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THE CONTRIBUTION OF AGROFORESTRY PRACTISE IN IMPROVING COMMUNITY LIVEHOODS IN MOSHI RURAL DISTRICT, TANZANIA

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ABSTRACT: The study was aimed to investigate on the contribution of agroforestry on improving community live hoods in Moshi rural district. The study was intended to answer three research questions which are about the factors affecting the adoption of agroforestry, contribution of agroforestry in improving community live hoods also challenges and responses facing agroforestry in Moshi rural district. The study used socio-economic survey design by employing qualitative and quantitative research approaches which was suitable for obtaining data useful in evaluating present practices and in providing basis for decision making. Hence provided sample size was 100 respondents from three selected villages. The study used two methods which is, interview schedule and questionnaire on data collection. The data collected was analyzed in terms of frequency, means and percentages by the help of computer software SPSS and presented using tables. The results of the study revealed that agroforestry improving the community live hoods through income generation, timber production, improve soil quality, reduce soil erosion, major source of food and wood energy, though there are some factors affecting the technology

adoption like land scarcity, adaptation to local skills, availability of information and skills, moreover the technology was affected by a lot of challenges like demographic change, lack of technical skills, lack of capital, lack of man power and land accessibility. This study has got five chapter from which every chapter has got its description.

INTRODUCTION

1.1 Background of the Study

Agroforestry is an integrated system of rural land resource management based on combining shrubs and trees with crops and/or livestock, whose interactions generate economic, environmental and social benefits. (Debeats, 2007). There is role of agro-forestry system in addressing rural development, food scarcity and income generation potential is described. Numerous benefits to agroforestry as it encourages the adaptation of natural ecological processes within the commercial system. It helps farmers in terms of controlling land degradation, sheltering crop and livestock, improving their landscape, and enhancing wildlife habitat while making the most out of commercial opportunities. The above-mentioned crucial elements involve key indicators such as biodiversity, productive capacity, ecosystem health, soil and water maintenance, carbon contribution, socio-economic benefits, and legal frameworks.

Agroforestry, the inclusion of trees within farming systems, has been a traditional land use developed by subsistence farmers throughout most of the world. In the last 40 years it has also become a subject for systematic study and improvement, and a livelihood option promoted by land use managers and international development efforts. It will come to the attention of global analysts and policy makers, for example UNFCCC (2008) and MEA (Hassan et al 2005), and has been recognized in regional and national development plans (NEPAD 2003) and is an obvious component of many farming systems.

Despite its ubiquity and apparent importance, is hard to find data on the actual extent of agroforestry around the world. The lack of data and more fundamental misconceptions of what agroforestry is, will lead to an assumption that it is globally of little importance, even by people who should know better: “During preparation of

the IAAST report, USA referees said that everyone knew there were only 50,000 ha of agroforestry in the world and that they were a failure" (Roger Leakey, personal communication). Such misunderstandings lead to suboptimal policy decisions, and will be reversed by providing objective, data-base measures of the extent of agroforestry.

Understanding the extent and distribution of trees on agricultural land, at the landscape level, including the numbers and characteristics of farmers and farming communities within those landscapes, can help to assess the importance and role of agroforestry both to the livelihood of farming communities as well as to overall global. The contribution of Agroforestry practices is well appreciated throughout the world (Kebebew et al., 2011). Globally, famine and starvation are knocking with speed. As the world population expands the food problem has become increasingly severe, with the number of those malnourished reaching 3 billion (Olajide Taiwo et al., 2010).

During the period of 1993 to 2003 up till now, Africa's rate of population growth has been higher than the rate of food production Bishaw and Abdelkadir, (2003). For example, in Indonesia and Nicaragua, the report showed that home gardens contributed 21.1% and 35% of their total income respectively Tynsong and Tiwari (2010). In South West Bangladesh and North Eastern Bangladesh, the report showed that an average of 15.9% and 11.8% of household income is derived from home gardens respectively (Motiur et al., 2005).

Tanzania agro-forestry Project started in Tabora in 1986 and Shinyanga in 1991 to improve living standard for small scale farmers with poor resources and to reduce poverty (Allan, 2003). It will be a participatory project where farmers and policymakers shall be a part of the project and through training, support and networking with organizations; farmers will adopt agro-forestry technologies. In this study I was familiar with the contribution of agroforestry in improving community live hoods in the Moshi rural district. Despite the fact, this study investigated the contribution of agroforestry to the community live hoods in Moshi rural district, Tanzania.

1.2 Statement of the Research Problem

This study was focused on uncovering the state of knowledge and strategies was to address contribution of agroforestry to the community since that very little has been done in Tanzania and in Moshi rural district. This study assesses the contribution, factors affecting agroforestry and challenges faced by agroforestry in order to improve the community live hoods in Moshi rural district. The study by Kyamani (2008) on his study of an assessment on the status of agroforestry technologies among the communities, has been studded entirely by in Uyui district, on her study she revealed that agroforestry technologies have started to provide some of the various benefits to farmers e.g. fuelwood, poles and income generation also the agroforestry contribute on improvement of soil fertility and control of soil erosion another study was conducted by Mbwiga (2016) on classification of Chagga agroforestry home gardens and their contributions to food, income and wood energy to communities of Rombo District, revealed that The Chagga agroforestry home gardens were the major sources of food, income and wood energy for the community then lack of extension services, pests and diseases and land shortages are the main constraints in the Chagga agroforestry home gardens.

The study by Charles (2013) on Agroforestry as Adaptation Strategy under Climate Change in Mwanga District, Kilimanjaro after reveal of the results of the study he recommended that. Vigorous efforts are needed to provide knowledge on the agroforestry products value addition innovation, promoting rich carbon land use, understanding and addressing competing claims on natural resources access and uses. Also, another study conducted by Wagner & Mremi (2019) which explained about the importance of common trees species in coffee agroforestry at Mount Kilimanjaro after the results they recommended that there is the need to understand factors underlying farmers' management decisions before recommending shade tree species.

1.3 Research Objective

1.3.1 General Objective

The overall objective of this study was to assess the contribution of Agroforestry on improving community live-hoods in Moshi Rural District, Tanzania.

1.3.2 Specific Objectives

The specific objectives is:-

1. To identify the factors affecting adoption of agroforestry in the study area.
2. To examine contribution of agroforestry in the study area.
3. To determine the challenges and response to the challenges of agroforestry in live-hoods to the community

1.4 Research Questions

1. What are the factors affecting adoption of agroforestry?
2. What are the contributions of agroforestry in the study area?
3. Which are the challenges and response facing agroforestry in the study area?

1.5 Significance of the Study

The study helped the community to know on how release of nutrients from the decomposition of tree residues was synchronized with the requirements for nutrient uptake of associated crops. While different trees and crops was all having different requirement, and there was always some imbalance, the addition of high-quality pruning's to the soil at the time of crop planting usually leads to a good degree of synchrony between nutrient release and demand.

The study provided a more knowledge on diverse farm economy and stimulates the whole rural economy, leading to more stable farms and communities. Economics risks reduced when systems produce multiple products.

The study also worked towards land protection and conservation through more effective protection of stock, control of soil erosion, salinity and water tables and a higher quality control of timber.

1.6 Scope and Delimitation of the Study

The study was conducted in three randomly villages to be selected from the selected ward, those villages include Kariwa, Okaseni and Longuo A in South Uru ward

Moshi rural districts in Kilimanjaro region due to their biophysical characteristics such as soil, vegetation and rainfall. Such characteristics create the conditions that are favorable for agroforestry in comparison to other parts of the country, the study was conducted to both small- and large-scale agroforestry projects, and this helped to get most relevant data because of difference in availability of resources. Furthermore, they differ in emphasis on practicing and monitoring.

The limitation of the study was not be possible to generalize the results to the whole country since the study was done only in Moshi rural, also the researcher was having very limited time for data collection so the researcher was not able to visit all agroforestry projects, also the study limited by lack of enough funds.

1.7 Conceptual Framework

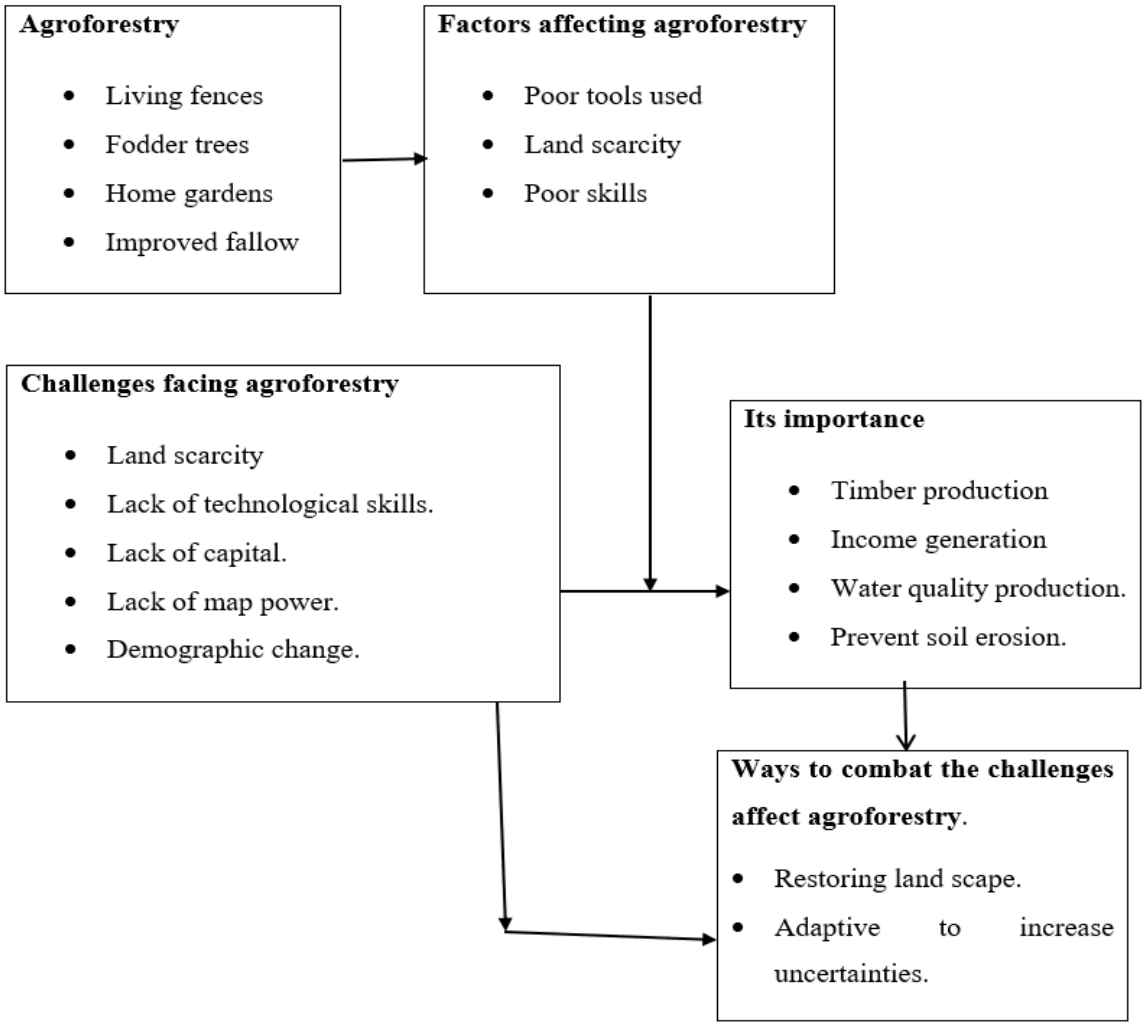

Figure 1.1 Conceptual frameworks showing the contribution of agroforestry toward community live hood.

Source: From my own construct (2021).

The conceptual frame work above shows the variable of this research, the first box explain the meaning of agroforestry. To define agro-forestry can be a difficult task. There are many ways to conduct an agroforestry system, for example by integrating trees and pasture, trees and beekeeping, trees and crop or trees and pasture and fishpond. To have trees with specific qualities such as giving shade, be deep rooted, and be multipurpose and fast growing is important. According to Mshana (2009), agro-forestry could to plant a tree on your land. You can have an agro-forestry system without knowing that you practice it, for example a live fence can be agro-forestry. A live fence is a bush with thorns to keep livestock out of the farm or to mark a boundary (Mshana, 2009), but to be a system a definition of agro-forestry is:

"Complex agro-forestry systems which look like and function as natural forest ecosystems, but are integrated into agricultural management systems". Agroforestry adoption has been affected by different factors in this framework the factors such as land scarcity which may lead to the insufficient area for conducting agroforestry, lack of information technology which cause poor information flow and adaptation to local skills are some of factors affecting adoption of agroforestry. Abebe (2005). The study by Mariro (2009) revealed that there are some challenges which are facing agroforestry adoption demographic change, lack of technical skills, lack of capital, lack of manpower and land accessibility are the one among of the challenges facing the agroforestry, challenges may hinder adoption or reduce the adoption rate where it may cause less contribution of agroforestry to the community livelihoods.

The contribution to community livelihoods is the dependent variable because the effective practicing on the agroforestry may lead to the increase of human consumption where food and fruits from agroforestry may be consumed by people, also animal consumption, the economic benefits also is the one among of the products of agroforestry where timber, poles, firewood and selling of crops and fruits may increase the community income, agroforestry also it has the benefits to the environment, it may protect water, contribution of the soil fertility as well as adaptation to climatic change. Boniface (2004).

1.8 Operational definition of key terms

Agroforestry is a land use management system in which trees or shrubs are grown around or among crops or pastureland. This diversification of farming system initiates an agro-ecological succession like that in natural ecosystems and so starts a chain of events that enhance the functionality and sustainability of the farming system (Michele, 2017).

Home gardens refer to the cultivation of a small portion of land which may be around the house hold or within working distance from the family home. Home garden can be described as a mixed cropping system that encompasses vegetables, fruits plantation crops, spices, herbs, ornamental and medicinal plants as well as livestock that can serve as supplementary source of food and income. Agriculture and food security (2013).

Livelihood defined as a set of activities essential to everyday life that are conducted over one's life span. These activities could include securing water food fodders.

Food Scarcity is a widespread of food, caused by several factors including war, natural disasters crops failure, population imbalance, widespread poverty, an economic catastrophe or government policies Huff, Gregg (2019).

LITERATURE REVIEW

2.0 Introduction

On this chapter am going to discuss the following issues which are, theoretical review, empirical review, and knowledge gap. Literature review is an account of what has been published on a topic by accredited scholars and researchers. Literature review enables a researcher to determine the weaknesses of various studies that have already been done, whereby it helped the researcher to get the profit of experience from other researchers and avoid their mistakes through identifying the knowledge gap and weaknesses in previous studies. This chapter presented the literature review of the study and focus on gathering related research works of previous scholars as

well as to review the different literature works that relate to research questions was developed for this study.

2.1 Theoretical Review

2.1.1 The Oasis Theory

The oasis theory was defined by Vere Gordon Childe (1928). Referring to one of main hypotheses about origin of agriculture that people started to domesticate plant and animals. He argued that at end of the Pleistocene, North Africa and near East experienced a period of desiccation, a period of an increased occurrence of drought, with higher temperature and decreased precipitation that aridity drove both people and animals to congregate at oases and river valley. The model provided the major intellectual foundation for much of the research and extension effort and management

Pollen cores show climates differ from region to region and climate change in Middle East was not severe enough to support this theory, also people and animals could have added into wetter hills surrounding the desert easier.

2.2 Empirical Review

Bargali (2018) studded about contribution of homegardens agroforestry in livelihood of rural farmers in Kumaun Himalaya, in India the study explores Homegardens as the intensive land-use systems involving the management of woody species grown in deliberate association with herbaceous species. A study on Socioeconomic and Environmental Benefits of Agroforestry Practices in a Community-based Forest Management Site in the Philippines, revealed that most of the people who practice agroforestry have social and economic improvement since there is improvement of housing condition, total standards of living, also income from farm are increased also provision of income from the farm products such as timber and fodders. Bugayong (2003).

The study on assessment of potential contributions of agroforestry to food security in Katsina, Sudan Savannah Area, Nigeria, revealed that the contribution of agroforestry practices in the study area included provision of fruits and leaves,

improvement of soil fertility, erosion control and provision of fodder. Most of the respondents reported an increased yield of food crops from a mixed tree and crop farm. Agroforestry practices increase quality of the soil with important nutrients and prevent soil erosion. Abdulhamid (2017). Also, the study by Ndalama (2015) was conducted to access the contribution of agroforestry to the improvement of community livelihoods in Balaka, Malawi, with emphasis on identifying the main forest products and services obtained from agroforestry trees, and identifying the impact of agroforestry adoption on livelihoods of farmers. The study revealed major impact of agroforestry adoption to improvement of livelihoods of farmers identified was; increase income, by increase crop yield and improved health and nutrition then was recommended a strong need to intensify promotion of agroforestry and advocacy to policy makers.

The study by Shilabu (2008) on the contribution of agroforestry to household food security and income generation in Maswa district, Shinyanga region. With objective of evaluating the contribution of agroforestry to household food security and income generation, revealed that agroforestry has brought the stability on income both individually and community also it lead to the food security to the families who practice .Also according to Mgeni (2008) studded about the adoption status of agroforestry practices in Mufindi district, Iringa region, Tanzania, the study determined factors influencing adoption of Agroforestry systems, technologies and find out corrective measures required for improving their adoption by the local communities. Recommendation to the Government to continue with a stepped-up provision of the needed germplasm and propagation materials, farmers need encouragement in establishing their own nurseries, awareness creation especially in relation to inclusion of fertility improving and food producing trees and shrubs.

2.3 Factor Affecting Adoption of Agroforestry

The study by Irshard et al (2011) on Identifying factors affecting agroforestry system in Swat, Pakistan the study has identified factors that affect the adoption of agroforestry practices; these include farmers' perceptions towards agroforestry, socio-economic characters of farmers and constraints for the development of agroforestry. The analysis of data demonstrates that the factors affecting farmers' adoption of

agroforestry practices have been varied depending on the type of factor. Growing of trees was observed as a function of social and economic characteristics of the farming community. Most of trees grown for fuel-wood, timber, fodder, income generation, environmental purpose and for controlling erosion. Poor crop-stand, lack of markets, lack of nurseries, damage by animals and humans and lack of incentives were the obvious constraints expressed by the farmers. Bigger size of the family positively influenced tree cultivation. Farmer's income has supported agroforestry. Education level encouraged trees. Studies that had been done in relation to adoption of agroforestry by Ajayi et al. (2012).

In Africa some of studies has been conducted on the factors affecting the adoption of the agroforestry. The study by Gitonga (2010) on socioeconomic factors affecting agroforestry adoption in Ndabibi location, Naivasha, Kenya found out that while some socio-cultural factors such as education, contact with extension service and membership to farmers association have a significant positive relationship with the adoption. In addition, economic factors of income and land tenure security were found to have a significant positive relationship with the adoption of agro forestry practice while land size was found to have a significant negative relationship with the adoption. Forest dependence was found to have a significant negative relationship to the adoption of agro forestry practice such that those were more dependent exhibited a low adoption while those who were less dependent exhibited a high adoption of agro forestry practice.

Adoption means the integration of the new concept, idea or technology. It implies repeated usage of the technology overtime. It refers to the ability to make decisions regarding to resource uses and technologies. The study by Mwase (2015) on Factors Affecting Adoption of Agroforestry and Evergreen Agriculture in Southern Africa. The study revealed that the major factors affecting adoption of agroforestry fall into two main categories of socioeconomic and biophysical factors. The factors are high initial costs of agroforestry practices, low extension knowledge, unavailability of agroforestry germplasm for economic, social and biophysical categories respectively they perceived that there is need to institutionalize sustainable agricultural land

management practices through policy formulation, budgetary allocation for extension officers and farmer training and starter up inputs.

However, another study conducted in Ghana that assessed the social economic factors affecting agroforestry adoption determined the level of education, age, income, years of farming experience, household farm labour, farm size, land tenure arrangement, knowledge on agroforestry practices, access to extension services, farmers' value of forest, proximity to a forest reserve area and farmers' willingness to plant trees**.** Obeng (2014).

In Tanzania the study conducted by Chija (2013) on the adoption status of Agroforestry systems and technologies in Kasulu District, Kigoma Region, revealed that lack of knowledge, land shortage and lack of monetary capital were the most factors affecting adoption of agroforestry. Also, Mgeni (2008) studded about the adoption status of agroforestry practices in Mufindi district, Iringa region revealed that insufficient provision of germplasm, land scarcity and limited knowledge indicated to be the main factors limiting and adoption of Agroforestry.

The study was carried out across Kilimanjaro region on the assessment of the institutional and socio-economic factors affecting adoption of Conservation Agriculture with Trees in Mwanga districts indicated farmer's age influences Sex and education level rural-urban migration as the one among of the factors affecting agroforestry adoption Nasari (2013).another study on the Agroforestry as adaptation strategy under climate change in Mwanga District, Kilimanjaro, Tanzania revealed that there is the diversity of benefits in agroforestry practices such as food , fodder , selling livestock ,fruits, timber and fuel wood also agroforestry practices tend that increase farmer`s resilience during environmental extremes and climate variability. Charles (2013)

2.4 Contribution of Agroforestry to Community Live hoods

2.4.1 Social-economic Contribution of Agroforestry

Globally on realizing the economic benefits of agroforestry most research on agroforestry has been conducted from the biophysical perspective, but socio-economic aspects are gaining attention Mercer and Miller, (1998). The study on

assessment of the social economic benefits of agroforestry for improving community livelihoods in Tehran, Iran revealed that Agroforestry provides jobs, reduces migration, and in many cases it effects on incomes and also effects on welfare and food security Hamidian (2011). The study on the potential of agroforestry for rural development in European Union revealed that in ecological terms, agroforestry can create synergies, enhancing the overall natural and social resources of an area. This goes hand in hand with economic potential of agroforestry. Economic considerations and benefits especially include the diversification of the farm income and the reduced environmental risks which make production a more secure practice. It is essential for agroforestry systems to be correctly implemented in order to be economically productive.

El Tahir (2015) on his study of Estimation of Economic Value of Agroforestry Systems at the Local Scale in Eastern Sudan perceived that total economic value of agroforestry includes marketable and non-marketable goods and services. The main direct marketable and sustainable high value products include: food, cash crops, firewood, gum, fodder, medicine, fodder, and honey, results reveal that agroforestry in the project sites have significantly contributed to the livelihoods of the local communities

In Tanzania the study conducted by Nzilano (2013) on the contribution of agroforestry homegardens to household food security and income generation among communities in Mbeya rural district, revealed that Agroforestry home gardens is a major source of food and income generation in Mbeya Rural District. Therefore, there is a need for enhancing and reviving further the Agroforestry homegardens technologies for the benefits of the wider communities beyond the district. This should go hand in hand with the provision of sufficient credit facilities, extension services together with marketing arrangements.

The study carried out in Rombo district on the classification of Chagga agroforestry homegardens to their contributions to food, income and wood energy to the local communities, revealed that The Chagga agroforestry homegardens were the major sources of food, income and wood energy for the community contributing about 95%, 86% and 73% respectively**.** Mbwiga (2019).

2.4.2 Environmental Contribution of Agroforestry

Globally, there a lot of studies conducted about the environmental contribution of agroforestry walker (2013) on his study of environmental benefits of agroforestry in the world revealed that, the environmental benefits of agroforestry are the environmental benefits of agro forestry are, improving natural resource development, the total crop and wood production from an agro forestry plot is more than the separate production on the same piece of land. This is because the trees and crops complement each other's growth. Weeds in young forestry plantations are substituted by harvested pasture or crops. Maintenance is less expensive and environmental resources are used effectively; Original open landscapes are created and are aesthetically pleasing and favor recreational activities. Agro forestry plots have landscaping potential and can enhance the public image of farmers in society. The greenhouse effect is countered by the constitution of an efficient system for carbon sequestration, by integrating the stock maintenance of organic material in the soil and superimposing a net fixing wooded layer, enables the protection of soil and water especially in sensitive areas. By lowering water tables, this can be reduced and downstream towns can benefit, Soil erosion and runoff can be controlled by reducing water loss, soil material, nutrients and organic matter, Biological activity and soil organic matter can be maintained at satisfactory levels for soil fertility, Through organic matter maintenance and the impact of tree roots, physical properties of soil can be maintained, The development of soil toxicities can be checked or reduced – soil acidification and salination can be monitored and trees can be employed to reclaim polluted soils, Solar energy is used more effectively than monoculture systems; a range of leaf shapes, alignments and plants of different heights all contribute to this, Agro forestry may result in a reduction in insect pests and related diseases. It can also reclaim degraded or eroded land, Trees and shrubs that aid in nitrogen fixing increase nitrogen inputs to agro forestry systems and Agro forestry is capable of creating a diverse farm economy and stimulating the entire rural economy resulting in more stable communities and farms. When systems produce a number of products, economic risks are reduced.

2.4.3 Challenges Facing Agroforestry

Agroforestry is a collective name for land use systems and technologies where woody perennials (trees, shrubs, palm, bamboos are deliberately used on the same piece of land management units as agricultural crops and/or animals in some form of spatial arrangement or temporal sequences and there are both ecological and economical interactions between the different components.

Globally, the study by Sharma, Prabhat, Verma (2018) studied on Agroforestry systems Opportunities and challenges in India, the adoption rates are still low because there are several challenges that reap the benefits of agroforestry like shortage of superior planting material, insufficient research, lack of market infrastructure, cumbersome and frustrating legislation in respect of tree felling, wood transportation and processing.

The study by Olave (2017) on Transition to agroforestry Current challenges and opportunities for the adoption of agroforestry as carbon sequestration strategy in middle Europe, reveals that Barriers to innovation in the agroforestry sector include the uncertainty regarding carbon assessment methodologies. In particular, Land Use and Land Use Change from Forestry (LULUCF) accounting needs to better reflect the full potential for carbon sequestration from agroforestry systems using comprehensive calculations. Economic modelling is also a key aspect in promoting agroforestry, as one of the greatest barriers to innovation is the uncertainty in finance and labour required in an agroforestry system.

The study by Owino (2015)**,** on his study of Challenges Affecting the Adoption of Agroforestry Practices around Chepalungu Forest in Bomet County, Kenya perceived those anthropogenic activities around Chepalungu forest has led to its reduction in size and has resulted in its degradation. Continued dependency on this forest may result in its total depletion despite its high biological diversity and the value of its natural resources, during his study identified challenges affecting the adoption of agroforestry practices. Notable challenges were: damage by animals, damage by man, tree nursery problems, inadequate capital, natural calamities, competing land uses, managerial problems and seed acquisition problems.

Many studies about the challenges facing adoption of agroforestry conducted in Tanzania, the challenges like Land tenure system which bring barriers to agroforestry through Small land plot size (mainly in upland villages) clan-owned land renting system absence of village land use plans, Land use and management which lead to slash and burning practice which farmers was mentioned and is not time and labor consuming and allows to control weed and pest and capacity and knowledge lack of awareness by farmers of environmental benefits of trees and misconception about trees e.g. fear of tree shade negatively affecting crops, and fruit trees attracting monkeys lack of awareness of existing forest legislation lack of knowledge of tree seedling management, pest and disease control, and adequate seeds and germplasm supply. This is according to FAO, 2014.

Another study was conducted by Chija (2013) which was about adoption status and management of agroforestry systems and technologies by communities in Kasulu district, Kigoma, Tanzania revealed there are many challenges facing adaptation of the agroforestry which include lack of knowledge, land shortage and lack of monetary capital were the most limiting factors.

In the studies cross out Kilimanjaro region Mbwiga (2016) studied about the assessment on the contribution of Chagga homegardens to the community livelihoods in Rombo district, after assessing the contribution, the study determined Lack of extension services, pests and diseases and land shortages are the main challenges in the Chagga agroforestry homegardens.

2.4.5 Responses to the Challenges Facing Agroforestry

Agroforestry systems include both traditional and modern land-use systems in which trees are managed together with crops and/or animal production systems in agricultural settings. Agroforestry is practiced in both tropical and temperate regions, where it produces food and fiber, contributes to food and nutritional security, sustains livelihoods, alleviates poverty, and promotes productive and resilient cropping and grassland environments, Even though these benefits justify increased investment in the development of agroforestry systems, the sector is disadvantaged

by adverse policies, legal constraints and a lack of coordination between the governmental sectors to which it contributes FAO (2014).

Globally the response to the challenges of agroforestry economic information needs include, valuation of ecosystem services provided by agroforestry practices over multiple spatial scales and time better quantification of economic costs and benefits for producers implementing agroforestry practices, understanding how agroforestry fits into production operations at different scales of production and marketing systems from a social science perspective, information needs include, formulation of technical support and educational opportunities that are most effective at encouraging agroforestry adoption, approaches that best apply that knowledge to the wide diversity of potential agroforestry adopters, better understanding of landowners' perceptions of climatic variability and change as it influences their adoption of agroforestry practices USDA (2011).

There is now general agreement about the magnitude and scale of the integration of trees into agricultural lands and their active management by farmers and pastoralists. Zomer et al. (2009),the challenges to the adoption of agroforestry in Africa may be encountered by some of practices and efforts like awareness creation for agroforestry has involved a variety of actors, Dissemination of technical knowledge and skills, Property rights, Subsidies or support for other land use practices FAO (2015).another study which conducted to investigate the agroforestry technology adoption and its effect on farmers' crop productivity in the Bawku West, Talensi and Nabdam Districts of the Upper East Region of Ghana revealed that Government, Non-governmental Organizations and other relevant stakeholders should further support in the provision of improved tree seedlings and extension services to improve on farmers' adoption of agroforestry technologies and their economic wellbeing (Mohamed, 2017).

In the cross of Kilimanjaro region there is some of studies conducted in order to explain the response towards the challenges facing adoption of agroforestry practices, on their study of Agroforestry as Adaptation Strategy under Climate Change in Mwanga District, Kilimanjaro, Tanzania, they revealed that efforts are needed to provide knowledge on the agroforestry products value addition

innovation, promoting rich carbon land use, understanding and addressing competing claims on natural resources access and uses (Charles & Munishi, 2013).

2.5 Knowledge Gaps

A gap in knowledge relates to a lack of holistic valuation of the benefits of agroforestry. So far, the evidence on livelihood benefits of agroforestry is scattered within primary studies. Published syntheses are limited to specific ecosystem services— especially certain provisioning ecosystem services and the role of agroforestry in supporting food production. This gap persists in the literature because researchers prioritize economic benefits or tools form ensuring non-economic livelihood benefits are not well developed. Studies on livelihood benefits of agroforestry in SSA mainly focus on market benefits, such as crop yield, timber, fuel wood and non-wood tree products (Kuyah et al. 2016). Those studies that consider non-market benefits limit research to tree cover and associated agro biodiversity. Non-Economic community livelihood benefits of agroforestry are, are not considered, and disvalued in most studies I made. The cultural role of agroforestry or its products is often overlooked. A recent review identified an apparent lack of studies on cultural benefits of trees on farms in SSA (Kuyah et al. 2016), although some of the trees documented to provide cultural benefits in forests are also found on farms. Many tree species found on farms have a central place in peoples' traditions and ceremonies. For example, beer from marulais shared with neighbors, helping to build and maintain social networks (Shackleton and Shackleton 2004); shea butter is presented as a gift among women to celebrate marriage, births or dowries (Boffa 2015); home gardens provide fruits for sharing, and they also play a role in cultural festivals and religious activities. The majority of rural people traditionally use wild species for medicine and other purposes. Harvesting and processing medicinal plants, e.g. shea butter and other tree products, entail traditional knowledge passed on across generations. Understanding the contribution of trees to various aspects of livelihoods is needed to support informed decision-making and evidence-based land use management in SSA.

RESEARCH METHODOLOGY

3 .0 Introduction

This section states how the researcher intends to approach the research questions and the techniques and the logics that the researcher is expecting to use. As it is indicated in the title, this chapter includes the research methodology of the dissertation. In more details, in this part the author outlines the research strategy, the research method, the research approach, the methods of data collection, the selection of the sample, the research process, the type of data analysis, the ethical considerations and the research limitations of the project (Syspos, 2015).

3.1 Description of the Study Area

3.1.1 Location of the Study Area

This study was carried out in Moshi Rural District, Kilimanjaro Region. The district is one of the seven districts of Kilimanjaro region. The other districts include Hai, Siha, Rombo, Mwanga, Same and Moshi Urban. The district is located between latitude 3°10'S and 3°48'S; and longitude 3715'E and 37°36'E. To the west, the district is bordered by Siha and Hai districts, while Mwanga district lies to the Southeast. To the north east, the district is bordered by Rombo district. To the south, it is bordered by Simanjiro district, which is in Manyara region. The district covers an area of 1529 kilometre squares (km^2) and administratively the district is divided into four divisions, 31 wards and 165 villages (URT, 2013). This study involved 1 ward and 3 villages which was selected randomly.

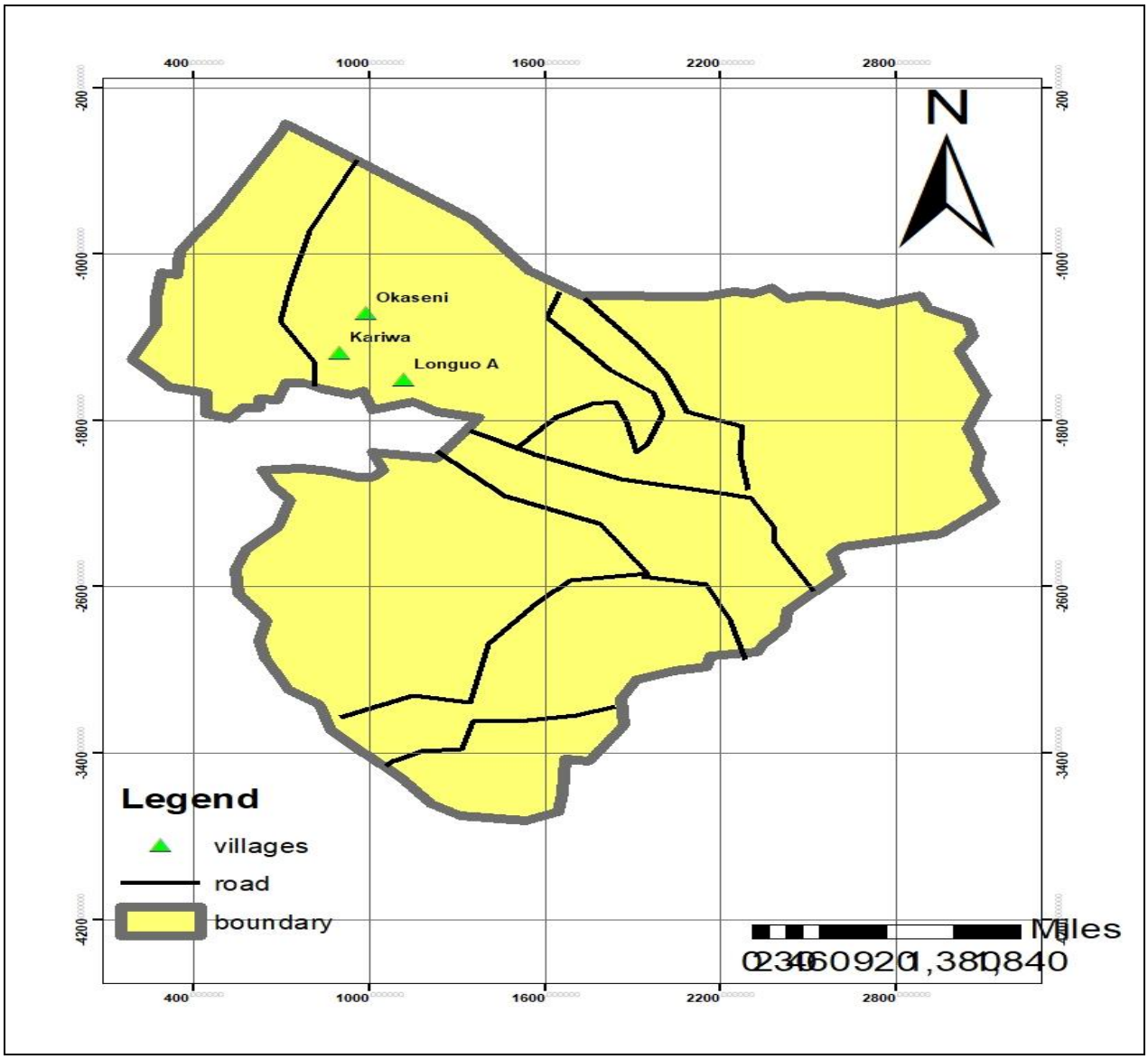

Fig 3.1 A Map of Moshi rural showing the study area (by researcher 2022)

3.1.1 Demographic Characteristics of the Study Area

Moshi rural district has a total population of 466,737 (URT, 2012). It was revealed that there were 225,767 males and 240,970 females (URT, 2013). The population density in the district is estimated to be 305.26 people per km2 (ibid.). The population growth rate is estimated to be 1.1 percent per year with average household size of 4.2 (URT, 2013). The major ethnic group in the district is Chagga (MDC, 2012).

3.1.2 Climate of the Study Area

Moshi rural district has average daily temperature of 26º C. The highest temperatures occur in the months of February, March, April, September October and November with mean maximum temperatures around 31 ºC. The lowest temperatures are experienced in June, July, December and January experienced at about 15ºC. The mean annual rainfall is 1520 mm (MDC, 2012). The area is characterized by bimodal rainfall patterns, where short rains fall between November and December particularly in the highlands, while long rains fall between March and May with the peak in April. Temperatures are also moderated by altitude (MDC, 2013) Moshi has a tropical climate. Therefore, in winter, there is much less rainfall than in summer. Köppen and Geiger classify this location as Aw. In Moshi, the average annual temperature is 23.4 °C. About 856 mm of precipitation falls annually.

The hot season lasts for 2.7 months, from January 5 to March 27, with an average daily high temperature above 88°F. The hottest day of the year is February 18, with an average high of 91°F and low of 68°F.

The cool season lasts for 3.1 months, from May 20 to August 24, with an average daily high temperature below 81°F. The coldest day of the year is July 13, with an average low of 61°F and high of 79°F (Kilimanjaro International Airport, 2019)

According to "Moshi Municipal Council – Background" (2016), *a* wet day is one with at least 0.04 inches of liquid or liquid-equivalent precipitation. The chance of wet days in Moshi varies significantly throughout the year. The wetter season lasts 6.4 months, from November 7 to May 20, with a greater than 24% chance of a given day being a wet day. The chance of a wet day peaks at 46% on April 19.

The drier season lasts 5.6 months, from May 20 to November 7. The smallest chance of a wet day is 1% on September 5. Among wet days, we distinguish between those that experience rain alone, snow alone, or a mixture of the two. Based on this categorization, the most common form of precipitation throughout the year is rain alone, with a peak probability of 46%on April 19(Kilimanjaro International Airport, 2019).

3.1.3. Targeted Population of the Study Area

The researcher conducted his research in Moshi rural area, where the ethnic group was Chagga people by consulting with farmer found at Kariwa ward, Okaseni, and Longuo A, Ward Executive Officers (WEOs) and Agricultural Extension Officers (AEOs). Also, the researcher believed that the targeted populations are familiar with the area and through their experience they were able to provide appropriate information on the research problem. The target population of this study was 100 respondents. According to the 2012 census, the population of the Moshi District was 466,737 whereby the number of males is 225,767 and the number of females is 240,970. Moshi rural populations according to Population Distribution by Administrative Units, United Republic of Tanzania (2013).

3.2 Research Design

According to Creswell (2014), a research design is a set of methods and procedures used in collecting and analyzing measures of the variables specified in the problem research. The study used the cross-sectional research design by employing both qualitative and quantitative research approach. Therefore, through this it was enabled effectively collection of information as well as data concerning about the research topic.

3.4 Description of sample and Sampling plan

A sampling frame is the set of source materials from which the sample has to be selected for research (Turner, 2003). The sampling frame for participants in this study involved local community in the three selected villages from selected ward. The sample also involved Ward Executive Officers (WEOs) and Agricultural Extension Officers (AEOs) from selected villages and ward, respectively**.**

3.5 Sample size

According to Henry, (2013) Sample size refers to the number of units for a sample usually the first question to be addressed by a study team to the sampling consultant. The sample size is importance. The sampling size is an important feature on any empirical study in which the goal is to make inferences about a population from a

sample (Ahn, 2014). The sample size of the local people in the selected wards was determined by using the following formula;

$$S = \frac{N}{1 + N(e)^2}$$

Where

N= total population/population size

e= level of precision

S=sample size

Solution

$$S = \frac{17328}{1+17328(0.1)^2}$$

Sample size = 99.4 ≈100

Example for sample

$$\frac{7236}{17328} \times 100$$

=41.7.

The current total number of populations in the selected villages accounted for 17328 with 7236 at Longuo A, 6036 at Kariwa and 4056 at Okaseni (WEO, 2020). Using 90 percent level of precision, the sample size for the local community obtained as follows:

Summary of Households and Sample Size 3.3.3 Summary of Households and Sample Size

Table 3.1 Overall Sample Size of the Target Population in the Study Area

Villages	**Frequency**	**Percentage (%)**
Longuo A	41.7	42
Okaseni	23.3	23
Kariwa	34.8	35
Total	99.8	100

Source: from my own construction (2026).

3.4.1 Sampling Procedures

Sampling refers to the process of selecting a number of individuals or objects from a population such that the selected group contains elements that can be found in the entire population (Orodho and Kombo, 2002). The process involves selection of sample size from sampling frame (ibid.).

The study used both probability and non-probability sampling procedures. Purposive sampling technique used to select participants for the focus group discussion, village executive officers, ward executive officers, and agriculture extension officers. The sampling technique used to obtain information from the people with position in Moshi rural district who may have knowledge and formal opinion on agroforestry practices.

3.5 Source of Data

For the purposes of this research, in depth interviews were used. In depth interviews are personal and unstructured interviews, which are aimed to identify participant's emotions, feelings, and opinions regarding a particular research subject. The main advantage of personal interviews is that they involve personal and direct contact between interviewers and interviewees, as well as eliminate non-response rates, but interviewers need to have developed the necessary skills to successfully carry an interview (Fisher, 2005, Wilson, 2003).

3.5.1 Primary Data

Data that has been collected from first-hand-experience is known as primary data. Primary data has not been published yet and is more reliable, authentic and objective. Primary data has not been changed or altered by human beings; therefore, its validity is greater than secondary data. According to Kothari (2004), primary data are those collected for the first time and are origin in quality. Primary data collected from the local people in the district council by preparing and distributing questionnaire.

3.5.2 Secondary Data

Data collected from a source that has already been published in any form is called as secondary data. The secondary data gathered from various books, journals, research publications and unpublished materials as well as from the regional and district

documentation offices concerning the contribution of agroforestry to community live hoods, The information used to supplement the data that collected from primary source particularly those related to agroforestry.

3.6 Data Collection Technique

When the research proposal completed and accepted by the course supervisor, I asked a letter for permission from administration of Mwenge Catholic University to allow further collection of data to the field where data was collected. Then the researcher visited the fields' station and make appointment with the District Authority administration on the day of collecting data. A researcher used questionnaires to collect data from Agriculture extension officer and the researcher was interviewed from local respondent (peoples). There was highly interaction between a researcher and respondents to ensure full cooperation of data collection. And soon after data collection completed researcher collected all the instruments supplied to the respondents to make sure that the instruments are back to the researcher in time after completion of the study. After the instruments of data well collected the result reported to the study.

3.6.1 Questionnaire Schedule

Is a research instrument consisting of a series of questions and other prompts for the purpose of gathering information from respondents. Although they are often designed for statistical analysis of the responses, this is not always the case. The questionnaire was invented by Sir Francis Galton (1822 – 1911). Data was collected from respondents by forming the necessary study population. The researcher distributed copies of items for questionnaire to the selected sample of the respondents. The use of guided questionnaires was used to collect data from respondents and they filled them then the researcher collected them, this helped researcher to save time.

3.6.2 Interviews Schedule

Interviewing involves asking questions and getting answers from participants in a study. Interviewing has a variety of forms including: individual, face-to-face interviews and face-to-face group interviewing. The asking and answering of

questions can be mediated by the telephone or other electronic devices (e.g. computers). Interviews can be – A. Structured, B. Semi-structure or C. Unstructured. The researcher used the interview in collection of data where interview employed to the local community who are capable in expressing themselves. The researcher used to prepare both structural and unstructured interview, structured interview guide was used in the study that consisted of questions to be asked to the local peoples, and face to face interview was conducted. This instrument used because the number of respondents was small.

3.6.3 Observation Schedule

Observation methods are the process of collecting data where information will be seeking by the way of researcher's experience without asking the respondents (Kothari, 1990). In this study, field observation was carried out in order to fill the gap which has not been filled by other method. This method was used because it provided the researcher and opportunity to look at what it takes place in actual situation rather than rely on second hand information. Observation was involved direct observation and observes the environmental challenges facing the areas. It involved collection of pictorial evidence in the areas, school environment, water resource, farms and infrastructure development using a camera.

3.7 Data Analysis Plan

Socio-economic data was analyzed by using Statistical Package for Social Sciences (SPSS) and Microsoft Excel Spreadsheets to obtain percentages, frequencies, and tables. Qualitative data was presented in form of descriptions supported by maps and photographs. Quantitative data was summarized by statistical methods such as line graphs, cross tabs, histograms, pie charts representing actual phenomena related to contribution of agroforestry practice to the community live hoods.

3.8 Validity and Reliability of the Research Instrument

3.8.1 Validity of the Research Instrument

Is the ability of the research tools to measure what is required to be measured Zeller (2015).The researcher was tested the data collected instruments which are

questionnaires guide and structured interview guide so as to evaluate and asses the accuracy and efficient of the data collection instruments, and evaluate the validity, appropriateness of the instruments, this enabled the researcher to test the validity of information, a researcher reviewed and adjust the questionnaires and interview when the instrument was not fit and compatible with the information to be collected prior to the real application to the instrument in exercise of data collection.

3.8.2 Reliability of the Research Instrument

Is the extent to which a measurement instrument or procedure yield the same results on repeated trials (Carmines (2010).Therefore, structural interview guide and questionnaires guide are reliable since they can give nearly the same results for which when treated repeatedly under the same condition thus the result that collected from one respondents at time, was given the results that are cross to one another as that of one another respondent from different context.

3.9 Ethical Consideration

The information of the persons collected was kept confidential and it was considering the ethical principles and guidelines necessary in research process. The research was considering the willingness of the respondents without compromise them either psychologically or physically. Also, people's ideas were considered and skills from different sources. Privacy, confidentiality, sensitivity to culture differences, gender and anonymity was maintained. Names of the participants were not documented on this research.

DATA PRESENTATION AND DISCUSSION OF THE FINDINGS

4.0 Introduction

This chapter comprises the analysis, presentation and interpretation of the findings resulting from this study. The analysis and interpretation of data is carried in phases which is based on the results of the questionnaire, deals with a quantitative analysis of data. The findings relate to the research questions that guided the study. Data were analyzed to identify, describe and explore the topic which is the: Contribution of

Agroforestry Practice in Improving Community Livelihood in Moshi Rural. The first part presents the demographic characteristics of respondents; the second part presents the findings based on the research questions.

4.1 Demographic information of respondents

4.1.1 Gender and education level of respondents

This section presents the analysis and interpretation of the data concerning the demographic characteristics of the respondents including gender, age, education level, occupation and marital status of the respondent.

Table 4.1 Gender and Education Level of Respondents

		Education level					
		informal education	primary education	secondary education	collage	university	Total
gender of respondents	Male	1	2	3	2	3	11
	female	1	0	1	4	7	13
Total		2	2	4	6	10	24

Source: field data (2022)

Table 4.1 summarizes the findings in the table 4.1 show that (58.0%) of the respondents participated in the study were female and (42.0%) of the respondents participated in the study were male. The study noted that majority of respondent in the study area were female indicating that women are dominant group residing in the study area that was Kariwa, Longuo A and Okaseni.

On the other side the findings in the table 4.1 indicate that 14(14.0%) of the respondents participated in the study have informal education, 14 (14%) of the respondents in the study attained primary education, 25 (25) of the respondents participated in the study attained secondary education 20 (20.0%) of the respondents participated in the study attained college education and 27(27.0%) of the respondent attained university level of education. The finding revealed that level of education among the respondents in the study area have strong link with the awareness on adaptations strategies of climate change/variability on food crops production where by the findings from field survey revealed that majority of respondent in the study

area have accessed secondary up to university education (secondary, college and university) therefore they are able to write and read. Also, cross tabulation has done and the result showed that 3% of male has got a university education while 7% of female have university education. 2% of male and 4% of female has got college education. This implies that people found on the study area has got a lot bite education to both male and female.

4.1.2 Age of Respondents

Table 4.2 Shows the years of respondent from the field area.

		F	%
Age of respondent	10-25 years	19	19.0
	26-36 years	31	31.0
	37-47 years	22	22.0
	47-58 years	21	21.0
	59 years and above	7	7.0

Sources: Field Study (2026)

Furthermore the findings in the table 4.1 indicated that 19 (19.0%) of the respondents participated in the study have age group of 10 years – 25 years, 31 (31.0%) of the respondents participated in the study have age group of 26 years – 36 years, 22 (22.0%) of the respondents participated in the study have age group between 37 years – 47 years and 21 (21.0%) of the respondents participated in the study have age group between 48 years – 58 and 7(7.0%) of respondent has 59years and above. The study noted that majority of respondents in the study area is energetic group who conduct different informal activities in order to earn income for their family and also most of them engaged in agricultural activities.

4.1.3 Marital status and occupation

Table 4.2 showed that 36 (36.0%) of the respondents participated in the study were single, 45 (45.0%) of the respondents participated in the study were married, 12 (12%) of the respondents participated in the study were divorced and 7(7.0%) were widower. The result showed that

Table 4.3 Marital Status and Occupation

		Occupation				Total
		Employed	**self employed**	**student**	**unemployed**	
Marital status	**Single**	0	1	6	1	8
	Married	4	10	0	1	15
Total		4	11	6	2	23

Sources: Field Study (2026)

Furthermore, the findings in the table 4.2 indicated that 17(17.0%) of the respondents participated in the study were employed, 48(48.0%) of the respondents in the study were self-employed, 22 (22.0%) of the respondents participated in the study were student, 12(12%) of the respondent were unemployed. The study noted that majority of respondents were self-employed where they decided to employ themselves by doing agriculture activities.

4.1.4 The Size of the Farm under Crop Production and types of agroforestry

The study has tried to show the size of the farm under which crops is produced and the types of agroforestry practiced on that area. The area that seems to be practiced by several people was about two hectare which is more practiced by more people than other types of agroforestry.

Table 4.4 Size of the farm under crop production and types of agroforestry

		types of agroforestry are best practiced in an area			Total
		agrosilvic ultural	**Silvipatoral**	**agrosilvopastoral**	
the size of farm under crop production	**A half hectare**	9	1	2	12
	One hectare	9	6	2	17
	One hectare and a half	7	3	1	11
	Two hectares	22	8	6	36

	Two hectare and a half	4	3	4	11
	Three hectare and above	5	3	5	13
Total		56	24	20	100

Sources: Field Study (2026)

4.1.5 The relationship between types of agroforestry and farm size

The findings in the table 4.3 revealed that 36(36%) of the respondents participated in they practice their agriculture activities on two hectares while agrosilvicultural becomes the main types of agroforestry done by the people whom I undertaken my research for them to possess two hectare this has caused by increase in population where by the land become too little for the people to perform their activities including agroforestry. the findings also shows that many people have been doing their agroforestry in less than two hectares. The table above shows that, 12(12%) own a half hectare ,17(17%) owning one hectare, 11(11%) own one hectare and above ,36(36%) own two hectares ,11(11%) owns two hectare and half, 13(13%) own three hectare and above. The major problems that inhibit the people from taking agroforestry is land where the area is insufficient for them to undertake agriculture activities in large extent, when the land will be somehow big it can allow people to take several types of agroforestry for increasing food security and raising their economy at Uru Kusini ward in Moshi rural.

4.2: Factors Affecting Adaptation of Agroforestry

This finding wanted to equip a researcher about the factors that affecting adoption of agroforestry practice in a study area. The question was answers provided and their answers summarized below as follows.

4.3 Challenges Facing Agroforestry

The study revealed some challenge that affecting the practice of agroforestry practice, one among them is shortage of irrigation water, lack of extension services,

poor agriculture technology land shortage and unreliability of markets and low prices.

Table 4.5. Shows the challenges facing agroforestry

	Strong disagree	disagree	Undecided	agree	Strong agree
Shortage of irrigation water	6.0%	3.0%	9.0%	48.0%	34.0%
Lack of extension services	3.0%	3.0%	13.0%	47.0%	34.0%
Incidence of pest and diseases	3.0%	3.0%	10.0%	36.0%	48.0%
Poor agricultural technology	3.0%	5.0%	10.0%	33.0%	49.0%
Land shortage	3.0%	8.0%	10.0%	35.0%	44.0%
Unreliability of markets and low prices	5.0%	4.0%	6.0%	34.0%	51.0%

Sources: Field Study (2026)

Table 4.6 Shows the relationship between shortage OF Irrigation water and occupation

		shortage of irrigation water					
		SD	D	U	A	SA	total
Occupation	employed	2	0	1	11	3	17
	self employed	0	2	2	23	21	48
	Student	3	1	1	9	8	22
	Unemployed	1	0	5	4	2	12
Total		6	3	9	48	34	100

Source: Field Study (2026)

The table below tried to give use the simple relationship between land shortage and occupation where by most of the employed people has responded on this with about 15% for agree and for strongly agree is about 26%

Table 4.7 Shows the relationship between land shortage and occupation

		land shortage					Total
		SA	D	U	A	SA	
Occupation	Employed	1	2	2	7	5	17
	self employed	1	2	4	15	26	48
	Student	1	4	3	7	7	22
	Unemployed	0	0	0	6	6	12
Total		3	8	10	35	44	100

Source: Field Study (2026)

Table 4.3 shown that the majority responded that despite they under take different kind of agroforestry but most of them suffer different problems on that activities according to their levels of economy that they have, those challenges include shortage of irrigation water where by 48% agreed that is the challenges that they are suffering from, 34% of the respondent agreed with strong agree that the shortage of water becomes a major challenges that triggering their activities the rest were disagreed with that challenge as shown in the table above. In case of lack of extension also seems to be problem to the people since majority were not having extension for them to be used during a dry season about 81% of the respondent agreed with this challenge with varies level of agreeing, the incidence of pests and diseases also become a challenges where by 36% agreed with this and 48% agreed with this problem this also has revealed by Gitonga (2010) in his study observed this as a challenge for agroforestry.

Table 4.8 Shows the average mean score of the indicators of people who responded on the challenge affecting agroforestry.

Respondents	23
Missing	1
Mean	4.4565

Source: Field Study (2026)

The mean score obtained indicates that in the study area people agreed that even though they undertake agroforestry but mostly face from several challenges such as shortage of land, poor technology, lack of land accessibility and unreliability markets and price that triggering them to prosper.

There are challenges to the mostly people who undertake this kind of agriculture, 10% of respondent has no any decision about this, 5% disagreed while 3% of respondent disagreed with this factors that affects agroforestry, Also the finding in table 4.3 showed that poor agriculture technology is one challenge about 33% of respondent agreed with this, 49% responded with strong agree that technology becomes a Mohamed 2017 in his study noticed this as challenges that faced agroforestry practice. Land shortage this is another challenge that faces agroforestry about 35% and 44% of respondent responded saying yes. Another unreliability pf markets and prices this shows that 34% agreed while 51% agreed with strongly agree about this challenge that is playing a great role on hindering the production of foods and other product from this type of agriculture. Mwasa (2015) in his study in South Africa he noticed that the lack of land can be a challenge for agroforestry practice in a given area.

4.4 The Contribution of Agroforestry in the Study Area

The study has tried to approve some advantage of having agroforestry and the result will be discussed below the table with the extent to which the people responded on that advantage abut most of the respondent has agreed that agroforestry practice has more important on improving community live hood.

Table 4.9 Findings is going to explain about the important of having agroforestry practice in an area.

	SD		**D**		**U**		**A**		**SA**	
	f	**%**	**f**	**%**	**f**	**%**	**f**	**%**	**f**	**%**
Source of food security	7	7.0	5	5.0	6	6.0	37	37.0	45	45.0
Income generation	1	1.0	5	5.0	10	10.0	29	29..0	55	55.0

Source of fuel wood	2	2.0	8	8.0	18	18.0	38	38.0	33	33.0
Building material	0	0.0	9	9.0	15	15.0	31	31.0	45	45.0
Provide fodder for livestock	4	4.0	2	2.0	10	10.0	41	41.0	43	43.0

Data source: Source: Field Study (2026)

Table 4.4 shown that the finding in table showed that The findings in the table 4.7 show that 45(45%) of the respondents participated in the study strongly agreed that agroforestry is source of security, 37 (37%) of the respondents participated in the study agreed that agroforestry is source of security, 12(12%) of the respondents participated in the study disagreed that agroforestry is source of security, 6(6%) of the respondents participated in this study undecided that agroforestry is source of security.

Also, the findings in the table 4.4 indicate that 55 (55%) of the respondents participated in the study strongly agreed that agroforestry is a source of income generation, 29 (29%) of the respondents participated in the study agreed that agroforestry is a source of income generation and 6 (6%) of the

Table 4.10 Shows the average score on the contribution of agroforestry practice in an area.

N	Respondents	100
	Missing	1
Mean		4.4957

Source: Field Study (2026)

As shown on the table above of mean score the mean showed that agroforestry has got more advantage where by many agreed about that , agroforestry is source of food security , income generation, source of fuel wood , building materials and provides fodder for livestock.

Figure 4.1. shows the types of agroforestry that practiced at natural extracts industries LTD.

Source: Field Study (2026)

The findings in the table 4.4 showed that 33(33%) and 38(38%) of the respondents participated in the study strongly agreed and agreed that agroforestry is a source of fuel wood. 10 (10%) and 19(19%) of the respondents participated in the study disagreed and undecided that agroforestry is a source of fuel wood. The study noted that many respondents argued that agroforestry is a source of fuel such as wood for domestic use. Another finding revealed that 45(45%) and 31 (31%) of the respondents participated in the study strongly agreed and agreed respectively that agroforestry provide building material.

Also the finding revealed that 43(43%) and 41(41%)of respondents at the study area strongly agreed and agreed respectively that agroforestry provide fodder for livestock , 10(10%) respondents of this study undecided that agroforestry provide fodder for livestock while 2(2%) and 4(4%) of the respondent disagreed and strongly disagreed that agroforestry provide fodder for livestock .this study has support by Hamidian (2011) his study showed that agroforestry provide reduce migration and increase food security.

According to the explanation that I made with Joseph Andrew Chura, from department of plants diseases. at natural extracts industries ltd, he said that agroforestry has more advantage for it provide foods for human consumption also is

environment friendly since it involves with tree planting and conservation. This study has support by Hamidian (2011) his study showed that agroforestry provides reduce migration and increase food security.

4.5 The Response to the Challenge of Agroforestry in Livelihood to the Community

Here the researcher wanted to know the response of respondent to those challenges that affect agroforestry practice in an area; the response is listed and summarized below as follows.

Table 4.11 Shows the response to the challenge of agroforestry

	SD		D		U		A		SA	
	F	%	f	%	f	%	f	%	f	%
Adequate extension service	4	4.0	4	4.0	8	8.0	51	51.0	33	33.0
Provision of knowledge skills on home garden management	2	2.0	2	2.0	7	7.0	34	34..0	55	55.0
Provision of incentives and use of rain water harvesting	1	1.0	5	5.0	8	8.0	44	44.0	42	42.0
Intensive and proper tree management	0	0.0	7	7.0	19	19.0	29	29.0	45	45.0
Affordable and easy technology	1	1.0	4	4.0	9	9.0	39	39.0	47	47.0
Training farmers	0	0.0	4	4.0	7	7.0	29	29.0	60	60.0
Land accessibility	1	1.0	2	2.0	14	14.0	45	45.0	38	38.0

Data source: Field Survey (2026)

Furthermore the findings in the table 4.5 indicated that 33 (33%) and 51(51%) of the respondents responded with strongly agree and agree respectively that by having adequate extension services will solve the problem of agroforestry especially during the dry season where mostly areas in Tanzania become dry and several agricultural activities stopped due to lack of water , 8(8.0%) the respondents undecided with the question asked to them while 4(4.0%) and 4(4.0%)of respondent at the study area responded with strong disagree and disagree respectively reacted with not agreeing that adequate extension service can't solve the problem of agroforestry.

The table above shown that 55(55%) and 34(34%) respondents at the field area reacted with strong agree and agree respectively that provision of knowledge skills on home garden management will contribute much on the increase of community live hood ,2(2.0%) and 2(2.0%) of the respondent at the study area strongly disagreed and disagreed that provision of knowledge skills on home garden management not the way of overcoming agroforestry problem while 7(7.0%) respondent from the field undecided provision of knowledge skills on home garden management . despite the were some respondent who disagreed but majority agreed that by provision of knowledge skills and home garden management will help to overcome the problem hindering agroforestry practice this was supported by Zomer et al (2009) on his study that he said that challenge to adoption with agroforestry in Africa may be encounter by some effort like awareness creation for agroforestry has involved a variety of actors , dissemination of technical knowledge and skills.

The result shown that 42(42%) and 44(44%) of respondent at the study area strongly agreed and agreed that provision of incentives and use of rainwater harvesting will mitigate the challenge of agroforestry, 5(5.0%) and 1(1.0%) of respondent agreed and strongly disagreed that provision of incentives and use of rain water harvesting while 8(8.0%) respondent undecided that provision of incentives and use of rainwater harvesting this implies that by providing incentives and use of rain water harvesting can minimize the effect facing agroforestry. 45 (45%) and 29 (29%) respondents from the field area strongly agreed and agreed that intensive and proper tree management can one among the solution to overcome the factors that affects agroforestry practice, 19(19%) of respondent undecided about intensive and proper tree management while 7(7.0%) respondents disagree that intensive and proper tree management cannot overcome the problem.

The table above summarizes that 47(47%) and 39(39%) of respondent strongly agreed and agreed that affordable and easy technology can solve the effects that affects agroforestry practice, 1(1.0%) and 4(4.0%) respondents strongly disagreed and disagreed that affordable and easy technology cannot overcome the problem of agroforestry. 4 0(4.0%) and 1(1.0) disagreed while 9(9.0%) of the respondent undecided that affordable and easy technology.

The table above shown, 60(60%) and 29(29.0%) of respondent from the study area strongly agreed and agreed respectively that training farmers will raise the awareness to the people about how agroforestry is more potential in the community even on conserving the environment, 4(4.0%) disagreed that training farmers not the solution but 7(7.0%) respondents undecided with the issue of training farmers. This implies that by providing education to the people in one way and another will help people to be equipped with the knowledge about agroforestry so that they can undertake it while the real what is about.

38(38%) and 45(45%) of respondent from the filed area strongly agreed and agreed that land accessibility will be a measure to overcome the challenge of agroforestry, 1(1.0%) and 2(2.0%) of respondent from the study area strongly disagreed and disagreed that land accessibility not the challenge for agroforestry to be done while 14(14%) of respondent from the study area undecided with this. Despite several people has disagreed by majority agreed that people should access the land for undertaking this kind of agriculture so that agroforestry can be done.in case people has got a land for undertaking agroforestry this can help to mitigate the challenge of land scarcity.

Figure 4.2 Shows the types of agroforestry that practiced at natural extracts industries LTD.

Table 4.12 Shows the Mean Scores of the response of the respondent on the ways to be used for overcoming the challenge.

Valid	23
Missing	1
Mean	4.5093

Source: Field Study (2026)

Table 4.12 shows the mean score that is about the response of the people about the ways to overcome the challenge that affecting agroforestry practice in the area such as adequate extension service, provision of knowledge skills on home garden management, provision of incentives and use of rain water harvesting, intensive and proper tree management, affordable and easy technology, training farmers and land accessibility.

Figure 4.3. Shows agroforestry practiced at Kilimanjaro plantation limited, where coffee and different types of trees grown the same area.

Other data were collected by interview where by most of the respondent were positively responded that, agroforestry practice has an advantage since most of the people get food from this. others undertake agroforestry they adopted from kihamba farming system (chagga home garden) by which crops that are highly grown are food crops and tree which are medicinal plant including rauvolfia caffra(msesewe), margaritaria discoidea(mshamana), bridelia micrantha(mmarie) other were coffee, banana and vanilla. The challenges that triggering them was lack of knowledge and skills, poor technology, pests and diseases and lack of extension for them to practice agroforestry

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