
Thesis

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Abstract

Tanzania is a union between mainland of Tanganyika and the Zanzibar islands. It is an East African country on the Indian Ocean. The country’s economy depends heavily on agriculture, which accounts for more than one-quarter of Gross Domestic Product (GDP). The sector is characterized by subsistence farming occupied by smallholder farmers who on average cultivate less than a hectare. Being the largest sector of the economy in Tanzania, agriculture contributes greatly to food security by providing food for both rural and urban communities. It also employs more than 75 percent of the labor force, thus it is a main source of income for most of the people particularly the rural communities. Most of the farmers engage in both crop growing and livestock keeping activities. Livestock kept include cattle, sheep, goats, and chicken while food crops grown include maize, wheat, cassava, bananas, fruits and vegetables. Cash crops include cashew nuts, coffee, sisal, tea, cotton, pyrethrum, tobacco, and cloves.

Cashew is among the cash crop that brings foreign currency in Tanzania. It is the main source of income for farmers in Masasi district. The Masasi District Council is endowed with favorable conditions for the production of cashew; nevertheless production potential has never been achieved. The slow pace of dissemination of information for good agricultural practices to the farmers leads to low cashew nuts production. Low cashew productivity is attributed to ineffectiveness of extension agents to delivery agricultural information to the cashew nuts growers. This case study aimed at assessing
extension agents’ effectiveness and good agricultural practices adoption amongst cashew nut growers in Masasi district council. The specific objectives of the study were to:

- Determine cashew nut growers’ awareness of agricultural extension services.
- Identify challenges of cashew nuts growers
- Determine cashew nut growers’ perceptions on the effectiveness of extension agents in dissemination of information for good agricultural practices of cashew nuts.
- Determine the use of good agricultural practices amongst cashew nuts growers.
- Explore the relationship between demographic characteristics and perceptions of effectiveness.
- Describe the relationship between demographic characteristics and use of good agricultural practices of cashew.

The study used mixed method research design where quantitative and qualitative methods of data collection were used. Quantitative data were collected by the researcher and trained enumerators. A sample of 120 respondents was randomly selected from 10 randomly selected wards. The survey was conducted at residential areas of the respondents. Qualitative data were collected through focus group discussions (FGD). Three FGDs were conducted each with 8 participants.

The average cashew farm size was 1.5 acres and ranged between 1 – 10 acres. The majority of the respondents were aware of the extension services needed, however Agricultural Extension Agents (AEAs) frequency of contact with farmers was found to be minimal. Major challenges encountered by respondents include pests and diseases,
climate change, untimely delivery of subsidized inputs such as sulphur, high prices of unsubsidized inputs, and lack of credits to farmers. About half of the respondents showed positive perceptions on AEAs effectiveness on dissemination of Good Agricultural Practices (GAPs). On the use of GAPs, results indicated that more than two thirds used recommended GAPs. Further, results indicated that there was no significant relationship between demographic characteristics and respondents’ perceptions on effectiveness of AEAs; and there was no significant relationship between demographic characteristics and use of GAPs.
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Fields of Study

Major Field: Agricultural and Extension Education
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Chapter 1: Introduction

The contribution of the agricultural sector in the Tanzania economy is invaluable due to its connection between its performance and key economic indicators like Gross Domestic Product (GDP) and employment (NAP, 2013). In Sub Saharan Africa including Tanzania, agriculture is the main source of food, employment, raw material for industries, and income for individuals and government (Sarris, Savastano, & Christiaensen, 2006). The agricultural sector in Tanzania plays an important role for ensuring food security and poverty reduction (NAP, 2013; Sarris et al., 2006). More than two thirds of the people in Tanzania live in rural areas relying solely on small-scale agriculture for their livelihood (URT, 2006). The contribution of the agricultural sector to the Gross Domestic Product (GDP) in Tanzania has been fluctuating, and in most cases declining (NAP, 2013). In that regard, a number of efforts have been in place to improve the sector, which include establishment of various extension projects and programs for the purpose of improving dissemination of agricultural knowledge and skills to the farmers; however, extension services are criticized for being ineffective (Rutatora & Mattee, 2001).

In this chapter, the main focus is on the background information about Tanzania, the country where this case study was conducted. The chapter also focuses on the general status of agriculture and its contribution to the economy of Tanzania. In the background information of agriculture, the cashew nut production trend in Tanzania is highlighted.
Further, the chapter elaborates on purpose, objectives, and significance of the study. Delimitations, limitations, basic assumptions, and definitions of key terms used throughout this document are also presented.

1.1 General Background of Tanzania

Tanzania is a union between mainland of Tanganyika and the Zanzibar islands (URT, 2013). It is an East African country bordering the Indian Ocean to the east, where to the north it borders with Uganda and Kenya; to the west, Burundi, Rwanda, and Democratic Republic of Congo; and to the south, it borders with Mozambique, Zambia, and Malawi (URT, 2013). According to the national census (2012) Tanzania is the largest nation in East Africa with a population of 44.9 million, a growth rate of about 3%, and a population distribution density of 51 persons per square kilometer (URT, 2007). About 80% of the population lives in rural areas. The country is diverse, multilingual, and composed of more than 120 ethnic groups (Mlozi, 1997; Batibo, 2005). Swahili is the national language of Tanzania, whereas English is the official medium of communication in some institutions such as secondary schools, academic institutions, and business settings (URT, 2013; Batibo, 2005).

The country’s economy depends heavily on agriculture, which accounts for more than one-quarter of GDP (NBS, 2013). Other main drivers of the economy include mining, industry, tourism, construction, transport, and financial services (BoT, 2015). The country’s total area covers 947,300km$^2$, however, only 24% of about 44 million hectares of the total land area suitable for agriculture is utilized, mainly by smallholder farmers cultivating average farm sizes of between 0.9 hectares and 3.0 hectares using
traditional cultivation methods. At most, 10% of the arable land is ploughed by tractor and production is determined by rainfall (NAP, 2013). According to the Tanzania National Agricultural Policy (2013), both crops and livestock are adversely affected by periodical droughts. The climate is tropical in most areas with average temperatures of 25°C - 31°C, whereas temperature in the highlands is 10°C - 20°C. It has potential land for irrigation of about 29.4 million hectares, but only 37% is under cultivation; additionally, only 4% of the total cultivated land is under irrigation. Livestock production includes cattle, sheep, goats, and chicken, while food crops grown in are maize, wheat, cassava, bananas, fruits, and vegetables (URT, 2013). Cash crops include cashew nuts, coffee, sisal, tea, cotton, pyrethrum, tobacco and cloves (URT, 2013). In the health sector, Malaria is one of Tanzania’s biggest killer diseases; other diseases include AIDS, measles, dysentery, cholera, and tuberculosis (URT, 2015). In addition to the economic challenges facing Tanzania, poor infrastructure, low agricultural productivity and value addition, inadequate service delivery, and management of urbanization also impact production (URT, 2013).

1.2 Agriculture in Tanzania

Agriculture is the largest sector of the economy in Tanzania (NAP, 2013). It greatly contributes to food security by feeding both the rural and urban populations (Cribb, 2010). It provides more than 90% of the food consumed in Tanzania, contributes about 26.5% of GDP, and employs more than 75% of the labor force (URT, 2014a). The agricultural sector is among the largest source of foreign exchange earnings; it accounts for about three quarters of the total exports (URT, 2014). The agricultural sector accounts
for the main source of income for most of the people, particularly those in rural areas. In the development process, agriculture is an engine for reducing poverty and improving general wellbeing of the farmers through better access to food (Cervantes-Godoy, & Dewbre, 2010).

Tanzania is among the top cashew nut producing countries in the world ranking 4th in Africa and 8th in the world (Nkonya, & Barreiro-Hurle, 2013). The Food and Agricultural Organization database of the United Nations (FAOSTAT, 2013) recognizes Africa, Asia (particularly India and Vietnam) and South America, Brazil in particular as the main cashew nut production regions. Cashew nuts in Tanzania are produced by small-scale and subsistence farmers with an average farm size of 1.5 ha (Masawe, Esegu, Kasuga, Mneney, & Mujuni, (eds), 2013). Cashew nut is an important export cash crop and a source of income for these smallholder farmers in the southern coastal regions of the country, particularly Mtwarra and Lindi. In terms of export value, cashew crop is the third major export crop after tobacco and coffee, representing about 10% of the total agricultural exports (URT, 2013). On average, 80% of the cashew nuts produced in Tanzania are exported as raw nuts, and the remaining amount processed locally using the manual technology (Nkonya et al., 2013).

Contribution of cashew nuts to the economy of the smallholder farmers in cashew producing areas in Tanzania could be increased if cashew nut production potentials were fully utilized. However, for many years cashew nut production has been unstable. During the post independence period, cashew nut production increased peaking at 145,080 tons in the 1970s, then, started to decrease gradually recording lows of 16,400 tons in the mid
1980s (NARI, 2015). Tanzania’s contribution to global cashew nut production fell from 10 to 3%. In the late 1980s and early 90s, cashew nut production continued to rise again, reaching 122,289.78 tons in 2000. This increase in tonnage was the result of deliberate efforts taken by the government of Tanzania in the mid 80s to 90s to improve the production of the crop. During this period the government implemented the Cashew Improvement Project (CIP) that started in 1990 and ended in 1996. The Cashew nut Production Improvement Pilot Project (CIPPP) preceded the CIP from 1985/86 to June 1989 (NARI, 2015). In 2012/2013, the sector experienced another fall in production where an average of 121,703.811 tones was recorded (CBT, 2014).

Besides CIP, there have been numerous efforts taken by the government of Tanzania to increase the cashew nut production and stabilize the production trend of the crop. Increasing area under cashew nut production and replanting new cashew varieties have been among the major endeavors (Nkonya et al., 2013). For instance, according to Nkonya et al. (2013), a total of 240,000 ha of cashew trees had been planted from 1961 to 1973. Additionally, the government of Tanzania established and continues to maintain cashew research unit at Naliendele Agricultural Research Institute (NARI) in Mtwara region (NARI, 2015). This unit is responsible for cashew research programmes in Tanzania and is committed to research activities in the areas of cashew pathology, vegetative propagation, cashew insects, agronomy, breeding, biotechnology, cashew nut and apple processing, and management of cashew nut development centers (NARI, 2015).
The Cashew Nut Board of Tanzania (CBT) is another important institution in the cashew sector. It is the main overseer of the cashew industry in Tanzania; it is a corporate body governed by Parliamentary Act No. 18 of 2009 whose regulations were approved in 2010 (URT, 2010). The CBT is responsible for regulating and promoting quality in the marketing and export of raw and processed cashew nuts, advising the government of Tanzania on matters relating to the cashew nut sector and for carrying out other functions deemed necessary by the Ministry of Agriculture (URT, 2010). Other major efforts that have been in place to improve cashew nuts production include establishment of laws that affect the industry such as Cashew Nut Industry Act of 2009 and the Warehouse Receipt Act No. 10 of 2005 (Akyoo, A., & Mpenda, Z, 2014). The introduction of a warehouse receipt system where cashew nut growers are legally required to sell their produce through primary cooperative societies has helped to strengthen the cashew nut marketing system (Akyoo et al., 2014). Also, in 2010, the Cashew Nut Industry Development Trust Fund (CIDTF) was established as a tool that provide a mechanism through which stakeholders of the cashew industry can contribute and finance the shared functions for the increased and sustainable development of the sector (URT, 2007).

Along with the aforementioned efforts, an effective and efficient agricultural extension service is pivotal to increased agricultural production (Sarris et al., 2006; Munyua, Adams, & Thomson, 2002). An effective extension service is a vehicle for agricultural transformation by enabling farmers to adopt and use good agricultural practices (Agbamu, 2000). Extension services communicate innovations and skills to the farmers so that they can use the information and advice for increased agricultural
productivity (Ali, Ahmad, & Ali, 2011). An extension service that is well organized with sustainable agricultural information flow approaches can be used as a strategy for poverty reduction (Akpalu, 2013). Within the cashew sector, the Cashew nut Board of Tanzania (CBT) in collaboration with the Tanzania local government authorities, including regional secretariats, municipalities, and district councils, organize extension services. As an incentive for the purpose of increasing land and number of cashew trees, farmers receive cashew seedlings for free (CBT, 2011). The CBT also provides trainings to Ward and Village Extension Officers and cashew nuts growers on good agricultural practices (GAPs). To make sure there is continuous cashew knowledge generation, CBT provides support to cashew research activities at Nalindele Agricultural Research Institute. With all of these efforts, cashew production is still unsatisfactory and growers have not met production potentials. Low productivity of the industry results in cashew nut growers having low income, ultimately leading to food insecurity and poverty in cashew producing areas.

1.3 Problem Statement.

Cashew nuts are the main source of income for farmers in the southern coastal regions of Mtwara and Lindi and significantly contribute to the economy of Tanzania as more than three quarters of the cashew nuts export in Tanzania are produced in this area. In Masasi District Council, cashew nuts contribute about 85% to its source of revenue (MDC, 2014). Over 90% of the people live in rural areas and agriculture is the predominant economic sector in the district. The district produces 29% of the Mtwara regions’ total cashew nuts (CBT, 2014). The Masasi District Council is endowed with
favorable conditions for the production of cashew. As of 2015, it is estimated that there are about 3,247,461 cashew trees in the district, which are expected to produce about 64,949 tons of cashew nuts. However, the reported production in the same year was 21,748 tons, resulting in a gap of 43,201 tons. Nevertheless, the potential has never been achieved. There has been a slow pace of cashew technology transfer to the farmers, leading to low cashew nuts production that some attribute to ineffective extension services delivery (Mshana, 2013). The average yield of a mature cashew tree in the Masasi district council ranges from 5-7 Kilograms per tree per year (MDC, 2014), which is approximately a quarter of the documented national average potential yield of 20 Kilograms per tree per year and even far below the average world recorded potential in Vietnam of 27 Kilograms per tree per year (Massawe et al., 2013). The presence of the Naliendele Agricultural Research Institute (NARI) in the region was aimed at researching different cashew production technologies for the purpose of improving cashew production and productivity. Similarly, the Masasi District Council via Agriculture, Irrigation and Co-operative office has always been linked to NARI in developing cashew production technologies, promoting the proven technologies and ensuring that they are disseminated and adopted by cashew nuts growers in the area for enhancing cashew nut productivity.

Despite the strategic placement of NARI for serving all cashew-producing farmers, and establishment of CBT, the production level of cashew has remained unsatisfactory (Martin, Topper, Bashiru, Boma, Waal, Harries, & Stathers, 1997). Since farmers use different criteria to gauge the effectiveness of extension services (Akpalu,
sufficient information is required to ascertain perceptions held by cashew nuts growers towards extension services offered in the district. The extent to which farmers perceive the effectiveness of extension services affects their decisions to adopt technologies (Adesina, 1995). Therefore, this study intended to assess extension agents’ effectiveness and good agricultural practices adoption amongst cashew nuts growers in the Masasi District Council. The data may help to find better ways to provide appropriate extension services in order to improve cashew productivity and consequently improve the living standards and wellbeing of the farmers in the district.

1.4 Purpose and Objectives of the Study

Purpose

The purpose of the study was to assess extension agents’ effectiveness and good agricultural practices (GAPs) adoption amongst cashew nuts growers in the Masasi District Council.

Objectives

The objectives of the study were to:

i. Determine cashew nut growers’ awareness of agricultural extension services in the Masasi district.

ii. Identify challenges of cashew nuts growers in the Masasi district.

iii. Determine cashew nut growers’ perceptions on the effectiveness of extension agents in dissemination of information for good agricultural practices of cashew.

iv. Determine the use of good agricultural practices amongst cashew nuts growers
v. Explore the relationship between demographic characteristics and perceptions of effectiveness

vi. Describe the relationship between demographic characteristics and use of good agricultural practices of cashew.

1.5 Significance of the Study

Economically, agriculture is the major occupation of the people of Masasi district council where cashew nut is the most important cash crop that generates a majority of the income. Agricultural extension services have an important role in increasing quality of crop production (Dibra, 2015). Extension services intervene to bring about change by providing knowledge and information that enable farmers to understand and adopt particular practices. Since cashew is the main cash crop and plays a key role in ensuring household income and food security in Masasi District Council, the findings of this study may help to improve the effectiveness of agricultural extension services and approaches leading to increased crop production particularly of cashew nut in the district. More importantly, the findings may help to inform extension agents and decision makers about appropriate and sustainable extension approaches that may promote the uptake of technologies and good agricultural practices of cashew for its increased production. Increased cashew production will create job opportunities for rural people particularly women and youth; increased cash incomes will help to reduce poverty and improve food security at household level. Likewise, due to increased crops production, the Masasi District Council will increase its revenue through collections from produce cess. The
collected funds can be used for improvement of social services including but not limited to education, health, water, and road infrastructures within the council.

1.6 Definition of terms

**Constitutional Definitions:**

1. Adoption: the degree of use of a new technology in long-run equilibrium when the farmer has full information about the new technology and its potential (Rogers, 1983; Feder, Just, & Zilberman, 1985)

2. Agricultural Extension: “A form of non-formal agricultural education to farmers”; “transmitting agricultural information to farmers” (Farrington, 2008).

3. Agronomic practices: Steps farmers incorporate into their farm management systems to improve soil quality, enhance water use, manage crop residue and improve the environment through better fertilizer management (Poisot, Speedy, & Kueneman, 2004).

4. Extension agent: “A change agent responsible for providing knowledge and information that enable a farmer to understand and make decisions about a particular innovation” (FAO, 1983)

5. Extension: Transmitting information to individuals or groups with the anticipation that the individual or group will implement the information; the organized exchange of information and the purposive transfer of skills (Rogers, 1983; Feder, et al., 1985).
6. Farmers: Smallholder farmers or peasants; those farmers owning small-based plots of land with average of 1.5ha, on which they grow subsistence crops and one or two cash crops relying almost exclusively on family labor (Poisot et al, 2004).

7. Food insecurity: “Situation when people have limited or no access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active healthy life” (Costa, 2014).

Operational definitions:

1. Effectiveness of agricultural extension service: refers to the extent to which agricultural extension programs provide the necessary and required agricultural technical support to smallholder farmers in order to improve crop productivity in the district. The effectiveness of the agricultural extension services was measured using a Likert-scale type questions where participants were asked to indicate their opinion regarding the effectiveness of Extension Agents in dissemination of good agricultural practices (GAPs) of cashews. The rating scale was designed as follows: SA=Strongly Agree, A=Agree, N=Neutral, D=Disagree, SD=Strongly Disagree, with assigned scores of 5, 4, 3, 2 and 1 respectively.

2. Use of good agricultural practices (GAPs) was determined using a Likert scale where farmers were asked to indicate how often they use the new recommended good agricultural practices. The rating scale was designed as follows: VO = Very often, O = Often, N = Neutral, OC = Occasionally, NA = Not at All, with assigned scores of 5, 4, 3, 2 and 1 respectively.
3. Perception of farmers’ on the effectiveness of agricultural extension agents: refers to the extent of farmers agreement with the statements related to the indicators of effective extension agents according to the literature. The level of perception was measured using Likert-scale type questions where participants were asked to indicate their opinion regarding effectiveness of extension agents on dissemination of technologies. The rating scale was designed as follows: SA=Strongly Agree, A=Agree, N=Neutral, D=Disagree, SD=Strongly Disagree, with assigned scores of 5, 4, 3, 2 and 1 respectively.

**Acronyms**

AEE: Agricultural and Extension Education  
AEA: Agricultural Extension Agent  
CBT: Cashew nuts Board of Tanzania  
CIDTF: Cashew Industry Development Trust Fund  
CIP: Cashew Improvement Programme  
DED: District Executive Director  
DAICO: District Agriculture, Irrigation and Co-operative Officer  
FAO: Food and Agriculture Organization  
GAP: Good Agricultural Practices  
MDC: Masasi District Council  
URT: United Republic of Tanzania  
MAFC: Ministry of Agriculture, Food Security and Co-operative  
NARI: Naliendele Agricultural Research Institute
1.7 Delimitations

This case study assessed effectiveness of agricultural extension agents and adoption of GAPs in Masasi District Council. More than 90 percent of the farmers in the study area grow cashew; thus, the study involved only cashew growers. In specific terms, the study focused on discerning cashew growers’ awareness and the extent to which they perceive their extension service in the district; how extension agents are helpful to cashew growers and the relationship that exists between demographic characteristics of the respondents and their adoption of GAPs formed the basis of this study. Due to budget and time limit Chiwale, Chigugu, Chikundi, Chikolopora, Lukuledi, Nangoo, Nanjota, Mitesa, Mwena and Mnavira wards were surveyed in order to achieve the objectives of the study.

1.8 Assumptions

The assumption of the study was that all respondents in the case study area have access to extension services from both public and private sectors and that they were in a position to make judgments and give opinions with respect to quality of the extension services delivery in the study area. It also assumed that extension agents engage farmers in their cashew extension programs and that farmers participate actively in the knowledge development and dissemination processes. Also, it was assumed that respondents gave honest responses to the survey.


1.9 Chapter Summary

Chapter one presented an overview of agriculture and its contribution to the economy of Tanzania. Similarly, the chapter presented background of cashew nut as an important cash crop to the smallholder farmers in southern coastal regions specifically Mtwar and Lindi. In the background, cashew nut production trends have been highlighted. Further, the chapter stated the purpose, objectives, and significance of the study. It is expected that the findings of this case study may help in improving productivity of the cashew sector, provide employment opportunities to rural communities, increase income, reduce poverty, and ultimately improve food security among cashew growers and Tanzania in general. Constitutional and operational definitions and acronyms of the key terms that are used throughout this document have also been presented. Additionally, the chapter stated the delimitations and basic assumptions of the study.
Chapter 2: Review of Literature

2.1 Introduction:

Agricultural extension provides advice and information that helps farmers increase agricultural production for economic growth and improved standards of living. Assessing farmers’ perceptions towards the services they receive is invaluable. Many studies on agricultural extension services have been conducted on various aspects related to perceptions on effectiveness of extension agents and GAPs adoption. This chapter therefore, reviews relevant literature on various aspects of agricultural extension services related to the purpose of the study. The literature review is based on overview of agricultural extension services in Tanzania, effectiveness of extension agents in technology dissemination, perceptions of farmers on the effectiveness and characteristics of extension agents, roles of extension agents, factors influencing farmers’ adoption of GAPs, and factors affecting extension agents in GAPs dissemination to farmers. This chapter also reviews the theoretical and conceptual frameworks of the study.

2.2 Agricultural Extension Services in Tanzania

In Tanzania agricultural extension services to a large extent have been a government responsibility. Agricultural extension services involve dissemination of agricultural knowledge, technologies, and GAPs to farmers for the purpose of increasing crop productivity and improved wellbeing and livelihoods (Kimaro et al., 2010). The
history of extension services in Tanzania can be looked in two phases: time after independence, and during decentralization policy. Time after independence, extension services in Tanzania focused on transforming small-scale farming into commercial farming and improving agricultural productivity (Rutatora and Mattee, 2001). During this time agricultural extension services were directed and controlled from the central government through the Ministry of Agriculture, Livestock and Fisheries (MALF) (Daniel, 2013). Time after decentralization; in 1996 the government of Tanzania passed the decentralization policy were extension services were under the Prime Minister’s office, Local Government and Regional Administration (PMO-RALG) (Rutatora and Mattee, 2001). Currently, all matters of the local government including extension services are under the Ministry of State in the President's Office Regional Administration and Local Government (PO-RALG) as shown in figure 1. Following decentralization policy the central government through MALF is solely responsible for formulation of policies for extension services to run smoothly (Rutatora and Mattee, 2001; Kimaro et al., 2010). Regional secretariats act as a bridge between local and central governments where all directives and policies related to agricultural extension services pass through the regional secretariats; whether they are from the MALF or district levels. The regional secretariats have the role of monitoring and evaluating all extension activities at district levels. The local government authorities through district councils are the main stakeholders of extension services. AEAs are under the district executive director (DED) through District Agricultural, Irrigation and Cooperative officer (DAICO). AEAs are placed in each ward and village, depending on the staff availability, some wards or villages might not have
AEAs at all. The placement of AEAs closer to beneficiaries helps to facilitate access of services and bringing agricultural extension services closer to the users (Daniel, 2013). In most cases extension approaches used include farmer field schools (FFS), farming systems approach (FSA), training and visit (T&V), contract farming, participatory extension, and farmer-to-farmer extension (Kimaro et al., 2010).

**The Organization Structure of Agricultural Extension Services**

![Diagram showing the organization structure of agricultural extension services in Tanzania](image)

**Figure 1. The organization structure of agriculture extension services in Tanzania**

Source: Adopted from Daniel, (2013)

The purpose of decentralization was to give autonomy to local government authorities to decide and plan development activities on their own without interference from the Central Government (Daniel, 2013). More importantly, the decentralization
policy intended to introduce a sense of ownership, and a bottom-up extension services to local government authorities (Rutatora and Mattee, 2001).

In developing countries, a public funded extension service is the most reliable way of disseminating agricultural information to smallholder farmers (AL-Sharafat et al., 2012; Munyua et al., 2002). However, agricultural extension services in these countries are considered to be ineffective (Betz, 2009). Rutatora and Mattee (2001) and Ibrahim et al., (2014) asserts that agricultural extension services in Tanzania are mostly supply-driven instead of demand-driven due to challenges such as lack of cost sharing, sustainability, sense of ownership and poverty leading to slow pace of the transfer of agricultural technology and GAPs to farmers. To address some of the challenges facing extension services in Tanzania, the government put some efforts in place for the purpose of improving the quality and effectiveness of agricultural extension. These efforts were the National Agricultural and Livestock Extension Rehabilitation Project (NALERP I) initiated in 1988, the National Agricultural Extension Phase II (NAEP II) initiated in 1996, and the Agricultural Sector Development Program (ASDP I) launched in 2006 (NAP, 2013).

With regard to the farmer-research extension linkage, Agbamu (2000) reported that Tanzania adopted an extension system where research and extension have unequal status and operate in a top-down approach. Agbamu (2001) claimed that the top down linkage seems to be ineffective as opposed to the bottom-up approach because the system is too hierarchical and bureaucratic. Similarly, Rutatora and Mattee (2001) reported that
extension methods used in Tanzania emphasize more on dissemination of technologies rather than extension education.

2.3 Effectiveness of Extension Agents in Technology Dissemination

Effectiveness in extension services is the degree to which socio-economic goals of the farmers are attained (Swanson et al., 1997). Mohammad & Altahat (2012) states that effectiveness is measured by looking the extent at which the organization goals have been achieved. Thus, effectiveness of extension agents is reflected on the way farmers’ social goals are attained (Misra, 1997). Effectiveness of an agricultural extension agent is reflected in the extent to which extension agents meet their goals of providing the necessary and required agricultural technical support to the farmers to improve farm productivity. It can also be seen as the ability of AEAs to deliver to the expectations of the farmers in improving production and quality of the crop (FAO, 1995; Swanson et al., 1997). Since AEAs perform different roles thus there are many different ways of expressing the real meaning of an extension agent. The Food and Agricultural Organization (FAO) of the United Nations (2016) defined an extension agent as a “change agent” or “vehicle of knowledge whose primary role is to achieve a transformation of attitudes, behavior and social organization”. Extension agents are technocrats responsible for dissemination of technologies and GAPs to the farmers with the hope that farmers will use them to improve agricultural productivity (Dube, 1993; Munyua et al., 2002). Agbamu (2000) states that AEAs can achieve their duties when there are strong linkages between farmers, researchers, and extension agents.
The quality of extension services depends on the effectiveness of the AEAs (FAO, 2016). Effectiveness of AEAs depend on how committed they are to carry out their tasks as required (Dude, 1993). To be successful in technology dissemination to farmers, AEAs must make use of extension approaches that are suitable for their clients (FAO, 2016). More importantly, effective extension services call for the AEAs to have expertise on various subject matters of specialization and interpersonal skills to successfully disseminate the technologies to farmers.

2.4 Perceptions of Farmers on the Effectiveness and characteristics of the Agricultural Extension Agents

Farmers’ decisions to adopt technologies depend on the perceptions they have about the attributes of the technology and the extension agents (Birkhaeuser et al., 1991). When there is strong relationship between AEAs and farmers it is likely that farmers will have receptive mind of technologies and GAPs for bringing about change in agriculture development (Doamekpor, 2011). Agricultural extension is informal education designed to help farmers improve their living standards (Ibrahim et al., 2014). In order to provide effective, efficient, and sustainable extension services, assessing farmers’ viewpoints and opinions toward the services they receive is inevitable (AL-Sharafat et al., 2012). When farmers have positive perceptions on the extension system influence their participation in extension programs; thus, helps to create demand-driven extension services (Ibrahim et al., 2014). Farmers perceive the effectiveness of AEAs based on the level of awareness about extension services, adoption of technologies, and improvements in farm productivity (Evenson, 1997; Ibrahim et al., 2014). Ibrahim et al. (2014) and Idowu
(2005) reported that for extension agents to deliver extension services effectively, they need to have: technical skills, expertise on crops and livestock produced in that particular area, cost conscious of the new technology, and ability to demonstrate technologies as well as analyze the feasibility of the results. As long as farmers realize increased income and improved life standards through increased farm productivity, they are likely to have positive perceptions towards their extension agents (Sarker et al., 2009).

2.5 The Role of AEAs in Technology Dissemination and Adoption

Agricultural Extension agents have diverse roles that they can perform in helping farmers to adopt technologies. According to the FAO, the primary roles of AEAs include helping farmers to identify their problems, solving the problems, and convincing farmers to adopt technologies for increased farm productivity. Other roles of AEAs include shaping of attitudes, behavior and social structures. Extension agents play a vital role in acting as a mediator between researchers and farmers to ensure that researchers are aware of the farmers’ problems (Idowu, 2005; Munyua et al., 2002). Also AEAs are change agents in the rural societies where they help to trigger development process, help farmers to create groups through which they can speak about their challenges, and overcome their problems (Rutatora and Mattee, 2001).

2.6 Factors influencing adoption of new technologies.

Negatu (1999) and AL-Sharafat et al. (2012) assert that farmers' adoption of a new agricultural technology dependents on several factors, which include characteristics of the new recommended technology, resource endowments, income level, literacy, farm
size, and land tenure system. Massawe et al. (2013) identified other factors such as relevance of the crop, market structure, government policies, weather, accessibility, and availability of technologies as factors that may also determine adoption of technologies. Zaunbrecher et al. (2014) also claimed that demographics, relevance, ease of use, and ability of farmers to use the technology has considerable effect in determining farmers’ adoption of the new technology. Additionally, when extension approaches used to disseminate technologies allow farmers to see, hear, try, raise concerns, and get immediate response, they are likely to adopt the technologies in question (Mshana, 2013).

The study by Mshana (2013) reported that farmers’ participation in technology generation and dissemination increases the chance that a technology will be taken and applied by end users. Diffusion of innovation theory identified five characteristics that determine the uptake of an innovation which include relative advantage, compatibility, trialability, observability and usability (Rogers, 1983).

2.7 Factors affecting Agricultural Extension Agents in Technology Dissemination to farmers.

The key factor in the success of agricultural extension services is improving human resources (Tesso, 2016; Idowu, 2005). Each AEA might have unique motivational factors that make him/her perform to the fullest; however, management of each factor is very crucial (Negera, 2014). Globally AEAs face similar challenges in performing their duties; however, there may be some few discrepancies between AEAs in developed and developing countries (Strong et al., 2009; Oloruntoba, 2003; Negera, 2014). In their studies Oloruntoba (2003) and Negera (2014) observed that wages, incentives, reward,
job stress, mentoring programs, trainings, and recognition are some of the factors affecting extension agents’ work performance. Similarly, Eneyew (2013) reported that factors such as farmer-research-extension linkages, institutional bureaucracy, insufficient knowledge, and weak accountability to farmers affect AEAs’ dissemination of technologies to farmers. In developing countries including Tanzania, the agricultural extension system has weak farmer-research-extension linkages characterized by top down and non-participatory approach (Agbamu, 2000; Rutatora and Mattee, 2001; Eneyew, 2013). Because extension agents and farmers are not involved in the planning process and formulation of policies, extension programs do not reflect farmers’ priorities; hence transfer and adoption of the technologies by extension agents becomes a challenging task (Eneyew, 2013). In some circumstances, public extension agents are assigned other responsibilities outside their fields of study of which dilute the efforts of the AEAs (Eneyew, 2013; Tesso, 2016). Since extension agents are not delivering to their optimal potentials agricultural productivity is likely to decrease, which in turn drag down economic growth of the farmers; thus, paving the way for a vicious cycle of poverty at household and national levels (Tesso, 2016; NAP, 2013)

2.8 Theoretical Framework

This study was guided by the theory of Diffusion of Innovation developed by Everett Rogers in 1983. The theory explains not only why farmers decide to adopt innovations but also how does farmers make decision to adopt those innovations. Furthermore, the Diffusion of Innovation theory states that adoption is a process, which takes place in a linear fashion (Rogers, 1983). Van den Ban and Hawkins (1996) assert
that the Diffusion of Innovation theory can be used in studies related to agricultural extension because it explains how new technologies spread across the community. The Diffusion of Innovation theory identifies four elements that influence the spread of new ideas to the farmers. These include innovation itself, communication channels, time and social system. Innovation is an idea that is perceived as new by the farmers (Robinson, 2009.; Rogers, 1983). Characteristics of an innovation that facilitate its easy diffusion into the community include its relative advantage, compatibility with what is existing in the community, trialability, observability and simplicity (Rogers, 1983). Communication channels are means through which new ideas are communicated to the community. It can be mass media such as radios, Television, newspaper or, interpersonal communication (Kaminski, 2011). According to Robinson (2009) interpersonal communications are more influential than mass media communications. Time refers to the duration it will take for an innovation to spread across the social system, while the social system is the community at large which plays an important part in the adoption of new ideas (Kaminski, 2011).

2.9 Conceptual Model

The study adopted the theory of Diffusion of Innovation as linear model, where independent and dependent variables demonstrate linear relationships. The conceptual framework of this study as shown in (Figure 2) illustrates that demographic characteristics influence both perceptions of farmers on the effectiveness of AEAs and adoption of GAPs, while socio-cultural and environmental factors influence cashew growers adoption of GAPs. The demographic characteristics, socio-cultural, and
environmental factors are independent variables while adoption and perception are dependent variables. Demographic characteristics and socio-cultural factors determine the readiness of cashew nut growers to adopt and use the recommended GAPs. Demographic characteristics of interest include age, education level, gender, income, and farm experience whereas the socio-cultural factor of interest is farm size. Environmental factors such as climate change and cashew pests and diseases also influence cashew nut growers to adopt recommended cashew GAPs. When the climatic condition is favorable for cashew growing, there will be no pests and diseases affecting cashews hence motivating farmers to adopt technologies for increased production. Institutional factors, which are extension agents’ education, frequency of visits, and extension approaches represent the social context. In this case, message communication is the point of interest of the study. The amount of information AEAs have and the advice they give to the farmers influence the way cashew nut growers perceive the AEAs effectiveness in delivering useful message to them. Danijela et al. (2011) defined perception as the “conscious recognition and interpretation of sensory stimuli, that serve as a basis for understanding, learning, and knowing, or for motivating a particular action or reaction”. The agricultural message and communication channels used by AEAs influence farmers to have positive perception towards them and ultimately determine their rate of adoption of the cashew GAPs. Due to their availability and usage, interpersonal communication channel such as direct contact with AEAs, demonstrations, and farmer field schools are much better than mass communication like radios and TVs (Okwu & Daudu, 2011).
2.10 Chapter Summary

Through a review of literature, this chapter explained various aspects related to the study, including agricultural extension services in Tanzania, effectiveness of extension agents in service provision, and farmers’ perceptions on the perceived effectiveness of extension agents in technology dissemination. Other relevant issues that have been reviewed include roles of extension agents in technology dissemination, factors influencing farmers on technology adoption, and factors affecting extension agents in technology dissemination to farmers. Theoretical as well as conceptual frameworks of the study have been presented. The conceptual framework explained how the dependent variables perceptions and adoption in this study is related to the
independent variables such as demographic characteristics, institutional factors, and socio-cultural factors for increased cashew production.
Chapter 3: Research Methodology

3.1 Introduction

This chapter presents methodologies for the study. The chapter introduces description of the study area, research design, and researcher’s subjectivity statement. The study used a mixed method research design including quantitative and qualitative methods. Population sampling, instrument development and administration, data collection, and analysis are presented. While validity and reliability were introduced under quantitative research methods section, rigor and trustworthiness are discussed under qualitative research methods section. Description of focus groups and limitations of the study are discussed under the qualitative research methods section. Also the methodology section introduces the techniques for integration of quantitative and qualitative data results.

3.2 Purpose and Objectives

The purpose of this study was to assess the perceptions of cashew nut growers on the effectiveness of agricultural extension agents in technology dissemination and adoption of good agricultural practices in Masasi District Council. The objectives of the study were to:

- Determine cashew nut growers’ awareness of agricultural extension services in the Masasi district.
• Identify challenges of cashew nuts growers in the Masasi district.
• Determine cashew nut growers’ perceptions on the effectiveness of extension agents in dissemination of information for good agricultural practices of cashew.
• Determine the use of good agricultural practices amongst cashew nuts growers
• Explore the relationship between demographic characteristics and perceptions of effectiveness
• Describe the relationship between demographic characteristics and use of good agricultural practices of cashew.

3.3 Research design

The study employed a triangulation mixed methods research design involving use of questionnaire and focus group discussions. The research was a case specifically conducted at Masasi District Council in Mtwara region, located in deep southern part of Tanzania. Yin (1984) explains that a case study is a hands-on investigation of a phenomenon within its natural settings. The case study allows for a small geographical area or small sample size of the population to be investigated exhaustively. It also enables the researcher to gain a deeper understanding of the issues in question. Although a case study enables a researcher to closely examine the issue of interest in a natural setting, its findings cannot be generalized into other settings. However, according to Zainal (2007) a case study can be used in evaluative research such as assessing effectiveness of programmes. This case study is conducted in Masasi District Council because the research is related to evaluation of programme and the study area is among the largest cashew nut producing district councils in Tanzania. Masasi District Council ranks the
second in cashew nut production within an average production of 27,666 tons per year after Tandahimba District Council which ranks first in cashew nut production with an average production of 70,752 tons per year (CBT, 2017). According to Zainal (2007) case study allows analysis of data from both quantitative and qualitative methods. The use of a mixed methods research design provides more depth and a better understanding of information and knowledge of the research topic (Creswell and Plano Clark, 2007). It also helps to improve validity, reliability and credibility through the triangulation of the information gathered (Creswell and Plano Clark, 2007). Focus group discussions helped to capture in-depth shared understanding of perceptions held by cashew growers’ towards the effectiveness of extension agents in the dissemination of technologies and adoption of good agricultural practices.

3.4 Study Context

Description of the Study Area

The study was conducted in September 2017 through January 2017 in the Masasi District Council (MDC) in the Mtwara region in Tanzania (See figure 3 & 4). The district has a population of 96,178 cashew growers with a total of 3,895,783 cashew trees. The MDC is among the eight councils under the Mtwara Region in Tanzania. The district lies between 10\(^0\) and 20\(^0\) degree south of the equator and 36\(^0\) and 38\(^0\) degrees East of Greenwich. The district borders Nachingwea and Ruangwa districts to the North, Lindi and Newala districts to the East, Ruvuma River to the South and Nanyumbu district to the West.
Map of Tanzania with its bordering countries

Figure 3. Map of Tanzania
Source: MDC (2014)
The Masasi district receives an average of 832 mm of rainfall per annum and its average temperature is 25°C while the highest temperature is 32°C and the lowest temperature is 22°C. The rainy season starts from December to April. The peak is usually reached in January but occasionally in March or April. The total amount of annual rainfall tends to vary with altitude (MDC, 2014). The average altitude is about 470 meters above sea level however the weather of the district is almost always humid and hot at day and cools during night (MDC, 2014).
3.5 Subjectivity Statement

The researcher of this study is a native citizen of Tanzanian, who worked for 7 years (2010 – 2017) as an Agricultural Extension Agent in the Masasi District Council. Prior to accepting the position of Extension agent, the researcher worked as a secondary school teacher of chemistry and biology for six years (2003 – 2009). Currently the researcher is the head of the department of agriculture, irrigation and cooperatives in Masasi District Council. Through the findings of this study, the researcher will acquire knowledge and skills that will improve the quality of services delivery in his work place. Data were collected and analyzed by the researcher himself.

3.6 Quantitative Methods

3.6.1 Population and Sampling

The MDC has 5 administrative divisions, 34 wards, 166 villages and 838 sub-villages with a total area of 3,829.9 Sq. km (MDC, 2015). All 34 wards are potential for cashew nut growing thus they had equal chance of being selected in the study. Wards were randomly selected where a total of 10 wards were included in the study. The Ward Executive Officers for each selected ward provided the list of farmers growing cashew nuts, from which a total of 12 farmers were randomly selected from each ward. Thus, a sample size of 120 cashew growers was randomly selected from the 10 randomly selected wards namely: Lukuledi, Nangoo, Nanjota, Mwena Mitesa, Mnavira, Chikoropora,
Chigugu Chiwale and Chikundi. For convenience the survey was conducted at residential areas of the respondents.

### 3.6.2 Instrument development and Administration

Cashew nuts value chain stages were used as the base for construction of ideas and concepts included in the questionnaire. The value chain stages of interest for this study were inputs, production, and marketing. A close-ended questionnaire was developed. A panel of 3 experts from Ohio State University and Sokoine University of Agriculture helped in reviewing the questionnaires. Also peer review helped during questionnaire development. During the survey, district and ward agricultural offices were contacted for additional information when deemed so. The sample size of the study was determined by using the Yamane (1973) formula, which assumes the confidence level (CI) of 95% and degree of variability of 0.5. According to Masasi district council annual report (2015) there are 96,178 cashew growers in the study area. Using the Yamane’s formula; \[ n = \frac{N}{1+Ne^2} \]; Where: \( n \) = sample size, \( N \) = population size \( e \) = the level of precision, (0.05), \( l \) = Statistical constant. Therefore, \[ n = \frac{96,186}{1+32,708 * (0.05)^2} = 399 \]. Yamane (1973) formula for determining the minimum sample size is used because the total number of cashew growers in the study area was known. However, one of the drawbacks of the formula is that it uses a confidence level of 95%; thus, the sample size becomes large. Due to time and budgetary constraints, only a sample of 120 cashew growers was used.

Regarding perceptions on the effectiveness of AEAs, a five point Likert scale, was used to determine cashew growers’ perception of AEAs in dissemination of GAPs.
The Likert scale ranged from Strongly Agree (SA), Agree (A), Neutral (N), Disagree (D), and Strongly Disagree (SD). Likert scale items measured levels of agreement or disagreement with respect to the topic in question. Respondents indicated their level of agreement within 18 statements measuring the perceived effectiveness of AEAs in delivering the information for GAPs. To determine perceptions on effectiveness of AEAs, the likert scores were summed up, and median was identified. Since the data were positively skewed with a skewness value of -1.9, the median was deemed as the appropriate cut off point (Gravetter & Wallnau, 2013). All points above the median were considered positive perceptions, and points below the median were considered as negative perceptions. Challenges of cashew nuts growers; using researchers experience on the study area, 17 challenges were identified. Respondents were asked to indicate the most pressing challenges. A frequency table was used to display the proportion of respondents, which fell in each challenge. With regard to use of good agricultural practices (GAPs) the study also used a five point Likert scale. The scale included options determining frequency of use: Very Often (VO), Often (O), Neutral (N), Occasionally (OC), and Not at All (NA). To determine the proportion of respondents’ use or not use of GAPs the likert scales were merged into two categories; very often, often, and occasionally were categorized into use of GAPs while not at all, and neutral were categorized into no use of GAPs.

3.6.3 Validity and Reliability

In order to ensure content and construct validity of the instrument, the questionnaire items were reviewed by a panel of 3 experts that included an academic
advisor from the Ohio State University, a member from Innovative Agricultural Research Initiative (iAGRI) and local supervisor from Sokone University of Agriculture in Tanzania who is familiar with the context of Tanzania agricultural extension services. Upon receipt of suggestions from the reviewers, some questionnaire items were modified and wording improved. For construct validity, and reliability of the instrument, the questionnaire was pilot-tested in Namajani village in which 20 cashew growers were interviewed. The respondents used in the pilot test were not among those used in the actual survey of the study. Pre-testing enabled the researcher and enumerators to have meaningful observations. Comments and suggestions were included concerning instructions, clarity of the questions, and relevance. Respondents’ comments and suggestions were also incorporated to improve the questionnaire. Pre-testing helped to assess the appropriateness of the questions and determine reliability of the questionnaire items. Since the questionnaire consisted of likert scale items the Cronbach’s alpha coefficient for reliability was calculated to check its internal consistency (Warmbrod, 2014). The calculated Cronbach’s alpha coefficient (α) was 0.84 for all items. The questionnaire is considered reliable if Cronbach’s alpha reliability coefficient for overall instrument is at least 0.70 (Gliem & Gliem, 2003; Warmbrod, 2014).

### 3.6.4 Data Collection

Quantitative data were collected by the researcher and trained enumerators. Three enumerators were trained in the methodology of data collection and well understood the individual questions asked to the participants. The enumerators verbally administered questionnaires from September 2016 to December of the same year. To overcome social
desirability bias, enumerators were trained to address the issues asked in brief so as to set a comfortable situation that encouraged honesty from the respondents, and thus not being judgmental. Also, the introduction letter from the DED and presence of the ward executive officers during the survey helped to build trust to the respondents and they felt free to give honest information to the enumerators.

3.6.5 Data Analysis

Both descriptive and inferential statistics were used to describe characteristics of the population. Data were cleaned, summarized, coded and analyzed to obtain descriptive statistics including frequencies, percentages, means, and standard deviations. Data were analyzed by using the Statistical Package for Social Sciences (SPSS) version 23.0. Frequency distribution and cross-tabulations were used to organize and simplify the data from the sample. All objectives of the study were quantitatively analyzed whereas some objectives were analyzed quantitatively and qualitatively. Awareness of agricultural extension services; frequency tables were used to show percentages of respondents and their sources of information for agricultural information. In order to discern the relationship between respondents’ demographic factors and perceptions of effectiveness of AEA, a Chi-Square test for association was used. The demographic factors of interest involved were age, sex, level of education, and farm size. To explore the relationship between respondents’ demographic factors and use of GAPs; a Chi-Square test for association was also used. The demographic factors of involved were age, sex, level of education, and farm size.
3.7 Qualitative Methods

The study used qualitative methods because they seek to gain more understanding of the issues in the society and help to provide support to the quantitative data results (Creswell and Plano Clark, 2007;). Qualitative research methods have the capacity to reveal thought and opinions of the respondents about the issues and thus provide opportunity for the researcher to look deep into the problem (Patton & Cochran, 2002). Semi-structured focus groups were the methods identified appropriate for this study. Three research objectives were investigating using these methods: awareness of agricultural extension services, challenges of cashew nuts growers, and perceptions on the effectiveness of extension agents in dissemination of information for good agricultural practices of cashew were investigated using qualitative research methods.

3.7.1 Theoretical Perspective

The qualitative research method was guided by the social constructionism theory, which explains that knowledge and truth are co-constructed by a person, their surroundings, and the context (Andrews, 2012). This perspective helped to investigate the way the farmers determined and created their opinions of extension agents and extension services based on the people surrounding them and their social context. Due to this it was deemed necessary to use focus groups so as to have in-depth and shared understanding of the awareness on extension agents, perceptions on effectiveness of AEAs and challenges they face as cashew nuts growers.
3.7.2 Population and Sampling

Participants for the focus group discussions were purposively sampled from the same 10 previously selected wards; however, these participated were not the ones who participated in the survey. Selection of the participants was based on their knowledge and experiences with cashew nut farming. Ward executive officers and ward agricultural extension agents helped in identifying the appropriate participants. Through the production records available in the agricultural and marketing cooperative societies in the selected wards, local government officials were able to identify appropriate participants for the FGDs. Participants varied in terms of age, sex, experience, farm size and education; however, there were more male than female participants in each of the three FGDs. Participants were contacted through mobile phones for first hand information, and later they were formally invited by letters which indicated venue, date, time and incentives for their participation in the focus group discussion. There were three focus group discussions, each consisting of 8 farmers. The small sample size for focus group discussions helps to give enough time for each participant to provide in-depth information about the topic in question (Creswell and Plano Clark, 2007, Palinkas et al., 2013).

3.7.3 Data collection methods

Case study methodology was adopted, where focus groups were used for data collection. The Focus Group Discussion (FGD) helps to gather people having similar background and experience to discuss and share the topic of interest (Caffarella & Daffron, 2013; Rossi et al., 2004). The data were collected through semi-structured
focus group discussions questions. The semi-structured focus groups questions helped to keep the discussion live. It also allowed two-way communication between the facilitator and the participants for better exploration of the topic in question. The researcher and an assistant facilitator facilitated the FGDs. Before starting the discussion, a brief explanation was given to the participants to seek their permission to record their voices, where each participant had to agree verbally to be recorded.

3.7.4 Description of the focus groups

Three FGDs were conducted, each with 8 participants. The first FGD was conducted in Lukuledi ward. Participants were farmers from Chikolopola, Mraushi, Lukuledi A, and Lukuledi B. Their age ranged from 28 to 61 years, many had primary education. Few owned motor vehicles while majority had motorbikes and bicycles. Lukuledi is moderately cashew nuts producing area with an average cashew farm size of 8ha. The FGD had five male participants and three female participants. The second FGD was conducted in Mwena ward. Participants were farmers from Chikukwe, Chigugu, Chikundi, and Mwena wards. Their age ranged from 31 to 58 years, many had primary education. Most of them owned motorbikes and bicycles. Geographically Mwena is moderately cashew nuts producing area with an average cashew farm size of 5ha. In Mwena center there were six male participants and 2 female participants. The third FGD was conducted in Makong’onda ward; Participants were farmers from Mnavira, Sindano, Chikolopola, Mchauru, and Makong’onda wards. Their age ranged from 31 to 68 years, majority had primary education. Most of them owned motor vehicles and motorbikes, few had bicycles. Geographically Mnavira is the high cashew nuts producing zones with
an average cashew farm size of 15ha, and majority of participants were aware of many cashew technologies and GAPs. In Mnavira center there were six male participants and 2 female participants.

3.7.5 Data analysis

FGDs were transcribed and thematic data analysis was conducted by the researcher. The data were organized, patterned, and categorized into themes for analysis (Driscoll et al., 2007). Data reduction was conducted based on the research questions and objectives. Thematic groups were identified, organized, analyzed, and connected to the study objectives for drawing conclusions.

3.7.6 Rigor and Trustworthiness

Rigor and trustworthiness were addressed through triangulation of findings; quantitative data provided support on the qualitative data. Moreover, the rigor and trustworthiness was addressed by providing a thick and rich description of the study to help with transferability, keeping detailed accounts of the methods used, decisions made during data collection, and providing the researcher’s statement of bias (Patton & Cochran, 2002).

3.8 Integration of Qualitative and Quantitative Data

Data were analyzed separately. Data collected through questionnaires were analyzed quantitatively using the statistical package for social sciences (SPSS version 23.0) whereas data collected through focus group were analyzed qualitatively. Data from qualitative and quantitative were concurrently analyzed; qualitative data results provided
support to the quantitative data results. Data were then merged to provide the final results.

### 3.9 Limitations of the study methodology

In regards to the quantitative methods, there was a lack of sufficient respondents. The sample size was small to be generalized; only 10 representative wards out of the 34 wards were used. It was also assumed that respondents gave honest responses. In addition, most of the farmers in the study area practice mixed farming, so, by the time data were collected, some of the respondents were not accessible. With regards to qualitative data analysis, challenges were in sorting out the dynamic and varied perceptions of cashew growers on agricultural extension agents from a single-period study. Also, the study did not include ideas from many stakeholder groups in agricultural extension services such as researchers, senior agricultural officers, and extension officers. Otherwise, their views on the current image of extension agents in Masasi district could have been very important.

### 3.10 Summary of methodology

The methodology section re-stated the purpose and objectives of the study, introduced description of the study area, which is Masasi District Council in Mtwara region, Tanzania. This chapter has two sections: quantitative and qualitative research methods. In both sections, sampling procedures, data collection, and data analysis were discussed. Validity and reliability have been introduced in the quantitative research methods whereas rigor and trustworthiness have been introduced in the qualitative
research methods. The researcher’s subjectivity statement, techniques for integrating quantitative and qualitative data results, and the limitations of the study methodology were presented.
Chapter 4: Results

4.0: Introduction

This chapter presents the results of the data analysis used to answer the specific objectives of this study. The chapter is divided into five sections, addressing each objective:

i. Determine cashew nut growers’ awareness of agricultural extension services in the Masasi district.

ii. Identify challenges of cashew nuts growers in the Masasi district.

iii. Determine cashew nut growers’ perceptions on the effectiveness of extension agents in dissemination of information for good agricultural practices of cashew nuts.

iv. Determine the use of good agricultural practices amongst cashew nuts growers.

v. Explore the relationship between demographic characteristics and perceptions of effectiveness.

vi. Describe the relationship between demographic characteristics and use of good agricultural practices of cashew.

Since the study used mixed method for data collection, the data presented comes from both quantitative and qualitative data analysis methods.
4.1 Socio - Demographic Characteristics

This section describes the socio-demographic characteristics of respondents. Aspects of socio-demographic characteristics covered include age, sex, marital status, level of education, sources of income, estimated income per month, farm size, and experience in cashew nuts growing activities.

Results on age distribution of respondents showed that of the 120 respondents majority 39.2 percent were between 46 - 59 years (active older farmer) whereas minority of farmers were between 18 - 35 years (younger farmers), which was 14.2 percent of the total respondents. The rest were middle-aged farmers (36 – 45 years) and elder farmers above 60 years. Results on sex show that majority 75 percent of the respondents surveyed were males while 25 percent were females. With regard to level of education, 84.2 percent had primary and some sort of non-formal education while 15.8 percent had at least secondary education. Results on sources of income (Table 1) showed that all respondents indicated engaging in crop production as a source of income. Moreover, 64.2 percent of the respondents engage in both crops growing and raising livestock and the rest indicated engaging in crop growing, raising livestock and shop business activities.

Table 1. Sources of income

<table>
<thead>
<tr>
<th>Sources of income</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crop growing activities</td>
<td>120</td>
<td>100.0</td>
</tr>
<tr>
<td>Livestock &amp; crop growing activities</td>
<td>77</td>
<td>64.2</td>
</tr>
<tr>
<td>Shop business, Livestock, &amp; crop growing activities</td>
<td>18</td>
<td>15.0</td>
</tr>
</tbody>
</table>
Table 2 shows results on cashew farm size whereby most (72.5 %) of the respondents had a farm size of 1 - 10 acres, and a minority of 8.3 percent had a farm size 26 – 130 acres.

Table 2. Farm size

<table>
<thead>
<tr>
<th>Farm size</th>
<th>n</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 10 Acres</td>
<td>87</td>
<td>72.5</td>
</tr>
<tr>
<td>11 - 25 Acres</td>
<td>23</td>
<td>19.2</td>
</tr>
<tr>
<td>26 - 130 Acres</td>
<td>10</td>
<td>8.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>120</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Results on estimated income per month indicated that the majority (79.2 %) of respondents earn up to Tanzania Shillings (TSH) 250,000 while the minority (4.2 %) earn above TSH 600,000. On average, the estimated income per month of the respondents was TSH 213,816. Results on experience revealed that 46.7 percent of the respondents reported having between 1 – 10 years of experience in cashew nuts growing activities, 32.5 percent between 11 – 20 years, and 20.8 percent between 21 – 45 years of experience in cashew nuts growing activities.

4.2 (a) Awareness of agricultural extension services (Quantitative)

Results showed that out of 120 respondents, 52.5 percent reported having AEAs in their villages while 47.5 percent reported having no AEAs in their villages. Further results show 47.5 percent who reported to have no resident AEAs in their villages had to walk for about 5.6 Km to seek extension services to the nearby villages. With regard to percent of frequency of contact with AEAs, results indicated that more than half (59.2%)
of the respondents reported to have never had contact with AEAs. However, during focus group discussion sessions, some respondents confessed that they are aware of the presence of AEAs but they simply neglected to seek advice from AEAs on cashew GAPs. “We have AEA in our ward, but I do not see benefits of his presence” (R.2, FGD3).

Moreover, 40.8 percent reported to have contact with AEAs at least 2 times per season. With regard to other sources of information (Table 3), the majority (79.2%) reported to have other sources of information on cashew GAPs other than AEAs while the remaining 20.8 percent reported to have no any other sources of information on cashew GAPs. Further, results showed that of those with other sources of information, 78.9 percent got information through TV and Radios while few (5.3%) reported using farmers’ exhibitions.

Table 3. Sources of information

<table>
<thead>
<tr>
<th>Sources of information</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radio/TV</td>
<td>75</td>
<td>78.9</td>
</tr>
<tr>
<td>Books &amp; Flyers</td>
<td>8</td>
<td>8.4</td>
</tr>
<tr>
<td>Farmers exhibitions</td>
<td>5</td>
<td>5.3</td>
</tr>
<tr>
<td>Radio/TV, Books &amp; flyers</td>
<td>7</td>
<td>7.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>95</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

4.2 (b) Awareness of agricultural extension services (Qualitative)

Qualitative data was used to analyze awareness of agricultural extension services in the study area. FGD1: This was conducted in Lukuledi ward. Participants reported that they are aware of the extension services available in their villages. The first theme identified was information on inputs availability, where participants stated that AEAs in
their wards helps to give information on the availability of inputs such as cashew seeds, seedlings and agrochemicals. “This season I did not know which chemical to use so that I can increase production, but after seeking the advice from the extension agent, she advised me the proper chemicals to use, and I managed to increase production” (R4, FGD1). Theme number two was pests and diseases. Participants stated that cashews are very prone to pests and diseases, so they are forced to look for extension services in order to rescue their fields. One of the participants of FGD1 said, “I am effectively utilizing the extension agent in seeking advice on how to control pests and diseases affecting my cashew field, without which I can not get good harvests” (R3, FGD1). The third theme was training and technologies. Participants stated that they are aware of the extension services through trainings on various cashew technologies. AEAs provide training on weeding, pruning, and spraying of chemicals. “I used to cooperate very well with the previous extension agent, and through his support I was able to buy an oxen plough of which I use it for farming activities” (R5, FGD1).

The second FGD was conducted in Mwena ward; participants had similar observations as in FGD1. Participants in FGD2 were aware of extension services through trainings in farmer groups where issues like planting, weeding, pruning and intercropping are addressed. “I did not know anything about cashew technologies, but after having extension agent in our village I am now knowledgeable on how to maintain correct spacing of cashews through reducing crowded trees, and I also know how to do pruning, timely weeding, intercropping with crops like groundnuts, sesame, cassava and maize” (R2, FGD2).

Focus group discussion 3 was conducted in Makong’onda ward. Participants were from high cashew nuts producing villages and wards. Participants stated that they are aware of the presence of extension agents in their wards and villages but they don’t see their contribution in cashew production. A theme that arose was training: participants
stated they used to get trainings and other cashew technologies from Newala district Council, which is the nearby district to them. “I have adopted many cashew technologies, and I am still using them but I got them from extension agents in the nearby district of Newala, not from our district” (R1, FGD3). However, the point of interest is that they are aware of the extension services.

4.3 (a) Challenges of cashew nuts growers (Quantitative)

Results in Table 4 indicate that pests and diseases are the major problem as reported by all (100%) of the respondents. When pests and diseases are not controlled, farmers may experience up to 100 percent crop losses. Climate change is also another challenge that has tremendously impacted cashew nuts growing activities with 98.3 percent of respondents reporting it as a problem. “There have been weather changes in every season which in most cases does not favor cashew production activities” (R8, FGD3). With regard to services obtained from the local government, 90 percent of the cashew growers reported an untimely delivery of subsidized inputs. Additionally, 76.7% of respondents reported unsubsidized inputs to have high prices that small-scale cashew growers could not afford to buy at a market price. Further results show that 75.8 percent of respondents stated lack of credits as among challenges affecting cashew production. As one participant said during a FGD: “We are not eligible even for small loans simply because we are farmers” (R1, FGD2). In regards to market, 69.2 percent of respondents reported that unreliable markets was a challenge, while 69.2 percent of the respondents selected lack of knowledge on cashew agribusiness as a challenge impacting cashew production.
Additionally, 9.2 percent of the respondents reported that AEAs in their wards are not motivated to deliver extension services thus affecting cashew nuts production activities.

Table 4. Cashew production challenges

<table>
<thead>
<tr>
<th>Challenges</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pests and diseases</td>
<td>120</td>
<td>100.0</td>
</tr>
<tr>
<td>Frequent occurrence of climatic disaster/bad weather</td>
<td>118</td>
<td>98.3</td>
</tr>
<tr>
<td>Untimely delivery of chemicals</td>
<td>109</td>
<td>90.8</td>
</tr>
<tr>
<td>High labor costs</td>
<td>99</td>
<td>82.5</td>
</tr>
<tr>
<td>High prices of agricultural inputs/tools</td>
<td>92</td>
<td>76.7</td>
</tr>
<tr>
<td>Lack of credits</td>
<td>91</td>
<td>75.8</td>
</tr>
<tr>
<td>Lack of agricultural inputs/tools</td>
<td>89</td>
<td>74.2</td>
</tr>
<tr>
<td>High taxes</td>
<td>84</td>
<td>70.0</td>
</tr>
<tr>
<td>Lack of reliable markets</td>
<td>83</td>
<td>69.2</td>
</tr>
<tr>
<td>Lack of knowledge on cashew agribusiness</td>
<td>83</td>
<td>69.2</td>
</tr>
<tr>
<td>Lack of training on improved cashew husbandry practices</td>
<td>82</td>
<td>68.3</td>
</tr>
<tr>
<td>Lack of knowledge on cashew management practices</td>
<td>70</td>
<td>58.3</td>
</tr>
<tr>
<td>Presence of old and unimproved cashew trees</td>
<td>46</td>
<td>38.3</td>
</tr>
<tr>
<td>Lack of extension advisory services</td>
<td>40</td>
<td>33.3</td>
</tr>
<tr>
<td>Lack of improved cashew technologies</td>
<td>29</td>
<td>24.2</td>
</tr>
<tr>
<td>Lack of improved cashew seeds</td>
<td>25</td>
<td>20.8</td>
</tr>
<tr>
<td>Extension staffs not motivated</td>
<td>11</td>
<td>9.2</td>
</tr>
</tbody>
</table>

4.3 (b) Challenges of cashew nuts growers (Qualitative)

Findings from qualitative analysis showed that participants in all three centers expressed similar kinds of challenges. FGD1 mentioned challenges, which were untimely delivery of inputs, theft cases, unreliable market, high labor costs. “Subsidized inputs are delivered late when cashew trees have already sprouted and affected by pests and
diseases” (R6, FGD1). Other challenges reported were climate change, difficulties in securing loans, and inappropriate spraying machines. “One of our major challenges is climate change, nowadays weather is unpredictable in such a way it greatly affects cashew production” (R3, FGD1).

Focus group discussion two (FGD2) reported similar challenges as FGD1. However FGD2 reported other challenges; high prices of unsubsidized inputs. “Subsidized inputs come late and those from agro-dealer stores which are not subsidized are of high prices, some farmers cannot afford to buy” (R7, FGD2). Participants reported that some blower operators do not adhere to the principal of spraying and dusting, thus they require back-up trainings. Participants also said that it very expensive to maintain a cashew field due to high labor charges.

In FGD3 participants pinpointed almost similar challenges as for FGD1 and FGD2: untimely delivery of subsidized inputs such as sulphur, high labor costs, loans are not accessible, and an unreliable market. “Cashew nuts marketing system is also a problem. We are not paid timely, in that case we can not manage to pay school fees for our children timely” (R4, FGD3). Climate change was also mentioned, “there has been a weather changes in every season which in most cases does not favor cashew production activities; for instance, when there is low rainfall, cashew nuts production decline” (R5, FGD3).

4.4 (a) Perceptions on the effectiveness of AEAs (Quantitative)

Likert scale items were used to determine respondents’ perceptions of the effectiveness of AEAs on dissemination of information for GAPs of cashew nuts. The scores of the likert scale items were summed up to identify a cut off point for determination of perceptions. Since the data were positively skewed (see Table 5) with a skewness value of -1.9, the median was deemed an appropriate measure of central tendency. The median was 82.5, thus all points above the median were considered as
positive perceptions, and points below the median were considered as negative perceptions. Results indicated that 50 percent of the respondents had positive perceptions while the rest had negative perceptions on the effectiveness of the AEAs on dissemination of information for GAPs.

<table>
<thead>
<tr>
<th>Statements</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advice on seeds/seedlings/agrochemicals availability</td>
<td></td>
</tr>
<tr>
<td>Advice on credits for buying agrochemicals</td>
<td></td>
</tr>
<tr>
<td>Advice on specific information on the use of agrochemicals</td>
<td></td>
</tr>
<tr>
<td>Advice on spraying/dusting</td>
<td></td>
</tr>
<tr>
<td>Advice on health &amp; environmental side effects of agrochemicals</td>
<td></td>
</tr>
<tr>
<td>Advice on improved cashew varieties</td>
<td></td>
</tr>
<tr>
<td>Advice on timely planting</td>
<td></td>
</tr>
<tr>
<td>Advice on timely weeding</td>
<td></td>
</tr>
<tr>
<td>Advice on timely pruning</td>
<td></td>
</tr>
<tr>
<td>Advice on pests and diseases control methods</td>
<td></td>
</tr>
<tr>
<td>Advice on harvesting</td>
<td></td>
</tr>
</tbody>
</table>

Table 5: Likert scale items on effectiveness of AEAs in dissemination of GAPs of Cashew Nuts
4.4 (b) Perceptions on the effectiveness of AEAs (Qualitative)

Findings from qualitative analysis indicated mixed feeling on the perceptions of effectiveness of AEAs in dissemination of information for GAPs. In FGD1 and FGD2, which were conducted in Lukuledi and Mwena respectively, participants had positive perceptions of the effectiveness of AEAs. In FGD1 participants reported that the extension agent in their ward is effective in advising on how to apply chemicals (spraying and dusting). The AEA also provides training on how to conduct weeding, correct spacing, pruning, and other GAPs for increased cashew production. “Our extension agent is very
active, motivated and she responds quickly when you need her assistance at any time” R4, FGD1). Participants commented that the AEA has been providing training through village meetings. “The extension agent has been not only providing agricultural information on GAPs of cashews but also on other crops depending on the crop calendar” R6, FGD1).

In FGD2 participants said that AEAs in their wards are effective in training and visiting farmers in their fields. “I used to go to the farmer with the extension agent, he teaches me on how to do weeding and pruning of cashews” (R8, FGD2). The AEAs have been teaching farmers on planting using correct spacing, spraying/dusting and post harvest handling of cashew nuts. However, one of the participants stated that “government provides motorbikes to the AEAs, but they are not always given fuel to run the motorbike”, In this case, sometimes the AEAs are not capable to visits all villages in the ward (R5, FGD2).

Participants in FGD3 had negative perceptions on the effectiveness of AEAs in their wards as one of the participants stated; “we have extension agent in my village as well as in the ward, but I don’t see their benefits” (R1, FGD3). Another participant said: “AEAs are brought in our villages by the government to help farmers, but in most cases they are just doing their own business” (R4, FGD3). During FGD3 it was revealed that whenever the AEAs give advice to cashew farmers, their advice was inadequate. “As I am talking right now, the AEAs are not found in the farms, both farmers and livestock keepers are all complaining that extension services are inadequate” (R8, FGD3). Further, participants commented that AEAs were supposed to visit farmers and provide training on farm preparation, weeding, pest and diseases identification, chemical selection and blower
operation. “In most cases AEAs are just found in their offices” (R6, FGD3). With regard to adoption participants stated that they are adopting technologies and GAPs disseminated by AEAs and their fellow farmers from nearby districts of Newala and Tandahimba. “In our villages farmers have highly adopted cashew technologies. We get those technologies from our fellow farmers in Newala and Tandahimba district councils (R3, FGD3).

4.5 Use of good agricultural practices

Likert scale items were used to determine respondents’ use of GAPs. Respondents were presented with 18 statements of GAPs on cashew value chain (see Table 6), which include inputs, production and marketing. The five point likert scale items which were used to investigate respondents use of GAPS were merged into two categories; very often, often, and occasionally were categorized into “use”, and not at all and neutral were categorized into “no use”. Results showed that in all three categories the use of GAPs for each statement were above ninety percent.

<table>
<thead>
<tr>
<th>Statement</th>
<th>% Use</th>
<th>% No use</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inputs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I use recommended seeds/seedlings/agrochemicals</td>
<td>95.0</td>
<td>5.0</td>
</tr>
<tr>
<td>I apply for credit for buying agrochemicals</td>
<td>94.2</td>
<td>5.8</td>
</tr>
<tr>
<td>I read specific information on the use of agrochemicals</td>
<td>97.5</td>
<td>2.5</td>
</tr>
<tr>
<td>I do spraying/dusting</td>
<td>97.5</td>
<td>2.5</td>
</tr>
</tbody>
</table>

Continued

Table 6: Likert scale items on use of GAPs of Cashew

56
Table 6 continued

<table>
<thead>
<tr>
<th>Statement</th>
<th>% Use</th>
<th>% No use</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am cautious on health &amp; environmental side effects of agrochemicals</td>
<td>97.5</td>
<td>2.5</td>
</tr>
<tr>
<td><strong>Inputs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I use recommended seeds/seedlings/agrochemicals</td>
<td>95.0</td>
<td>5.0</td>
</tr>
<tr>
<td>I apply for credit for buying agrochemicals</td>
<td>94.2</td>
<td>5.8</td>
</tr>
<tr>
<td>I read specific information on the use of agrochemicals</td>
<td>97.5</td>
<td>2.5</td>
</tr>
<tr>
<td>I do spraying/dusting</td>
<td>97.5</td>
<td>2.5</td>
</tr>
<tr>
<td>I am cautious on health &amp; environmental side effects of agrochemicals</td>
<td>97.5</td>
<td>2.5</td>
</tr>
<tr>
<td><strong>Production</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I plant improved cashew varieties</td>
<td>95.8</td>
<td>4.2</td>
</tr>
<tr>
<td>I do timely planting</td>
<td>97.5</td>
<td>2.5</td>
</tr>
<tr>
<td>I do timely weeding</td>
<td>97.5</td>
<td>2.5</td>
</tr>
<tr>
<td>I do proper and timely pruning</td>
<td>97.5</td>
<td>2.5</td>
</tr>
<tr>
<td>I use advised pests and diseases control methods</td>
<td>96.7</td>
<td>3.3</td>
</tr>
<tr>
<td>I follow advised harvesting techniques</td>
<td>95.8</td>
<td>4.2</td>
</tr>
<tr>
<td>I usually do cost-benefit analysis of specific cashew technologies and management practices.</td>
<td>93.3</td>
<td>6.7</td>
</tr>
<tr>
<td>I educate others on cashew farming</td>
<td>92.5</td>
<td>7.5</td>
</tr>
<tr>
<td>I follow what I was advised through demonstration methods</td>
<td>95.0</td>
<td>5.0</td>
</tr>
<tr>
<td><strong>Marketing</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I follow advices on post-harvest handling (grading &amp; storage)</td>
<td>96.7</td>
<td>3.3</td>
</tr>
<tr>
<td>I am advised on cashew agribusiness</td>
<td>95.0</td>
<td>5.0</td>
</tr>
<tr>
<td>I follow advises on sale of cashew nuts</td>
<td>95.8</td>
<td>4.2</td>
</tr>
<tr>
<td>I follow advises under co-operative societies</td>
<td>96.7</td>
<td>3.3</td>
</tr>
</tbody>
</table>
4.6 Relationship between demographic characteristics and perceptions of effectiveness

A Chi-square test of association was performed in order to explore the relationship between demographic characteristics of respondents and perceptions of effectiveness of AEAs in dissemination of information for GAPs. The demographic characteristics of interest were age, sex, level of education, and size of cashew farm. Results indicated that the relationship between age of respondents and perceptions on the effectiveness was statistically not significant, $X^2 (1, N = 120) = 0.315, P > .05$. Age of respondents is not related to perceptions of effectiveness. Likewise sex and effectiveness of AEAs had no significant relationship, $X^2 (1, N = 120) = 0.178, P > .05$. Further results indicated that there was no relationship between level of education of the respondents and perceptions of the effectiveness of AEAs, $X^2 (1, N = 120) = 0.178, P > .05$. Further results indicated that size of the cashew farm had no significant relationship with effectiveness of AEAs, $X^2 (2, N = 120) = 4.207, P > .05$.

4.7 Relationship between demographic characteristics and use GAPs

A Chi-square test of association was calculated in order to describe the relationship between demographic characteristics of respondents and use of GAPs. The demographic characteristics of interest were age, sex, level of education, and size of cashew farm. It was found that the relationship between age of respondents and use of GAPs was statistically not significant, $X^2 (1, N = 120) = 2.664, P > .05$. Regarding sex of
respondents it was also not significantly related to the use of GAPs, $X^2(1, N = 120) = 1.379, P > .05$. Additionally, results indicated that there was no significant relationship between level of education and use of GAPs, $X^2(2, N = 120) = 0.261, P > .05$. Also, results also indicated that size of the cashew farm had no relationship with use of GAPs, $X^2(2, N = 120) = 0.422, P > .05$.

4.8 Chapter Summary

The fourth chapter presented findings on cashew nut growers’ awareness of agricultural extension services, challenges of cashew nuts growers, perceptions on the effectiveness of AEAs in dissemination of information for good agricultural practices of cashew nuts, and the use of good agricultural practices amongst cashew nuts growers. Other findings presented were on relationship between demographic characteristics and perceptions of effectiveness of AEAs, and relationship between demographic characteristics and use of GAPs of cashew. The data was analyzed quantitatively in all objectives and qualitatively to some aspects of the study; awareness, effectiveness and challenges of the cashew growers in the study area. Demographic characteristics of the respondents were also highlighted.
Chapter 5: Conclusions

5.0 Introduction

This chapter presents discussion of major findings, conclusion, recommendations, and topic for further research.

5.1 Objective 1: awareness of agricultural extension services

Results showed that 52.5 percent reported having AEAs in their villages, and out of it results indicated that 59.2 percent of the respondents reported to have never had contact with AEAs. This could be attributed to the shortage of AEAs in the villages. The Masasi district council’s finance, administration and planning committee report of December 2016 showed that the required number of AEAs was 220 while the number of AEAs present is only 52 which is 23.6 percent of the total requirement of AEAs in the district. The district (MDC) has a total of 34 wards and 166 villages; none of the villages has an Extension agent. Extension agents are supposed to be placed at village levels; however, they are found only at the ward level where the coverage area is very large. The MDC (2014) profile indicated that small ward had 2 villages while the large had up to 10 villages.

Further, it was noted that AEAs are often immobile due to lack of transport and thus they are not able to visit all the farmers in the villages. It was not that the MDC has provided motorbikes to some of the AEAs however these motorbikes are not facilitated
with fuel so as to enable them to be mobile. During FGDs, participants in all three centers of Lukuledi, Mwena and Makong’onda reported to be aware of the extension services, and advised the government to provide transport to the AEAs so that they can visit many farmers as possible. In addition 79.2 percent of the respondents reported to have other sources of information on cashew GAPs, implying that majority of respondents are aware of the extension services in the district. This could also be attributed to the facts that since AEAs are not able to reach all the farmers, majority opt to look for alternative sources of getting technologies and GAPs for the sake of increasing cashew production.

5.2 Objective 2: Challenges

Findings showed that there were many challenges that respondents face in cashew nuts growing activities, however, the major problems reported were: pests and diseases, climate change, untimely delivery of inputs, high labor costs, high prices of inputs, and lack of credits. Results in objective 4 showed that on average usage of GAPs is over 90 percent indicating farmers’ awareness of use of the GAPs; nevertheless, production of cashew in the study area is low implying that challenges facing cashew growers largely contribute to low cashew productivity. Speaking of pests and diseases; cashews varieties available in the study area seems to be susceptible to pests and diseases such as powdery mildew and blight and when left untreated, these pests and diseases can cause up to 100 percent crop losses. In that regard cashew growers need technologies and GAPs that can combat with pests and diseases. Although the government provides subsidized cashew inputs, most of the times inputs are delivered late when cashew trees have been affected by the pests and diseases. According to Massawe et al. (2013) when pests and disease are
not controlled, cashew production per tree per year is about 2 – 3 Kilograms. Despite the
good intention of the government to subsidize cashew inputs, the delivery mechanism
used seems to be bureaucratic thus the need for a mechanism that will enable timely
delivery of inputs. Majority of the cashew growers are small-scale farmers who cannot
afford to buy inputs at market price, so when the subsidized inputs are lately delivered it
greatly affects the poor farmers. Climate change is very much related to pests and
diseases. When unexpected weather change occurs, it creates a favorable environment for
pests and diseases. However, it was noted that the MDC has started training farmers on
climate smart agriculture so as to mitigate the effects of weather changes. Pertaining to
lack of credits, in most cases farmers are not given loans because they are subsistence
farmers, thus they lack collaterals and crop insurance. With regard to labor cost, it was
noted that there was only 52 tractors in the district, which means majority use family
labor to prepare their fields using hand hoe. Those with larges farms use hired labor or
herbicides to clean their fields. Unless solutions found, reported challenges are
enormously causing low cashew production in the study area.

5.3 Perceptions on the effectiveness of AEAs

Results indicated that 50 percent of the respondents had positive perceptions
while the rest had negative perceptions on the effectiveness of the AEAs on
dissemination of information for GAPs. The negative perceptions can be attributed to the
fact that generally there is shortage of AEAs in the study area. As explained in objective
1, AEAs available in the district are only 23.6 percent of the total required number of
extension staffs. In some of the wards where AEAs are available it was noted that AEAs
serve many other nearby wards and villages. Due to this shortage it is obvious that AEA
are not often able to visit every village or every individual farmer. In most cases
extension services are provided through farmer groups thus those who are not in groups
left unattended. The positive perceptions can be attributed to the 52 available AEA
and other sources of information such as mass media like local radios and Televisions. There
is one local radio in the district, and another from the nearby district, which are used to
give information to the community related to many issues including GAPs of cashew
nuts. Additionally, regardless of their small number, the available AEA help to
disseminate information for GAPs via demonstrations and farmers groups available in the
villages. Although some of the cashew growers indicated to have other sources of
information, there is a need to create a demand driven and cost shared extension services.
Farmers should not wait for AEA to go to their residents and farms rather farmers
should be able to eagerly look and seek advice from the AEA.

5.4 Use of GAPs

Results indicated that usage of GAPs were above 90 percent. Due to shortage of
AEAs cashew growers have other alternatives of getting information on GAPs of cashew
nuts. It can also be related to the fact that cashew is the main cash crop in the study area
that farmers are very keen to care of it. Further, the two radios (Fadhila FM and Newala
FM) head in the study are very useful in spreading cashew GAPs to the farmers. Again,
as an effort to increase cashew nuts production, the MDC conducts periodical cashew
GAPs mass awareness campaigns in all villages. These campaigns help to insist farmers
on the proper time of weeding, pruning, dusting/spraying and grading of the nuts.
Moreover, it was observed that experienced farmers are used to mentor the less experienced ones on various issues related to cashew technologies and GAPs thus making the usage of GAPs a common practice to majority of the farmers.

5.5 Relationship between demographic characteristics and perceptions of effectiveness

Results indicated that there was no significant relationship between demographic characteristics and perceptions of effectiveness of AEAs on the dissemination of information for GAPs. This might be due to small sample size or there was no influence of demographic characteristics on the perceptions of effectiveness. However, the assumptions were: relatively younger and active farmers would have more positive perceptions compared to relatively older inactive farmers. This is due to the fact that younger and active farmers are probably mobile and able to move and seek advice from AEAs and thus their mobility makes them see comparative advantages of using advices from AEAs. Speaking of sex, the assumption was that males would have positive perceptions than female respondents because males own majority of the cashew farms. Similarly on education, it was assumed that those with secondary education and above would have positive perceptions than those with primary education and below. It was expected that a farmer with relatively high education could see the relative advantages of adhering to the recommended GAPs of cashew than his/her fellow farmer without good education. Likewise it was assumed that farmers with large cashew fields would have positive perceptions towards effectiveness of AEAs in the sense that they highly need
extension services and likely to see the impact of AEAs as compared to their fellow farmers with small acreages of cashews.

5.6 Relationship between demographic characteristics and use of GAPs

Results showed that there was no significant relationship between demographic characteristics and the use of GAPs. Again this might be due to small sample size or there was no influence of demographic characteristics on the use of GAPs. It can be said that regardless of their difference in age, sex, education and size of the farm they all need to use GAPs to increase cashew nuts production. This could also be due to the fact that majority of the respondents were older farmers with enough experience on the use of GAPs. Nevertheless, it was assumed that younger and active farmers would report using more GAPs than older inactive farmers, as younger farmers are more mobile and able to seek advice from AEAs and other sources of information such as radios, TVs, newspapers, magazines, leaflets, and books. Young farmers are also likely to get agricultural information through social medias such as face book, twitter, WhatsApp, Instagram etc. Thus, their mobility could make them see comparative advantages of following recommended technologies and GAPs. Pertaining to sex, it was expected that males would report using more GAPs than females because many males own farms that females. In the same way it was expected that farmers with secondary education and above would report using more GAPs than their fellow with primary education and below. When it comes to the question of adoption educated farmers are expected to make reasonable and quick decisions than non-educated farmers (Rogers, 1983). Also, it was expected that farmers with large farm size would indicate using more cashew
technologies and GAPs than those with relatively small cashew farms (below 25 acres). However, majority of the respondents (72.5%) had a farm size between 1 - 10 acres, and very few had farm size above 26 acres.

5.7 Overall Conclusions

Based on the findings of the study, the following conclusions are drawn:

- Cashew nuts growers were aware of the extension services available in Masasi district council; however, AEAs frequency of contact with farmers was minimal which could be due to shortage of AEAs in the district. The minimal frequency of contacts of AEAs with farmers leads to farmers receiving insufficient information on the correct use of cashew GAPs leading to low cashew productivity.

- There are so many challenges affecting cashew nuts growers. Pests and diseases, climate change, untimely delivery of inputs, high labor costs, high prices of inputs, and lack of credits were the major challenges of cashew nuts growers in the study area.

- Half of the cashew nuts growers had positive perceptions on the effectiveness of AEAs in dissemination of information for GAPs. Generally this result indicates that AEAs are not effective in dissemination of the correct information and GAPs to the cashew growers. Partly this could be due to shortage of AEAs and lack of transport facilities. With the current increase of cashew nuts price from (TSH 1,200 to 3,800) probably will attract more farmers to invest in the cashew production, thus making use of the available AEAs in the study area.
Majority of the cashew nuts growers use GAPs, however cashew productivity is still low. This could be due to: shortage and ineffectiveness of AEAs which lead to farmers receiving insufficient information on the use of GAPs. Again this indicates that challenges reported by farmers largely affect cashew production. For instance untimely delivery of subsidized inputs of which are delivered and used when cashews have already been affected by pests and diseases. It was also noted that in the study area farmers use more sulphur dust which only prevents powdery mildew than wettable chemicals which prevent and cure powdery mildew and other cashew pests and diseases. Other reasons could be unpredictable weather changes which cause existence of more cashew pests and diseases. Moreover, some farmers reported to have old and local cashew varieties which has low disease resistance and potentials of production.

There was no influence of demographic characteristics of farmers on the perceptions of effectiveness of AEAs on the dissemination of information for GAPs.

There was no influence of demographic characteristics of farmers on the use of cashew GAPs.

5.8 Recommendations

Local government should ensure that all villages and wards have enough AEAs. This can be achieved through the district council asking permission from the central government to employ AEAs for every financial year.
• Providing remuneration and regular in-service trainings to AEAs so as to equip them with new cashew GAPs. Creating good working environment such as descent house can motivate the AEAs.

• Encouraging and strengthening partnership with private extension service providers such as NGOs and community based organizations (CBOs) so that these organizations can provide extension services in areas where the public extension services are not available. Currently there are so many AEAs in the streets graduated from the Ministry of Agriculture Training Institutes (MATI) who have not employed. If these AEAs are hired by CBOs or NGOs they can jointly help to provide extension services in the study area.

• Timely delivery of subsidized inputs. Despite the good intention of the government to subsidize cashew inputs, the delivery mechanism used is bureaucratic. Instead of bulky purchase system of inputs, which is used right now, it would be better if each district purchase its own inputs depending on their agro-ecological zones. This will help farmers in a particular district to get inputs on time. For instance in Masasi district the cashew trees start sprouting in March while other districts start on May.

• With the increased price of cashew nuts, Agricultural Marketing Co-operative societies (AMCOs) can be recommended to set aside some funds for purchasing inputs ahead of time and distribute to their members. Some of the funds can also be used to hire AEAs who will provide extension services to the AMCOs members.
• Replacing old and local cashew trees with improved ones, and establishing new cashew farms. In collaboration with Naliendele Agricultural Research Institute, the MDC can have a strategic plan to remove old tree through top working or cutting down old trees and planting new ones.

• The MDC should set aside some fund from its own source collection for purchasing motorbikes and fuel so as to facilitate AEAs to be mobile and reach many farmers as possible.

• The MDC should ensure that every ward has ward resource centers. These will be one stop centers which can have a lot of resource materials such as books, leaflets, journals, magazines, newspapers, and TVs where farmers can visit at their own time for consultation.

• MDC should encourage cashew nuts growers to join in rural financial institutions such as savings and credit cooperatives (SACCOs) and village community banks (VICOBA) so that they can secure loans for buying inputs.

5.9 Implications for Tanzania extension

In Tanzania more that 75 percent of the people live in rural areas, agriculture being their main source of income and food. In the study area cashew is the main cash crop, and majority of the farmers are small scale doing subsistence agriculture. In order to change subsistence farming into commercial farming, collective efforts among main stakeholders on the agricultural sector is inevitable. Extension agents are crucial in this move because their contribution is highly required.
The findings of the study showed that cashew nuts growers are aware of the extension services though they are not frequently visited by AEAs so as to give them recent information on cashew GAPs. This implies that AEAs are not reaching farmers as it deemed to be, meaning that dissemination and adoption of cashew technologies is minimal. In that case cashew production will continue to be low, farmers income will also be low and ultimately poverty level will be high among the farmers.

Respondents reported challenges that draw them back as far as cashew productivity is concerned. Untimely delivery of subsidy inputs was one of the challenges that scored high, implying that with all efforts farmers take, they may end up with low production because they are unable to control pests and diseases promptly. The local government should make sure that inputs are delivered on time so that pests and diseases can be controlled to reduce crop losses. It was also noted that if pests and diseases are not controlled earlier might cause crop losses up to 100 percent.

Regarding perceptions, findings indicated that half of the farmers had positive perceptions while the rest had negative perceptions, which generally indicate that AEAs are ineffective. This implies that AEAs are not delivering extension services to the expectations of the farmers. However shortage of AEAs in the study area affects extension services delivery. Nearly all villages in the study area had no resident AEAs. This indicates that majority of the farmers are not getting extension services frequently.

Findings on the use of GAPs indicated over 90 percent of the farmers reported using them however cashew productivity is still low. With this proportion of GAPs
usage, it shows that cashew growers are ready to adopt technologies but they may be receiving incorrect information.

Results from this study showed that regardless of their status (age, sex, level of education and size of the farm) they need to use GAPs in order to increase cashew nuts production. Bearing in mind that cashew is the main source of income in the southern zone where the study was conducted, AEAs efforts are very important to make sure farmers livelihood is improved through increased income, food security, and improved social services such education and health.

5.10 Areas for Further Research

- Replicating this case study by using a larger sample size that involves AEAs effectiveness in dissemination of information for GAPs so as to find out why cashew productivity is low while farmers are aware on most of GAPs and extension services. This study start was conducted using relatively small sample, and time used was relatively very short that could not enable to capture every thing that could provide the better picture of the extension services in the district. Furthermore, besides using large sample size, other stakeholders should be involved in the study. Such stakeholders include AEAs, CBT, Naliendele Agricultural Research Institute (NARI), District Executive Director (DED) and District Agriculture, Irrigation and Co-operative officer (DAICO).

- Based on the findings of this study the researcher recommends a study on factors affecting extension agents’ effectiveness in dissemination of GAPs to farmers in Masasi district council. AEAs are the front liners in the Extension services in
making sure farmers get the best technologies and GAPs from the Naliendele agricultural research station. Regardless of their shortage, when they are properly managed they can serve relatively large number of farmers and thus off set the shortage of the AEAs. Once motivational factors of AEAs are plainly known it would be easier for the DAICO to make sure AEAs are provided with incentives for the increased cashew productions in the district.

5.11 Summary

Chapter five presented discussion of the findings for each objectives of the study, overall conclusions and recommendations for the AEAs, and the government of Tanzania. Implications of the study for the Tanzania extension services and areas for further research were presented.
References


doi: 10.1787/5kmmv9s20944-en


Website: Cashew nut Board of Tanzania (CBT): [http://www.cashewnut-tz.org](http://www.cashewnut-tz.org)

Website: Naliendele Agricultural Research Institute (NARI) [http://www.kilimo.go.tz/naliendele/index.html](http://www.kilimo.go.tz/naliendele/index.html)


Appendix A
Permission to conduct research in Masasi District Council

MASASI DISTRICT COUNCIL
(All correspondences should be addressed to District Executive Director)

Tell: 2510031, 2510013.
Fax: 2510045.
E-mail: ded@masasi.go.tz

P. O. Box 60,
Masasi,
Mtwara,
TANZANIA.

Ref. No. MDC/PF.3271
Date: 26th October 2016

Dear Mr. Winfrid E. Tamba

RE: REQUEST FOR CONDUCTING A STUDY IN MASASI DISTRICT COUNCIL.

Reference is made to your letter of October 20, 2016 on the above subject.

This is to inform you that the Masasi district council has no objection to your request for conducting the study as requested. Furthermore, you are assured of good cooperation from the staff in the district in carrying out your study.

Yours sincerely,

Mohamed K. Muhidini
For District Executive Director
 MASASI.
Appendix B
Institution Review Board (IRB)

CC: Tamba, Winfrid E. <tamba.1@buckeyemail.osu.edu>; Stoddard, Jacob <stoddard.13@osu.edu>
Subject: Study Determined Exempt for #2016E0562

The Ohio State University
Office of Responsible Research Practices
300 Research Administration building
1960 Kenny Road
Columbus, OH 43210-1063
Phone (614) 688-8457
Fax (614) 688-0366
orrp.osu.edu

10/17/2016
Study Number: 2016E0562
Study Title: Assessing Perceptions of Cashew Growers on the Effectiveness of Agricultural Extension
Agents in Technology Dissemination and Adoption in Masasi District Council - Tanzania.

Principal investigator: Mary Rodriguez
Date of determination: 10/17/2016
Qualifying exempt category: #2

Dear Mary Rodriguez,

The Office of Responsible Research Practices has determined the above referenced project exempt
from IRB review.

Please note the following about this determination:

- Retain a copy of this correspondence for your records.
- Only the Ohio State staff and students named on the application are approved as Ohio State
  investigators and/or key personnel for this study.
- Simple changes to personnel that do not require changes to materials can be submitted for
  review and approval through Buck-IRB.
- No other changes may be made to exempt research (e.g., to recruitment procedures,
  advertisements, instruments, protocol, etc.). If changes are needed, a new application for
  exemption must be submitted for review and approval prior to implementing the changes.
- Records relating to the research (including signed consent forms) must be retained and
  available for audit for at least 5 years after the study is closed. For more information, see
  university policies, Institutional Data and Research Data.
- It is the responsibility of the investigators to promptly report events that may represent
  unanticipated problems involving risks to subjects or others.

https://outlook.office.com/owa/?viewmodel=ReadMessage&emId=150951696785113430854&sp=1&isPrintView=1&sz=12&isPopup=true&path=

RE: Study Determined Exempt for #2016E0562 - Tamba, Winfrid E.
10/18/16, 9:51 PM

This determination is issued under The Ohio State University’s OHRP Federalwide Assurance
#00006378. Human research protection program policies, procedures, and guidance can be found on
the OHRP website.

Please feel free to contact the Office of Responsible Research Practices with any questions or
CtHLS/HRPP.

Jacob Stoddard
stoddard.13@osu.edu
(614) 292-0526
Appendix C
Informed consent for survey

The Ohio State University

College of Food, Agricultural, and Environmental Sciences
Agricultural Communication, Education, and Leadership Department

INFORMED CONSENT


Researcher: Winfrid Tamba

Sponsor: USAID – iAGRI Scholarship

Participants’ right:
Your participation in this research is absolutely voluntary and you do not give up any personal legal rights by agreeing to participate. Refusal to participate will involve no penalty or loss of benefits to which the subject is otherwise entitled and subjects may discontinue participation at any time without penalty or loss of benefits.

Purpose of the study:
The purpose of the study is to assess extension agents’ effectiveness and good agricultural practices (GAPs) adoption amongst cashew nuts growers in the Masasi District Council. The study will involve collecting information on agricultural productivity, awareness on agricultural extension services, Cashew growers’ opinions on the effectiveness of Extension Agents in dissemination of technology and good management practices of cashew, Cashew growers’ willingness to adopt technologies and good agricultural practices of cashew and challenges of cashew production activities. As
a prospect participant in this study, you are being asked to participate because you are a cashew nuts grower residing in Masasi District Council.

**Study tasks or procedures:**
The study will collect information about socio-demographic, awareness on agricultural extension services, cashew growers’ perceptions on the effectiveness of Extension Agents in dissemination of technology and good management practices of cashew, cashew growers’ willingness to adopt technologies and good agricultural practices of cashew and challenges of cashew production activities. Only demographic information such as gender, education level, and marital status will be collected. No information that identifies you such as name, social media ID, physical address, email address and phone numbers will be collected.

**Duration of the study:**
The study uses a questionnaire administered by an interviewer to you, and the survey will take about 45 to 75 minutes of your time. The survey will be done at a place convenient to you (e.g. at your farm, home, or at the village office), pictures of your farm may be taken.

**Confidentiality of participants’ records:**
The questionnaire used in this study does not require information that identifies you as a participant. Numbers will be assigned to the questionnaires for ease of reference during data analysis. You may wish to fill in the questionnaire on your own so as to remain anonymous. The completed questionnaires will be kept for four months and destroyed after the analysis is completed by August, 2017. The findings from this research will be used for academic purposes, recommendation for agricultural policies, and for practice improvement without any reference to you as a participant. Data collected in this study and the final report will be kept and stored in the Department of Agricultural Communication, Education and Leadership in the College of Food, Agriculture and Environmental Sciences of The Ohio State University.

**Contacts and Questions:**
In case you have any questions regarding your rights in this research or any further enquiries about this study, you may contact Dr. Mary T. Rodriguez by calling +1 614-247-6001 or email her at rodriguez.746@osu.edu.

For questions about your rights as a participant in this study or to discussed other study-related concerns or complaints with someone who is not part of the research team, you may contact Ms. Sandra Meadows in the Office of Responsible Research Practices at +1-800-678-6251, +1-614-688-8641, or meadows.8@osu.edu.

**Incentives provided:**
During the survey, you will be given refreshments such as soda and snacks plus a 5,000 Tanzania Shillings equivalent to US$ 2 depending on the availability of funds. You can withdraw at any time and still receive the stated amount as an incentive.

**Sponsor:**
This study will be conducted for the fulfillment of the requirement of completion of the master’s degree of science in Agriculture and Extension Education of The Ohio State University. My studies are sponsored by USAID-iAGRI scholarship in which this study is part of it.
Appendix D.
Informed consent for focus group discussion

THE OHIO STATE UNIVERSITY

College of Food, Agricultural, and Environmental Sciences
Agricultural Communication, Education, and Leadership Department

CONSENT TO PARTICIPATE IN FOCUS GROUP DISCUSSION


Researcher: Winfrid Tamba

Sponsor: This study will be conducted for the fulfillment of the requirement of completion of the master’s degree of science in Agriculture and Extension Education of The Ohio State University. My studies are sponsored by USAID-iAGRI scholarship in which this study is part of it.

Participants’ right:
Your participation in this research is absolutely voluntary and you do not give up any personal legal rights by agreeing to participate. Refusal to participate in the focus group will involve no penalty or loss of benefits to which the subject is otherwise entitled and subjects may discontinue participation at any time without penalty or loss of benefits.

Purpose of the study:
The purpose of this focus group is to try to understand the perceptions of cashew growers on the extension agents’ effectiveness and good agricultural practices (GAPs) adoption amongst cashew nuts growers in the Masasi District Council.

Study tasks or procedures:
The focus group will collect ideas and views about awareness on agricultural extension services and cashew growers’ perceptions on the effectiveness of Extension Agents in dissemination of technology and good management practices of cashew. Although the
focus group will be tape recorded, your responses will remain anonymous and no names will be mentioned in the report. There are no right or wrong answers to the focus group questions. We want to hear many different viewpoints and would like to hear from everyone. We hope you can be honest even when your responses may not be in agreement with the rest of the group. In respect for each other, we ask that only one individual speak at a time in the group and that responses made by all participants be kept confidential. You will be in a group with 6 to 8 other cashew growers.

**Duration of the study:**
The focus group discussion will take about 45 to 90 minutes of your time. The focus group discussion will be done at a place convenient and close to you.

**Confidentiality of participants’ records:**
Although the focus group will be tape recorded, your responses will remain anonymous and no names will be mentioned in the report. The recorded information will be kept for four months and destroyed after the analysis is completed by August, 2017. The information learned in the focus groups will be used for academic purposes, recommendation for agricultural policies, and for practice improvement without any reference to you as a participant. Data collected in this study and the final report will be kept and stored in the Department of Agricultural Communication, Education and Leadership in the College of Food, Agriculture and Environmental Sciences of The Ohio State University.

**Contacts and Questions:**
In case you have any questions regarding your rights in this research or any further enquiries about this study, you may contact Dr. Mary T. Rodriguez by calling +1 614-247-6001 or email her at rodriguez.746@osu.edu.

For questions about your rights as a participant in this study or to discuss other study-related concerns or complaints with someone who is not part of the research team, you may contact Ms. Sandra Meadows in the Office of Responsible Research Practices at +1-800-678-6251, +1-614-688-8641, or meadows.8@osu.edu.

**Incentives provided:**
During the focus group discussion you will be given refreshments such as soda and snacks plus a 15,000 Tanzania Shillings equivalent to US$ 7 depending on the availability of funds. You can withdraw at any time and still receive the stated amount as an incentive. Transport allowance of 20,000 Tanzania Shillings equivalent to US$ 10 will be provided.
Appendix E
Recruitment letter for survey

THE OHIO STATE UNIVERSITY
College of Food, Agricultural, and Environmental Sciences
Agricultural Communication, Education, and Leadership Department
P. O. Box 60
MASASI
12 September 2016

Ref: Invitation to participate in survey

Dear participant,

My name is Winfrid Tamba, a student from the department of Agricultural Communication, Education and Leadership of the Ohio State University in the United States of America. I am writing to ask you to participate in a survey related to cashew growing activities. The survey will be held at your residence. The questionnaire will take about 30 – 45 minutes. To compensate you for your time TSH 5,000 Tanzania shillings equivalent to US$ 2 will be given as an incentive. You can withdraw at any time and still receive the stated amount as an incentive. You were randomly selected from a list of cashew growers in your ward. Participation in this research is voluntary and you do not give up any personal legal rights by agreeing to participate. Refusal to participate in the survey will involve no penalty or loss of benefits to which you are entitled and you may discontinue participation at any time without penalty or loss of benefits.

Yours truly,

Winfrid E. Tamba
MSc. Student
Appendix F
Recruitment letter Focus Group Discussion

THE OHIO STATE UNIVERSITY
College of Food, Agricultural, and Environmental Sciences
Agricultural Communication, Education, and Leadership Department

P. O. Box 60
MASASI
6 January 2017

Ref: Invitation to participate in focus group discussion of cashew growers

Dear participant,

My name is Winfrid Tamba, a student from the department of Agricultural Communication, Education and Leadership of the Ohio State University in the United States of America. You are invited to participate in a focus group discussion of the cashew growers. This study is conducted for the fulfillment of the requirement of completion of the master’s degree of science in Agriculture and Extension Education of The Ohio State University. The focus group will be held near your places in a date to be specified later on, and you will be in a group with 8 other cashew growers. During this discussion, you will have the opportunity to share your experiences with and thoughts about your perceptions on the effectiveness of agricultural extension agents in technology dissemination and adoption. The information learned in the focus groups will be used for academic purposes, recommendation for agricultural policies, and for practice improvement without any reference to you as a participant. To compensate you for your time, all attendees will receive 15,000 Tanzania shillings equivalent to US$ 7. During the discussion you will be given refreshments such as soda and snacks. You can withdraw at any time and still receive the stated amount as an incentive. Transport allowance of 20,000 Tanzania Shillings equivalent to US$ 10 will also be provided.
You were purposively selected from a list of cashew growers in your ward.

Although I hope you will join me, refusal to participate in the survey will involve no penalty or loss of benefits to which you are entitled and you may discontinue participation at any time without penalty or loss of benefits. Please be assured that anything you say during the focus group will be kept strictly confidential.

I will be contacting you by telephone to give you more details about this important event and answer any questions you may have about the study. You are also welcome to call me at +255753 180 411.

Yours truly,

Winfrid E. Tamba
MSc. Student
Appendix G
Questionnaire for Cashew Nuts Growers

INTRODUCTION

This questionnaire is intended to collect information that will facilitate to assess extension agents’ effectiveness and good agricultural practices adoption in Masasi district council for the award of Master degree of Winfrid Tamba at The Ohio State University. Any information that will be volunteered will be used purely for academic purposes and the confidentiality of the participants will not in anyway be disclosed. However, the results of the study may be available to other institutions and individuals.

Date.......................Ward..................................Questionnaire no..................

Section 1: Socio-demographic Information

1.1. Age ................... Years

1.2. Sex  (0) Male (1) Female ☐ [   ]

1.3. Marital Status: (0) Single (1) Married ☐ [   ]

1.4. Highest level of education (0) Non formal education, (1) Primary education, (2) Secondary education, ☐ (3) Others (specify)

 ..........................................................................................

1.5. What is your main source(s) of income? (0) Crop growing activities (1) Livestock keeping activities (2) Shop business (3) Family remittances (4) Others (specify) ....................

1.6. What is your total estimated income per month? ........................................... TShs.
1.7. What is the size of your farm that you grow cashew nuts............. (in acre)? □

1.8. Years of experience in cashew nuts growing activities .......................(Number)

1.9. Have you received any training on cashew nut growing? (0) No (1) Yes [ ]

1.10. If answered yes in Q. 1.9 above, who offered the training? (0) VAEOWAEQ (1) CBT extension agent (2) Researchers (3) Others, specify ________________________

1.11. If attended training, what was the duration? (0) whenever needed (1) one day seminar (2) Training at a specified station for a week (3) Others, specify .......... □

1.12. Check whichever applies regarding challenges encountered in your cashew nuts production activities

<table>
<thead>
<tr>
<th>No.</th>
<th>Challenges</th>
<th>Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Lack of improved cashew seeds</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Lack of improved cashew technologies</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Presence of old and unimproved cashew trees</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Lack of credits</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Lack of agricultural inputs/tools</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Untimely delivery of chemicals</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>High prices of agricultural inputs/tools</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Pests and diseases</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>High labor costs</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>High taxes</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Lack of extension advisory services</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>Extension staff in my area is not motivated</td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>Lack of knowledge on cashew management practices</td>
<td></td>
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<tr>
<td>14.</td>
<td>Lack of knowledge on cashew agribusiness</td>
<td></td>
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<tr>
<td>15.</td>
<td>Lack of training on improved cashew husbandry practices</td>
<td></td>
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<tr>
<td>16.</td>
<td>Lack of reliable markets</td>
<td></td>
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<tr>
<td>17.</td>
<td>Frequent occurrence of climatic disasters/bad weather</td>
<td></td>
</tr>
</tbody>
</table>
Section 2: Awareness on agricultural extension service

2.1. Does the village have resident Agricultural Extension Agent? (0) No (1) Yes [ ]

2.2. If the answer in Q 2.1 above is No, how far is a nearest Agricultural Extension Agent (in Kilometer) ..................

2.3. Indicate the frequency of contact with Extension agents on seasonal basis. (0) 0 (Never) (1) 1 to 2 times (rarely) (2) 3 to 5 times (Occasionally) (3) 6 to 10 times (Often) (4) Very often (More than 10 times) [ ]

2.4. Apart from the Extension Agents, do you have other sources of information on cashew nuts production technologies? (0) No (1).Yes [ ]

2.5. If the answer in Q 2.4 above is yes, indicate the other sources of information? (0) Radio/TV (1) Books & Flyers (2) Farmers exhibitions [ ]

2.6. If answered yes in Q 2.4 who facilitated the information obtained? (0) VAEO/WAEO (1) CBT extension agent (2) Researchers 3. Others, specify .........................

Section 3: Cashew growers’ opinions on the effectiveness of Extension Agents in dissemination of technology and good management practices of cashew.

3.1. Please, Rate the effectiveness of extension agents in the following areas by indicating whether strongly agree (SA), agree (A), undecided (N), disagree (D), strongly disagree (SD) following statements.

<table>
<thead>
<tr>
<th>Possible cashew good management practices</th>
<th>SA</th>
<th>A</th>
<th>N</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INPUTS</strong></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Advice on seeds/seedlings/agrochemicals availability</td>
<td></td>
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</tbody>
</table>
### Possible cashew good management practices

<table>
<thead>
<tr>
<th>Advice on credits for buying agrochemicals</th>
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<tbody>
<tr>
<td>Advice on specific information on the use of agrochemicals</td>
</tr>
<tr>
<td>Advice on spraying/dusting</td>
</tr>
<tr>
<td>Advice on health &amp; environmental side effects of agrochemicals</td>
</tr>
</tbody>
</table>

### PRODUCTION

<table>
<thead>
<tr>
<th>Advice on improved cashew varieties</th>
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</thead>
<tbody>
<tr>
<td>Advice on timely planting</td>
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<tr>
<td>Advice on timely weeding</td>
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<tr>
<td>Advice on timely pruning</td>
</tr>
<tr>
<td>Advice on pests and diseases control methods</td>
</tr>
<tr>
<td>Advice on harvesting</td>
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<tr>
<td>Advice on cost-benefit analysis of specific cashew technologies and management practices.</td>
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</table>

### MARKETING

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<thead>
<tr>
<th>Advice on post-harvest handling (grading &amp; storage)</th>
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</thead>
<tbody>
<tr>
<td>Advice on cashew agribusiness</td>
</tr>
</tbody>
</table>
### Possible cashew good management practices

<table>
<thead>
<tr>
<th>Possible cashew good management practices</th>
<th>VO</th>
<th>O</th>
<th>N</th>
<th>OC</th>
<th>NA</th>
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</thead>
<tbody>
<tr>
<td>Advice on sale of cashew nuts</td>
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<tr>
<td>Advice on co-operative societies</td>
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</table>

### Section 4: Cashew growers’ willingness to adopt technologies and good agricultural practices of cashew.

4.1. Please, indicate whether Very often (VO), Often (O), Neutral (N), Occasionally (OC), Not at All (NA) with regard to how often you use the new recommended cashew technologies and good agricultural practices (GAPs) as advised by Extension Agents in your village.

<table>
<thead>
<tr>
<th>Possible cashew good management practices</th>
<th>VO</th>
<th>O</th>
<th>N</th>
<th>OC</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INPUTS</strong></td>
<td></td>
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<tr>
<td>I use recommended seeds/seedlings/agrochemicals</td>
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<tr>
<td>I apply for credit for buying agrochemicals</td>
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<tr>
<td>I read specific information on the use of agrochemicals</td>
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<tr>
<td>I do spraying/dusting</td>
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<tr>
<td>I am cautious on health &amp; environmental side effects of agrochemicals</td>
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<tr>
<td><strong>PRODUCTION</strong></td>
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<tr>
<td>I plant improved cashew varieties</td>
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<td>I do timely planting</td>
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<tr>
<td>Possible cashew good management practices</td>
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<td>----------------------------------------------------------------------------------------------------------</td>
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<tr>
<td>I do timely weeding</td>
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<td>I do proper and timely pruning</td>
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<td>I use advised pests and diseases control methods</td>
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<tr>
<td>I follow advised harvesting techniques</td>
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<tr>
<td>I usually do cost-benefit analysis of specific cashew technologies and management practices.</td>
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<tr>
<td>I educate others on cashew farming</td>
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<td>I follow what I was advised through demonstration methods</td>
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<tr>
<td><strong>MARKETING</strong></td>
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<tr>
<td>I follow advices on post-harvest handling (grading &amp; storage)</td>
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<tr>
<td>I am advised on cashew agribusiness</td>
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<tr>
<td>I follow advises on sale of cashew nuts</td>
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<tr>
<td>I follow advises under co-operative societies</td>
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</table>

**THANK YOU FOR YOUR PARTICIPATION**
Appendix H
Focus group discussion guide questions

Focus Group Discussion guide questions for cashew nuts growers

1) How does the presence of extension agents help you in addressing your needs as a cashew nuts grower?

2) In which ways do you view your extension agents as effective in their role of disseminating technologies and good agricultural practices of cashew nuts growing?

3) To what extent are Extension Agents helpful in assisting you as a farmer in solving problems related to cashew nuts production?

4) How does the support received from Extension agents relate to the extent of your adoption of technology and good agricultural practices of cashew?

5) What are the major farming challenges you are experiencing in cashew nuts growing activities in your area?