

**THE EFFECT OF LOCAL GOVERNMENT REFORM PROGRAMME ON
ENHANCING FARMERS' DEMAND FOR REFORMED EXTENSION SERVICES
IN KONGWA, BAHU, BUKOMBE AND GEITA DISTRICTS IN TANZANIA**

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**A THESIS SUBMITTED IN FULFILMENT OF THE REQUIREMENTS FOR THE
DEGREE OF DOCTOR OF PHILOSOPHY OF SOKOINE UNIVERSITY OF
AGRICULTURE. MOROGORO, TANZANIA.**

ABSTRACT

Reformed Extension Services were introduced by the Government of Tanzania to improve the delivery of essential farm management skills and technologies in order to bridge the gap between the actual and potential levels of farm productivity. These reforms were brought about through decentralization under the Local Government Reform Programme whereby public services were brought closer to farmers by increasing the number of public extension agents while at the same time, encouraging the private sector to be a major player in providing such services. Despite the adoption of Local Government Reform Programme decentralization agenda that influenced the inception of Reformed Extension Services, low level of crop productivity has been reported. This trend has been one of the major challenges against achieving optimal farm productivity. This made it imperative to assess the effects of this Programme in enhancing farmers' demand for reformed extension services in four districts of Bahi, Kongwa, Bukombe and Geita. Specifically, the study examined farmers' satisfaction with the provision of reformed extension services, assessed farmers' access to the reformed extension services, determined factors that influence their level of accessibility, and lastly determined the effects of the reformed extension services on productivity of key food crops including maize, paddy, and sorghum. A cross-sectional survey was employed to collect data from 272 respondents who were selected through proportionate stratified sampling procedure. Data were collected using a structured questionnaire and key informant interviews. Content analysis was used to analyse qualitative data while descriptive and multivariate statistics were used to analyse quantitative data. The findings from a Likert scale revealed that the level of farmers' satisfaction with reformed extension services was higher at 77 against 29percent of dissatisfaction. Likewise, farmers' satisfaction level was significantly higher than dissatisfaction. The t-test for comparing means between strongly disagree to

disagree and agree to strongly agree attitudinal statements were significantly different at $p < 0.001$. However, there was an increase in the delivery of extension services after the reforms when compared to the times before the reforms. Moreover, a Probit model of decision to access private and public reformed extension services and likewise a zero-truncated Poisson regression model for the level of access to private and public reformed extension services revealed and confirmed the importance of personal and household attributes namely age and household size; farm/plot characteristics such as farm size, farm distance, and land tenure; and socio-economic and institutional factors such as. on-farm training, farmers groups, and access to credits) as important factors in determining access to the reformed extension services. Finally, a linear production function whereby reformed extension services were entered as inputs to farm production, among other inputs, revealed that an increase in key farm inputs, labour in terms of man-days) and capital such as pesticides and machinery, use of fertiliser, irrigation, and improved seeds together with the reformed extension services enhanced farm productivity. Generally, the reformed extension services were observed to be key ingredients in enhancing productivity. Although the Local Government Reform Programme decentralization agenda was a reality in making local government authorities become community-based administration at district levels, not all farmers benefited from the reformed extension services within the study area. Moreover, the reform agenda has shown that the interplay of public and private actors in providing extension services has significantly increased accessibility and farmers' demand for the improved services. Thus, alongside the public sector efforts, heightening operations of private actors and introduction of Public-Private Partnership arrangements in the provision of extension services, have become competitive, and cost-effective. In addition, the reformed extension services have become productivity improving inputs alongside with improving human capacity among farmers. It is therefore recommended that extension services reforms which included engagement of the private

sector in the provision of the service should be maintained. Furthermore, it is recommended that future focus of the extension service reforms should be strategic and packaged specifically for individual crops in different agro-climatological zones in Tanzania. This will lead to increase in productivity of these crops in the areas they are produced.

DECLARATION

I, John Mais Mapesa, do hereby declare to the Senate of Sokoine University of Agriculture that this thesis is my own original work done within the period of registration and that it has neither been submitted nor concurrently being submitted in any other institution

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DEDICATION

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CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

1.1.1 Agricultural extension service

It is widely accepted that farmers' productivity is influenced by human capital, which consists of both natural and learned skills including the ability to process information (Andreson and Feder, 2004; McNamara, 2009; Roberts, 1999). It is further claimed that the enhancement of farmers' human capital and hence improvement of productivity is influenced by the degree of farmers' demand for extension services (Fernandez, 2005; van der Ban and Hawkins, 1999). In this case improved productivity is an indicator of farmers' demand for extension services. The goals of agricultural extension services include, transferring of information from the global knowledge and local research bases to the farmers' adoptive abilities and enabling them to clarify their own goals and possibilities by educating farmers on how to make better decisions which stimulate desirable agricultural development (FAO, 2010). Thus, any investment in extension services has the potential of improving agricultural productivity and thus increase farmers' incomes, especially in developing economies, where more than 90 percent of the world's extension personnel are located (Anderson *et al.*, 2004).

The agricultural sector in Tanzania, like in many other developing countries in sub-Saharan Africa (SSA), is known to be the backbone of the country's economy. The sector employs about 66.9percent of largely rural population while accounting for about 23percent of the GDP, 30 percent of exports and 65 percent of inputs to the industrial

sector (URT, 2016). A large proportion of the population employed in this sector are smallholder farmers who operate small farms of about 2.2 hectares and use traditional methods of farming, resulting into low levels of productivity, thus trapping them within the circle of poverty (Rapsomanikis, 2015). As land is a fixed resource, unlocking smallholder farmers out of the poverty circle calls for concerted efforts of enhancing farmers' human capital in terms of information provision and knowledge and skills transfer to help them analyse the information received in order to improve farm production. Extension services, which were popularly provided by the government for free as a "public good," were intended to transfer knowledge and skills to farmers for desirable production (Lalitha and Babu, 2019).

In many developing countries where agriculture is a major employer, the provision of extension services has not lived up to the farmers' expectations due to several challenges, which include availability, accessibility, and affordability of extension services. Prior to the implementation of Structural Adjustment Programmes (SAPs) in the 1980s, most governments delivered extension service as a public good, but the service registered negligible impact on farm productivity (Rivera and Alex, 2004; Babu and Joshi, 2015). This undesirable experience called for the reform their extension services by many governments around the world. India, Pakistan, Bangladesh, Zimbabwe, Nepal, Sri Lanka, Uganda, Botswana, and Tanzania are few of emerging economies which embarked on agricultural extension service reforms with the aim of bringing the services closer to farmers, given their demands (Hanyani-Mlambo, 2000; Tladi-Sekgwama, 2000; Babu and Joshi, 2015; Baloch and Thapa, 2016; Afrad *et al.*, 2019; Uprety and Shivakoti, 2019; Wanigasundera and Atapattu, 2019). Most of these agricultural extension service reforms aimed at increasing both public and private sector participation through programmes such as India's Agri-clinic and Agri-business Centres (ACABC) which aimed to increase

efficiency and effectiveness in service provision via Public-Private Partnership (PPP) (Babu *et al.*, 2013; Babu and Joshi, 2015).

Due to economic potential and positive benefits generated by extension services, many governments, including Tanzanian government, have taken exclusive responsibilities for delivering the services as a public good (Jork Anderson *et al.*, 2004; Dina Umall-Deininger, 2014). Nevertheless, the impact of extension services on farm productivity varied from place to place, reflecting the differences in the manner in which they have been delivered (Jork Anderson *et al.*, 2004). A 113-country survey conducted by the Food and Agriculture Organization (FAO) in (1988-89) revealed that, the practice of extension service provision as a public good was one of the major factors for the decline and varying trend of crop productivity. Similarly, in Tanzania, many studies suggest that public extension services have insignificant influence on the improvement of agricultural production (Brown and Kane, 1999; URT, 2007; Dina Umall-Deininger, 2014).

For many years, extension programmes have been implemented by the Ministry of Agriculture and Cooperatives, using its staff from the national level down to the field level. Many authorities and studies have viewed this arrangement as bureaucratic, ineffective, and too far removed from farmers (Rutatora and Mattee, 2001; URT, 2013). Basing on the insignificant influence of extension services on crop productivity, the Tanzanian Government reviewed and rethought on the appropriate channel for delivering the services. This was implemented in line with the inception of Local Government's Decentralization agenda.

1.1.2 Local government's decentralization agenda

The genesis of local government authority agenda of decentralization in Tanzania surfaced in 1986 when Tanzania embarked on international structural adjustment programmes of 1986 with the aim of reducing the role of the public sector in the economy (UNDP, 2004; URT, 2004; Mafuru *et al.*, 2016). The implementation of the agenda necessitated for the restructuring of the central government and transferring of resources from the national to the district level, and making district administration community based (UNDP, 2004; Ngware, 2005; Mbogela, 2014). The agenda paved a way for the Local Government Reform Programme I (LGRP-I) of 1999 which was implemented in 2000-2007, and the LGRP - II of 2008-2014 which was known as decentralization by devolution that is “D by D” and which was meant to be a conduit for the reduction of Tanzanians living in poverty through decentralized authorities (Ngware, 2005; URT, 2008; URT, 2013).

The thrust of LGRP I and II was to make public services delivery more efficient in various sectors such as agricultural extension services, education, health and infrastructure, and water services. Therefore, under the Regional Administration Act of 1997 and the Local Government Act No. 6 of 1999, the responsibilities of delivering such services were transferred to the Local Government Authorities (LGAs) based on administrative and structural strategies to support the reform (UNDP, 2004; URT, 2004). The LGRP led to the reformation of all cross-sectoral programmes such as extension services delivery, education, health, infrastructures, and water which were integrated under the LGRP and were put under the local government authorities' structures.

1.1.3 Extension services in Tanzania

Agricultural extension provision in Tanzania is generally discussed under three major periods namely the post-independence (1961-1966), the post-Arusha Declaration (1967 to the mid-1980s) and post mid-1980s (Rutatora and Mattee, 2001). During the first two

periods, the government was the major provider of agricultural extension services under the preface of public services. During this period, agricultural extension services were aimed at transforming peasant agriculture to large-scale farming and improving agricultural production. The third period (from the mid-1980s to date) witnessed a gradual withdrawal of the public sector from direct provision of agricultural extension services as well as reliance on centralized control and state ownership of the major means of production. This paradigm shift has increased private sector extension services delivery, production, processing, and marketing of agricultural inputs and produce. Significant institutional changes in agricultural extension services occurred in 1997, when the constitution was amended to support the decentralization agenda and several local government acts were enacted. This introduced a major national reform which was known as Local Government Reform Program (LGRP), whereby the delivery of public extension services was vested in the local governments. The idea is to have extension services administered at the lowest level of the government and being brought closer to people for better accountability where active participation of beneficiaries and other actors can be more effective. In this new setting, the private sector was expected to complement and increase agricultural extension services delivery to farmers, while the public sector was gradually striking a balance so as to control or rectify the extension services market failure experienced due to externalities, monopoly, insufficient distribution, and excludabilities.

Despite these initiatives, agricultural extension service were still inaccessible to majority of farmers largely due to limited number of service providers because a relatively fewer public extension service providers were employed (Isinika, 2005). It was therefore deemed necessary to embark on a reform programme to enhance extension service provision. In this respect, agricultural extension service delivery was reformed in 2013 as part of the public sector reform process under the Local Government Reform Programme

II (LGRP II), popularly known as decentralization by devolution (D by D). The thrust of LGRP II was to have public services delivery become more efficient in various sectors including extension services (URT, 2008; URT, 2013). Under LGRP II, the responsibility of delivering reformed extension services (RES) was vested in the Local Government Authorities (LGAs) (Kimaro *et al.*, 2010; Elifadhili, 2013). This was done to ensure improved accessibility, affordability, and availability of extension service through effective participation of beneficiaries (smallholder farmers) and through encouraging the private sector to get involved in extension service delivery (Kimaro *et al.*, 2010). The structure of agricultural extension system, therefore, changed following the D by D reform process as presented in Figure 1.

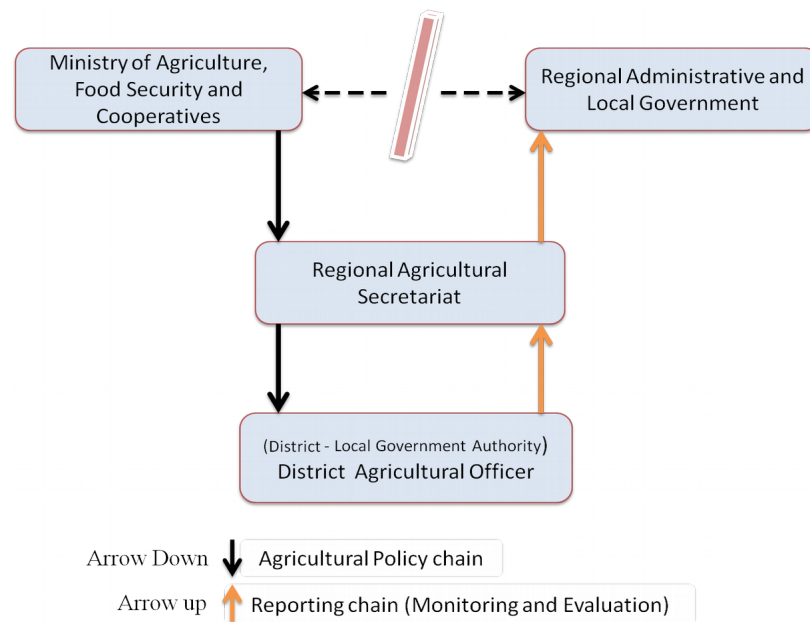


Figure 1: Structure of the extension services in Tanzania after decentralization; (Adopted and modified from URT, 2013)

The potential providers of agricultural extension services fall into three major groups. The first group is the public sector including ministries, agricultural sectoral departments, research institutions, local governments and international allies. The second group comprised the private (non-profit) sector including economic agents, shareholders, NGOs.

And the third group includes other private for-profit sectors such as cooperatives, commercial production, and marketing firms (URT, 2008; Kimaro *et al.*, 2010). Thus, depending on the categories of extension services providers, the reformed extension services (RES) were referred to as a public-private good or a public private partnership model (PPP) (URT, 2013).

As a result of RES, various pluralistic demand-driven approaches have been used in delivering extension services whereby farmers participate in planning and implementation. The new approaches that RES introduced include Farmers Field Schools (FFS), Farmers credit access, on farm training, Contract Farming, Farmers groups, Private Sector participation, Public Sector participation and Farmer to Farmer extension (Rutatora and Rwenyagira, 2005; Daniel, 2013; Wambura *et al.*, 2015). With these approaches, the government's efforts have been geared towards enhancing farmers' demand and use of RES for improved productivity (Kimaro *et al.*, 2010; URT, 2013) by improving availability, affordability, and accessibility of extension services. Similarly, the Ministry of Agriculture's Training Institutes (MATIs) planned to have many Extension Officers enrolled, trained, and deployed to the districts throughout the country. The aim was to ensure that farmers are informed and equipped with agricultural knowledge and skills to improve their farming practices and eventually productivity (URT, 2004; Elifadhili, 2013; URT, 2013).

Thus, based on the LGRP in 1999, the government decided to transfer its entire field staff to local government authorities in line with the district focus policy (URT, 1997; URT, 2000). With the Local Government Act No. 6 of 1999, the local authorities are now the implementing agencies for the agricultural extension services in their respective areas. In addition, the government established policies and programmes to encourage development

of private extension services, along with continued sustenance in some cases, and designed the private extension systems to be cost-effective (Akpalu, 2013). All these efforts were intended to have both public and private providers operating to increase competitiveness while rectifying market failure of the extension services experienced, and hence increased productivity. The experienced market failure also necessitated policy reforms of the extension service to increase the number of extensions service providers via both public and private arms and PPP. This results into increased competitiveness in the service provision and creating cost effective means of access the services by farmers and choices and hence meaningful demand for extension services and use.

1.2 Problem Statement and Justification

The inception of Reformed Extension Services (RES) was intended to improve farm yield through the LGRP's decentralized services which were brought closer to farmers while encouraging the private sector to be a major player and increasing the number of public extension agents. In this respect, the LGRP agenda led to the sectoral reformation of extension services "RES" making them user friendly to farmers and encouraging farmers to "seek for it", or demand and use the services for increased crop yields. Therefore, in order to enhance RES demand from farmers, the services should be satisfactory, accessible, and user friendly.

The decentralization agenda of the Local Government Reform, which led to the implementation of the Local Government Reform Programme II leading to the Reformed Extension Services as one amongst the several sectoral reforms in Tanzania, was aimed at decentralizing and bringing extension services closer to the people. The approach was intended to have both public and private providers operate in order to increase

competitiveness and hence increased productivity. This policy reforms was necessary due to the experienced market failure in extension service provision. One of the expectations of the reforms was to increase the number of extensions service providers via both public and private arms under PPP. This resulted into increased competitiveness in service provision, reduction of the cost of service delivery and giving farmers wider choices of service providers. . Examples of RES players under public-private partnership “PPP” are Tea Research Institute of Tanzania (TRIT) and Tanzania Coffee Research Institute (TaCRI) which operate as autonomous organisations providing extension service representing the government in tea and coffee industries respectively.

The genesis of RES and farmers demand for its use intended to improve farm yield by increasing the number of public extension agents meanwhile bringing services closer to farmers and encouraging private sector interplay to deliver extension services. However, low level of crop productivity has been reported to persist and pose a major constraint in achieving sustainable crop production (Isinika *et al.*, 2016; Msuya and Wambura, 2016), and especially of key food crops such as maize, paddy, and sorghum (Isinika *et al.*, 2005). The average yield levels of maize, paddy, and sorghum are 1.57, 2.02, and 0.96 ton/ha respectively against their potential yield levels of 4.5, 6, and 3 ton/ha respectively (Msuya and Wambura, 2016). Among other factors, of underperformance are linked to low level of extension services delivery and limited access and use of extension services and hence inconsistent demand for the services by farmers (Isinika *et al.*, 2005; Babu *et al.*, 2013).

Besides this linkage, however, still there is scanty information on what determines farmers’ decision of accessing and the level of access to “RES.” Several previous studies on the subject exist and these include Koskei *et al.* (2013), Abdallah and Abdul-Rahaman (2016), Wossen *et al.* (2017) and Kishore *et al.* (2019), however most of these studies

examined access but lacked the RES perspective. Other studies such as Daniel *et al.* (2013), Sanga *et al.* (2013), and Rutatora and Mattee (2001) examined accessibility and participation rates of extension services but did not examine the level of accessibility.

Moreover, there is a large body of literature that shows the relevance of extension services to crop productivity (Feder *et al.*, 2004; Alene and Manyong, 2007; Asfaw *et al.*, 2012; Davis *et al.*, 2012; Gebrehiwot, 2015). However, all these related studies examined the impact of extension services provision without considering the policy aspects. Different scholars such as Rutatora and Mattee (2001), Isinika *et al.* (2005), Rutatora and Rwenyagira (2005), Daniel *et al.* (2013) and Leyaro and Morrissey (2013) exemplified the efficacy of RES towards improving farm productivity and food security in Tanzania, but lacked the empirical component detailing the RES on crop productivity.

On the other hand, demand is a result of satisfaction; in this respect, knowledge on the level of satisfaction from RES by beneficiaries/farmers also seems to be limited. There is a plethora of research on satisfaction with extension services in other parts of the world including for example Ganpat *et al.* (2014), and Elias *et al.* (2016), Lotfy and Adeeb (2016). However, in Tanzanian, researches that have explicitly examined satisfaction level on post policy reforms such as RES (Daniel *et al.*, 2013) are scarce.

Moreover, productivity of the agricultural sector depends on how effectively and efficiently farmers maximize their production through the use of optimal combinations of inputs, know-how, and land management methods (Fjeldstad *et al.*, 2004; Umall-Deininger, 2007). Thus, besides the LGRP, Tanzania has established various policies and different programmes to sustain smallholder farming. Examples of such initiatives are *Kilimo Kwanza*, FAMOGATA, MKUKUTA, subsidized farm inputs programmes such as

the National Input Voucher System (NAIVS), Southern Agricultural Growth Corridor of Tanzania (SAGCOT), MKUZA, and TASAF, just to mention a few (URT, 2009). In the face of all these initiatives, many studies have been undertaken to measure their effectiveness, perceptions, level of community participatory and adoption as well as their performance against social services delivery (Eele *et al.*, 2000; Tidemand and Msami, 2010; URT, 2015).

However, much has not yet been done on the effect of these reforms on extension services delivery and the beneficiaries. According to Temu and Mgeni (2009) and URT (2015) there are scanty comprehensive studies on agricultural production and productivity on enhanced demand for and use of extension services based on reforms using farm-level data in Tanzania. This study, therefore, attempted to fill the existing knowledge gap of post policy reform “RES” in the context of the inconsistency of extension services demand indicators and yields. This was carried out by looking at its accessibility, the effect on productivity and beneficiary’s satisfaction through answering the following questions: (i) Does the reform meet the farmers’ demand for extension services to influence an increase in productivity? (ii) Does the reforms assist in fulfilling the demand gap for extension services to farmers?

Answers to these questions will, therefore, shade light on why farmers’ productivity is low in some places besides the existence of reformed extension services; this is what this study sought to address specifically by assessing the effects of local government reform on the enhancement of demand for agricultural reformed extension services delivery based on main staple food crops (maize, paddy and sorghum) in the selected districts in Tanzania.

1.3 Justification of the Study

The findings from this study will inform policy makers on the importance of incorporating the private sector in extension service delivery. This will help to reduce or address challenges making agricultural extension service a public good which limits agricultural production. In addition, the study contributes to literature on human capital which is mostly considered to be a labour force for production, while in practice it should be considered as an economic value for increased productivity. Furthermore, the findings add to the body of knowledge on Sustainable Development Goal Number 2 (Targets 2.3 and 2a), which aim at doubling agricultural productivity by ensuring access to productive resources including inputs, knowledge, financial services, markets, and opportunities for value addition (United Nations (UN), 2015). The study provides information on how policy reform impacts the productivity and then informs strategic policy interventions which are necessary for improving extension services delivery in order to improve crop productivity through research information and technology promotion.

1.2 Objectives

1.2.1 Overall objective the study

The overall objective of this study was to analyse the effects of the Local Government Reform Programme on enhancing demand for reformed extension services in four districts of Bahi, Kongwa, Bukombe and Geita in Tanzania.

1.2.2 Specific objectives

To achieve the overall objective, three specific objectives were pursued as listed below:

- i. To assess farmers' satisfaction with reformed extension service in the study areas;

- ii. To assess the determinants of access and level of access to reformed extension services in the study areas, and
- iii. To analyse the effects of the reformed extension service delivery on crop productivity.

1.3 Research Hypotheses

Each of the above specific objectives was subjected to a testable null hypothesis as presented below:

- i. Maize, paddy, and sorghum farmers were dissatisfied by reformed extension services.
- ii. Farmers' socio-economic, institutional, and plot characteristics do not significantly affect the decision of access to public and private RES.
- iii. Farmers' socio-economic, institutional and plot characteristics do not determine the level of access to public and private RES.
- iv. Public and private RES, and farmers' socio-economic, institutional and farm/plot factors have no significant effect on maize, paddy, and sorghum productivity.

1.4 Organization of the Thesis

This thesis consists of five chapters. Chapter One presents the introduction to the study with background information, problem statement, justification and objectives. Chapter Two presents the literature review which include theoretical and conceptual frameworks and the empirical review. Chapter Three describes the different methods used in the study. Chapter Four presents the findings and discussion while Chapter Five presents the conclusions and recommendations based on the findings.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Theoretical Framework of the Study

This study is guided by five theories which include the theory of satisfaction, public good and market failure, regulation, access and neo-classical.

2.1.1 The theory of satisfaction

The theory of satisfaction bases on the foundation for satisfaction in mankind's ability to learn from previous experiences and expectations regarding a service or product. In order to understand customer satisfaction, it is useful to identify who is a customer and what satisfaction means to such a customer. Suguna (2006) and Shodhganga (2009) describe customer satisfaction theory as the fulfilment of a person's needs and expectations after evaluating and using a product or service. Since satisfaction is a subjective concept for example customer needs, emotions, and a resource or service being an objective concept, satisfaction or dissatisfaction may vary from one person to another for a given product or service. In the current study, the theory was used to analyse satisfaction or dissatisfaction with reformed extension services by beneficiaries (farmers) on the availability, accessibility and affordability using attitudinal statements.

2.1.2 The theory of public good and market failure

The Public Good theory shows different types of goods in terms of excludability and rivalry of use that is non-excludable and non-competitive. In this case, an individual cannot be excluded from use and if used by one individual does not reduce availability to

others (Umall-Deininger, 1997, 2007) such as collective supply which cannot be rejected. Equally, market failure is a concept in economic theory which represents a situation when the allocation of goods and resources by a free market is not efficient. Market failure can be a result of general factors including public goods, monopoly, imperfect supply, and externalities. According to Dollery and Wallis (2001), the provision or consumption of public goods can cause market failure. Extension services could be classified according to their economic characters based on whether they are closer to being public goods or private goods using the economic principles of rivalry and excludability. In this study, the theory was used to explain the paradigm shift of the extension services in Tanzania from being public goods and their market failure to being public-private goods by the government's intervention through changing policies, decentralization, legal framework on taxes, subsidies and regulations to correct the undesirable situation (URT, 1999; URT, 2007).

2.1.3 The economic theories of regulation

The economic theory of regulation discusses the public and private interest of regulation. The primary aim of regulatory instruments is to improve the operating efficiency of the regulated firms (Den Hertog, 2010). The basic requirement is to see if regulatory instruments and institutions are equally well-placed to promote the necessary investments and to balance the conflicting interests between for example consumers and investors, private extension services providers and the public (Den Hertog, 2010). The theory of regulation was used to find out how the Local Government Authorities, being the regulators, are performing to their best to regulate competitions between for profit and not for-profit private organisations.

2.1.4 The theory of access

The theory of access was advanced by Ribot and Peluso (2003), who argue that access is the ability to benefit from things (resources) including material objects, persons, institutions, and symbols. This theory focuses on the ability to benefit from, rather than the right to, resources unlike in the property theory. This formulation of access brings attention to a wider range of social relationships that can constrain or enable people to benefit from resources without focusing on property relations alone (Ribot and Peluso, 2003; Myers and Hansen, 2020). The analysis of access to resources or services is, thus, a process of identifying and mapping the mechanisms by which access is gained, maintained, and controlled. Moreover, since access patterns change over time, they must be understood as processes (Ribot and Peluso, 2003; Myers and Hansen, 2020). In the context of this study, the access theory is used to identify the determinants of farmers' decision to access RES and the level of access to RES "as resources/services or inputs" for farm production.

2.1.5 The neo-classical production theory

The neo-classical production theory purports that a farmer is assumed to be a rational producer whose intent is to maximize profit by minimizing costs or maximising output, subject to given resource constraints or input costs (Debertin, 2012). Therefore, assuming constant input prices/costs, a rational producer is expected, in this study, to combine inputs efficiently to maximise output level per land area. However, rationality and certainty assumptions do not hold, and most farmers fail to realise potential production levels due to lacking knowledge of how to efficiently combine farm inputs. Extension service, thus, enters as an input that provides synergistic items of skills and knowledge required to efficiently combine inputs (Cerdán-infantes *et al.*, 2008).

2.2 A Review of Agricultural Performance and Reformed Extension Services

This section provides an empirical review of previous related studies, focusing on the study objectives, the methodology employed and study results in order to identify and justify the literature gap.

2.2.1 Agricultural performance in Tanzania

Productivity is often affected by factors such as environmental conditions, capital, land, agricultural inputs, such as seeds and fertilizers used, and farmers' know-how (Utz, 2007). There was an increase of agricultural production, especially food production in the second half of the 1980s that contributed to increasing income and welfare of rural households, and hence poverty reduction (Utz, 2007). However, this growth was not sustained beyond 1994 upon the removal of all subsidies for agriculture, which led to stagnation if not decline in production as a rapid increase in fertilizer prices reduced their use and reduced yields, especially for maize and wheat (Skarstein, 2005). Although the levels of maize and rice production increased during the 1990s, low real prices and limited marketing opportunities meant that much of this increase was used for household own consumption. Tanzania had a strong economic performance during 2000-2004 and, although agriculture had lower growth rates than industry and services, it (agricultural production) contributed significantly to GDP growth (World Bank, 2006).

2.2.2 Public-Private Partnerships (PPP)

The private-good nature of many extension services has raised interest in the privatization processes (Haan *et al.*, 2001; Healey, 2005; Demisse, 2011). Contracting schemes are among private-sector mechanisms for providing services to small-scale farmers (Rivera and Alex, 2004; FAO, 2006; FAO, 2012). Moreover, there is growing recognition that even where public financing of extension is justified, private service delivery is often

more efficient in serving clients. Contracted extension strategies take many different approaches to division of responsibilities for financing, procurement, and delivery of services. In addition, contracted extension systems seek to reduce costs and improve cost-effectiveness of public extension services, although most current reforms go further and attempt to draw on private sector funding to improve financial sustainability of extension (Rivera and Alex, 2004; FAO, 2006; Fernandez, 2007; Demisse, 2011).

2.2.3 Review of other studies in the framework of RES

Tidemand and Msami (2010) assessed the impact of local government reform in Tanzania in 2006 using descriptive analysis. They observed that, over three-quarters of Tanzanians in 2006 thought that local government reform was “helping” to improve social service delivery. There was evidence of some positive trends in terms of improved governance and social service delivery. They concluded that more detailed analysis of the relationships between elements of reform that influence public awareness, demand, and satisfaction for their outcomes was needed (Tidemand and Msami, 2010).

In another study Gido *et al.* (2015), using explanatory research design examined the level and determinants of demand for extension services among small-scale maize farmers in Kenya. The results indicated that organic farmers had a mean of three contacts with extension providers compared to conventional farmers who had a mean of one contact per year. They revealed further that, age of the household head, education level, and farming experience influenced significantly the demand for extension services.

Lwoga *et al.* (2011) assessed access to and use of agricultural knowledge and information in rural areas of Tanzania using mixed methods which were quantitative, qualitative, and participatory. Semi-structured interviews were used to collect qualitative and quantitative

data. Their results revealed that knowledge and information needs and information seeking patterns of farmers were location specific. The major sources of information for farmers were predominantly local (neighbours, friends, and family), followed by public extension services. Apart from radio and cell phones, advanced technologies (like internet and email) and printed materials were used at a low rate despite their existence in the communities. Lwoga *et al.* (2011) found further that seeking patterns that is demand, was very scattered and locational; hence, the extent of access to and use of agricultural knowledge and information that is, the extension services in rural areas of Tanzania was low.

Braathen (2004) assessed the local government reform, finance, and services delivery in Tanzania using descriptive statistics in six district councils (Bagamoyo, Ilala Municipal Council, Iringa, Kilosa, Moshi and Mwanza City Council). The study found that local government prioritization of investment by sector ranked as follows: education (43%), health (14%), roads (13%), water (8%), and agriculture (6%). In conclusion, the agricultural sector ranked the lowest in priority list by the local government system. The study predicted inconsistent efforts towards extension services reform and unenhanced demand by farmers for the services.

Hu *et al.* (2012) also assessed a top-down public agricultural extension system in China and its early commercialization reforms during the 1990s using a cross-sectional design. The author revealed that inclusive reform initiatives, demand and the adoption of new technologies significantly improved farmers' access to agricultural extension services. Three key features of the reform initiatives were: (i) inclusion of all farmers as target beneficiaries, (ii) effective identification of farmers' extension service demands, and (iii) an accountability system of providing better agricultural extension services to farmers. These three influenced farmers' demand for the reformed services.

Farrington (1995) assessed the effect of external funding on public extension services by employing exploratory research design. The public extension services in most of the less developed countries have been provided based on the external funding, which often achieves uneven impact on unsustainably high costs. However, by examining the conventional agricultural extension pressures, it was revealed that participatory and institutionally pluralistic approaches geared towards cost-sharing were efficient methods of service provision.

In the literature review, most of the previous studies focused on reforms and social services delivery such as water, education, health and road infrastructures; others linked reforms with financing, participation, adoption, and performance vis-à-vis social services. With extension services, their emphasis was on commercialization, private participation, and staff performance, but there is little attention on linking the reformed extension services with the demand and use to farm production and productivity. With this review, Tidemand and Msami (2010) recommended that more detailed analysis of the links between elements of reformed extension services, demand for, and use of the same, and outcomes of the use is needed. This justifies the execution of this study.

2.3 Methodological Review

2.3.1 Assessment of farmers' satisfaction with extension services

The analytical literature on examining the farmers' satisfaction with extension service is wide and has had broad application with respect to context and specifics. A widely used analytical method of examining satisfaction has been a Likert scale which is based on single or double (with positive and negative) sentiments. In this case, the respondents are called to express their agreement or disagreement to such sentiments. Responses are

scored on either a four-, five- or ten-point scale. A five-point scale is the commonly used scale with strongly agree = 5, Agree = 4, Neutral = 3, Disagree = 2, and Strongly Disagree = 1. Ganpat *et al.* (2014) and Taleghani and Mehdizade (2016) are some of the scholars who have applied Likert scales to assess the satisfaction level of extension service provision.

However, the use of Likert scales to assess satisfaction as far as extension service delivery is concerned has received an array of analytical critiques. One query relates to the scale construction, especially when deciding the length of the scale. Whether researchers should use an odd or even number of responses largely based on the value (or not) of providing a mid-point for the respondent to select is a subject of debate (Sandiford and Ap, 2013; Eysenck and Hartley, 2014).

Other studies (Yazdanpanah and Feyzabad, 2017) used structural equation modelling to measure farmers' satisfaction with extension service provision. This method is reliant on the American Customer Satisfaction Index whereby satisfaction is modelled based on personal perceived quality, customer expectations, and perceived value. The model comprises a five-point scale (very low, low, moderate, high, and very high) to reduce the statistical problem of extreme skewness. The scales contain multiple items which are developed to measure each of the psycho-social variables: perceived expectation, quality, value, satisfaction, loyalty, and complaint handling. With a reliability scale, the structural equation model produces estimated satisfaction based on scores for each question under each variable under study, which are perceived quality of service, customer expectations, and perceived value.

However, despite the critiques, this study used a Likert scale because it is simple in scaling (in a five-scale measure) farmers' perceptions/attitudes and satisfaction level from their use of reformed extension service packages (Ajala *et al.*, 2013).

2.3.2 Access and the level of access to extension services

The analytical literature on the assessment of access and the level of access to extension services has attracted wide attention in the literature. It is widely cited that access to agricultural extension services can be estimated using the Probit or Logit models especially when the dichotomous nature of the dependent variable is taken into consideration (Suvedi, Ghimire, and Kaplowitz, 2017). Logit and Probit models translate the values of the independent variables (X_i), which may range from $-\infty$ to $+\infty$ into a probability for Y which ranges from "0" to "1" and compels the disturbance terms to be homoscedastic. This makes the selection between the two models very sticky as both models provide equally efficient parameters. The forms of probability functions rely on the distribution of the difference between the error terms associated with a choice. The Probit and Logit models assume the existence of an underlying latent variable for which a dichotomous realization is observed (Abdallah and Abdul-Rahaman, 2016).

Moreover, in most cases, the determinants of access and the level of access tend to be jointly determined in the wide literature (Moahid and Maharjan, 2020). This is because farmers' decisions on whether or not to access, and the level of service to access fall within the household models whereby decisions are made jointly (non-separable) (Löfgren and Robinson, 1999). Introducing selectivity issues, the most used models are the double hurdle model which estimates the first stage as a choice equation and the second as a normal Ordinary Least Square (OLS) regression with the level of

access/participation being a continuous variable. Otherwise, Heckman's two-stage procedure which takes care of endogeneity and selectivity biases with similar stages to the double hurdle model are employed (Danso-Abbeam, Ehiakpor and Aidoo, 2018).

However, most of these models fall short of estimating the level of access to extension service as most of the services are provided by various agents/bodies whose contacts cannot be added into a single continuous variable. This study took a step further by modelling level of access to RES using count model of Zero truncated Poisson Regression model after the test of relevance which isolated the Negative Binomial regression. This model accumulates the number of times a farmer accessed extension services from public and private agents and institutions. This included non-zero observations as zero represented no access to RES (Hardin and Hilbe, 2015).

2.3.3 Effects of extension services on crop productivity

The analysis of extension service effect on agricultural productivity has, throughout the literature, been studied from different angles of empirics, some attributing the contents or by type of extension services offered and some grouping the types of extension services a farmer came into contact with. For instance, Davis *et al.* (2012), examined the effect of Farmer Field Schools (FSS) on crop productivity and poverty in Eastern Africa. The FFS are understood to be a component of agricultural extension services through which knowledge and skills are channelled to majority of beneficiaries via participatory adult learning methods and hands-on experience (Mwamakimbula, 2014).

In their study, Davis *et al.* (2012), Kijima and Otsuka (2012) analytically employed a longitudinal impact evaluation with quasi-experimental methods to provide evidence on

economic and production impact of a FFS project in East Africa using panel data. Due to the nature of their study and programme and available data on modelling the impact of FFS on productivity, they employed an ex-post facto design combining a double difference with matching estimators (propensity score matching and covariate matching).

As observed, some of the studies on the effects of extension services on crop productivity are based on using impact assessment methods to determine the differences of treatment (receiving extension services) against untreated groups of farmers. For instance, Sebaggala and Matovu (2020) estimated the impact of extension access on farm productivity while controlling for selection and endogenous bias associated with extension access by employing instrumental variable estimations. Their results revealed that, access to extension services does not significantly improve crop productivity of farmers. Owens *et al.* (2003), on the other hand, explored the longitudinal nature and explicit measures of farmer ability and found that after controlling for innate productivity characteristics and farmer ability of either using household fixed effects estimation or by including a measure of farmer ability and village fixed effects, access to agricultural extension services (defined as receiving one or two visits per agricultural year) raised the value of crop production by about 15 percent. This raises a lot of contradictions in the evaluation of the effect of extension service on crop productivity.

The above contradictions have also been recognised by other scholars. For instance, Betz (2009) observe that previous research on the effects of agricultural extension on productivity had mixed results, which is the consequence of the manner in which methodological issues of endogeneity, heterogeneity, and measurement of productivity variable are addressed. Literature on productivity and agricultural extension identifies several methodological complications that make it difficult to make broad empirical

generalizations about the effects of agricultural extension services on productivity (Anderson and Feder, 2004).

While RESs encompass several methods used to channel agricultural extension services, the impact of each method on crop productivity will be out of scale. However, to address the accumulated effect of the programme on the selected food crops, a linear production function (Cobb-Douglas) incorporating RES as an essential input in combination of other factors of production was employed. This model takes into consideration all other primary covariates/regressors such as labour and capital to a linearized production function.

2.4 Gaps in Literature

The study was undertaken as an attempt in addressing the gap based on previous empirical studies which had limited focus on the effects of local government reforms' of D by D's on enhancing farmers' demand for agricultural extension services for crop productivity (Tidemand and Msami, 2010; URT, 2012; Kayandabila, 2013). However, although there have been many studies on agriculture in Tanzania, there are limited recent nationwide studies on the production and productivity covering major food crops especially maize, paddy, and sorghum, in relation to post policy analysis (Leyaro and Morrissey, 2013).

2.5 The Conceptual Framework

This research focused on the influence of local government reforms programme on smallholder farmers' demand for reformed extensions services, with aim of increasing yield per area that is "crop productivity" in the selected districts of Tanzania. Reformed Extension Services (RES) are assumed to be among key inputs to agricultural productivity. Hence, the demand for them is inevitable (Fjeldstad *et al.*, 2004; Umall-

Deininger, 2007). Reformed extension services in this study are broadly conceptualized as an intermediate variable that focused on the delivery of the information /inputs to farmers. This information ranges from anticipated future prices for farm products, information on technologies and on management. For example information and provision of new research products such as improved crop cultivars, seeds, crop management, and the techniques involved in using particular inputs (Gars and Ward, 2016). Therefore, as a productive input, farmers are expected to have knowledge and understanding and hence demand for information and technological inputs (Umall-Deininger, 2007). Thus, the level of smallholder farmers' demand for reformed extension services information including accessibility, availability, and affordability is assumed to have some influence on farmers' crop productivity (Anderson and Feder, 2004).

Therefore, the local government reform in this study is considered to be an independent variable that has effects on the dependent variables—increased demand for RES for crop productivity. As it has been discussed earlier, one of the most important economic factors which influence agricultural development and success is extension services delivery as it enhances productivity. Hence in this case, local Government Reform Programme II produced or positioned the inception of RES, which was intended to bring agricultural services closer to farmers and introducing private players with the aim of e increasing crop productivity at farm level, and which, for a long time, had been below potential levels. This increased service delivery to participants led to competition, which was expected to make RES offered at lower and affordable costs. The RES package included on-farm training, farmers' groups, contract farming, farmer to farmer extension, NGOs, farmer field schools, access to credit, ward agri-centres establishment, and public and private extension services (Figure 2).

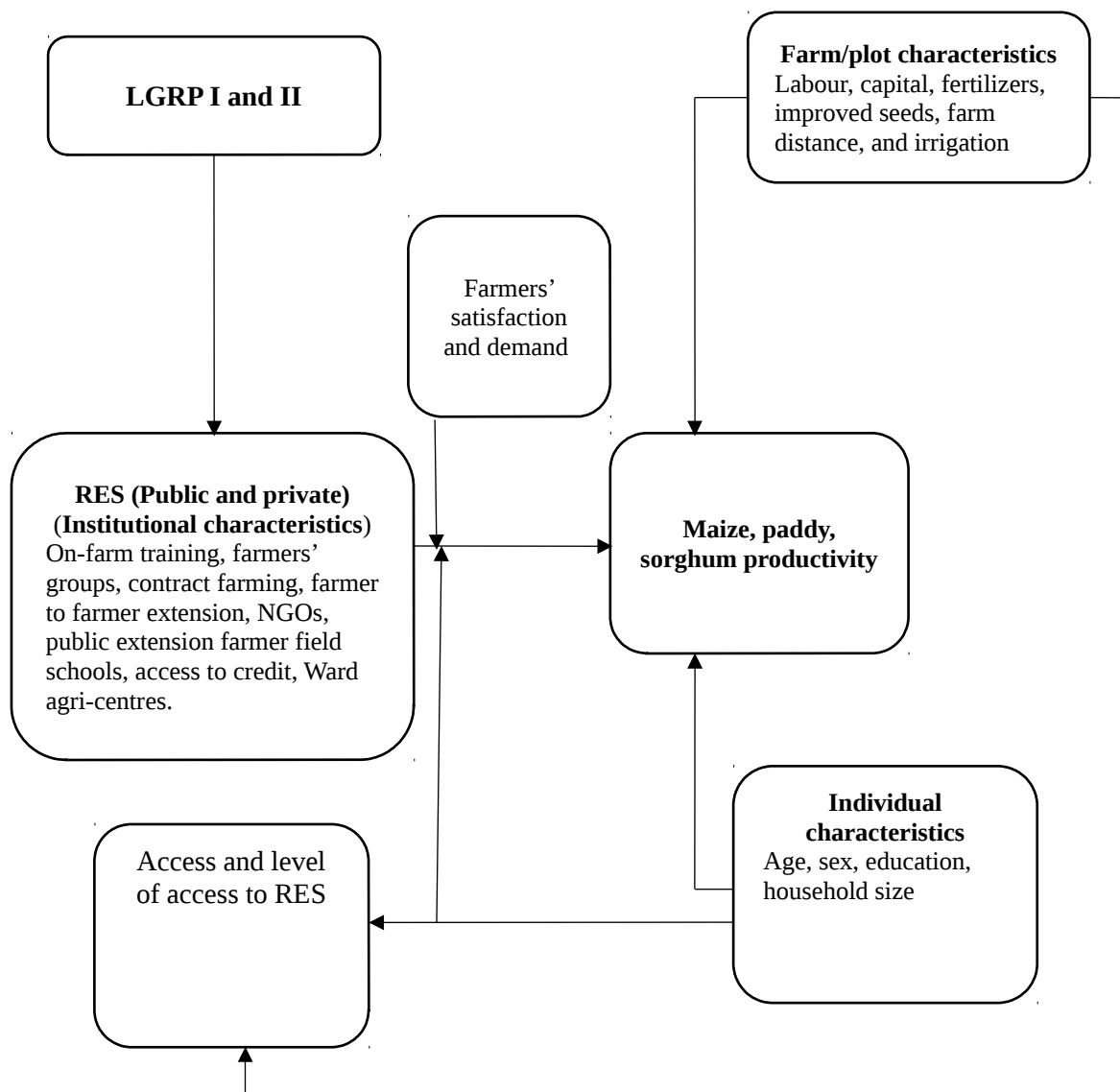


Figure 2: Conceptual framework

In this study, farmers were interviewed using attitudinal statements to substantiate their level of satisfaction with RES, particularly with respect to availability, affordability, and accessibility of the services. The main idea was to assess farmers' understanding of RES and their positive effects on productivity and seek or demand for them. However, since RESs were intended to improve farm yield by increasing the number of public extension agents and by decentralizing service provision to bring services closer to the farmers while encouraging private sector interplay to deliver extension services, were expected to increase crop productivity at farm level.

Thus, following the objectives of determinants of access to RESs and the effects of RESs on crop productivity, the conceptual framework of this study was drawn from the Neo-classical production theory, whereby a farmer is assumed to be a rational producer whose intent is to maximize profit by minimizing costs or maximising outputs, subject to given resource constraints or input costs (Debertin, 2012). Cost minimisation in this aspect can be brought about by increased number of RES delivery players, who then operate competitively and provide low cost services to farmers. In this way, farmers have more choices, which are expected to increase affordability. Hence, RES enters as an input required to efficiently be combined with other inputs to forge for potential level of productivity. However, access and the level of access to RES have, for some time, been constrained by a number of factors, which are individual, institutional, and farm or plot specific. Therefore, together with other inputs, RESs are considered to be key inputs in bringing about higher potential levels of maize, paddy, and sorghum productivity.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Description of the Study Area

3.1.1 Selected districts

The study was conducted in Dodoma and Geita Regions, specifically in Kongwa and Bahi Districts for Dodoma and Geita and Bukombe Districts for Geita Region. These two regions were among thirty two (32) districts which were selected as pilot districts for the implementation of the LGRP II (the “D by D”) in Tanzania. For this study, the selection of districts from the 32 pilot districts found in the two regions was done purposefully whereby two best performing districts (Geita and Bukombe Districts) were selected from Geita Region and two worst performing districts (Kongwa and Bahi Districts) were selected from Dodoma Region. This status was based on a 2015 comprehensive assessment of the LGRP II performance report (URT, 2015).

3.1.2 Location of the study area

This study was carried out in the selected districts of Kongwa and Bahi from Dodoma Region, and Geita and Bukombe Districts from Geita region (Figure 1.3).

3.1.2.1 Dodoma Region

Dodoma Region has a total land area of 41 311 km² making it the 12th largest region of Tanzania Mainland out of 26 regions. The region lies inland very close to the centre of Tanzania Mainland and is located between latitudes 6° 57' and 3° 82'vSouth of the Equator. Longitudinally, the region is situated between 36° 26' and 35° 26' East of the

Greenwich. The region comprises seven districts namely Dodoma Urban, Bahi, Chamwino, Chemba, Kondoa, Kongwa, and Mpwapwa.

In terms of climate, Dodoma Region is mostly semi-arid with low and erratic rainfall. Rainfall is the most important climatic factor in the region; it falls in a single rainy season between November/December and April/May. Generally, these rains fall in heavy storms resulting in flash floods. Consequently, about 60 percent of the precipitation turns into run-off rather than penetrating into the soil for crop growth. Total rainfall ranges from 500 mm to 800 mm per annum with high geographical, seasonal, and annual variations. The temperature in the region varies according to the altitude but generally ranges from about 15°C in July to 30° C in October. Moreover, temperature differences are observed between day and night and may be very high with hot afternoons getting as high as 35° C and chilly nights going as down as 10° C.

In terms of topography, Dodoma Region occupies the Northern part of the Central Plateau of Tanzania which has elevations ranging from 1200 to 1500 metres above the sea level. The plateau surrounds the region on all sides except the South-Eastern boundary with a major scarp of up to 180 meters high which is the Eastern part of the Great Rift Valley. Topographically, Dodoma Region forms part of the Central Plateau of Eastern Africa extending from Ethiopia in the North to the Transvaal in South Africa.

3.1.2.2 Geita Region

Geita Region is a newly formed region lying to the extreme Northern part of Tanzania and was established by dividing Mwanza, Kagera and Shinyanga Regions in 2012. It lies between Latitudes 2° 8' and 3° 28' South of the Equator and between Longitudes 31° 15' and 32° 48' East of the Greenwich. The region is 1100 to 1300 metres above the sea level and shares boarders with Kagera Region to the North West, Shinyanga Region to the

South and South Eastern parts, and Mwanza Region to the North. The region is also shares borders with Lake Victoria waters.

Administratively, Geita Region comprises five districts namely Geita, Bukombe, Chato, Nyang'wale, and Mbogwe. In total, the Region is made up of 18 divisions, 98 wards and 463 villages. Geita Region covers 4.3percent of the Tanzania Mainland's total area of 942 748 km², making it one of the smallest regions in the country, with a total surface area of 20 054 km² of which 1 946 km² is covered by water dominated by Lake Victoria, leaving 19 933 km² of dry land.

The region has a moderate temperature of 22° C to 30° C with an average rainfall of 900 to 1200 mm per annum. Rainfall is evenly distributed with short rains from September to December, followed by a dry spell from January to February before long and heavy rains set in between March and May. From June to September, the region is subjected to a dry season. During hot and rainy seasons, humidity ranges from 35 to 60 percent. The region is characterised by undulating land spotted hills and mountainous. The land is characterised by black cotton soil, loam, sand. and sandy loam, and clay loam soils which are suitable for growing varieties of crops including cassava, sweet potatoes, beans , paddy maize, groundnuts, millet/sorghum, cotton, and the like.

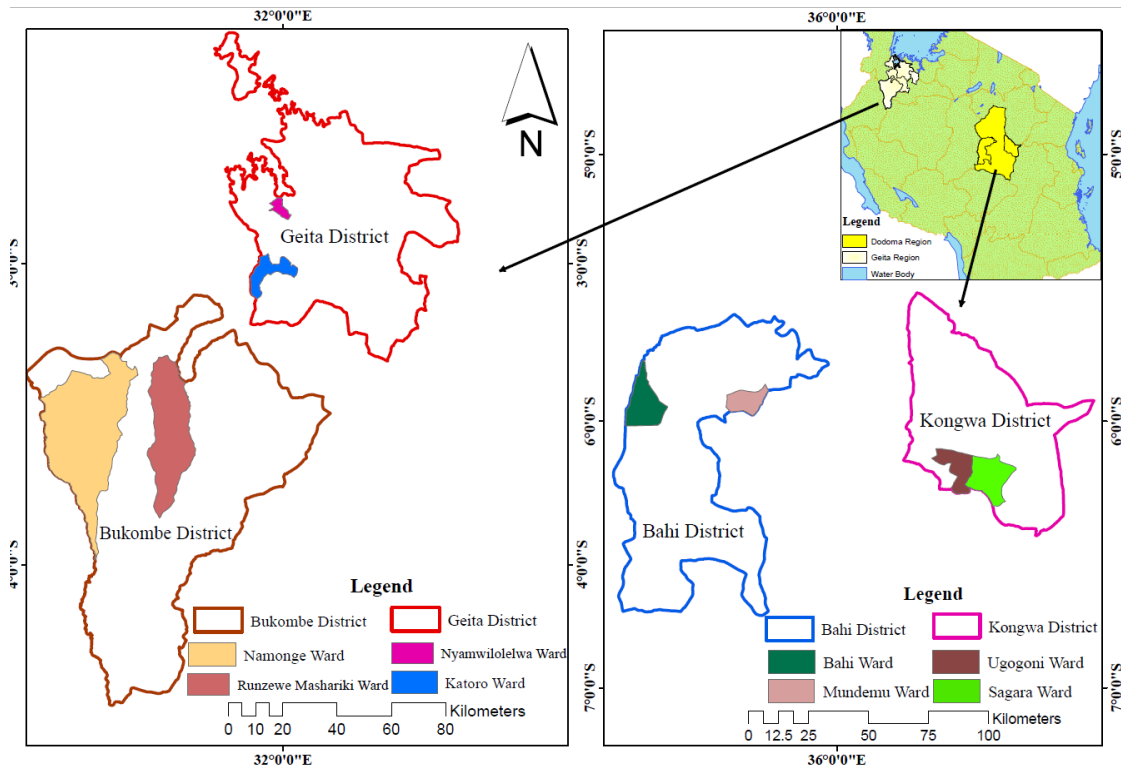


Figure 3: The map of Tanzania showing the selected districts and wards

3.2 Research Design and Sampling Methods and Techniques

The study employed a cross-sectional research design whereby data were collected once and were only suitable to describe the situation at the period when the research was being carried out. The minimum number of study participants or sample size was estimated by using multistage non-finite population. The sampling methods used involved a multistage sampling procedure which was employed in the selection of maize, paddy, and sorghum farmers in the study area.

With regard to sample size determination, in situations where population size is doubtful or unknown, Louangrath (2014) proposes an alternative of minimum sample size determination called “n-omega” or Multistage Non-finite Population (MNP) method for minimum sample size determination. The new method as per Louangrath (2014) is based on the specified alpha level. Using the random error α level as the basis of calculating the

sample size, the MNP method allows the researcher to determine a minimum sample size at various levels of confidence interval. Based on this approach, the minimum sample size was calculated as explained below.

The representative sample of farmers was selected based on Lougrath's estimates of minimum, maximum, and median sample sizes. In the first step, the estimated sample size n_1 was obtained via the root of the conventional specified precision estimation (SPE) method as presented in equations I:

$$n_1 = \frac{z\sigma}{E} \dots\dots\dots (1)$$

Where, $z_{0.95} = 1.65$; $\sigma_{N(0,1)} = 1$; and $E = 0.05$ for 0.95 confidence interval. Z is the z value for an infinite population at 0.95 per cent level of confidence, σ is the variance and E is the size of random error at 5 percent.

Given this information, the $n_1 = 33$. In the second process, minimum sample size n_2 was obtained via SPE as:

$$n_2 = \frac{Z^2 \sigma^2}{E^2} \dots\dots\dots$$

(2)

Based on the 0.95 confidence interval, we get $n_2 = 1089$. In the third stage, the square root of the median n_3 of the range of n_1 and n_2 is obtained as:

$$n_3 = \frac{\sqrt{n_1 - n_2}}{2} \dots\dots\dots$$

.....(3)

Which estimates $n_3 = 22.98$, based on the same assumptions. Codifying n_3 into distribution space ω , the following was obtained:

$$\omega_{max} = \frac{n_3}{0.01} = \frac{22.98}{0.01} = 2297.83, \dots\dots\dots(4)$$

$$\omega_{min} = \frac{n_3}{0.99} = \frac{22.98}{0.99} = 23.21 \dots\dots\dots(5)$$

Thus, the estimated distribution range was:

$$\omega = \omega_{max} - \omega_{min} = 2274.61 \dots\dots\dots(6)$$

Finally, to obtain the minimum sample size (n_ω), the square root of the median of the range was estimated as:

$$n = n_\omega = \sqrt{\frac{\omega}{2}} = \sqrt{\frac{2274.61}{2}} = 33.72 \approx 34 \dots\dots\dots(7)$$

The minimum sample size was obtained by first finding the square root of the median of the range, assuming a confidence interval of 0.95, with a 0.05 error level. Then the minimum sample size was 33.72, which was approximately 34 counts. In this study, the sample size was 34 smallholder farmers per village (2 villages x 4 wards x 34). Therefore, the total sample size for the study was 272 households.

Thus, with multistage procedure, in the first stage, regions were randomly selected with reference to the pilot district’s comprehensive performance assessment of 2015. In the second stage, districts were purposively selected according to the level of performance. Then, in the third stage, random selection was employed to select eight wards. In the fourth and fifth stages, two villages from each ward and 17 farming households from each village were selected.

This means that one region has to have two districts (2 districts each with 2 wards summing up to 4 wards). Each ward has to have 2 villages therefore with 4 wards gives 8

villages, whereas 1 village has to have 17 HH. (1 region = 2 districts x 2 wards x 2 villages x 17 HH = 136) were randomly selected. Having two regions means 136 HH farmers x 2 = 272. About 272 household farmers were interviewed using a structured questionnaire together with 28 key informants who were interviewed using a checklist / self-administered questionnaire. A household questionnaire and a checklist for key informant interviews were the tools that were used in data collection.

Content analysis was used to analyse qualitative data while quantitative data were analysed by descriptive and inferential statistics, using SPSS and STATA programmes. The qualitative data collected through key informant interviews were used to explain the socio-economic, institutional and farm/plot characteristics of the surveyed farmers. Primary data on maize, paddy, and sorghum were used for quantitative analysis in respect to three study objectives. Pictures were also taken as an observation technique to reflect extension service provision of the selected crops. Ethics guiding scientific conduct of research and photography were highly observed. Individuals in the pictures taken were included in the shot after a formal consent asked from the individuals and field guide. This also involved asking for their consent to use the pictures in a research output/report.

3.3 Data Processing and Analysis

3.3.1 Objective one: Farmers' satisfaction with reformed extension services

To measure the “farmers' demand for RES indicators” which is the level of farmers' satisfaction with RES and the extent of delivery of extension services to farmers from various service providers, both descriptive and inferential analyses were employed. The former included computation of frequencies and percentages on a Likert scale test scores as described in Clason and Dormody (2016). With this scale, the respondents were asked

to rate items on a level of agreement using strongly agree (5 points), agree (4 points), undecided (3 points), disagree (2 points) and strongly disagree (1 point). In the first objective, 30 attitudinal statements related to RES on availability, access, and affordability were used. The named attitudinal statements were in two-fold that is any positive statement must be followed by a related but negative statement. Descriptive statistics were computed to analyse satisfaction levels based on scores on a Likert-type scale. An independent sample t-test was applied to compare the mean scores between agree to strongly agree versus strongly disagree to disagree on the RES delivery.

The Cronbach's Alpha (α) was determined in order to assess the internal consistency (reliability) of the scale used as described in Tavakol and Dennick (2011). This provides a measure of the internal consistency of a test or scale expressed as a number between 0 and 1. Internal consistency describes the extent to which all the items in the test measure the same concept or construct, and hence it is connected to the inter-relatedness of the items within the test. Internal consistency was determined according to Tavakol and Dennick (2011) in order to ensure validity of a research tool. According to Tavakol and Dennick (2011) and Mineka and Sutton (2006), higher values of alpha are more desirable. However, as a [rule of thumb](#), the ratio should be 0.70 or higher with 0.60 as the lowest acceptable threshold (obtained from substantial samples) before a research instrument is used. Responses on access to extension services over a period of delivery were used in the analysis of the extent of extension services delivery over a period of time. Microsoft Excel Computer programme was used in the analysis for the presentation of graphical and mathematical estimates. Moreover, the t-test was used to test whether the positive responses differed significantly from negative responses regarding farmers' satisfaction with RES delivered.

3.3.2 Objective two: Determinants of access to reformed extension services

Besides the local government decentralization agenda of the LGRP II of fostering the introduction of RES, the study analysed factors affecting farmers' demand for RES that is, decision to access RES among maize, sorghum, and paddy farmers and factors that determine the level of access to RES delivery by players available in the area.

Quantitative data from the household survey were processed and analysed using SPSS as well as STATA software. Descriptive statistics of means and standard deviations were used to describe the socio-economic, institutional and plot characteristics of surveyed farmers. To determine factors that affect farmers' decision of accessing RES and the level of access to RES, Probit and zero-truncated Poisson regression model for count data were used, respectively. A Probit model was used to analyse factors influencing the decision to access public and private RES because the dependent or response variable was modelled as a binary variable that the farmer accessed or did not access RES. A separate regression for private and public extension service was estimated to extract information on decision and level of access after implementation of RES whereby the government focused on employing more extension agents, the factor which encouraged participation of the private sector. Probit and Logit models are similar and are commonly used to examine binary outcomes. The main difference between the two is the nature of distribution; Logit model uses a cumulative distribution function of the logistic distribution, while Probit model uses cumulative distribution function of the standard normal distribution, but the inferences obtained from using the two models tend to be similar (Gujarati, 2003).

The Probit model was used to determine factors that affected the decision to access RES amongst farmers in Bahi, Kongwa, Bukombe, and Geita Districts based on the responses of farmers in the sample. The decision to access RES was computed from a cumulative distribution function as:

$$y_i = \begin{cases} 1 & \text{if } y_i^c = x_i \beta + \epsilon_i > 0 \\ 0 & \text{otherwise} \end{cases} \dots\dots\dots (8)$$

Where $y_i = 1$ if the farmer accessed private and public RES, and $y_i = 0$ otherwise, where y_i represents the observable value of 1 and 0 which model the latent continuous variable y_i^c .

The zero-truncated Poisson regression model was later employed to assess the level of access to private and public RES among the surveyed farmers. The Heckman two-step model, Ordinary Least Squares (OLS) regression model and double hurdle models of decision and the level of use (selection models) were used mostly in determining the extent of access depending on the nature of the data. In this study, the level of access to RES by farmers was observed to be a count data where a farmer was asked to name the number of times, they had accessed/contacted public extension officers and any private extension services. This data contained non-negative and non-zero (positive) counts of RES and had a Poisson distribution with equal mean and variance (Equidispersion property of a Poisson distribution) after testing for over-dispersion with negative binomial regression.

While catering for possible diagnostic problems of collinearity and heteroscedasticity, the post-estimation results of conditional marginal effects at the mean of the regressors (log transformed) were extracted for both the probit and the zero-truncated Poisson model, and significant variables at one, five and 10 levels of significance were interpreted. As a supplement to the survey data, qualitative information collected from the key informants was thematically processed/transcribed, coded, and analysed through content analysis.

3.3.3 Objective three: Effects of reformed extension services on crop productivity

Quantitative data from the household survey were processed and analysed using the SPSS as well as STATA software. Descriptive statistics were used to describe the socio-

economic, institutional and plot characteristics of surveyed farmers. To examine the effect of RES on crop productivity among smallholder famers in Kongwa, Bahi, Geita and Bukombe Districts of Tanzania; most of the previous studies examined the effect of extension services on farm productivity using impact models such as propensity score matching and endogenous switching regressions (Asfaw *et al.*, 2012; Luh and Road, 2017; Wossen *et al.*, 2017; Danso-Abbeam *et al.*, 2018). The adoption of impact modelling in this study, however, was out of scope because no farm-based information was collected before the implementation of RES as a component of LGRP I and II. To attribute the effect of RES on farm productivity, this study employed a linear production function whereby RES variables were entered as inputs to farm production among other inputs while controlling for farmers' socio-economic and institutional characteristics. While the use of cross-sectional data could subject the findings to selectivity bias, to reduce the size of error the study used data that were collected from high and low performing districts according to LGRP II clusters. This study adopted a linear production function by Baloch and Thapa (2018), and Kishore *et al.* (2019) by further introducing farmers' socioeconomic, and farm and institutional variables in the model as expressed in equation eight:

$$\log(Y_i) = b_0 + b_1 \log X_1 + b_2 \log X_2 + \dots + b_n \log X_n + u_i \dots \dots \dots (8)$$

Where Y_i is crop productivity in kg/ha, b_0 is a constant; $b_1 - b_n$ are the coefficients of the independent variables; $X_1 - X_n$ are independent variables of farmers' socioeconomic variables including age, sex, education, household size; institutional factors (RES); farm inputs and/plot characteristics including labour in man days, capital as the value/expenditure on insecticides and machinery, irrigation, use of

improved seeds, and farm distance); and u_i is the error term. The expected condition is that an increase in factor input combination, including the use of RESs will positively affect maize, paddy, and sorghum productivity.

The model was tested for multicollinearity and non-constant variance (heteroscedasticity) in STATA. Multicollinearity was observed and collinear variables were dropped. Model estimates/coefficients were reported using robust standard errors, thus catering for Gauss Markov constant variance assumption (Greene, 2003; Gujarati, 2003).

The key assumption was that the increased demand and hence the use of RES “agricultural inputs” was expected to increase or affect farm output and productivity levels positively as per local government decentralized agenda whereby the LGRP II introduced RES for increased crop productivity.

3.4 Limitations of the Study

The study was undertaken to address the gap based on previous empirical studies which had limited focus on the effects of local government reforms’ (D by D) on enhancing farmers’ demand for agricultural reformed extension services for increased productivity (Tidemand and Msami, 2010; URT, 2012; Kayandabila, 2013). However, although there have been many studies on agriculture in Tanzania, there are limited recent nationwide studies on reforms tenets that enhance or influence farmers’ demand for the services on improved production and productivity covering major food crops especially maize, paddy, and sorghum, in relation to post policy analysis (Leyaro and Morrissey, 2013).

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

This chapter starts by presenting the summary statistics of surveyed farmers in the study area. This involves farmers' socio-economic characteristics, farm level characteristics, and institutional characteristics as connected to RES. This is followed by results and discussion from empirical analysis of farmers' satisfaction with respect to RES, access, and level of access to RES and the effect of RES on maize, paddy, and sorghum productivity.

4.1 Characteristics of Surveyed Farmers in the Study Area in Relation to RES

This part deals with the presentation of summary statistics of key variables used in the study in terms of minimum, maximum, mean, and standard deviation. Descriptive statistics for farmers' household attributes, farm or plot level characteristics, socio-economic and institutional factors of the respondents are presented first followed by the presentation of findings on each objective.

The summary statistics as presented in Table 1 show that the average age of the farmers in the surveyed districts was 44 years with the majority of the households headed by males, married, with a primary level of education (78%). The average household size was 6 individuals. Based on their farm/plot characteristics, most farmers had an average land size of 2.3 hectares located at an average distance of 3 kilometres with most of them owned by farmers themselves. However, only 15, 26 and 3 percent of the surveyed farmers reported to have received on-farm training, having membership to a group and having access to credit, correspondingly.

Based on their farm/plot characteristics, most farmers owned private land with minimal usage of input in the production of food crops, although 53 percent reported to have used improved seeds. The farming business was also found to be small holding with average acreage being below 2 hectares and productivity levels from 2015 to 2017 for maize, paddy, and sorghum remaining below the expected potential levels.

Moreover, a very big proportion of the surveyed farmers (82%) had received both public and private extension services. In addition, about 80 and 68 percent were found to have accessed both public and private extension services after reformation whereby the government decided to employ and allocate more extension agents. Access to public and private extension services such as Farmer Field Schools (FFS), NGOs, on-farm training, farmer to farmer extension service, and farmer groups were the most used extension methods by the surveyed farmers. Despite being in small proportions, there were gradual sensitization of demand and use of RES.

Table 1: Farmers' socio-economic, institutional and plot/farm characteristics

Category	Description	n	Minimum	Maximum	Mean	Std. D
Household characteristics	Age of HH	272	22	85	44.24	11.92
	Marital status (1 if Married, 0 otherwise)	272		1	0.88	0.32
	Sex of HH (1 if Male, 0 otherwise)	272		1	0.84	0.37
	Years of schooling for HH	270		16	6.56	2.77
	Household size	272	1	12	6.04	2.76
Land tenure	Own/private land	271		1	0.80	0.40
	Leased land	272		1	0.18	0.38
	Family land	272		1	0.11	0.31
Access to credit	Dummy (1 of accessed credit and 0 otherwise)	272		1	0.04	0.19
On-farm training	Dummy (1 if received on-farm training and 0 otherwise)	272		1	0.14	0.35
Inputs use (1 Yes, 0 No)	Fertilizers	217		1	0.00	0.07
	Insecticides	217		1	0.00	0.07
	Fungicides	216		0	0.00	0.00
	Improved seeds	222		1	0.53	0.50
	Herbicides	216		1	0.14	0.35
Crops farmed	Maize	272		1	0.81	0.40
	Paddy	272		1	0.49	0.50
	Sorghum	272		1	0.30	0.46
Farm/plot features	Total farm size under cultivation	272	0.20	10.12	2.34	2.62
	Farm size under Maize cultivation in 2017 (in hectares)	169	0.40	8.09	1.51	1.00
	Farm size under Paddy in 2017 (in hectares)	167	0.20	10.12	1.05	1.09
	Farm size under Sorghum in 2017 (in hectares)	50	0.61	2.43	1.48	0.53
	Maize yield in Kg per hectare in 2017	159	24.71	4200.79	594.29	626.53
	Maize yield in Kg per hectare in 2016	171	74.13	4942.10	634.01	590.99
	Maize yield in Kg per hectare in 2015	160	80.31	4324.34	613.90	549.92
	Paddy yield in Kg per hectare in 2017	132	0.00	5040.95	1316.29	1012.74
	Paddy yield in Kg per hectare in 2016	146	210.04	7351.38	2424.16	1430.28
	Paddy yield in Kg per hectare in 2015	161	17.50	7141.34	2118.00	1578.37
	Sorghum yield in Kg per hectare in 2017	41	148.26	988.42	550.26	288.54
	Sorghum yield in Kg per hectare in 2016	39	164.74	1235.53	480.69	265.16
	Sorghum yield in Kg per hectare in 2015	47	148.26	823.68	399.90	200.49
	Distance to the farm	268	0.00	35.00	3.07	3.00
Reformed extension services	Received extension services in last 12 months	272		1	0.82	0.39
	Number of contacts with extension officer	272		1	0.08	0.29
	Access to public extension officer	272		1	0.80	0.40
	Access to private extension officer	272		1	0.68	0.47
	Farmer groups	272		1	0.42	0.49

Category	Description	n	Minimum	Maximum	Mean	Std. D
	On farm training	272		1	0.18	0.39
	Farmer-to-Farmer Extension	272		1	0.67	0.47
	Contract farming	272		1	0.08	0.28
	Agricultural exhibition or shows	272		1	0.06	0.24
	Leaflets, magazines and news papers	272		1	0.08	0.27
	Radio and TV	272		1	0.20	0.40
	Farmer field schools(group-based)	272		1	0.28	0.45
	Ward Agricultural Resource centres	272		1	0.02	0.13
	Contacted by NGO	272		1	0.46	0.50
	Have received farm training	272		1	0.14	0.35
	Access to farm credit	272		1	0.04	0.19
	Participate in farmers groups for credits status	272		1	0.92	0.27

4.2 Farmers' satisfaction with Reformed Extension Service

4.2.1 The extent of extension service delivery before D by D¹, during D by D and during the research time

Before reformed extension services at LGRP I (that is before D by D), during RES at LGRP II (that is during D by D) and during the research period, farmers experienced extension services delivery at varying rates. The findings showed that those who had received reformed extension services in the previous 12 months (During the research time), 5 years previously (during D by D) and 10 years previously (before D by D) were only 18.4, 24.6, and 22.8 percent respectively (Table 2). This implies that there had been some increase in the extent of extension services delivery after the reform when compared to the times before the reforms of the extension services though it was not that much. The increase depicts enhanced demand and use of reformed extension services compared to the times before the reforms (Table 2).

¹ D by D means decentralization by devolution and was the main way of decentralisation during the second phase of Local Government reform Programme (LGRP II)

Table 2: Extent of extension services delivery experienced by farmers over time periods

Extension services delivery	Responses			
	Yes Frequency	%	No Frequency	%
Whether households had got extension services in the previous 12 months	50	18.4	222	81.6
Whether households had got extension services in the previous 5 years	67	24.6	205	75.4
Whether households had got extension services in the previous 10 years	62	22.8	210	77.2

According to Figure 2.1, equation $Y = 2.2x + 17.5$, extension service delivery to the farmers was increasing by 2.2 units for every period. The increase had a direct proportion with enhancing the demand in concurrence with the local government reform, which conceived the reformed extension services. For example, in the previous 10 years to the previous 5 years extension service delivery increased from 22.8 to 24.6 percent [$100(24.6-22.8)/22.8$] which was about 7.9 percent increase. However, from the previous 5 years to the previous 12 months, extension service delivery decreased from 24.6 to 18.4 percent [$100(24.6-18.4)/18.4$] which was about 25.2 percent. This is due to the arithmetic increase interval which was five years (10 years, 5 years, 1 year) which means the third was only 12 months, that is. one year only which could not make the same interval of five years. Secondly, the year 2017 was known to have been a bad year whereby short drought with little rainfall distribution throughout the year in Tanzania. The Regional Extension Officer in Geita Region had this to say,

“... in 2017 we received very little rains at an average of 400 mm; crops dried up in fields, and it contributed to insufficient extension services provision records...”

(Regional Extension Officer, 12 July 2018).

Productivity of the agricultural sector, however, depends on how effectively and efficiently farmers maximize their production through the demand and use of the optimal

combination of inputs, know-how, capital, land, management methods and environmental factors which include water/rainfall availability (Fjeldstad *et al.*, 2004; Umall-Deininger, 2014). To explain a decrease in the extent of extension service delivery in 2017, the performance of RES relied on the perfection of other factors affecting crop production. These results are also similar to those reported by Maponya and Mpandeli (2013) who revealed that the proportions of agricultural extension services provision can be altered by unpredictable weather/rainfall events.

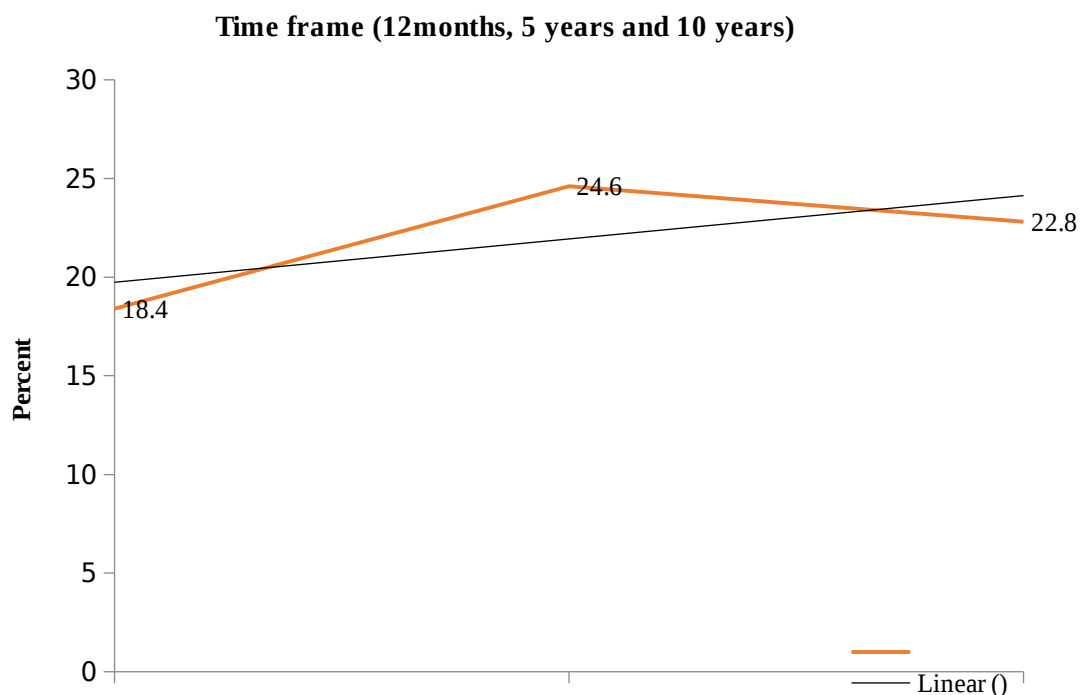


Figure 4: Extent of extension services delivery over time period

4.2.2 Analysis of farmers' satisfaction with reformed extension services

4.2.2.1 Reliability test results for the research tool used

The results showed that the Cronbach's Alpha for the research tool used was 0.814, indicating that the tool was reliable and valid in terms of measuring farmers' levels of satisfaction regarding the reformed extension services, access, availability, affordability, and delivery.

4.2.2.2 Level of farmers' satisfaction with reformed extension services

The results as presented in Table 3 indicate that the highest number of smallholder farmers who strongly agreed to have been satisfied with extension service delivery and access was far higher (77%) than the number of those who were not satisfied (29%) with the same services delivered. This means that, satisfaction is an indicator of the demand; therefore, the higher the satisfaction the higher the enhanced demand for reformed extension services. The findings revealed that, 84.2 percent of the respondents agree and strongly agree that, the extension services were delivered by extension staff without expecting anything in return from the farmers. On the other hand, 68.0 percent of the farmers disagreed with the statement that they had been receiving the services unconditionally. This implies that the services were mostly offered unconditionally by extension service providers, but awareness of the use of RES, market failure, control improved the extent of use which encouraged the demand for reformed extension service.

About four-fifths (78.6%) of the farmers reported that extension was successful. Only 17.2 percent disagreed and 4.0 percent were undecided. However, 59.6 percent disagreed with the statement that extension service failed in fulfilling its mission. This implies that extension service provision and quality of the services provided to farmers were acknowledged and well observed by the clients (farmers) hence encouraging farmers to demand for use. About 56.1 percent of farmers reported that, extension staff members were ready to assist them at any time of need for the extension services. About 21.4 percent agreed and strongly agreed that extension service providers were reluctant in providing services at the time farmers were in need of such services. This implies that even if many extension service providers showed up willingness in service provision, yet

there were some discrepancies in the provision of the same services which needed to be addressed. This is supported by Namonge Ward Agricultural Extension Officer of Bukombe District who made the following observation,

“It is true that I do not often respond to all farmers’ requests. It is because the ward has an approximate population of 30 000 in an area of 1500 square kilometres which means it is difficult to reach every farmer in the whole area while I do not have transport means and with a small financial capacity”
(Namonge Ward Agricultural Extension Officer, 15 June 2018).

The findings also revealed that extension service was perceived to have been concerned about welfare of farmers and that of their families. This was reported by many of the respondents of about 84.6 against 4.1 percent of the respondents, who they agreed and strongly agreed with this statement. The findings also showed that extension service providers offered quality extension services. About 61.7 percent of the farmers agreed and strongly agreed that extension staff provided good quality service against 25.4 percent who disagreed. This was also the case with farmers’ willingness to collaborate with the extension service staff. More than four-fifths (86.1%) of the respondents agreed while 6.2 percent strongly agreed with the statement that they were willing to collaborate with extension officers, where possible. Similarly, a higher per cent (87.1%) of the respondents agreed and strongly agreed against 5.9 percent who disagreed (was observed in farmers’ response to the willingness to recommend to other farmers the importance of extension services (Table 3). This implies that the reformed extension services came up with good results “that encourage farmers demand” whose benefits were recommendable by the farmers such that the services could be extended to other farmers for increased productivity and food security among the farming community.

These findings on farmers' satisfactions with RES delivery and access indicated that satisfaction (77%) was higher than dissatisfaction (29%). This implies that the LGRP II with its tenets of bringing services closer to people and the private sector succeeded in showing farmers that the RES were important for crop production and productivity and were thus encouraged or enhanced to demand for services. This practically proved to the farmers that participation in using the services or demand for the service could help farmers increase their farm productivity versus the non-use of the same services.

Table 3: Farmers' responses on satisfaction with the RES

Attitudinal statement variables	Farmers' responses				
	Strongly Disagree	Disagree	Undecided	Agree	Strongly agree
I believe the extension service helps me without expecting anything in return	25(9.2) *	5(1.8)	13(4.8)	98(36.0)	131(48.2)
Extension staff provide help wherever they know they expect something	102(37.5)	83(30.5)	56(20.6)	13(4.8)	18(6.6)
Extension is known to be successful at the things it tries to do	12(4.4)	36(13.2)	11(4.0)	107(39.3)	106(39.0)
Extension service has proved failure in its mission	96(35.3)	66(24.3)	52(19.1)	35(12.9)	23(8.5)
In my time of need the extension service is always ready to assist me	70(25.7)	49(18.0)	3(1.1)	104(38.2)	46(16.9)
There has always been reluctance in extension services provision by the service providers	96(35.3)	66(24.3)	52(19.1)	35(12.9)	23(8.5)
The extension service is concerned about my welfare and that of my family	4(1.5)	7(2.6)	31(11.4)	159(58.5)	71(26.1)
The extension service has not been on the farmers' welfare but on themselves (extension agents)	100(36.8)	72(26.5)	74(27.2)	18(6.6)	8(2.9)
The extension service is always ready and willing to work with me	36(13.2)	45(16.5)	16(5.9)	106(39.0)	69(25.4)
Willingness and readiness of extension service providers to work with farmers is almost nil	82(30.1)	76(27.9)	54(19.9)	37(13.6)	23(8.5)
My expectations are held in high regard by the Extension service	47(17.3)	62(22.8)	12(4.4)	86(31.6)	65(23.9)
Extension services did not meet what farmers expected out of them	96(35.3)	66(24.3)	52(19.1)	35(12.9)	23(8.5)
Extension officers are easy to reach	66(24.3)	55(20.2)	30(11.0)	109(40.1)	12(4.4)
There is a big social distance between extension officers and farmers which makes them not easily accessible	66(24.3)	59(21.7)	71(26.7)	44(16.2)	32(11.8)
I firmly believe that advice from extension officers is always true	30(11.0)	26(9.6)	47(17.3)	115(42.3)	54(19.9)
Extension offices' advice is not reliable to be followed	85(31.2)	73(26.8)	72(26.5)	26(9.6)	16(5.9)
I am pleased with the extension service and will continue to depend on it	13(4.8)	25(9.2)	52(19.1)	133(48.9)	49(18.0)
I cannot continue depending on extension services as there is no significant change which has been observed	95(34.9)	78(28.7)	66(24.3)	24(8.8)	9(3.3)
Extension service offers high quality services	16(5.9)	53(19.5)	38(14.0)	118(43.4)	47(17.3)
There have not been high quality extension services provided	73(26.8)	72(26.5)	76(27.9)	33(12.1)	18(6.6)
I believe extension service treats all farmers fairly and equally	56(20.6)	33(12.1)	45(16.5)	104(38.2)	34(12.6)
Extension officers always select farmers whom they want to work with, with biasness	77(28.3)	68(25.0)	70(25.7)	34(12.5)	23(8.5)
I like collaborating with the extension service when possible	8(2.9)	9(3.3)	21(7.7)	90(33.2)	144(52.9)
Collaborating with extension staff to me is next to impossible	104(38.2)	80(29.4)	69(25.1)	15(5.5)	5(1.8)
I would willingly recommend to other farmers to go for extension services	10(3.7)	6(2.2)	19(7.0)	108(39.7)	129(47.4)
Since no impact of extension services provided, I can't recommend them to any other farmer	107(39.3)	77(28.3)	66(24.3)	15(5.5)	7(2.6)
The services provided to me are vital to my farming	8(2.9)	15(5.5)	8(2.9)	130(47.8)	111(40.8)
My farming success hasn't been part of the extension service work, but my own efforts	97(35.7)	77(28.3)	67(24.8)	24(8.8)	7(2.6)

The preferable source of farming information is extension officers who always value my opinions	55(20.2)	41(15.1)	11(4.0)	89(32.7)	76(27.9)
Since extension officers do not value my opinions, I do not have good relationship with them as a source of farming information	74(27.2)	59(21.7)	67(24.6)	38(14.0)	34(12.5)

***The numbers in brackets are percentages, and those outside the brackets are frequencies.**

The findings concus with those of Bartoli *et al.* (2012) in a study on the impact of agricultural extension services which revealed that, 58.3 percent of farmers were satisfied with advisory services but 14.3 percent were not. The study finding also concurs with the findings by Nzully (2007) who revealed significant ($p < 0.0001$) differences in the level of satisfaction with extension services among farmers. Nzully (2007) concluded that, 81.5 percent satisfaction of extension services was statistically different from 18.5 percent dissatisfaction. These findings however, differ from those of Ganpat *et al.* (2014) which showed that farmers' satisfaction with extension services in the Eastern Caribbean State was low at about 41 percent satisfaction level. The findings from this study are also in contrast with those in a study by of Lotfy and Adeeb (2016) which revealed that, farmers' level of satisfaction with extension services was very low to about 36 percent , showing weak satisfaction due to variations in land holdings, location, farmer education levels, and the quality of extension services delivered.

Table 4: Descriptive statistics of attitudinal statements

Nature of the attitudinal statement		Strongly disagree to Disagree (SDAD)	Agree to Strongly Agree (ASA)
Negative	Mean	58.69	20.15
	n	15	15
	Std. Deviation	8.16	8.49
	Std. Error of Mean	2.10	2.19
	Minimum	38.90	8.10
	Maximum	68.00	35.40
	% of Total Sum	71.0%	23.0%
Positive	Mean	23.94	67.28
	n	15	15
	Std. Deviation	14.11	14.82
	Std. Error of Mean	3.64	3.82
	Minimum	4.10	44.50
	Maximum	44.50	88.60
	% of Total Sum	29.0%	77.0%

In this objective (the first specific objective of the study), revealed significant mean differences in the percentage scores between those who agreed and those who disagreed with satisfaction and dissatisfaction with the RES delivered to farmers in the study area. The minimum and maximum score on agree to strongly agree on the positive statements about RES delivery was 44.5 and 88.6 percent respectively with a mean of 67.28 percent (Table 4). The t-test results presented in Table 5 indicate that the mean scores between agree and disagree indicators of satisfaction and dissatisfaction with RES delivery were significantly differed from each other. The F-statics were found to be significant indicating that the model fitted well the test variables used in the analysis.

Table 5: Independent samples test

Variable		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Strongly disagree to Disagree (SDAD)	Equal variances assumed	8.02	0.008	-8.25	28	0.000	-34.75	4.21
	Equal variances not assumed			-8.25	22.42	0.000	-34.75	4.21
Agree to Strongly Agree (ASA)	Equal variances assumed	7.62	0.010	10.68	28	0.000	47.13	4.41
	Equal variances not assumed			10.68	22.31	0.000	47.13	4.41

4.2.2.3 Relevance of the theories applied to this objective and results

The theory of satisfaction lies on the foundation for satisfaction in mankind's ability to learn from previous experiences and expectations regarding a service or a product. In order to understand customer satisfaction, it is useful to identify who is a customer and what satisfaction means to such a customer. Suguna (2006) and Shodhganga (2009)

describe customer satisfaction theory as the fulfilment of a person's needs and expectations after evaluating and using a product or a service. Since satisfaction is a subjective concept for example customer needs, emotions, and a resource or service being the objective concept, satisfaction or dissatisfaction may vary from one person to another for a given product or service.

In this study, the theory was used to determine the paradigm shift of the extension services in Tanzania from being a public good with its market failure to being a private or a quasi-private / public private partnership (PPP) good. The public – private good was clearly observed in the agricultural pursuits when the government seriously intervened and engaged to changing policies, reforms, decentralization, reviewing legal framework on taxes, subsidies and regulations to correct the undesirable situation (URT, 1998; URT, 2004). The introduction of the Local Government Reform Programme and the inception of reformed extension services which aimed at encouraging private players, bring services closer to the people, increase public staff and reduce or control market failure was observed to have significant effect on increasing farmers' awareness and demand for RES and hence farmers' satisfaction and use of RES. The results with higher satisfaction per cent than dissatisfaction per cent show that the RES programme succeeded in influencing farmers' demand for using the services and that the services were important to crop productivity. However, if the extent of services delivery was increasing at a relatively low rate it means the farmers' demand for the service was also increasing gradually hence bridging the demand gap created by market failure caused by public good practices. This was essential to note as from the fact that RES could not reach all farmers in the study area. It follows therefore that this theory and concepts were useful and relevant to the study at hand, because the government's interventions were fruitful as they managed to control market failure, enhance farmers' demand and reveal that RES strategy was viable and satisfactory for farmers' benefits on crop productivity. Plates 1 and 2 show the rain-

fed paddy farms with practising improved cropping system as trained by extension officers from public and private sectors.



Plate 1: Paddy transplanting seedlings in Geita



Plate 2: A paddy farmer in Bahi District (rain-fed paddy production)

4.3 Access to Reformed Extension Services

4.3.2 Determinants of farmers' decision to access RES

The marginal effects at the mean for maximum likelihood estimates of a probit model of decision to access (Table 6) revealed that individual/household, farm/plot characteristics, and institutional factors significantly influenced the decision to access public and private RES. In the study districts, it was found that a per cent increase in farmer's age increased the likelihood of accessing public and private RES by 32 and 17 per cents, respectively.

This is not surprising because older farmers have comparative advantage in terms of capital accumulation, extension visits and credit worthiness as well as human capital in terms of experience and knowledge on the importance of accessing RES than is the case with younger farmers. These findings are similar to those of Makhura (2001). However, the findings are in contrast to the findings by Mbitsemunda and Karangwa (2017) who established that older farmers are risk averse thus are less likely to opt for improved agricultural technologies.

A per cent increase in the household size was observed to reduce the likelihood of accessing public RES by 27 percent (Table 6). This is explained by the fact that an increase in household size increases the dependence ratio and thereby household resources (labour and/or income) are directed to other domestic or family needs, and less expenditure is allocated for accessing RES. This finding is also supported by Randela *et al.* (2008) who observe that most smallholder farmers produce more for subsistence or household consumption than for selling, thus underscoring the need to access RES.

Table 6: Marginal effects at the mean of a probit model on decision to access RES

	Access to public extension service			Access to private extension service		
	dy/dx	Std. Err.		dy/dx	Std. Err.	
Log age	0.319	0.132	**	0.165	0.088	*
Sex	-0.140	0.103		0.026	0.071	
Primary education	0.043	0.105		-0.095	0.076	
Secondary education	-0.074	0.140		-0.100	0.097	
Marital status	-0.144	0.122		-0.051	0.077	
On-farm training	0.100	0.101		0.103	0.060	*
Log household size	-0.272	0.072	***	-0.060	0.044	
Log farm size	-0.084	0.051	*	-0.190	0.040	***
Region	0.509	0.098	***	0.333	0.069	***
Farmed maize	-0.399	0.099	***	-0.034	0.058	
Farmed Paddy	-0.026	0.101		0.170	0.068	**
Log farm distance	-0.028	0.045		0.088	0.031	***
Land tenure	-0.161	0.167		-0.067	0.086	
Group membership	0.269	0.080	***	0.064	0.053	
Access to credit	0.498	0.258	*	0.380	0.215	*
Number of observations		261				

Note *, **, *** represent significance at the 10%, 5%, and 1% levels respectively.

An increase in farm size under cultivation by one per cent among the surveyed farmers was observed to decrease the likelihood of accessing public and private RES by 8 and 19 per cents, respectively (Table 6). This is because the expansion of farm size translates to an increase in the size of farm inputs such as labour and capital required which will also demand increased budget to purchase such inputs thus disincentivizing the demand for RES. This observation is supported by McNamara *et al.* (1991) who revealed that an increase in the farm size translates to increased managerial time and costs, which reduce the demand for RES. A per cent increase in the distance to the farm (km) increased farmers' likelihood to access private RES by 8 per cent. This is because most of the farm fields were located at an average distance of 3 kilometres, and this was observed during field visits that most farms were located in one locality/neighbourhood where private RES providers could easily reach and deliver their services to many farmers. This is contrary to public RES providers whose number is minimal (like in Kongwa District where only eight Extension Officers were serving the villages of the entire district); hence they were less likely to visit distant farms due to limited resources such as transport facilities.

Receiving on-farm training increased the likelihood of accessing private RES by 10 percent compared to farmers without on-farm training (Table 6). On-farm training sessions are known to practically instil farmers with knowledge on the importance of RESs for agricultural productivity, supported by guaranteed benefits accrued from the services as most private providers entice, it drives farmers to demand private RES. Farmers in Dodoma Region were also observed to be more likely to access both private and public RES than those in Geita Region. This is because many NGOs providing extension services were in Bahi District thus increasing the base or scope of access to RES, particularly among paddy farmers. Furthermore, paddy attracts attention of both private and public RES providers due to its food security and economic potential.

Being a member to a farmer group increased the likelihood of accessing public RES by 27 percent because groups eased access to information and procedures to access public RES (Table 6). Likewise, positive relationship was observed between group members who share experience, new technologies and encourage one another. It was reported that, most public RES providers prefer meeting groups at one time rather than meeting individual farmers. Farmers groups also exert influence in accessing RES due to their collective action capacity in resource mobilization and cost minimisation in financing productive inputs such as farm implements. Similar findings are reported by Abdallah *et al.* (2016). Having access to credit increased the likelihood of accessing public and private RES by 50 and 38 per cent compared to farmers who had no access to credit (Table 6). This implies that the higher the financial stability or capacity the higher the probability of investing in agricultural technology and access to RES, and its demand. This is because having access to credit increases the ability of procuring public and private RES. it is a stable asset base that enables farmers to access credit and increased the ability to demand and access RES. This result concurs with those in study by Spio (2002) and Koskei *et al.* (2013) who confirmed that access to credit gives farmers' economic and financial ability to demand and access extension services and afford its costs.

4.3.3 Determinants of level of access to public and private RES

The conditional marginal effects at the mean for a zero-truncated Poisson regression model for the level of access to private and public RES (Table 7) showed that individual, institutional, and farm/plot level characteristics significantly determined the level of access to public and private RES. The results showed that, with respect to individual characteristics, variables for farmers with positive number of private and public extension visits, a per cent increase in farmers' age increased the extent/level of access to public and

private RES accessed by 70 and 49 percent, respectively. This implies that as farmers grow older, they acquire farming experience and knowledge on the importance of RES in improving farm productivity which dictate their levels of access to RES. However, the level of education was found to reduce the level of access to public and private extension services by 27 and 40 percent respectively. This is probably because most of the educated farmers like to read and get much of the theoretical knowledge, but they do not concentrate much on the practical part where a combination of human capital is mostly needed. Similarly, for individuals with positive number of public extension visits, male farmers had 42 percent higher number of public extensions visits than female farmers. This could be linked to ownership and decision-making structure whereby males dominate and are considered as final decision makers, thus preferring public RES which are less costly than are the private RES.

Moreover, a per cent increase in the household size for farmers with positive number of public extension visits reduced the level of accessing public RES by 78 percent (Table 7). This is because large households invest less in better farm practices as most of them produce for subsistence while allocating their labour to other farm or non-farm employments for household livelihood demands. Farmers in Dodoma Region with positive number of public and private RES contacts accessed public and private RES by 13 and 15 percent more than was the case with those in Geita Region. This could be supported by earlier observation whereby farmers in Dodoma Region particularly those in paddy production accessed more of RES as compared to sorghum farmers due to having more RES providers including NGOs. This is also proved by the level of contacts with public and private RES providers whereby sorghum farmers with positive visits had 79 and 98 percent chances of being successful. This reflects the importance of paddy for

income, employment, and food security concerns, given the level of RES in demand relative to maize and sorghum (Sattaka *et al.*, 2017).

Other farm/plot characteristics such as farm size showed that, for farmers with positive number of visits/contacts from public and private RES, a per cent increase in farm size lowered the number of public and private RES contacts by 25 and 35 percent, respectively (Table 7). These findings are supported by Abdallah and Abdul-Rahaman (2016) as well as McNamara *et al.* (1991) who also established that an increase in farm size increased the managerial costs and time, which discouraged farmers from demanding private and public RES. Otherwise, a per cent increase in distance to the farm (km) for farmers with positive number of public and private RES accessed/visits increased the farmers' contacts with public and private RES by 45 and 34 percent, respectively. Most of farm plots were located at an average distance of 3 kilometres, mostly in one locality (farmland) where public RES providers would afford to visit more frequently/once at a time collectively. This rendered the provision of extension services to be of minimum cost among RES providers to reach farmers in a single locality than to each farmer individually.

Table 7: Marginal effects at the mean for zero-truncated Poisson model on extent of access to RES

	Public extension			Private extension		
	dy/dx	Std. Err.		dy/dx	Std. Err.	
Log age	0.700	0.297	**	0.488	0.296	*
Sex	0.417	0.234	**	0.356	0.226	
Marital status	-0.360	0.268		-0.142	0.289	
Log household size	-0.782	0.177	***	-0.149	0.196	
Primary education	0.058	0.268		-0.198	0.223	
Secondary education	0.012	0.335		0.446	0.306	
Tertiary education	-0.366	0.355		-0.332	0.325	
Region	2.129	0.283	***	4.169	0.233	***
Farmed maize	-0.398	0.254		-0.138	0.221	
Farmed paddy	0.788	0.266	***	0.974	0.233	***
Log farm size	-0.250	0.146	*	-0.351	0.140	**
Log farm distance	0.445	0.122	***	0.342	0.145	**
On-Farm training	1.948	0.267	***	1.083	0.191	***
Land tenure	-1.005	0.726		-0.464	0.589	
Group membership	0.088	0.191		0.098	0.166	
Access to credit	0.339	0.245		0.260	0.228	
Number of observations	245			243		

Note *, **, *** represents significance level at 10, 5, and 1 per cent level, respectively.

Having received on-farm training, as an institutional variable, was observed to be significant while belonging to a farm group and access to credit were observed to be insignificant but with positive effect on the level of access to public and private RES. This implies that training gives farmers skills and knowledge and creates favourable environment of accessing productive technologies and information. Specifically, for farmers with positive numbers of visits by public and private extension agents, receiving on-farm training increased the level of accessing public and private RES by 95 and 8 per cent respectively compared to farmers who did not receive on-farm training. This finding is supported by Anderson and Feder (2003), who reveal that on-farm training increase the need and level of RES demanded, given the imparted knowledge which proved to be essential for achieving high farm level productivity and income. Similarly, membership in farm groups increased the level of public and private RES demanded, albeit with insignificant effect. It has been established that group participation stimulates information exchange (Katungi, 2006). Membership to farm groups enhances access to relevant information and knowledge, through joint efforts and sharing while at the same time minimising the cost of access to such services. Moreover, access to credit facilities assured an increase in the level of public and private RES demanded and, according to Spio (2002), access to credit strengthens farmers' financial capacity and hence the ability to access various forms of RES.

4.3.4 Relevance of the theory applied to this objective and results

The Theory of Access

This study was guided by the theory of access, advanced by Ribot and Peluso (2003), which reveals that access is the ability to benefit from things (resources) including material objects, persons, institutions, and symbols. The theory concurs with the results of

the study whereby social relationship that is socio-economic and institutional factors significantly influenced the demand that is the decision to access public and private RES as well as the level of access to RES and its benefit on productivity. “Socio-economic and institutional (on-farm training, farmers’ groups, access to credits), personal and household attributes (age, household size), farm/plot characteristics (farm size, farm distance, land tenure)” are important factors which determined access to RES as an indicator for RES demand by farmers. This shows that the theory and concept used were useful and relevant to the study at hand. Plates 3, 4, and 5 show maize, sorghum, and paddy crop farms with attractive plants following RES provision by public and private players.



Plate 3: A maize farm in Bukombe District



Plate 4: Sorghum farmers in Kongwa

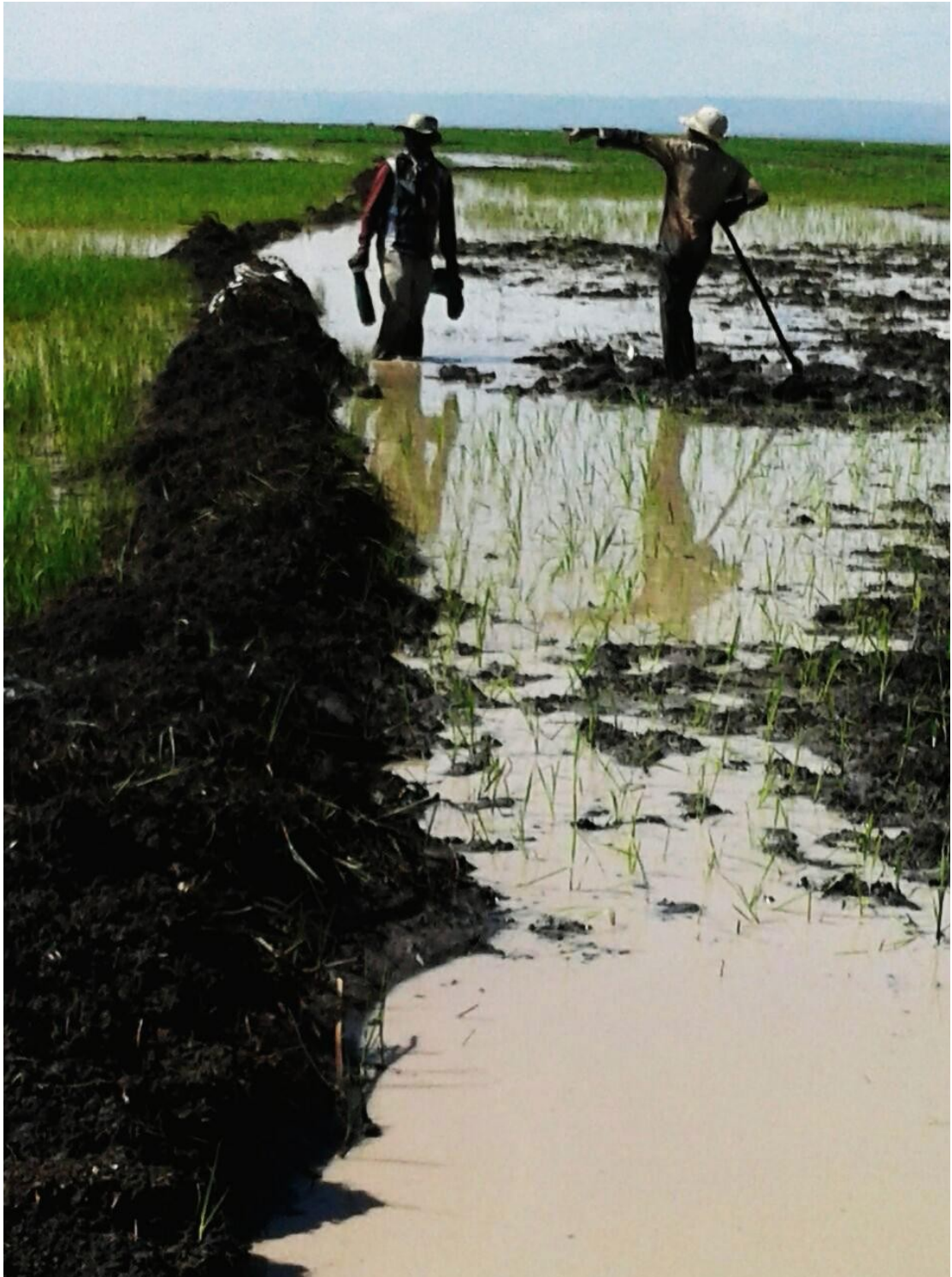


Plate 5: Paddy farming in Bahi

4.4 Effects of the Reformed Extension Services Delivery on Crop Productivity

This section presents the results and discussion of the effect of RES on farm productivity extracted from a production function output.

4.4.1 Factors affecting maize, paddy, and sorghum productivity

Ordinary least squares (OLS) regression for factors affecting maize, paddy, and sorghum productivity in the sampled districts was carried out after controlling for multicollinearity and constant variance. The F-test for overall significance of maize and paddy productivity model was observed to be significant ($p > 0.000$), thus rejecting the null hypothesis that the model with intercept only fits the data well ($H_0: X_1 + X_2 + \dots + X_n = 0$). The study, however, failed to reject the null hypothesis that the model for factors affecting sorghum productivity is well fitted with the intercept only. This is due to low degrees of freedom whereby few farmers were observed to have grown sorghum. The results are, however, reported for illustrative purposes.

Generally, RES as presented in Table 8 were observed to have a significant effect on the productivity of maize, paddy, and sorghum. Access to private extension visits, credit, being in a farmer groups, receiving on farm training, farmer to farmer extension contacts, contract farming, and farmer field schools were found to affect maize, paddy, and sorghum productivity. For maize productivity, being in a farmers' group and receiving on-farm training increased farm productivity by 67 and 46 percent respectively. Similarly, farmer to farmer extension is known to be the most common form of knowledge and technology transfer amongst farmers. This played a significant role in increasing maize productivity by 33 percent while operating under contract farming. Also participating in farmer field schools increased maize productivity by 26 and 28 percent respectively. For

paddy productivity, on the other hand, having access to credit, receiving on-farm training, and participating in farmer field schools was observed to significantly increase paddy productivity by 56, 46, and 28 percent respectively. Contact with a private extension agent significantly increased paddy yield proportion by 36 percent. Similarly, for sorghum, having contacted private extension officers, receiving on-farm training, and participating in farmer field schools increased output per hectare by 80, 46, and 16 percent. Surprisingly and contrary to maize and paddy crops, participation in farmer groups, however, lessened sorghum productivity by 52 percent probably due to weaker institutional participation as few sorghum farmers were seen to participate in such groups.

These results conform the underlining theory of production whereby technical skills provided via RES as inputs, capacitated farmers to efficiently combine inputs in order to maximise output per area. This is because private extension agents, mainly those who provided RES through visits in Bahi and Geita Districts, remarkably helped many paddy farmers by providing them with improved seeds and other inputs as well as farm best practice training sessions, given the food and economic potential paddy/rice upholds. This observation is also concordant with the results of studies by Henningsen *et al.* (2015), Kalimang`asi *et al.* (2014), and Velde and Maertens (2014) who confirmed that visits with a public and a private extension officer increased access to improved technologies and skills. Participation in contract farming, being in a farmer group, and receiving on-farm training equipped farmers with better inputs, skills and technology thus increasing output per plot/productivity. Access to credit, on the other hand, as indicated in literature (Idiong, 2007; Duy, 2015) was found to increase farmers' ability to access better farm inputs and technologies thus improving productivity. Group membership has also been proved to encourage farmer to farmer extension services and FFS where knowledge and ideas are shared (Abbeam *et al.*, 2018).

Table 8: Multiple regression results of factors affecting maize, paddy and sorghum productivity

	Log Maize Yield			Log Paddy Yield			Log Sorghum Yield		
	Coef	Robust Std. E		Coef	Robust Std. E		Coef	Robust Std. E	
Individual variables									
Log age	0.409	0.233	*	0.138	0.308		-0.403	0.541	
Log household size	-0.121	0.114		-0.153	0.177		0.295	0.329	
Primary education	0.004	0.256		0.453	0.306		0.128	0.550	
Secondary education	-0.177	0.338		0.483	0.359		0.239	0.732	
Tertiary education				0.767	0.395	*			
Sex	0.291	0.148	*	0.080	0.269		-0.424	0.258	
Region	-0.302	0.222		-0.628	0.550				
Farm characteristics									
Log farm distance	-0.020	0.080		-0.046	0.139		0.200	0.256	
Fertilizers	0.306	0.105	***	0.367	0.191	*			
Improved Seeds	0.019	0.208		0.449	0.227	*	-0.759	0.553	
Log Capital	0.431	0.219	*	0.948	0.185	***	0.729	0.351	*
Irrigation	-0.484	0.472		1.589	0.550	***	0.348	0.680	
Log Labour (man-days)	0.353	0.108	***	0.094	0.133		-0.749	0.362	*
Institutional/RES									
Public extension	-0.018	0.149		0.114	0.257				
Private extension	-0.089	0.443		0.358	0.178	**	1.805	0.722	**
Access to Credit	0.564	0.488		0.381	0.180	**			
Group membership	0.678	0.196	***	0.233	0.187		-0.520	0.297	*
On farm Training Farmer to farmer extension	0.464	0.189	**	0.396	0.227	*	0.814	0.407	*
Contract farming	0.331	0.125	***	0.256	0.279		-0.264	0.345	
Radio and TV	1.255	0.137	***	-0.050	0.310		0.379	0.657	
Farmer field schools	0.137	0.230		-0.083	0.258		-0.239	0.477	
Constant	0.278	0.155	*	0.613	0.253	**	0.060	0.362	**
Number of observations	5.982	0.789	***	6.263	1.371	***	11.158	3.175	*
F (18,140)/ (21,117)/ (14,18)	160			140			36		
Prob>F	3.060			3.290			1.500		
R-squared	0.000			0.000			0.204		
Root MSE	0.652			0.722			0.614		
	0.303			0.487			0.603		

Note *, **, *** represents significance at the 10%, 5% and 1% levels respectively.

Other factors that were revealed to influence maize, paddy and sorghum productivity were individual and farm specific attributes. For individual attributes, an increase in the age of the farmer by one per cent and being male were seen to increase maize productivity by 41

and 29 percent respectively. According to scholars (Mendola, 2007; Tiwari *et al.*, 2008; Abbeam *et al.*, 2018), aged farmers are claimed to have accumulated experience in farming and adopting new farm technologies which thus influence farm productivity positively. Moreover, having a tertiary level of education increased paddy productivity levels by 77 percent. This is because high level of education reflects the ability to interpret and adopt modern farm practices provided by varying extension service providers, most of which require skills in the implementation and management (Wossen *et al.*, 2017; Senthilkumar *et al.*, 2018). Similar studies by Chandio and Yuansheng (2018) and Ghimire *et al.* (2015) indicated that, with an increase in rice varieties/technologies, and an increase in the level of farmers education have been a central aspect in adopting and influencing rice productivity levels. Moreover, an increase in labour man-days, capital, and the use of fertiliser, irrigation, and improved seed were also found to increase maize, paddy, and sorghum productivity in the studied sites.

In addition, Beta values or coefficients for labour and capital are interpreted as input elasticities which check the responsiveness of output from the unit change in the factor input and are interpreted directly as percentages. A per cent increase in the level of capital inputs used led to an increase in land productivity for maize, paddy, and sorghum by 0.43, 0.95, and 0.73 per cent respectively. Paddy productivity also increased by 0.37, 0.45, and 0.59 percent when fertiliser, improved seeds, and irrigation, respectively, were used. The Use of fertiliser was similarly found to increase maize productivity by 0.31 percent compared to those not using fertiliser. An increase in labour man days for maize production per each hectare led to an increase in productivity by 35 percent while lowering sorghum land productivity by 0.75 percent. This means that most sorghum production levels had reached the third stage of productivity which reflects that continued increase in labour will lower output per hectare as marginal productivity of labour has reached maximum. Furthermore, increasing use of man labour, capital, while using

improved seeds, irrigating, and fertilizer have widely been documented in literature under production theory (Ahmed *et al.*, 2005; Chepng'etich *et al.*, 2015; Tun and Kang, 2015) to have increased farm level production efficiency per hectare of crops farmed.

4.4.3 Relevance of the theory applied in the objective and results

The Neo-Classical Production Theory

From the neo-classical production theory, the results revealed that RES as a key factor input related to increasing public and private (NGOs) extension visits, provision of on-farm training, supporting farmer groups, pursuing contract farming, accessing credits and farmers' field schools worked best in improving maize and paddy productivity levels. These results conform to the underlining theory of production whereby technical skills provided via RES as inputs capacitated farmers to efficiently combine inputs in order to maximise output per unit area. Plates 6, 7, and 8 show sorghum and maize that are near harvesting with good produce after the farmers got education from public and private extension agents via RES programme in Kongwa and Bukombe Districts.



Plate 6: A Sorghum farm in Kongwa



Plate 7: A Sorghum farm in Kongwa



Plate 8: A maize farm mixed with legumes in Bukombe

CHAPTER FIVE

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Key Implications of the Study

The overall objective of the study was to establish a quantitative understanding of the effects of Local Government Reform Programme (LGRP) on farmers' demand for reformed extension services aiming at increasing crop productivity. Based on the decentralization agenda of the Local government Authorities, the study established the rationale of adopting the LGRP II (the decentralization by devolution programme) which brought extension services closer to the people and promoted the engagement of private sectors and increased recruitment of public extension staff with the following purposes:

- i. Reducing the role of the public sector in the economy;
- ii. Being a conduit for the reduction of Tanzanians living in poverty through decentralized authorities;
- iii. Restructuring and delegating the powers from the central government to the districts by transferring resources from the national to the district level, and making district administration accountable to the community;
- iv. Agent of reforms of all cross-sectoral programmes include agricultural extension services;
- v. Delegation of powers from the central government to the local government authorities; and
- vi. Increasing competitiveness of services delivery by allowing other players to participate.

In this regard, extension services that are RES under the LGRP II in essence were reformed for increasing crop yield by farmers through:

- i. Improved delivery of farm management skill and technology;

- ii. Control or reduction of market failure caused by offering extension services as a public good;
- iii. Bridging the gap between actual and expected potential level of productivity; and
- iv. Increased demand for extension services by farmers created by farmers' awareness, choice and use of RES for increased productivity.

The expectations of the reform were therefore:

- Seeing extension services administered at the lowest level of the government for better accountability whereby active participation of beneficiaries/farmers and other actors can be more effective;
- Having policies, legislations, and regulations in place to control market failure caused by public good delivery, monopoly, externalities, imperfect distribution of the service by broadening the scope of private actors; and
- Registering improvement in RES accessibility, affordability, and availability by having competitive and cost-effective service provision among farmers in Tanzania.

The study assessed whether the LGRP II (D by D) tenets have successfully managed to enhance farmers' demand for RES for increased potential crop productivity by answering the following questions: namely, does the reform meet the farmers' demand for extension services to influence increase productivity? ii. Have the reforms assisted in fulfilling the demand gap for extension services to farmers?

The general conclusion section is organized according to the order of the results and discussions presented in Chapter Four, following the specific objectives of the study.

5.2 Conclusions

Based on examining farmers' satisfaction with the provision of RES, the level of farmers' satisfaction with RES was found to be higher at 77 percent against the 29 percent level of dissatisfaction. The extent of extension services delivery after reform was seen to have increased compared to the period prior to its inception. Generally, RES delivery did not reach all farmers equally within the study area. However, it managed to reflect its importance on crop production among farmers. These findings suggest that a very strong coordinating role is needed to further encourage and sensitise farmers to demand for and use RES for increased productivity. It was learned that production data do not inspire a quick response by farmers to demand and use extension services. Mostly, statistics from villages, wards, districts, regions, and even national-wide concentrate more on production such as in tons, kilograms, and bags. This is a direct transformation of human capital to labour force, but which is not based on economic value of productivity which calls for production per area ("productivity"). This suggests that data recording should have more emphasis on productivity data as they will stimulate farmers to engage more on small areas with minimum production cost aiming at increased productivity.

A Probit model of decision to access private and public RES showed that individual/household attributes (age), farm/plot characteristics (farm distance), and socio-economic characteristics/institutional (on farm training, farmers groups, access to credits) significantly influenced the decision to access public and private RES. In addition, a zero-truncated Poisson regression model for the level of access to private and public RES showed that individual/household socioeconomic characteristics (age), farm/plot characteristics (farm distance), and institutional (on farm training) factors significantly determined the level of access to public and private RES. This confirms the importance of personal and household attributes, farm/plot characteristics, socio-economic and

institutional as important factors which determine access to RES. Hence, the first and second null hypotheses were rejected.

The study also found that age and on-farm trainings were important in influencing access and the level of access to RES among maize, paddy, and sorghum farmers, but not all RES factors worked well across the crops studied. Thus, there is a need for designing separate RES packages for each crop. Similarly, it was further learned that many private players such as NGOs involvement in paddy production in Bahi District substantially influenced increased yield of paddy compared with other districts and made Dodoma Region's access to RES have higher effect than was the case with Geita Region.

The analysis of the effect of RES on crop productivity revealed productivity levels from 2015 to 2017 for maize, paddy and sorghum to be below the expected potential levels. These levels continue to keep many farmers within circles poverty as little production is realised. The study reveals that RES uptake by farmers was slowly experienced. With respect to the production theory, an increase in key farm inputs, labour (in man-days) and capital (pesticides and machinery), use of fertiliser, irrigation, and improved seeds together with RES were seen to enhance productivity levels. Generally, RES was observed to be a key ingredient in bringing about potential levels of productivity. The largely strengthened implementation would encourage more potential results, especially in acquiring technical knowledge which is crucial in combining key farm inputs. By these results null Hypothesis H_3 was rejected. These results conform to the underlining theory of production whereby technical skills which are provided via RES as inputs capacitated farmers to combine efficiently inputs in order to maximise output per area that is, productivity.

The study also found that 2017's productivity was low and surprisingly with limited use of access to RES in the study area. This was claimed to be caused by little rains experienced in the study area. That is, extension services are assumed to be in direct proportion with enough rainfall distribution or irrigation.

Moreover, reformed extension services were introduced by the government following major national decentralization reforms (LGRP I and II) in order to improve delivery of essential farm management skills and technologies. The focus was to bridge the gap between actual and expected potential levels of farm productivity and subsequently raising farmers' understanding and demand for the extension services. Hence, the use of the extension services can lead to increased income that may enable farmers increase productivity and break away from the circle of poverty. However, although RES delivery did not reach all farmers within the study areas, but they significantly raised farmers' demand for RES at a desirable agricultural production. Hence, efforts are required further to strengthen RES use for crop productivity.

5.3 Contribution of the Study to Policy Making and Body of Knowledge

Broadly, this study has made important contribution to the body of knowledge by using economic principles in dealing with extension services delivery. This study has managed to showcase that like land, capital, and labour; extension service is an essential factor input to a production process. Further, extension service delivery as a public good failed in impacting productivity levels due to market failures, thus necessitating policy reforms. Therefore, broadening access to extension service packages through reformation from public, private, and quasi-private (PPP) enhances competitive and cost-effective service

provision, while broadening choice elements and hence increasing accessibility and ultimately increasing farm productivity.

The study informs further and contributes to LRGAs strategic engagement on economic initiatives for reliable public services delivery. Specifically, it provides more insights to policy makers at the local government level to exert more efforts on engaging private actors in extension service delivery which in turn move from being a public good to a public-private good. To the body of science, the study feeds scholars with information on how the local government reform programme in relation to reformed extension services RES which involve public-private interplay contribute to speeding up service delivery and broadly impacting farm level agricultural productivity.

The study also contributes to knowledge regarding RES provision that a combination of many other factors related to individual socio-economic attributes, farm/plot features to be essential on the success of RES accessibility and the extent of its accessibility. Moreover, although on-farm practical training provided by both public and private RES providers has been effective in affecting productivity of each crop, the study adds knowledge that attaining potential levels of crop productivity depends on specific combination of RES packages as not all packages work best for each crop.

5.4 Recommendations

As RES have proved to be essential and satisfactory to majority of farmers, therefore the local Government authorities which assume the responsibilities for RES will need to play a very strong coordination role in order to bring on board all the various extension providers and other stakeholder so that extension services are provided as part of a comprehensive agricultural development programme. It is important to strengthen

extension services by the government through provision of infrastructural facilities to reduce operation costs by private providers and transport facilities to public extension staff to enable them reach more farmers.

The study urges RES providers and pertinent stakeholders to use on-farm training, farmers groups, and promote credit access as they have worked effectively in enhancing the extent of RES accessibility at minimum cost while reaching bigger numbers of farmers. This is also because the number of RES providers is small compared to the population of farmers in demand for the service.

RES mainly on-farm practical training and farmer groups provided by both private and public providers are seen to significantly improve maize, paddy, and sorghum productivity levels. Thus, dissemination of RES to farmers should be strategic or targeted (Plate 5.1-5.4) by focusing on each crop with its extension services package/requirement as not all RES packages work best for each crop.

5.5 Study Limitations and Areas for Further Research

The assessment of RES satisfaction, accessibility, and its effect on crop productivity relied on cross-sectional data that were collected at one point in time and complemented by qualitative information from key informants. This was attributed to lack of baseline data on the situation before the inception of reforms. This study was, therefore, better suited to employ a continuous list of panel or time series data to better grasp the effect of RES on crop productivity.

Information on sorghum productivity was seen to be non-robust due to smaller number of sorghum farmers surveyed. The study therefore calls for further studies that will examine

the effect of RES among sorghum farmers using a large sample of farmers in order to produce working policy recommendations. Moreover, the study was limited to rain fed maize, paddy, and sorghum farmers. It is therefore recommended that, further studies should be done to examine and compare the demand for RES and the effects on crop productivity amongst irrigated and rain fed maize, paddy, and sorghum.

Plates 9, 10, 11 and 12 show in practice various forms of RES provided and their visual results on crop sorghum, maize and paddy farming and productivity when efficiently combined with other factors of production.



Plate 9: On-farm training; Sorghum farmer and extension officer in Kongwa



Plate 10: A Paddy farmer during weeding practice in Geita



Plate 11: Weeding in maize farm in Geita



Plate 12: Paddy farms in Bahi

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APPENDICES

Appendix 1: Questionnaire for Smallholder farmers

BACKGROUND INFORMATION

Date of Survey:

Name of the Village/Street:

Name of the Ward:

Name of the District:

Name of the region:

Name of the enumerator

Name of Supervisors (i).....

(ii).....

Dear Respondent,

Your household has been selected randomly to participate in a research that is on-going in this district about **Effects of Local Government Reform on Enhancement of Demand for Agricultural Extension Services Delivery in Selected Districts in Tanzania**. The main purpose of the research is to generate information based on improving agricultural extension services and its demand by farmers for increased crop productivity in the study areas. All the responses you will give will be treated confidentially, and the research results will be used only for the purpose stated above and for academic purposes. Therefore, you are kindly requested to respond to all questions openly and truthfully.

A. SOCIO-DEMOGRAPHIC PROFILES OF RESPONDENTS

1. Household members

HH members' serial numbers	P 1 Household head	P 2 Spouse	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P 10	P 11	P 12
Name (Only one, optional)												
Sex (1 = M; 2 = F)												
Date of birth												
Ethnic group												
Education level (1. None, 2. Primary, 3. Secondary, 5. Colleges, 6. Others).												
Marital status (1. Married, 2. Widowed, 3. Never married, 4. Divorced/separated)												
Main occupation (1. Crop production, 2. Livestock keeping, 3. Government employment, 4. Non-government employment, 5. Trading, 6. Others (<i>Specify</i>))												

2. For how long have you been living in this village?years

3. Have you received extension services in your household in the past 12 months? Yes, No

4. Have you received extension services in your household in the past five years? Yes, No

5. Have you received extension services in your household in the past ten years? Yes, No

B. FARMERS' SATISFACTION WITH EXTENSION SERVICE DELIVERY IN THE STUDY AREAS

6. Does your village have an extension officer? Yes No

7. Is there any private extension services provision in the village? Yes No

8. Was there any private extension services provision in the village ten years back? Yes No

9. Is there any public extension services provision in the village? Yes No

10. Was there any public extension services provision in the village ten years back? Yes No

11. Does the Village Executive Officer give room for extension officer to speak in the village meetings for agricultural issues? Yes No

12. Does the extension officer have an office in the village executive officer's office? Yes No

13. Does the extension officer pay visit in the farmers' fields? Yes No

14. How many contacts did you have with an extension officer to talk about agricultural issues for the past 12 Months?

15. Which group of leaders is a major source of encouragement to modern agricultural practices in your area?

1. Village government/ VEO	<input type="checkbox"/>
2. Councillors	<input type="checkbox"/>
3. District Executive Director	<input type="checkbox"/>
4. District Commissioner	<input type="checkbox"/>
5. Extension Officers	<input type="checkbox"/>
6. Peer group	<input type="checkbox"/>

16. Which types of people are normally involved in the agricultural extension services delivery in your village?

1. Farmers	<input type="checkbox"/>
2. Among family members	<input type="checkbox"/>
3. Private vendors	<input type="checkbox"/>
4. Extension Officers	<input type="checkbox"/>
5. District Executive Officer's Office	<input type="checkbox"/>
6. Investors	<input type="checkbox"/>
7. Others (Specify)	<input type="checkbox"/>

17. Kindly state whether you strongly disagree (SD), disagree (D), agree (A) or strongly agree (SA) with each of the statements in the following table [*which are used in this study to measure level of satisfaction with delivery of extension services in your village*]

Attitudinal statement variables	Farmer's responses			
	Strongly disagree	Disagree	Agree	Strongly agree

I believe the extension service help me without expecting anything in return					
Extension staff provide help wherever they know they expect something					
Extension is known to be successful at the things it tries to do					
Extension have proved failure in its mission					
In my time of need the extension service is always ready to assist me					
There has been always reluctance in extension services provision by the service providers					
The extension service is concerned about my welfare and that of my family					
The extension service has not been on the farmers' welfares but on themselves (extension agents)					
The extension service is always ready and willing to work with me					
Willingness and readiness of extension service providers to work with farmers is almost nil					
My expectations are held in high regard by the Extension service					
Extension services did not meet what farmers expected out of them					
Extension officers are easy to reach					
There is a big social distance between extension officers and farmers which make them not easily accessible					
I firmly believe that the advice from the extension officers is always true					
Extension offices advices are not reliable to be followed					
I am pleased with the extension service and will continue to depend on it					
I cannot continue depending on the extension services as there is no significant change which has been observed					
Extension offers a high quality of service					
There have not been high quality Extension services provided since then					
I believe Extension treats all farmers fairly and equally					
Extension officers always select farmers whom they want to work with biasness					
I like collaborating with the Extension service when possible					
Collaborating with extension staff to me is next to impossible					
I would willingly recommend other farmers to the Extension services					
Since no impact of extension services provided, I can't recommend any other farmer to participate					
The services provided to me is vital to my farming					
My farming success haven't been part of the extension service work, but my own efforts					
The preferable source of farming information is Extension officers who always value my opinion					
Since they do not value my opinions, I do not have good relationship with them as source of farming information					

B. DETERMINANTS OF ACCESS TO EXTENSION SERVICES IN THE STUDY AREAS

18.	Are there extension officer's work schedules to meeting farmers	Yes			
		No			
20.	Are there any NGOs/Organizations which provide extension services in the village?	Yes			
		No			
22.	Is it easy for a farmer to access the services of extension officer?	Difficult			
		Easy			
24.	What kind of extension services do you receive in your area?	Farmer groups			
		Integrating among different extension providers			
		Pluralistic extension approaches (Using various extension services and approaches). Participatory			
		Training and Visit			
		Farmer-to-Farmer Extension			
		Contract farming			
		Agricultural exhibition/shows			
		Leaflets, magazines and news papers			
		Radio and TV			
		Farming Systems approach			
		Farmer field schools (group-based)			
		Ward Agricultural Resource Centres			
		36.	What is your farm size under cultivation	Maize Ha
				Paddy Ha
Sorghum (Kongwa)	... ... Ha			
37.	Crop prices; (TZS/Kg) Maize			2017	TZS
				2016	TZS
				2015	TZS
				2014	TZS
41.	Crop prices; (TZS/Kg) Paddy			2017	TZS
				2016	TZS
		2015	TZS		
		2014	TZS		
45.	Crop prices; (TZS/Kg) Sorghum (Kongwa)	2017	TZS		
		2016	TZS		
		2015	TZS		
		2014	TZS		
46.	What is the land tenure of the land you are	Owned			
		Leased			

	using for agriculture?		
48.	What are the types of farm implements do you use	Hand hole	☺
		Oxen plough	☺
		Power tiller	☺
		Tractor	☺
52.	How do you rank the farm input prices available in your village?	1. High	☺
		2. Moderate	☺
		3. Affordable	☺
55.	What is the distance from your residential place to the field?	..... km	
56.	How many on-farm training have you attended?	.....
57.	How did you come to own your land in the village? (tick all which are appropriate)	1. Bought	☺
		2. Inheritance	☺
		3. Given by village authority	☺
		4. Land registration	☺
		5. Other (Specify)	
62.	If there are NGOs/Organizations which are involved in extension services in your area, just list at least two?	1.	
		2.	
64.	What can you tell about the contribution of the organization you have just mentioned in your demand to extension services?		
67.	Are farm inputs made available in your village timely?	1. Yes	☺
		2. No	☺
68.	If there are groups of people which are involved in extension service in your area, can you list at least two?	1.	
		2.	
70.	What can you tell about the group's contribution in your extension services demand?		
74.	What media do you access in your area? (Tick all which are appropriate)	1. Radio	☺
		2. Television	☺
		3. News papers	☺
		4. Others Specify:.....	
75.	What factors enhance households' access to extension services?		
79.	What factors constrain households' access to extension services?		

C. AGRICULTURAL PRODUCTIVITY (before and after reform)

1. Reform I (1999 – 2007)
2. Reform II (2008 – 2014) Decentralization by Devolution “ D by D”

(Reformed Extension Services belong to the D by D era)

Smallholder farmer’s land packages and crops		
83. What is your farm size in use (acres)	1. Maize	
	2. Paddy	
	3. Sorghum (Kongwa)	
86. What is your primary operation of land	Crops only	
	Mixed farming	
88. Land tenure? (Tick all which are appropriate)	1. Own	
	2. Leased for a period	
	3. Given by a friend - period	
	4. Family allocated	
	5. Other (Specify)	

About crop productivity		
93.	What type of food crops are you producing?	
94.	What other crops do you grow (List at least five crops)	1. 2. 3. 4. 5.
99.	On extension services demand, do you greatly seek extension services in your area?	Yes I do Not much
101.	Do you use farm inputs in your agriculture pursuits?	Use Don't use
103.	Types of farm inputs available	1. Fertilizers
		2. Insecticides
		3. Fungicide
		4. Improved seeds
		5. Herbicides
		6. Others (Specify)
109.	Which one did you use?	
112.	Production Costs	Family labour
	i. Land preparations	Paid costs

114.	ii.	Cultivations	Family labour	
			Paid costs	TZS..... ...
116.	iii.	Seeds	Traditional seeds	
			Bought	TZS..... ...
118.	iv.	Weeding	Family labour	
			Paid labour	TZS..... ...
120.	v.	Inputs (fertilizers/insecticides/herbicides)	Manure / Composites	
			Bought	TZS..... ...
122.	vi.	Harvests	Family labour	
			Paid labour	TZS..... ...
124.	If irrigated then from which source, of water for irrigation is obtained	Pond		
		River		
		Lake		
		Others		
128.	How many times per annum the harvest is done from your field			
129.	Productivity: (kg/acre)			
Maize Productivity: (Production per unit area / acre) kg/acre				
Year of Production	Number of Acres	Total production/ yield	Production per Acre	Remarks
2017				After Reformed Extension
2016				After Reformed Extension
2015				After Reformed Extension
2014				After Reformed Extension
2013				After Reformed Extension
2012 - 2008				Before Reformed Extension
Paddy Productivity: (Production per unit area / acre) kg/acre				
Year of Production	Number of Acres	Total production/ yield	Production per Acre	Remarks
2017				After Reformed Extension

2016				After Reformed Extension	
2015				After Reformed Extension	
2014				After Reformed Extension	
2013				After Reformed Extension	
2012 - 2008				Before Reformed Extension	
Sorghum Productivity (Kongwa District): (Production per unit area / acre) kg/acre					
Year of Production	Number of Acres	Total production/ yield		Production per Acre	Remarks
2017					After Reformed Extension
2016					After Reformed Extension
2015					After Reformed Extension
2014					After Reformed Extension
2013					After Reformed Extension
2012 - 2008					Before Reformed Extension

D. EFFECTS OF REFORMED EXTENSION SERVICE DELIVERY ON AGRICULTURAL PRODUCTIVITY

Reform I (1999 – 2007)

Reform II (2008 – 2014) Decentralization by Devolution “D by D”

(Reformed Extension Services belongs to the D by D era)

Variables / Indicators for reformed extension services are: Private extension services, Land tenure/distribution, Credit facilities on agricultural production, Contract farming, Farm field school/demonstration, Media, Public-private extension services/partnership

Smallholder farmer's land packages and crops			
130.	Are you a fulltime engaged farmer (i.e. you don't have any other income generating activities?)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
131.	Do you participate in farmers' groups for modern farming practices?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
132.	Do you participate in farmers' groups for credits status?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
133.	Which group of leaders is a major source of encouragement to smooth land acquisition and ownership on and in your area?	1. Village government	<input type="checkbox"/>
		2. Councillors	<input type="checkbox"/>
		3. District Executive Director	<input type="checkbox"/>
		4. District Commissioner	<input type="checkbox"/>
		5. Religious leaders	<input type="checkbox"/>
		6. Peer group	<input type="checkbox"/>

About crop productivity

134.	With Maize what kind of varieties do you normally produce?		
135.	With Paddy what kind of varieties do you normally produce?		
136.	(Kongwa) With sorghum what kind of varieties do you normally produce?		
137.	Reasons for producing the mentioned varieties of maize?	1. More marketable	
		2. High return/yield	
		3. Easy to grow	
		4. Less cost of production	
		5. Durable on storage	
		6. Other (<i>Specify</i>)	
138.	Reasons for producing the mentioned varieties of Paddy	1. More marketable	
		2. High return/yield	
		3. Easy to grow	
		4. Less cost of production	
		5. Durable on storage	
		6. Other (<i>Specify</i>)	
139.	(Kongwa) Reasons for producing the mentioned varieties of Sorghum	1. More marketable	
		2. High return/yield	
		3. Easy to grow	
		4. Less cost of production	
		5. Durable on storage	
		6. Other (<i>Specify</i>)	
About Effects			
140.	Do the small scale farmers have access to credits?	Yes $\frac{3}{2}$	
		No $\frac{3}{2}$	
141.	What can you tell about the contribution of credit facilities to your crop production?		
142.	Are there any demonstration plots/ farmers field school/field trainings?	Yes	
		No	
143.	What is the contribution of demonstration plot/field trainings facilities to your crop production?		
144.	What is the number of private firms that are working in the area for extension services delivery?		
145.	What can you tell about the contribution of private firms, organization, retailers to your crop production?		
146.	What can you tell about the media's contribution to your crop production?		

147.	Do you have contract farming scheme in your village?	Yes	جواب
		No	جواب
148.	What can you tell about the contract farming scheme's contribution to your crop productivity?		
149.	Is it possible to end the existing food shortage?	1. Yes	
		2. No	
150.	If yes in Q. 77, how?		
151.	In which way do the reformed extension services have contributed to your crop production?		

E. CHALLENGES FACING THE REFORMED EXTENSION SERVICES DELIVERY SYSTEM

152. (Challenges ranked in terms of their severity towards productivity)

“This is an index summated scale”

Challenges	Degree of their severity		
			2
1. Land unavailability for food crop production(arable land)			
2. Seasonality in food crop production (not perennial)			
3. Limited extension services staffs (limited number of Extension officers)			
4. Limited supply of extension services to farmers			
5. Expensive inputs and mechanization (Fertilizers and machines)			
6. Delay in inputs (fertilizers, pesticides, etc.)			
7. Inadequate skills in crop production management and (value chain)			
8. Lack of irrigation facilities			
9. Unfavourable conditions on accessing credit from financial institutions (bank, SACCOS and other financial institution)			
10. Unpredictable rainfall (unreliable rain)			
11. Outbreaks of diseases/pests/insects –affect food crop plants			
12. Poor quality of seeds			
13. Lack of reliable markets			
14. Land conflicts			
15. Lack of storage facilities			
16. Inadequate skills in postharvest handling			
18. Destructive birds			
19. Land unavailability			
20. Contradiction among regulations			
21. Existing Policy and Institutional Frameworks do not support the sector			

(marketing framework)			
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1) Code: 2 = More challenging 1= Less challenging 0 = Not Challenging

2) Mention any other general critical challenges facing Extension Services delivery to farmers in your area apart from the above once.

Appendix 2: Questionnaire for key informants - 1

Checklist for key informants (*Ward and Village Extension Officers, Ward and Village Executive Officers and Councillors*)

Dear, Sir/Madam,

I am here for the research purpose on the effects of Local Government Reform on Enhancement of Demand for Agricultural Extension Services Delivery. All information provided will strictly be treated confidentially. Thanks.

Name of the Respondent.....

Mobile Number

Ward.....Village.....

District

Region

1. How many villages are there in you wards?
2. How many agricultural extension officers are there in the ward?
3. Do they have transport facilities to enable them reach the intended farmers
4. What is the actual area currently under Maize cultivation in the Village/Ward? (acres).
5. What is the actual area currently under Paddy cultivation in the Village/Ward? (acres).
6. What is the actual area currently under Sorghum cultivation in the Village/Ward? (Kongwa District)..... (acres).
7. Are there any Maize/Paddy demonstration farms in your Village/Ward? Yes No
8. Are there any Maize/Paddy farm field school in your Village/Ward? Yes No
9. Are there any Sorghum farm field school in your Village/Ward? (Kongwa) Yes No
10. Do you have credit facilities for farmers in your Village/Ward? Yes No
11. Do the extension services in your Village/Ward a public/private venture? Yes No
12. Please, list at least three popular traditional maize varieties grown in your Ward/Village _____, _____, _____ and _____
13. Which one of the mentioned has the highest yield potential _____?
14. Please, list at least three popular traditional paddy/*Sorghum* varieties grown in your Ward/Village

- _____, _____, and _____
15. Which one of the mentioned has the highest yield potential _____?
 16. Are there any improved (high yield) maize varieties grown in the Village/Ward? Yes
 - No
 17. If the answer in Q.16 is YES, mention the improved varieties,
and
 18. How and where do farmers get this improved varieties

 19. Are there any improved (high yield) paddy/*Sorghum* varieties grown in the Village/Ward?
 Yes No
 20. If the answer in Q.19 is YES, mention the improved varieties
, and
 21. How and where do farmers get the improved varieties?

 22. Indicate the average yield per acre of both traditional and improved Maize varieties in your
 Village/ Ward (for 2016 and 2017).
 a) Traditional maize varieties kg/acre (2016) kg/acre (2017)
 b) Improved maize varieties kg/acre (2016) kg/acre (2017)

23. Indicate the average yield per acre of both traditional and improved Paddy / *Sorghum* varieties in your Village/ Ward (for 2016 and 17).

- c) Traditional maize varieties kg/acre (2016) kg/acre (2017)
- d) Improved maize varieties kg/acre (2016) kg/acre (2017)

24. Mention and explain agricultural projects/programs currently being implemented in your Village/Ward to boost maize/paddy/Sorghum production.

25. . To what extent has the extension services succeeded in your area so far?

- Excellent = or > 75%,
- Very good 70% -75%,
- Good 60% - 69%,
- Fair 50% - 59%,
- Failure 50%,
- NA = 0,

26. What are the challenges you are facing on working with extension services?

27. What opportunity do the extension services have to farmers?

28. Do you think there is any production per unit area increase potentials through extension services?

Yes No

29. If the answer to Question 28 is YES, explain how

30. How can you describe the contribution of extension services to poverty alleviation strategies?

31. Mention initiatives the government is undertaking to ensure local government reform is harnessing the extension services in the Ward to enhance crop productivity potentials

Appendix 3: Questionnaire for key informants 2

Checklist for key informants (*District Agriculture Officer*)

Dear, Sir/Madam,

I am here for the research purpose on the effects of Local Government Reform on Enhancement of Demand for Agricultural Extension Services Delivery. All information provided will strictly be treated confidentially. Thanks.

Name of the Respondent.....

Mobile Number

Ward.....Village.....

District

Region

1. How many Villages/Wards are there in your District?
2. How many Agricultural Extension Officers are there in the District?
3. Do they have transport facilities to enable them reach the intended farmers?
4. How are they placed in the District
5. What is the actual area currently under Maize cultivation in the District? (ha).
6. What is the actual area currently under Paddy cultivation in the District? (ha).
7. What is the actual area currently under Sorghum cultivation in the District? (Kongwa).....
(Ha)
8. Are there any Maize/Paddy demonstration farms in your District? Yes No
9. Are there any Maize/Paddy farm field school in your District? Yes No
10. Are there any Sorghum farm field school in your District? (Kongwa) Yes No
11. Do you have credit facilities for farmers in your District? Yes No
12. Do you have contract farming system for farmers in your District Yes No
13. Does the extension services in your District a public/private venture? Yes No
14. Please, list at least three popular traditional maize varieties grown in your District
_____, _____, and _____
15. Which one of the mentioned has the highest yield potential _____
16. Please, list at least three popular traditional paddy/*Sorghum* varieties grown in your District
_____, _____, and _____
17. Which one of the mentioned has the highest yield potential _____
18. Are there any improved (high yield) maize varieties grown in the District? Yes No
19. If the answer in Q.18 is YES, mention the improved varieties,
..... and

20. How and where do farmers get this improved varieties
21. Are there any improved (high yield) paddy/ (*Kongwa District - Sorghum* varieties grown in the District? Yes No
22. If the answer in Q.21 is YES, mention the improved varieties
-, and
23. How and where do farmers get this improved varieties
-
24. Indicate the average yield per Hectare of Maize in your District (for at least ten years back).
- | | | |
|-----------|-------|----------|
| 2016/2017 | ..... | Tons/Ha. |
| 2015/2016 | ..... | Tons/Ha. |
| 2014/2015 | ..... | Tons/Ha. |
| 2013/2014 | ..... | Tons/Ha. |
| 2012/2013 | ..... | Tons/Ha. |
| 2011/2012 | ..... | Tons/Ha. |
| 2010/2011 | ..... | Tons/Ha. |
| 2009/2010 | ..... | Tons/Ha. |
| 2008/2009 | ..... | Tons/Ha. |
| 2007/2008 | ..... | Tons/Ha. |
25. Indicate the average yield per Hectare of Paddy in your District (for at least ten years back).
- | | | |
|-----------|-------|----------|
| 2016/2017 | ..... | Tons/Ha. |
| 2015/2016 | ..... | Tons/Ha. |
| 2014/2015 | ..... | Tons/Ha. |
| 2013/2014 | ..... | Tons/Ha. |
| 2012/2013 | ..... | Tons/Ha. |
| 2011/2012 | ..... | Tons/Ha. |
| 2010/2011 | ..... | Tons/Ha. |
| 2009/2010 | ..... | Tons/Ha. |
| 2008/2009 | ..... | Tons/Ha. |
| 2007/2008 | ..... | Tons/Ha. |
26. Indicate the average yield per Hectare of Sorghum “Kongwa District only” (for at least ten years back).
- | | | |
|-----------|-------|----------|
| 2016/2017 | ..... | Tons/Ha. |
| 2015/2016 | ..... | Tons/Ha. |
| 2014/2015 | ..... | Tons/Ha. |
| 2013/2014 | ..... | Tons/Ha. |
| 2012/2013 | ..... | Tons/Ha. |
| 2011/2012 | ..... | Tons/Ha. |
| 2010/2011 | ..... | Tons/Ha. |
| 2009/2010 | ..... | Tons/Ha. |
| 2008/2009 | ..... | Tons/Ha. |
| 2007/2008 | ..... | Tons/Ha. |
27. Mention and explain agricultural projects/programs currently being implemented in your District to boost maize/paddy/Sorghum production.
-

28. To what extent has the extension services succeeded in your area so far?

- Excellent = or > 75%,
- Very good 70% -75%,
- Good 60% - 69%,
- Fair 50% - 59%,
- Failure 50%,
- NA = 0,

29. What are the challenges you are facing on working with extension services?

.....
.....

30. What opportunities do the extension services have to farmers?

.....
.....

31. Do you think there is any production per unit area increase potential through extension

services? Yes No

32. If the answer in Question 31 is YES, explain how

.....
.....

33. How can you describe the contribution of extension services to poverty alleviation strategies?

.....
.....

34. Mention initiatives the government is undertaking to ensure local government reform is

harnessing the extension services in the district to enhance crop productivity potentials

.....
.....

Thank You for your Cooperation!

Appendix 4: Questionnaire for key informants - 3

Checklist for key informants for the Ministry of Agriculture / Regional Agriculture Officer

Dear, Sir/Madam, I am here for the research purpose on the effects of Local Government Reform on Enhancement of Demand for Agricultural Extension Services Delivery. All information provided will strictly be treated confidentially. Thanks.

Name of the Respondent.....

Mobile Number

Region

Ministry.....

1. On regional basis, provide data for maize, paddy and sorghum production in the last 10 years.
(from 2017).
2. What is the estimated annual demand for maize and rice in Tanzania? (Tones).
3. What is the actual total area under maize, paddy and sorghum cultivation in the country?
..... (Hectares).
4. What portion of the actual area is under irrigation? (Hectares).
5. What is the proportion of the area currently under irrigation in relation to irrigation potentials?
..... (percent).
6. What is the national yield per hectare (productivity) of maize, paddy and sorghum in Tanzania
in the last ten years?
7. Outline agricultural policies (directives) geared towards promoting maize and paddy
production and marketing in Tanzania.

.....
.....

8. Outline projects/programs under implementation in Tanzania to boost maize and paddy
production and productivity.

.....
.....

Please, explain how the maize and rice subsector is regulated .

.....
.....
.....,

10. Mention initiatives the government is undertaking to ensure local government reform is harnessing the extension services in the country to enhance crop productivity potentials

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

11. Do you think there is any production per unit area increase potential through extension services? Yes No

12. If the answer in Question 11 is YES, explain how

.....
.....

13. (a) What are the major challenges facing the maize and paddy productivity in Tanzania?

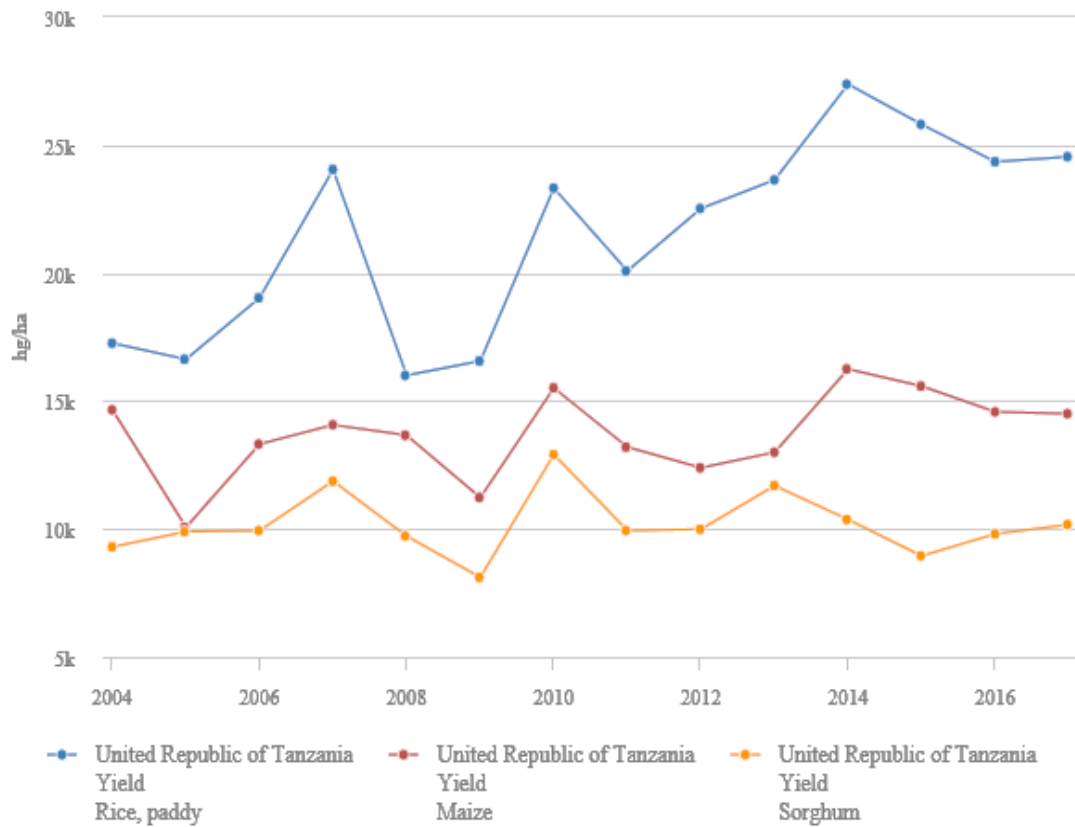
.....
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.....

Outline measures taken by the Ministry to address the challenges.

.....
.....

Thank You for your Cooperation!

Appendix 5: Tanzania Paddy, Maize and Sorghum yield from 2004 to 2017 sourced from FAOSTAT



Source: FAOSTAT (Jul 00, 2019)