled farm (tenure security) (4.5366) access to credit (2.2175), household size (0.21974), sex of household head (1.2757). The first three parameter estimates were statistically significantly different from zero at the level of significance of $\alpha = 0.01$, access to credit at $\alpha = 0.05$ while the last two parameters household size, sex of house hold head were significant at $\alpha = 0.1$. These results imply that a unit change of a variable, on average would led to land improving investment and increases approximately by the value units of the respective parameters' coefficients. Other variables which had a positive signs but were not significantly different from zero included; the slope of the farm, farming experience, household head education, access to extension services and

distance of the farm from the homestead while unexpectedly income was dropped during the analysis.

The significant results coefficients conform to the studies conducted by various scholars. For example Dube and Guveya (2013) in Zimbabwe and Hagos (2012) in Mozambique found that male-headed households were more likely to undertake land investment in the form of parcel boundary demarcation. Hagos, (2012) in Mozambique found farm size was positively associated with land investment in conservation structures, Dlamini and Masuku (2011) in Swaziland reported that farmers' land improvement was positively influenced by tenure security status, Awudu (2008) and Hagos (2012) found that access to credit positively influenced crop productivity and long term land investment in Ghana and Mozambique respectively and lastly Roth *et al.* (1990) in Uganda where farmers who held political position were found to have positive relationship with land improvement investment.

The coefficients on farmers' distance of farm from the main the road (-0.2245) and the constant term (-13.2862) were negative and significantly different from zero at $\alpha = 0.01$ level of significance. In the case of distance from the road, the results imply that if a parameter estimate increase by a one percent, on average the land improving investment would decrease by (0.2245), holding other regressors constant. The constant tells that in the absence of other factors land improving investment decreases by 0.2245%. The results were consistent with those of Gebremedhen and Swinton (2003) who reported that the distance of the farm from the main road would be negative implying a decrease in investment as the farm located far away from the road. Also the result on distance is consistent with the findings of Teshome (2013) in Ethiopia who found farmers whose

homesteads were far from the main road had a lower probability of investing in soil conservation technologies. Age of the household head had a negative sign and insignificant.

The results of this chapter have built important foundation from which the recommendations, conclusion and area of further studies regarding to indigenous land formalization and agricultural investment have been drown in the next chapter.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

The overall objective of the present study was to assess the effect of land titling on tenure security and subsequent investment on land improvement among smallholder farmers in Mbozi District, Songwe Region. The study specifically pursued to determine the proportion of smallholder farmers in Mbozi district who have formal land titles under customary certificate right of occupancy (CCRO) as well as statutory right of occupancy (Title deed) and the proportion of land whose ownership has been formalized within the district. The study also intended to identify how land tenure security is defined according to local criteria among farmers and determine indicators that express tenure security by land owners. Furthermore, the study aimed at determining the level of investment in land improvement undertaken by farmers who have titled farms and untitled farms, as well as determining the factors that influence small holder farmers' investment decisions under each land tenure system. The following section present conclusion and recommendations

5.1 Conclusion

The findings of the study indicate that out of 95 respondents 44(46.4%) did not have titles. Out of 34 869 registered titles majority (92.12%) were customary certificate of right of occupancy (CCROs) compared to farmers with statutory right of occupancy who account for only 8.88%. The district has a high percent (82.36%) of land administered under indigenous land tenure system. Although the district was among the first in Tanzania to implement the formalization of indigenous land tenure it still has a very small percentage of land (5.98%) whose ownership has been formalized. This has been explained by the facts that land tenure titling is a recent intervention. Moreover, most respondents

expressed satisfaction with the security of tenure provided under customary tenure system in the District.

Based on descriptive statistics the results show that smallholder farmers attach planting Coffee, Banana and other perennial crops, as a key local criterion for defining land tenure security in the District. The planted perennial trees are a determinant of farmers' assurance to reap benefits from their land. Thus the criteria become important for both male and female respondents for defining tenure security based on local criteria. Most of respondents felt they have complete land use rights over the farms they operate, indicating tenure security. Also smallholder farmers expressed that indigenous land tenure holding is performing well since most farmers depend on it, hence they have not moved to other land tenure holding system as a strategy for improving their security on land. Furthermore the expression of tenure security has showed majority of male and female respondents had complete land use rights whereas majority of male respondents also have complete land transfer rights.

Mean comparison results, indicate that the mean land improving investment is relatively higher on titled farm plots operated by farmers with a mean difference of Tshs 250 809 compared to the smallholder farmers operating untitled farms. On the basis of these findings the researcher failed to reject the null hypothesis which states that the mean land improving investment on formalized land is significant higher than the level of mean investment on land improving undertaken by farmers under non-formalized land ownership in the study district. This means that there is more land improving investment on titled land or farms operated smallholder farmers compared to those who operate untitled land/farms.

The logistic regression model stability was tested in which it was found to fit the data with R^2 of 58%. The results indicate that most of the regressors included in the analysis influence smallholder farmers land improving investment decision. The parameter estimates of farm size, distance of the farm from the main road, titled farm (a proxy of tenure security), political status were highly significant at $\alpha = 0.01$, only access to credit variables was significant at $\alpha = 0.05$ while household size and sex of household head were significant at $\alpha = 0.1\%$. The highly significant variables imply they have a high influence on the variation of the dependent variable. In this case, land improving investment followed by variables with relatively small significant level in Mbozi District.

Based on these results, the null hypothesis which states that selected factors such as farm size, household size, tenure security and education, have no significant influence on the level of land improving investment among small holder farmers under formalized land tenure systems relative to non-formalized land ownership was rejected. Since the factors included in the model have an influence on the likelihood of smallholder farmers to invest on both productivity enhancement and security enhancement investment.

Nevertheless, the study established that only a very small percent (5.98%) of the District land has formalized ownership and the majority of small holder farmers operate their farming activities on formalized land whose ownership has been formalized under customary certificates rights of occupancies (CCROs) while (0.6%) has been formalized under statutory rights of occupancy. It was found that though indigenous land tenure system provides security of tenure to farmers but most of small holder farmers with land titles perceive more security over their land than those own untitled land. Moreover planting Coffee, Banana and other trees, is a key local criteria farmers use to define land tenure in the study district. Additionally majority of the farmers have complete land use

rights while only few of female expressed limited complete land transfer rights in the study district.

Findings on the level of land improving investment and factors affecting farmers' decision to invest in investment for land improvement depicts that farmers who own titled land have a relatively higher mean investment while farm factors of farm size, titled plot (Tenure security), distance, political status, access to credit, sex of the household head, household size and distance each had a positive influence on land improving investment. The study establishes that there is a relatively higher investment on formalized land compared to those of unformalized land. It was also established that age of the respondents is highly associated with resource allocation in land improving investment in which correlation analysis shows that most of younger people have a tendency to invest in land improving investment than older people. The study also establishes that the mean land improving investment decreases as respondent gets older.

5.2 Recommendations

Based on the empirical results of the study, policy recommendations are suggested for enhancing land improving investment of the smallholder farmers for future sustainable agricultural production and productivity in the study area.

The findings show that the proportion of land that has been formalized in the district is very small mostly through customary Certificate rights of occupancy (CCRO). Only 5.98% of the land in the district is titled, most of which 34,869 (91.12%) of land formalization are under customary rights of occupancy, but generally the land whose ownership has been formalized is very small within the district, about 5.98%.

The study has shown that the amount invested by smallholder farmers on formalized land is relatively higher than that of untitled plots or farms in the study district, meaning that formalization of indigenous land has significant effects on small holder farmers' decision to invest on land improving investment in the study district.

The findings of this study indicates that Household size, sex of head of household, farm size, distance of the farm from the main road, titled farm (a proxy of tenure security) and access to credits are factors which significantly influence land improving investment among small holder farmers in the district at various level.

On the basis of the above observation study recommends the following:

i. The study recommends that the government and Smallholder farmers should continue to formalize land so as to ensure many small holder farmers have formalized their land and enjoy the economic benefits of improve tenure security.

ii. The study findings indicate that most of farmers perceived more secure tenure over their land when they hold formalized land/farms despite the limited of use rights. The study recommend that the government's land formalization interventions should be coupled with improvement of policies and laws so as provide wider land use rights to all producers (male and female) hence ensure wide spread of economic benefits in the economy.

iii. The study recommends that Government and Development partners should allocate more resources on land formalization to stimulate more land improving investment, since small holder farmers with such land holding status tend to invest

more on formalized land as a result of improved tenure security than on untitled land which is assumed less secured.

iv. Seven factors such rural roads, access to credits and availability of family labour and titled farms (proxy of tenure security) enhance titling and hence land investment in land improvement. It is recommended by the study that, the policy makers and the government at large should consider and improve those factors so as ensure that land titling interventions accelerate further rate of land improving investment for current and future interventions in the district.

5.3 Areas for Further Studies/Research

According to the findings of the present study in depth research is recommended to be conducted in the areas of;

i. Factors influencing small holder farmers to invest in land improving investment on untitled land despite the tenure insecurity associated with the land holding systems

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APPENDICES

Appendix 1: Questions for Small Holder Farmers in Mbozi District

B. Structured Questions for Smallholder Farmers Msc Research Sample Survey

This questionnaire is structured to gather information related to indigenous land tenure formalization from smallholder farmers and other key peoples and institutions, organizations in Mbozi district so as to assist the researcher in fulfillment of Master of Science in Agricultural Economics research requirements of Sokoine University of Agriculture, Morogoro.

Name of Enumerator…….. Date ……/……./20…..……

Enumerator Mobile ……..Time: Started ……. Time ended ……

No.	QUESTIONS	Answers
BQ1	District	**Mbozi**
BQ2	Name of the Division	
BQ3	Name of the Ward; 1=Ward1: ……. 3=Ward3: …… 2= Ward2: ……..4=Ward4: ……	
BQ4	Name of the Village; 1=Village1: …….. 3=Village3: …… 2=village2: ……..4=Village4: ……..	
BQ5	Mobile number of respondents	
BQ6	Name of respondent	
	Part I: Questions for Objective One, Two and Four	
BQ7	What is the Sex of the house hold head? 1= Male; 2=Female	
BQ8	Age of household head (Years)	
BQ9	What is the number of years did the household head spent for schooling	
BQ10	How many household members in the household?	
BQ11	Does your household own land for farming/residence? 1=Yes; 2=No	
QB12	What is the size of all land(s) that your household owns (in hectares)	
BQ13	What is the size of land that you have allocated for agriculture? (Ha)	
BQ14:1	Do(es) the land(s)/farm(s) owned by your household have land titles? 1=Yes; 2=No	
BQ14:2	If Yes, how many plots/farms have been titled? 1= one; 2= Two; 3= Three; 4= Four; 5= Other	
BQ14:3	If Yes, under what type of land titling/ tenure rights the Land/farm was Titled 1= Customary (CCRO); 2= statutory; 3= Others (specify)	
BQ15	What is the total size of the land(s)/farm(s) that have been titled under CCROs? (in hectares)	
BQ16	What is the total size of the land(s)/farm(s) that have been titled under statutory? (in hectares)	
BQ17	What is the total size of the land(s)/farm(s) that have been titled under statutory? (in hectares) under other tenure category	
BQ18	In which year did each of the farm/plot been titled? 1= farm1…..;	

No.	QUESTIONS	Answers
	2= Farm 2….; 3= Farm3……; 4= Farm4……..; Farm5……	
BQ19	What is the distance in kilometers of furthest titled farm/plot from households?	
BQ20	What is the distance in kilometers of nearest titled farm/plot from households?	
BQ21	What is the distance in kilometers of furthest titled farm/plot from main Road?	
BQ22	What is the distance in kilometers of nearest titled farm/plot from households?	
BQ23	What is the distance in kilometers of furthest untitled farm/plot from main Road?	
BQ24	What is the distance in kilometers of nearest untitled farm/plot from Household?	
BQ25	What is the distance in kilometers of furthest untitled farm/plot from main Road?	
BQ26	What is the distance in kilometers of nearest farm/plot from main Road?	
BQ27	What is your average income you earn per year(T Shillings)	
BQ28	Do you make any land improvement at your plot(s) /farm(s)? 1=Yes;2=No	
BQ29	If Yes at what farm/plot do you prefer to invest between tilted and untitled? 1=Tilted farms/Plots; 2= Untitled farm/Plots	
BQ291	What is the type of investment undertaken on your farm or land in past five year?1= trees/coffee Planting, 2= Manuring, 3= Mulching, 4= Fertilizer,	
BQ291	What is the land size in hectares for each of the above in BQ391 was invested?	
BQ292	What is quantity invested on each type of investment in BQ391 in Tshs	
BQ293	What is value invested on each type of investment in BQ391 in Tshs	
BQ294	What is total amount SHF invested in Tshs **(**to be computed)	
BQ30	What is the source of income to finance land improving investment?1= Credit 2.= Own Savings 3.= Others specify	
BQ31	What is the number of years have you been owning plots/ farms	
BQ32	Did you ever receive any extension services from any organization?1=Yes; 2= No	
BQ33	How many years have you been farming?	
BQ34:1	Do you think the plot/ Land farming is secured against appropriation by private/state? 1= Yes; 2=No	
BQ34:2	If Yes, what might be the reasons among the following 1= rent; 2 = land is untitled; 3 = disputed land; 4= other	
BQ34:3	If No, what might be the reasons	
BQ35:1	What is the slope of your plot/farm?1= steep slope; 2= Gentle slope; 3= flat	
BQ35:2	In which plot in (BQ35:1) above you prefer more to invest in land improvement? 1= Steep sloped farm: 2= Gentle sloped farm; 3= Flat	

No.	QUESTIONS	Answers
	farm	
BQ36:1	Have you have ever held any political leadership for the last ten years,1=Yes; 2=No	
BQ36:2	If Yes which Position you held? 1= constituency/ward representative. 2= village chairperson; 3= Sub village chairperson 4= others	
BQ37:1	Did this household ever access credit and saving facilities in ten years ago for agricultural production? 1= Yes; 2= No	
BQ37:2	If Yes to (BQ27), what kind of credit and saving facilities? 1= Banks; 2=SACCOS; 3= Banks and SACCOS; 4= MFI (microfinance institutions); 5= Group saving scheme; 6 = Other	
BQ37:3	If yes to (BQ27), is the household accessing credits using CCRO/ Title deed as collateral?	
BQ38	What did you use the obtained land titles for, among the following?	
BQ38:1	Use of agricultural inputs such (Improved seeds, fertilizers, manuring) 1= Yes; 1= No ; 3= I planned to do so	
BQ38:2	Soil protection against erosion and use of improved technologies 1= Yes; 1= No ; 3= I planned to do so	
BQ38:3	Selling land in order to overcome some income issues for basic needs 1= Yes; 1= No ; 3= I planned to do so	
	Part II: Specific Objectives Three	
BQ39:1	Do you feel that the land you own can be taken by the state or private in the five to come? 1= Yes; 2= No	
BQ39:2	If Yes, what are the reasons behind?	
BQ39:3	If No, give the reasons?	
BQ40:1	Do you feel any sense of land tenure security? 1= Yes; 2 = No	
BQ40:2	If Yes, what are the factors/characteristics/attributes attached to land/farms that have tenure security (list them), CCRO, Fencing, tree, rent	
BQ40:3	If No, what are the factors/characteristics/attributes attached to land/farms that have tenure insecurity (list them)	
BQ41	List the factors that define tenure security in your vicinity starting from the most important to the least important? 1= …… 2= ……..3=……. 4= ……..	
42	Do you believe that you will be evicted from your plot/residence next five years? 1= Yes; 2= No	

Appendix 2: Questions for Key Informants at District, Ward and Village Level

This questionnaire is structured to gather information related to indigenous land tenure formalization from smallholder farmers and other key peoples and institutions, organizations in Mbozi district so as to assist the researcher in fulfillment of Master of Science in Agricultural Economics research requirements of Sokoine University of Agriculture, Morogoro.

Name of Enumerator……Enumerator Mobile ……Date …….. 20…..…

Time: Started ……. Time ended ……..

No.	QUESTIONS	Answers
AQ1	District	**Mbozi**
AQ2	Name of the Division	
AQ3	Name of the Ward	
AQ4	Name of the Village	
AQ5	Mobile number of respondents	
AQ6	Name of respondent	
AQ7	Position of respondent 1= Land officer 2= Extension officer 3=District Foresters 4= Land committee members = GIS member	
AQ8	Number of years in services at the district	
AQ9	What is the total size of land in square kilometers?	
	1= District ……..2= Ward……..3= Village…….	
AQ10	What is the total land size in square kilometers suitable for agriculture?	
	1= District ……..2= Ward……..3= Village…..….	
AQ11	What is the total land size in square kilometers owned under customary within your vicinity	
	1= District ……..2= Ward……..3= Village…….	
AQ12	What is the total land area in square kilometers owned under customary within your administrative areas?	
	1= District ……..2= Ward……..3= Village…….	
AQ13	What is the total land area in square kilometers owned under customary within your administrative areas?	
	1= District ……..2= Ward……..3= Village……...	
AQ14	Was there an operating land titling program in your area? 1= Yes2= No	
AQ15	If yes, who implemented the program?	
	1= The Ministry of Land, Housing and Human settlement2= MKURABITA= NGO (mention) 4= other	
AQ16	When was it started and when it ended	
AQ17	On which type of land tenure was the land tenure reform program intervention targeted?1= customary land , 2= Public land	
AQ18	What is the total customary land size in square kilometers owned by smallholder farmers that have been titled in the district/ward/village?	

No.	QUESTIONS	Answers
AQ19	What is the total public/state land size in square kilometers owned by smallholder farmers that have been titled in the district/ward/village?	
AQ20	What is the total number of smallholder farmers who have land titles in the district/ward/village?	
AQ21	What is the total number CCROs issued to smallholder farmers in the district/ward/village?	
AQ22	What is the total number Titled deeds that have been issued to smallholder farmers in the district/ward/village?	
AQ23	Do you think CCROs/Title deed has improved tenure security of the farmers in district? 1= Yes, 2= No	
AQ24:1	Do farmers use their CCRO to secure credit from financial institutions? 1= Yes; 2= No	
AQ24:2	If Yes, what is the total number of farmers who used their titled land as collateral?	
AQ25:1	In your opinion, has the land titling had effects on the way farmers in your locality invest in agricultural inputs? 1=Yes; 2= No	
AQ25:2	If Yes, If yes, in what ways? 1= Manuring; 2= soil conservation; 3= more use of fertilizers; 4= Tree and tree crops planting; 4= plot/farms demarcation; 5= other	
AQ26	How would you compare the factor intensity on agricultural land in this district between farmers with CCROs and titled deed?	
AQ27	If there is any difference in investments on titled and untitled land, what might be the reasons for the differences titling?	
AQ28	Are you aware of the term tenure security? 1=Yes; 2 = No	
AQ29	If yes, How do land owners/farmers in the community describe security of tenure based on local criteria?	
AQ30	What are the indicators of tenure insecurity expressed by land owners in the District, Ward, and Village?	
AQ31	Do you think CCROs/Title deed has improved tenure security of the farmers in district? 1= Yes; 2= No	
AQ32	If yes, in what ways	
AQ33	If yes in AQ33**,** what is percentage change in the number of small holder farmers cultivating untitled farms?	
AQ34	If yes in AQ33, whatis the percentage of smallholder farmers without conflict over use rights in past five years?	
AQ35	If yes in AQ33,what is the percentage of small holder farmers who didn't denied use rights in past five years?	
AQ36	What is the total number of farmers whom you believe they will not be evicted from their land for development projects?	
AQ37	What is the total number of farmers whom you believe they will be evicted from their land for development projects in the next five year	

Appendix 3: Independent sample t test- Equality of variance test

		Levene's Test for Equality of Variances		**t-test for Equality of Means**			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
Total Amount SHF invested in Tza	Equal variances assumed	3.443	0.067	-2.428	89	0.017	280438.31
	Equal variances not assumed			-2.332	44.94	0.024	280438.31