

**FACTORS INFLUENCING EFFECTIVENESS OF DECENTRALISED
AGRICULTURAL EXTENSION INFORMATION AND SERVICE DELIVERY
IN TANZANIA: A CASE STUDY OF ARUMERU DISTRICT**

NOEL CRISPINE KOMBA

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

ABSTRACT

The study aimed at determining factors influencing the effectiveness of decentralised agricultural extension information and service delivery in Tanzania. A cross sectional research design was used to collect data from 390 respondents from Arumeru District which were purposively selected. Data were collected using a semi-structured questionnaire, focused group discussions, key informant interviews and observations checklist. Statistical Package for Social Sciences (SPSS) was used in the data analysis whereby inferential statistics were determined. Quantitative data were analysed using McNemar Chi-square test, Paired t-test; Wilcoxon signed ranked test, Pearson chi-square test and Binary logistic regression. Qualitative data were analysed through content analysis. The study found that there was no statistically significant influence of administrative-delinking on farmers' access to agricultural extension information and services delivery at $p \leq 0.05$. Moreover, it was found that, the increase in the local government autonomy had no significant influence on the delivery of quality agricultural extension information and services to farmers. In addition, the study findings show that, 71% of the respondents were of the view that the shift in agricultural extension information and service delivery decision making had no significant influence on farmers' empowerment. Furthermore, it was found that there was statistically significant inequity in the provision of agricultural extension information and service delivery among farmers in the study areas at $p \leq 0.05$ despite the change in the government relations. Generally, the decentralized agricultural extension information and service delivery did not significantly contributed in improving quality, access equity and empowerment of smallholder farmers. Its effectiveness is hindered by actor's non-compliance to D by D principles, guidelines and regulations as well as weak institution arrangement. It is recommended that, D by D sector coordination Ministry, which is PO-RALG, should review the policy and enforce

the application of laid down rules, guidelines and procedures to make AEI&SD become D by D compliant.

DECLARATION

I, NOEL CRISPINE KOMBA, do hereby declare to the Senate of Sokoine University of Agriculture that this thesis is the result of my own original work and has neither been submitted nor being concurrently submitted for a degree award in any other institution.

Noel Crispine Komba
(PhD Candidate)

Date

This declaration is confirmed by:

Prof. M.R.S. Mlozi
(Supervisor)

Date

Prof. Z.S.K. Mvena
(Supervisor)

Date

COPYRIGHT

No part of this thesis may be reproduced, stored in any retrieval system, or transmitted in any form or by any means without prior written permission of the author or Sokoine University of Agriculture in that behalf.

ACKNOWLEDGEMENTS

Completion of this doctoral thesis was made possible with the support of several people. I would like to express my sincere gratitude to all of them. First of all, I am extremely grateful to my research supervisors, Prof. Malongo R.S Mlozi and Prof. Zebedayo S.K Mvena from the Department of Agricultural Extension and Community Development for their valuable guidance, scholarly inputs, and consistent encouragement which I received throughout the research work. This feat was possible only because of the unconditional support provided by them. I also thank members of academic and non-academic staff in the Department of Agricultural Extension and Community Development at Sokoine University of Agriculture.

The thesis would not have been completed, without the financial support from Tanzania Commission for Science and Technology (COSTECH), I thank and appreciate for the support. I thank the support and encouragement received from my family, colleagues and officemates at the Presidents' Office-Regional Administration and Local Government, Ministry of Constitutional and Legal Affairs and National Audit Office of Tanzania. Last but not least, I convey my profound gratitude to all respondents in Arumeru District. Any errors herein are entirely mine.

DEDICATION

This work is dedicated to Rose, Audrey, Andrew and Alvin who stood beside me throughout my studies in Morogoro and Kampala.

TABLE OF CONTENTS

ABSTRACT.....	ii
DECLARATION.....	iv
COPYRIGHT.....	v
ACKNOWLEDGEMENTS	vi
DEDICATION.....	vii
TABLE OF CONTENTS	viii
LIST OF TABLES	xvi
LIST OF FIGURES	xviii
LIST OF APPENDICES	xix
LIST OF ABBREVIATIONS AND ACRONYMS	xx
CHAPTER ONE	1
1.0 INTRODUCTION.....	1
1.1 Background.....	1
1.2 Problem Statement and Justification	11
1.3 Objectives	12
1.3.1 Overall objective.....	12
1.3.2 Specific objectives	12
1.3.3 Research hypotheses	12
1.4 Theoretical Framework	13
1.4.1 Principal-agent theory.....	13
1.4.2 Implications of the agency theory on effectiveness of AEI&SD under D by D Policy	14
1.4.3 Limitation of the principal–agent theory	15

1.4.4	New Institutional Economics (NIE) theory	16
1.4.5	NIE implications on decentralized AEI&SD system in Tanzania.....	17
CHAPTER TWO		22
2.0	LITERATURE REVIEW	22
2.1	Global Overview of Agricultural Extension Information and Service Delivery	22
2.2	The Paradigm Shift in Agricultural Extension Information and Services Delivery	22
2.2.1	Development of agricultural extension information and services delivery in Tanzania	24
2.2.2	The organization of AEI&SD in Tanzania	25
2.3	Administrative de-linking and its influence on accessibility of AEI&SD	27
2.3.1	Management and coordination of agricultural extension information and advisory services	27
2.3.2	The funding of agricultural extension information and service delivery in Tanzania	28
2.3.3	Agricultural extension agents' professional development.....	28
2.3.4	Recruitment of extension agents.....	29
2.4	Influence of Local Government Autonomy on the Quality of Agricultural Extension Information and Services Delivery.....	30
2.4.1	Efficiency in provision of agricultural extension services	30
2.4.2	Relevance of agricultural information and technology	31
2.4.3	Agricultural extension services financing mechanism	32
2.4.4	Adoption of agricultural technology.....	32
2.4.5	Inclusiveness of agricultural extension information and services delivery	33

2.4.6	Diversity of agricultural extension methods and approaches	33
2.5	Shifts in AEI&SD to Decision Making to Local Government and its Influence on Farmers Empowerment	34
2.5.1	Farmer's Participation in Decision Making.....	35
2.5.2	Fora for agricultural knowledge and skills sharing	36
2.5.3	Crops and livestock yields	36
2.5.4	Capacity to engage in commercial farming	37
2.5.5	Farmers capacity to initiate demand for AEI&SD	38
2.5.6	The contribution of AEI&SD on improved farmer's livelihood	38
2.6	The Influence of Changed of Mode of operations between Central and Local Government Authorities on Provision of Equitable AEI&SD to Farmers	39
2.7	The Implication of Empirical Review on the Statement of Research Problem and Justification.....	40
CHAPTER THREE		42
3.0 METHODOLOGY		42
3.1	Description of the Study Area	42
3.2	Research Design	46
3.3	Sampling Procedures	46
3.3.1	Stage I: Selection of geographical location	46
3.3.2	Stage II: Selection of farming households' respondents	47
3.4	Data Collection.....	48
3.4.1	Validity and Reliability Test.....	48
3.4.2	Primary data collection.....	49
3.4.3	Secondary data.....	50
3.5	Data Analysis.....	50

3.5.1	McNemar’s chi-square test.....	50
3.5.2	Paired sample t-test.....	53
3.5.3	Wilcoxon signed-rank test.....	54
3.5.3.1	Equity between Male and Female farmers	55
3.5.3.2	Equity between crop farmers and livestock keepers	55
3.6	Binary Logistic Regression Model.....	56
3.6.1	The effect size.....	57
3.6.2	Chi-square test	58
3.6.3	Content analysis.....	59
3.7	Limitation of the Study	62
CHAPTER FOUR.....		63
4.0 RESULTS AND DISCUSSIONS.....		63
4.1	Respondents Socio-Economic Characteristics of the Respondents.....	63
4.2	Socio-economic Factors Influencing Farmers’ Perception on Effectiveness of AEI&SD following the Implementation of D by D Policy.....	67
4.2.1	Socio-economic factors influencing farmers’ perception on access to AEI&SD with administrative de-linking from MAFC to LGAs.....	67
4.2.2	Socio-economic factors influencing farmers’ perception on the quality of AEI&SD after increase in Local Governments Autonomy.....	72
4.2.3	Socio-economic factors influencing farmers’ perception on empowerment due to the shift in AEI&SD to LGAs.....	77
4.2.4	Socio-economic factors influencing farmers’ perception on enhanced equity in provision of AEI&SD due to change in mode of operation between central and local government	82

4.3	Administrative de-linking of Agricultural Extension Information and Services Delivery from the MALF to LGAs	88
4.4	Accessibility of AEI&SD due to Administrative De-linking Process.....	89
4.4.1	Number of agricultural extension agents per village	90
4.4.2	Access to agricultural inputs.....	91
4.4.3	Access to financial services	93
4.4.4	Access and linkage to agricultural market.....	94
4.4.5	Access to information on agricultural technologies	95
4.4.6	Farmers contacts with extension agents	97
4.4.6.1	Average number of AEA contacts days' to famers group per month	99
4.4.6.2	Average number of contacts days to individual farmer per month	100
4.4.6.3	Number of meetings that village AEA held per year in a village	101
4.4.6.4	Number of organized field demonstration days per year	103
4.4.6.5	Distance in accessing agricultural extension information and services delivery	105
4.4.6.6	Average time lapsed by AEA to attend farmers' request.....	106
4.4.7	Costs of accessing agricultural extension information and services delivery	107
4.4.8	Type of support farmers received from agricultural extension agents before and after the de-linking reforms	109
4.4.9	Sources of information that farmers rely on when making agricultural decisions before and after de-linking reforms	111
4.4.10	Involvement of farmers in participatory extension approaches.....	113

4.4.11	Summary of key findings regarding accessibility of AEI&SD to farmers due to administrative de-linking process	115
4.5	Influence of LGA Autonomy on the Quality of Agricultural Extension Information and Services Delivery in Tanzania	117
4.5.1	Responsiveness of the AEA from the time farmers demand was initiated	119
4.5.2	Agricultural information and technologies that AEA deliver before and after decentralization.....	122
4.5.3	Quality of information, knowledge and skills that the AEAs delivered to crop and livestock keepers before and after LGAs autonomy	126
4.5.4	Funds allocated to agricultural extension services in village development agricultural plans.....	129
4.5.5	Opinion about adoption of technologies from extension agents	132
4.5.6	Inclusiveness of agricultural extension information and services delivery	133
4.5.7	Use of various methods and approaches to deliver knowledge and skills to farmers	136
4.5.8	Crops and livestock productivity due to increased LGAs autonomy	137
4.5.9	Efficiency on the agricultural extensions services offered to farmers.....	138
4.5.10	Summary of key issues regarding influence of LGA Autonomy on the quality AEI&SD in Tanzania	139
4.6	Respondents' Opinions on the Influence of the Shift of AEI&SD Decision making Process to LGAs on Farmers' Empowerment.....	140
4.6.1	Respondents' participation in agricultural development plans.....	141
4.6.2	The status of farmer's organizations and associations due to a shift in agricultural decision making process to the villages	143

4.6.3	Status of farmers' fora for knowledge and skills sharing	144
4.6.4	Capacity to engage in commercial farming	147
4.6.5	Farmers' yields as a result of a shift in AEI&SD decision making.....	149
4.6.6	Farmers' income as a result of a shift in AEI&SD decision making	151
4.6.7	Farmers livelihood due to the shift in agricultural extension information decision making	152
4.6.8	Farmers capacity to initiate demand from extension services	153
4.6.9	Farmers knowledge and skills on disease/pest control.....	156
4.6.10	Summary of key issues regarding the influence of the shift of agricultural extension service decision making process from central government to the LGAs on farmers' empowerment.....	158
4.7	Respondents' Opinions on the Influence of Change in Mode of Operation between Central Government and Local Government on Provision of equitable AEI&SD.....	158
4.7.1	Wilcoxon signed ranked test results for accessing agricultural extension information and delivery of services between crop farmers and livestock-keepers due to change in mode of operation between central and local government.....	166
4.7.2	Summary of key findings regarding the influence of change in mode of operation between Central and Local Government on enhancing provision of equitable AEI&SD	172
4.8	Theoretical implication of the study findings.....	173
4.8.1	The Principal-agent theory	173
4.8.2	The New Institutional Economic (NIE) theory	176

CHAPTER FIVE	179
5.0 CONCLUSIONS AND RECOMMENDATIONS	179
5.1 Conclusions	179
5.1.1 The influence of administrative de-linking from MALF to LGAs on AEI&SD accessibility to farmers	179
5.1.2 The influence of LGAs’ autonomy on the quality of AEI&SD to farmers.....	180
5.1.3 The influence of Shift in AEI&SD decision making process to LGAs on farmers’ empowerment.....	180
5.1.4 The influence of change in mode of operation between central and LGAs of enhancing provision of equitable AEI&SD.....	181
5.2 Recommendations	181
5.2.1 The influence of administrative de-linking from MALF to LGAs on AEI&SD accessibility to farmers	181
5.2.2 The influence of LGAs’ autonomy on the quality of AEI&SD to farmers	182
5.2.3 The influence of Shift in AEI&SD decision making process to LGAs on farmers’ empowerment.....	182
5.2.4 The influence of change in mode of operation between central and LGAs of enhancing provision of equitable AEI&SD.....	182
5.2.5 Suggestions for further study.....	183
REFERENCES.....	184
APPENDICES	211

LIST OF TABLES

Table 1:	Social-economic characteristics of respondents (n= 390)	64
Table 2:	Socio-economic factors influencing farmer’s perception on access to AEI&SD during administrative de-linking from MAFC to LGAs	68
Table 3:	Socio-economic factors influencing farmers’ perception on quality of Agricultural Extension Service services after increase in Local Government Autonomy.....	73
Table 4:	Socio-economic factors influencing farmers’ perception on farmers’ empowerment due to the shift in AEI&SD to LGAs	78
Table 5:	Socio-economic factors influencing farmers’ perception on change in mode of operation between central and local government on enhancing equity among farmers.....	83
Table 6:	McNeymar's chi square test results for accessibility of agricultural inputs before and after de-linking of services (n=390).....	91
Table 7:	Average extension agents contact with respondents before and after administrative de-linking of AEI&SD (n=390)	97
Table 8:	Farmer’s information sources under administrative de-linking reforms (n=390).....	113
Table 9:	Paired t-test results on the response of AEA on farmers initiated demand before and after increase in local government autonomy	120
Table 10:	The McNeymar's chi-square test to compare the relevance of agricultural information and technologies that AEAs delivered before and after decentralization	123

Table 11: McNeymar's chi-square test to compare quality of information, skills and knowledge delivered to respondents before and after increase in LGA Autonomy	129
Table 12: Funds allocated for agricultural extension information and service delivery from 2007-2015	131
Table 13: Chi-square results on respondents opinions on quality of AEI&SD with increase in LGAs autonomy.....	135
Table 14: Respondents opinion on empowerment as a result of shift in agricultural extension decision making to the village level (n=390)	141
Table 15: Selected knowledge and skills sharing fora before and after a shift in agricultural extension services decision making to LGAs.....	146
Table 16: Respondents opinions on the status of farmers empowerment as a result of a shift in agricultural extension decision making to the village level (n=390).....	149
Table 17: Respondents opinions on pest/disease identification and control due to the shift in agricultural extension decision making to the village level (n=390).....	157
Table 18: Wilcoxon signed ranked test results for accessing AEI&SD based on gender (n=390).....	160
Table 19: Wilcoxon signed ranked test results based on crop farmers and livestock-keepers access to AEI&SD (n=390)	167

LIST OF FIGURES

Figure 1: The Principal-agency theory on decentralized agricultural extension and service delivery in Tanzania 16

Figure 2: Organization structure of agricultural extension services in Tanzania.26

Figure 3: A map of Arumeru District showing study areas.....44

LIST OF APPENDICES

Appendix 1: Questionnaire for Farming Households211

Appendix 2: District Level Information Checklist Arusha and Meru District
Council.....221

Appendix 3: Focus Group Discussion Checklist224

Appendix 4: Key Informant Checklist.....226

LIST OF ABBREVIATIONS AND ACRONYMS

ADC	Arusha District Council
AEA	Agricultural Extension Agent
AEAS	Agricultural Extension and Advisory Services
AEI&SD	Agriculture Extension Information and Service Delivery
AfDB	African Development Bank
ASDP	Agricultural Sector Development Programme
ATMA	Agricultural Technology Management Agency
BDHS	Bangladesh Demographic and Health Survey
CAG	Controller and Auditor General
COSTECH	Commission for Science and Technology
D by D	Decentralization by Devolution
DADP	District Agricultural Development Plan
DAEC	District Agricultural Extension Coordinator
DALDO	District Agricultural and Livestock Development Officer
DANIDA	Danish International Development Agency
DIIS	Danish Institute for International Studies
DRC	Democratic Republic of Congo
FAO	Food and Agriculture Organization
FBOs	Faith Based Organizations
FFSs	Farmer Field Schools
FGD	Focus Group Discussions
GoK	Government of Kenya
IFPRI	International Food Policy Research Institute
IFRI	International Forestry Resources and Institutions

IKS	Institute of Kiswahili Studies
ILC	International Land Coalition
IMF	International Monetary Fund
KI	Key Informant
LGAs	Local Government Authorities
MAAIF	Ministry of Agriculture, Animal Industry, and Fisheries
MALF	Ministry of Agriculture, Livestock and Fisheries
MALD	Ministry of Agriculture and Livestock Development
MDC	Meru District Council
MEAS	Modernizing Extension and Advisory Services
NAIC	National Artificial Inseminations Centre
NAIVS	National Agricultural Inputs Voucher System
NAP	National Agricultural Policy
NGOs	Non-Governmental Organizations'
NIE	New Institutional Economics
PAT	Principal Agent Theory
PO-RALG	President's Office-Regional Administration and Local Government
SPSS	Statistical Package for Social Sciences
TBC	Tanzania Broadcasting Corporation
URT	United Republic of Tanzania
USAID	United States Agency for International Development
VIF	Variance Inflation Factor
WB	World Bank
WTAI	World Technology Achievement Index

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

The ongoing world reforms on social, political, and economic dimensions which range from globalization, participation, privatization to decentralization have also necessitated a change in the national extension systems. Therefore, among other reforms, decentralization of services delivery has emerged as an important trend in the policy discourse on development across nations. Reforms is a political reality worldwide with many forms and dimensions and varies greatly within and across countries (Regmi *et al.*, 2010). According to Mollel (2010), decentralization refers to an alternative management arrangement which involves a transfer of decision making powers and administrative responsibilities from the central government to the periphery. Decentralization gives people in the peripheral areas more powers and authority to decide on matters affecting their daily life.

In the context of this study, effectiveness of agricultural extension information and service delivery under the context of decentralization by devolution (D by D) policy refers to the ability of the agricultural extension information and service delivery (AEI&SD) to meet its envisaged objectives of improving the quantity and quality of extension information and service delivery to farmers in conformity with D by D objectives. The effectiveness of AEI&SD was measured in terms of farmers' accessibility to AEI&SD, quality and responsiveness of agricultural extension information services which are delivered to farmers, farmers' empowerment, and equity between different farmers groups in the delivery of extension information services.

Theoretically, it is believed that services become more sustainable and responsive to community needs when the beneficiaries are put at the centre of all intervention planning, execution monitoring, and evaluation process. The design and implementation of decentralization vary across the world depending on the context and the choice of decentralization design by a particular country. Mollel and Tollenaar, (2013) identify two basic principles in classifying decentralization: first, decision on the extent to which authority to plan is vested in a particular administrative level, and second ascertaining the amount of autonomy that the decentralized organizations achieve in carrying out their tasks. These two principles pose five questions, what functions should be devolved to the peripheral? What functions should remain at the centre? What level of autonomy should be given to the lower level government? What should remain at the centre? And what modality of financing should be adopted to make decentralization reform more effective? In this respect, decentralization is therefore classified as involving political, administrative and financial dimensions each of which has its peculiar characteristics.

According to Ozmen (2014), the political dimension of decentralization involves the transfer of state administration, legislative authority, and judiciary autonomy to the local governments. Political decentralization aims at giving more authority to the citizens and their elected representatives in decision making and public administration. It is a set of constitutional amendments and electoral reforms which are designed to open new spaces for representation of sub-national policies. It represents a system of government that has a vertical division of power among multiple levels of government each with independent decision making powers (Ozmen, op.cit).

Fiscal decentralization according to Falleti (2004 as cited by Ozmen 2014) refers to a series of policies designed to increase the financial autonomy of the sub national

government. If the local government and private organizations are to carry out decentralized functions effectively, they must then have adequate revenues as well as the authority of making decisions on expenditure (Rondinelli (1981 as cited by Ozmen 2014). Experiences from decentralization reforms worldwide have indicated that weak central–local fiscal transfer mechanism which inadequately correspond to the needs of decentralized functions have led to the failure of decentralization to live up to its promises. Therefore, for successful attainment of its goal, political, fiscal, and administrative dimensions of decentralization need to be implemented simultaneously.

The third dimension of administrative decentralization focuses on transferring responsibility for planning, financing, and management of certain public functions from the Central Government to the subordinate units or levels of Government, semi-autonomous public authorities, corporations or regional authorities. The nature of transfer of power and responsibility under administrative dimension gives rise to four major forms of decentralization namely: deconcentration, delegation, privatization, and devolution (Ozmen, 2014). Therefore, decentralization by devolution is a branch of the administrative dimension of decentralization. Devolution usually refers to a transfer of responsibilities of services to municipalities/district councils. As pointed out by Tidemand and DANIDA (2010), in a devolved system Local Government Authorities have clear and legally recognized geographical boundaries over which they exercise authority and within which they perform public functions.

Devolution form of decentralization is popularly advocated as an effective management option in empowering the community as opposed to deconcentration, delegation, and privatization. The latter are limited in terms of the degree and level of community

involvement. It is a devolution type of administrative decentralization that mostly underlies political decentralization.

Worldwide, agricultural extension information and service delivery systems are under increasing pressure to become more effective, responsive to clients' needs, and less costly to their governments. In this respect, many countries have reformed their agricultural extension information and service delivery systems by decentralizing some of its functions to the community level to suit community needs. According to Aboagye (2015) the theoretical arguments in favour of agricultural extension information and service delivery decentralization are twofold: firstly, was the push for the governments to increase and promote administrative efficiency in the implementation of agricultural extension development programme. Secondly, was the need to bring governments closer to the citizens both geographically and institutionally to ensure participation of the latter in the agricultural extension information and service delivery programmes.

In reality, the implementation of decentralized agricultural extension information and service delivery worldwide has been associated with mixed results. Literature Glendenning (2010); WB and IFPRI, (2010) has shown that decentralization of agricultural extension information and services delivery has been very successful in some countries, while it has either remained the same or has had little impact in other countries. For example, in Costa Rica, there is a unique system of decentralization under which the government provides farmers with extension vouchers which can be used in receiving extension information and service delivery from private specialists. Generally, the decentralized agricultural extension services in Costa Rica have improved farmers' access to agricultural extension information and service delivery as well as their capacity to initiate and demand for services (FAO, 2008). In the Netherlands, about 60% of the

agricultural extension information and services delivery budget comes from farmers, while the remaining 40% is provided by the government (Qamar, 2005). This approach has on the one hand, led to an increased quality and efficiency in AEI&SD, while on the other hand, it has reduced the Government powers and authority over farmers due to its inability to keep financial promises.

Similarly, Hu *et al.* (2009) show that, China has the largest agricultural extension information and services delivery system worldwide with one extension officer serving 283 farming households. The agricultural extension system contributed to China's agricultural growth in the early 1980s. However, despite these recorded achievements, decentralization of agricultural information and services delivery extension in China did not go along with the decentralization of public funding and the fiscal system; as a result it weakened the public services (Hu *et al.*, 2015).

According to Glendenning and Babu (2011) in India decentralized agricultural extension information and services delivery led to both positive and negative impacts. On the positive side, decentralized agricultural extension information and service delivery has boosted the working morale and motivation of frontline extension agents, have improved accessibility of extension funds, and has promoted career and professional development of extension workers. However, on the negative side decentralization reforms in India suffered from weak local ownership, attitudinal barriers and administrative failures (Raabe, 2008) as cited by (IFPRI, 2011).

In Africa especially in Nigeria, the results of decentralized AEI&SD are mixed and cannot be generalised. For example, Akramov (2009) found that, despite the decentralization of AEI&SD, only 46.4 percent of Nigeria farming households used modern agricultural

inputs such as improved seeds, chemical fertilizers and pesticides. Similarly, Adesiji *et al.*(2010) assessed farmers' access to extension services in Ogon State and found that 90% of the respondents had access to agricultural extension information services; but it was less than half, 49% of the respondents who reported that agricultural extension information and service delivery were effective. Therefore, these findings confirm that, the impact of decentralization on agricultural extension information and delivery services in Nigeria were context specific.

In addition in Zambia, under the National Agricultural Policy of 2004, agricultural extension information and service delivery was provided by both public and private sectors (MEAS, 2014). According to MEAS report (2014), there is inadequate cooperation and coordination between the private and public extension service actors which compromises accessibility of agricultural extension information and services delivery. Furthermore, the study report shows that, despite decentralization, use of agricultural inputs have trended upward since 2001, but 45% of the Zambian farmers still do not use fertilizers on their fields, more than 40% do not use hybrid maize seeds and 28% of the rural households remain net buyers of maize. These findings show that decentralization has not been able to transform farmers' access to agricultural inputs.

In Uganda, Bashaasha *et al.* (2011) found that, decentralization had been characterized by the transfer of powers, functions, and responsibilities for planning and implementation of agricultural extension information and services delivery from the Ministry of Agriculture, Animal Industry, and Fisheries (MAAIF) to the District Local Government. However, the implementation of decentralized extension information and services delivery in Uganda resulted into both negative and positive results. Crowder and Anderson (2002 as cited by IFPRI, 2011) pointed out that agricultural extension information and services delivery

under decentralization were greatly constrained by operational funding, except in situations where supplements from development partners or NGOs funding were available. Moreover; there were misappropriation of funds by local authorities and the reduction of staff satisfaction which were stemming out of lack of promotions, resentment against being supervised by local councils that are not technically equipped in the field, the perceived unrealistic expectations from political supervisors, and isolation from the headquarters. However on a positive note, Semana (1998 as cited by IFPRI 2011) noted that decentralization was perceived to have enhanced participation of local communities in planning and implementing of programmes and ensured closer staff supervision.

In Kenya, under the National Extension Policy of 2013 the trend has been towards complementing public extension information and services delivery with the private sector. Here, extension information and services delivery were provided through three different models namely; free public extension, partial cost shared, and fully commercialized extension service which was another form of decentralization (Maina, 2012). Free agricultural extension information and services delivery were commonly provided to smallholder farmers who were engaged in the growing of staple foods and minor cash crops across the entire agro-ecological zones (Kenya, 2012). The partial cost-shared agricultural extension information services model was mostly within the public sector. The public sector was mainly characterized by limited commercialization. The fully commercialized extension service was mainly found in areas with commercial crops such as tea, coffee, sugar, pyrethrum, barley, tobacco, horticulture and dairy; and farmers were willing and able to pay for the extension services. Previously, the provision of agricultural extension information and services delivery was dominated by the public sector through respective departments of extension in the parent ministries. However despite the initiatives taken by the Government of Kenya (GoK) through the National Agricultural

Extension Policy, agricultural extension information and service delivery in Kenya was ineffective and in turn compromised agricultural productivity among farmers (Gido *et al*, 2014).

In Tanzania, the history of decentralized agricultural extension information and service delivery can be traced along with the changes and development of Local Government Authorities' landscape. In 1972, the Government the abolished Local Government Authorities as a result of being associated with inefficiency, lack of technical capacity, and weak local revenue base (Pallangyo and Rees, 2010). From 1972 onwards, the Government shifted from partnership to direct management of the development process and the provision of agricultural extension services by adopting deconcentration form of decentralization. Deconcentration was devised to revamp inefficient local government system which later encountered a number of challenges (Pallangyo and Rees, 2010). Some of the challenges encountered by LGAs included increased government expenditure, increased financial dependency on the Central Government in financing recurrent and capital investment projects, limited citizen participation, and relatively long distance in accessing services. Generally, there was a down falling in the living standard of the people as a result of high transactions and operating costs (Norman and Massoi, 2010).

Having experienced these challenges, the Government of the United Republic of Tanzania decided to re-establish Local Government Authorities in 1984. However, the envisaged objectives were not realized as the Local Government Authorities had weak managerial and human resource capacity; poor management; shortage of properly qualified, disciplined, and committed personnel; shortage of revenues due to having narrow tax bases; and lack of transparency and accountability (Pallangyo and Rees, 2010; Norman and Massoi, 2010).

Given that backdrop, the Government of Tanzania in the late 1990s introduced the decentralization by devolution (D by D) policy as a vehicle towards improving agricultural extension information and service delivery. Its aim was to address the challenges which emerged during the implementation of the new re-introduced Local Government Authorities. According to Masanyiwa (2013), some of the reasons for embarking on decentralization of agricultural extension information services were to enhance people's participation in governance issues at the local level, bringing the public service under the control of the people through their elected councillors, giving local councillors the powers over all local affairs. Other reasons include improving financial and political accountability, creating local government administration which was answerable to local councils, de-linking local government administration from their former ministries, as well as creating new central-local government relations based on legislation and dialogue.

Hence in 2000, the Tanzania Government decentralized agricultural extension information and service delivery system by devolving political, administrative, and fiscal powers to the Local Councils. One of the expectations from this reform includes improvement of the volume and quality of extension services at the local level. Through the Local Government Act No.9 of 1999, the Local Government Authorities (LGAs) were officially given the mandate of rendering agricultural extension information and service delivery (URT, 2011). This, among other things, included planning, mobilizing resources, recruiting extension agents, motivating its extension agents and taking care of other employees' welfare including remuneration, promotion, demotion as well as training and staff development (Hulst *et al.*, 2008). Hence, the then Ministry of Agriculture, and Livestock Development (MALD) remained with the role of policy and guidelines formulation, quality assurance, technical support and facilitation of research-extension linkages with

farmers through the President's Office-Regional Administration and Local Government (PO-RALG) (URT, 2011; Masanyiwa, 2014).

In conclusion, literature shows that, the demand for decentralized agricultural extension information and services delivery is strong throughout the World (Green, 2015). However, the benefits of decentralisation are not obvious. There are ongoing debates on the efficacy of decentralization as an effective policy instrument for improved agricultural extension information service delivery. The basis of this contestation is the evidence provided by decentralization literature especially in agricultural extension information sub-sector, which shows the prevalence of both positive and negative correlation between decentralization and service delivery (Mookherjee, 2015).

Theoretically, the mixed results of decentralized extension information and services delivery might have been attributed to either the choice of the decentralization design reform that a particular country has undertaken or the actual implementation process. As reported by Aboagye (2015), in order for the decentralized extension organization to be able to deliver services which reflect the needs of the farmers, nurturing of favourable political and organization environment was inevitable. According to Aboagye (2015), there should be changes in the political environment/factors that include the willingness of the Central Government to relegate responsibilities as well as to provide the necessary support from in terms of resources (i.e. funding) and capacity building to the Local Government Authorities. In addition, Aboagye (2015) emphasizes on the importance of having a clear stipulated legal framework showing the relationship between the different actors so as to minimize overlaps and disconnection between and among extension service actors. Moreover, Soufflé theory of decentralization insists on the importance of organizational factors towards building a strong and stable decentralized system (Parker,

1995). Such factors include institution technical capacity, beneficiary participation in planning and management, adequate funding and the presence of vibrant accountability mechanism.

1.2 Problem Statement and Justification

The main objective of decentralizing AEI&SD in Tanzania was to improve the quality and quantity of the services to farmers' through improving administrative and managerial efficiency. However, in reality there is no evidence as to whether these particular objectives have been achieved (Kyaruzi *et al.*, 2010; Mvuna, 2010). In addition, studies on the provision of AEI&SD in Tanzania show that AEI&SD is ill-equipped, uncoordinated, and has a high ratio of famers to extension , underutilizes information communication technology, and has limited use of participatory approaches (Wambura *et al.*, 2012). However, it is important to note that, the prior listed studies used programme based approach as opposed to holistic approach, and therefore provided little explanations on the underlying factors influencing effectiveness of AEI&SD (Masanyiwa, 2014). Hence, the main questions are; has D by D policy been able to live up to its expected objectives thus, influence the effective provision of decentralised AEI&SD to farmers in Tanzania? What are the factors that influence the effectiveness of decentralised AEI&SD in Tanzania?

Based on the above, there was a need to carry out a study using holistic approach to determine factors influencing effectiveness of AEI&SD with a view of revitalizing and sustaining agricultural production and productivity to farmers in Tanzania. The findings of this study would be used to advice the government with regard to the effectiveness of the policy and suggest areas for reforms for future design of agricultural extension services delivery in Tanzania.

1.3 Objectives

1.3.1 Overall objective

The main aim of this study was to investigate the factors influencing the effectiveness of AEI&SD during the implementation of D by D policy in Tanzania.

1.3.2 Specific objectives

The specific objectives of this study were to:

- i. Examine the extent to which administrative de-linking from MALF to LGAs has influenced accessibility of AEI&SD to farmers.
- ii. Determine the influence of LGAs' autonomy on the quality of AEI&SD to farmers.
- iii. Assess the influence of the shift AEI&SD decision making process to LGAs' on farmers' empowerment.
- iv. Identify the influence of change in mode of operation between central and LGAs on provision of equitable AEI&SD to farmers.

1.3.3 Research hypotheses

Ho: 1 There is no statistically significant influence of administrative de-linking of AEI&SD from MALF to LGAs on its accessibility to farmers.

Ho: 2 There is no statistically significant influence of LGAs autonomy on the quality of AEI&SD to farmers.

Ho: 3 There is no statistically significant influence of shifting of AEI&SD decision making process to LGAs on farmers' empowerment.

Ho: 4 There is no statistically significant influence of change in the mode of operation between the central government and local government authorities regarding equitable provisioning of AEI&SD to farmers.

1.4 Theoretical Framework

The study was guided by a combination of theoretical perspectives drawn from governance and sociological theories such as the principal-agent theory and institutional theory. Since the decentralization reform is a complex undertaking and its implementation varies across countries globally, the combination of these theories does provide a sufficient framework for analysing the effectiveness of decentralization policy on agricultural extension services delivery in Tanzania. These are discussed hereunder.

1.4.1 Principal-agent theory

The principal-agent theory which is also referred to as the agency theory is one of the dominant theoretical perspectives for analysing and organizing relationships in public governance. As observed by Masanyiwa (2014), the theory was initially developed by economists and widely applied by sociologists, political scientists, and lawyers. The theory states that the principal determines the work and the agent undertakes the work with the expectation that the agent will make decisions which are in the best interest of the principal (Jensen and Meckling, 1976; Eisenhardt, 1985; 1989 as cited by Macias, 2012). In return, the agent and the principal make an agreement outlining how much payment or resources would be given to the agent for the effort which is necessary in completing the task. The organization is considered to be the nexus of contracts, which are implemented with the intention of ensuring that all parties are acting on their own self-interest and at the same time are motivated towards maximizing the value of the organization. This agreement is usually in the form of a contract which acts as a unit of analysis between the principal-agent relationships.

The Agency theory is concerned with resolving two problems that can occur in agency relationships (Macias, 2012). First, to resolve problems that arise when the desires or goals

of the principal and the agent are conflicting and it is difficult or expensive for the principal to verify what the agent is actually doing. Secondly, when there is a problem of risk sharing that arises when the principal and the agent have different attitudes towards risks. It is worth noting that, in some instances the principal and the agent may prefer different actions because of the different risk preferences. Therefore, since the unit of analysis is the contract governing the relationship between the principal and the agent, the theory focuses on determining the most efficient contract governing the principal-agent relationship.

1.4.2 Implications of the agency theory on effectiveness of AEI&SD under D by D

Policy

The principal agent theory is important and relevant in analysing the effectiveness of AEI&SD during the implementation of D by D policy. It (principal agent theory) focuses on the trade-off between different actors and changes which decentralization may bring (Hiskey, 2010). The D by D institutional implementation arrangement involves an array of actors including the lead sector ministries. In this study, the MALF and PO-RALG represent the central government; the “principal”. The two ministries are responsible for policy and guidelines formulation, quality assurance, and the provision of technical backstopping to Local Government Authorities (LGAs). The LGA’s are the actual implementers of the policy. The theory allows us to view the central government as the ‘principal’ with the objective of improving access, quality, financial soundness and equity of public services rather than profit as assumed in the economic models. LGAs are viewed as ‘agents’ who are given resources to implement decentralization policy in order to achieve these objectives. At the lower level, the community or service users and local politicians are the principals with the mandate of making decisions on local service delivery needs and priorities including agricultural sector development plans and

strategies. This theory provides a framework of two aspects: firstly, to examine how the principal monitors the performance and shapes incentives and punishments to LGAs in the process of executing decentralized agricultural extension services to the citizens. Secondly, to examine how the design of D by D policy has taken into consideration the contextual needs of different actors as a mechanism of reducing and sharing risks for effective maximization of policy potentials. The contract and unit of analysis are the D by D policy institutional implementation arrangements and other relevant policies and guidelines regulating the provision of agricultural extension information and service delivery.

1.4.3 Limitation of the principal–agent theory

Despite being a strong framework in analysing decentralization, (Macias, 2012) pointed the exclusive use of the Principal Agent Theory (PAT) as a conceptual lens presents some limitations. The inherent assumption is that there is a goal incongruity because then agent will act selfishly and behave in the manner that serves its interests best. If there is a goal alignment between the two organizations, the Agency Theory offers little explanation concerning behaviours after this alignment of goals is achieved. In cases of goal alignment, the theory concludes that the agent must be given a higher incentive to perform, but does not address cases in which the actual goals are aligned whereas the perceived goals are not. Furthermore, the theory is criticized for its primary focus on vertical relationship between the principal and the agent and hence it poses difficulties to analyse multiple principals, especially if they are from different institutions (Masanyiwa, 2014). To address such criticism for the sake of maximizing results, this study complemented the Agency Theory with New Institutional Economics theory which provides more insights in addressing the shortcomings of the agency theory.

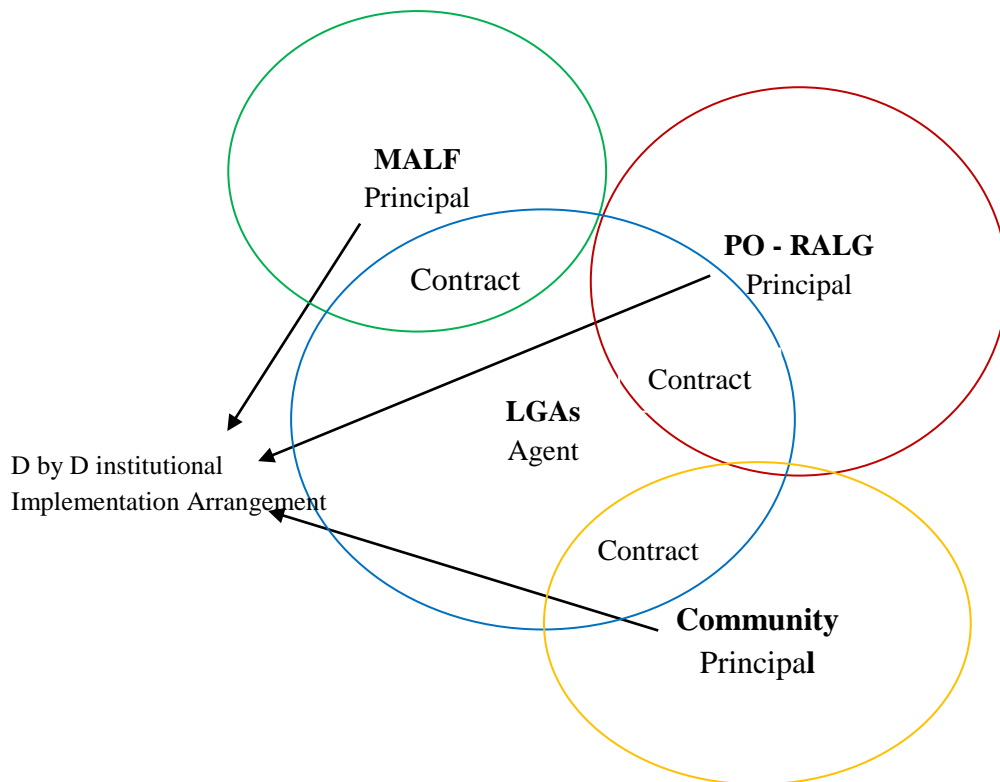


Figure 1: The Principal-agency theory on decentralized agricultural extension and service delivery in Tanzania

1.4.4 New Institutional Economics (NIE) theory

The New institutional economics theory is a large and a relatively new multidisciplinary field that includes aspects of economics, history, sociology, political science, business organization, and law. As Coase (2000) argues, the development of this approach can be traced back to 1937. Other contributors in the development of the NIE include North, (2000). This new direction of economics considers that the cost of transacting is determined by institutions; and institutional arrangements are the key to economic performance; and the country's legal, political, and social systems, determine its economic performance. The NIE can be distinguished from the old institutional economics approaches by its ability to integrate institutional agents as key factors in determining economic performance.

According to Nabli and Nugent (1989), as cited by Kherallah and Kirsten (2002), the purpose of NIE is both to explain the determinants of institutions and their evolution over time and to evaluate their impact on economic performance, efficiency, and distribution. This theory is relevant in evaluating the impact of agricultural public policy and research in developing countries especially the aspects relating to access to agricultural inputs and financial services, cooperative societies, and associations, grades and standards, contract farming and other vertical relations as well as trade behaviour and performance. In this case, the NIE framework provides mechanisms of analysing D by D policy as an institutional reform by considering its evolution, determinants for its effectiveness as well as its influence on AEI&SD in Tanzania.

1.4.5 NIE implications on decentralized AEI&SD system in Tanzania

The term institution is perceived differently by different scholars, but most of the definitions recognize the existence of formal and informal institutions. Formal institutions refer to a set of laws, contracts, political systems, organizations, and markets, while informal institutions include norms, traditions, customs, value systems, religions, and sociological trends (North, 1990). According to Coase (2000), these are the rules of conduct that facilitate coordination or govern relationships between individuals or groups. Institutions provide for more certainty in human interaction (North, 1990). Institutions have an influence on our behaviour and therefore on outcomes such as economic performance, efficiency, economic growth and development.

As Williamson (2000) pointed out, NIE operates at both the macro and micro levels. The macro-level deals with the institutional environment, or the rules of the game, which affect the behaviour and performance of economic actors and in which organizational forms and transactions are embedded. At a macro-level, the focus of analysis is on the set of

fundamental political, social, and legal ground rules that establish the basis for production, exchange, and distribution. The micro-level analysis, on the other hand, also known as the institutional arrangement, deals with the institutions of governance. These refer more to the modes of managing transactions and include market, quasi-market, and hierarchical modes of contracting. An institutional arrangement is basically an arrangement between economic units that govern the ways in which its members can cooperate and/or compete.

Based on the NIE theoretical framework, the effectiveness of decentralized agricultural extension information and service delivery system as an institutional reform can be analysed on two main levels. Firstly, is at the macro-level, which includes Tanzanian political, social, economic and legal contextual factors governing the implementation of decentralized agricultural extension service delivery system. These factors have important bearing in the effectiveness of the D by D policy on agricultural extension information and service delivery. Issues relating to agricultural extension service resources, funding, and what functions to decentralize and not to decentralise, management and coordination of extension services and enforcement of by-laws and making of policy more responsive to community needs-all these are determined by the later factors. Therefore, the NIE framework provides guidance in assessing the policy on effective AEI&SD.

Secondly, the micro-level which focuses on the institutional arrangement governing the implementation of decentralized AEI&SD and how such interactions influence farmer's access to quality and equitable AEI&SD. The study uses the concept of institutions because decentralization is an institutional reform which involves the transfer of roles and functions from one central institution to multiple institutions and actors at the lower levels (Ribot, 2002; Kimaro and Sahay, 2007). The design of institutions and participations of various actors in the institutions influence both the process and outcomes of

decentralization (Fig. 2). Institutions shape behaviours of individuals and their interactions, which in turn, shape institutions (Ribot, 2002). These institutions have a critical bearing on AEI&SD users' access to such services.

North (1995) posits that the NIE have some limitations as it commits an error of omission as it underplays or ignores the importance of politics as a determinant factor in making institutions be effective. Political factors provide explanation for the direction and magnitude of the departures from the status quo that an economic institution makes it possible and yields insights into the sources of variability in their performance.

The discussed theories are integrated in the conceptual framework here under for the purpose of setting the study direction.

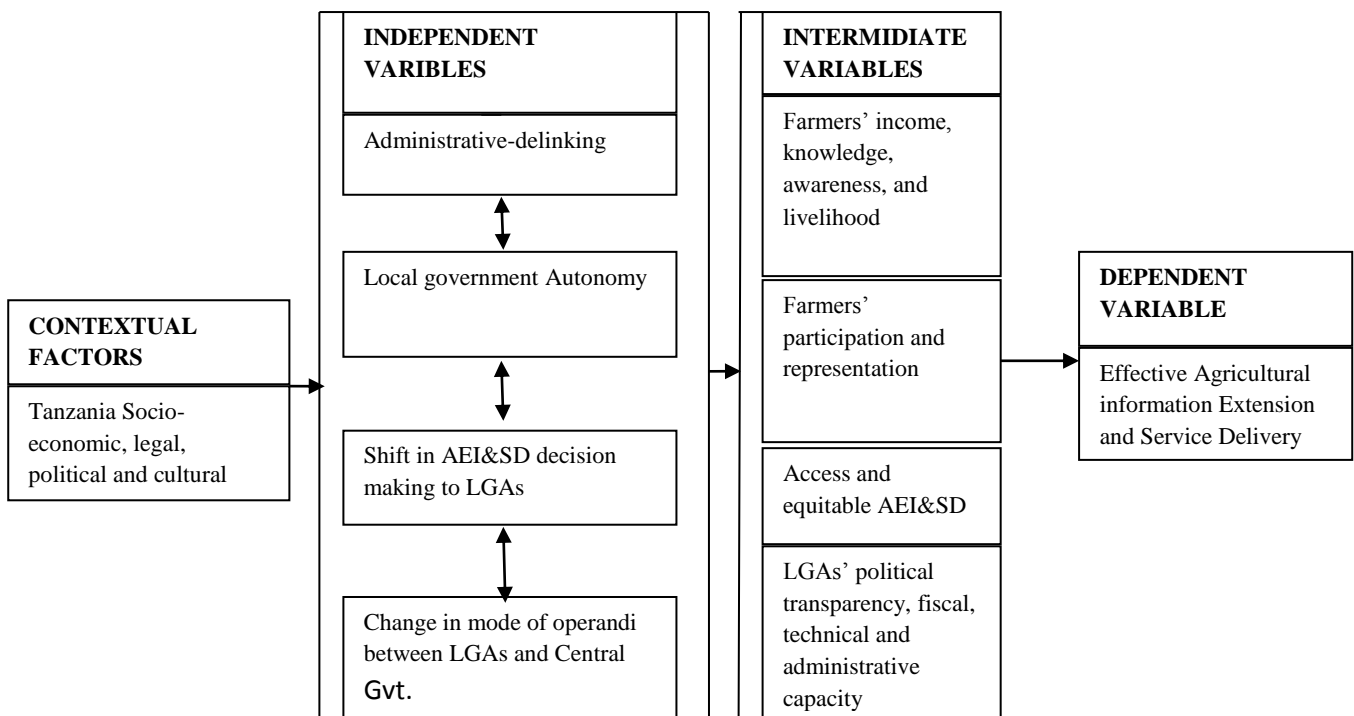


Figure.2: Conceptual Framework for assessing factors influencing the Effectiveness of AEI&SD during the implementation of D by D Policy in Tanzania

Practically, the effectiveness of AEI&SD under the implementation of D by D policy in Tanzania is influenced by the nature and choices of decentralization dimension, and contextual factors governing the implementation of the reform as a policy. As Green (2015) pointed out, the impact of decentralization is context specific and varies from one country to another and from one project to another. In order to improve the quantity and quality of AEI&SD in Tanzania, the government firstly de-linked some of its administrative functions from MALF to LGAs and increased the LGAs autonomy. Secondly, decentralization shifted decision making powers from the central government to LGAs. Thirdly, the government changed the power sharing and relationship structure between the Central Government and LGAs from commanding relationship into a system of intergovernmental relations.

The D by D choices were expected to improve agricultural extension information and service delivery system. It was anticipated that, effective implementation of these choices would lead to improved AEI&SD accountability, improved farmers awareness and knowledge, improved resource allocation to agricultural extension information, and improved service delivery. The implementation of these choices was also expected to have improved LGAs administrative and technical capacity, farmers' participation and representation, and transparency, which in turn, would have resulted to an effective agricultural extension information and service delivery system.

Since decentralization reforms involved a number of actors ranging from the central government to local governments, effectiveness of decentralized AEI&SD depends on the political will of the central government to support local governments technically, administratively, and financially. For example, the release of responsibilities from the central government to the local governments has to go hand in hand with resources

allocation for implementations. If the released responsibilities do not match with the resources allocation the effectiveness of AEI&SD under D by D context is not likely to be achieved. Cabral (2011) found that decentralization of AEI&SD in the Indian State of West Bangal and Kerella, South Africa, Bolivia, and Philippines were successful because the central governments offered support of resources to their local governments.

In addition, the presence of unambiguous legal framework which shows the role and responsibility and relationship between various extension services actors is a key in making decentralized AEI&SD effective (Aboagye, 2015). Hence, it was assumed that the responsibility of LGAs, PO-RALG, MALF, and other stakeholders need to be clear so as to avoid overlaps and conflicts during the implementation of decentralized AEI&SD.

Also it was assumed that farmers participated in the initial planning of the decentralized AEI&SD to ensure that there was famers' ownership and improved accountability .As suggested by Rivera (2008), participation should go further by involving other stakeholders such as research institutions and private companies so as to strengthen networks and improve service delivery. Farmers' participation is another accountability mechanism which enables farmers to assess as to whether or not they receive relevant services, and hence can demand for better services. Similarly, LGAs adequate funding, technical and managerial capacity also contribute to the effectiveness of AEI&SD under the implementation of D by D.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Global Overview of Agricultural Extension Information and Service Delivery

The public AEI&SD is as old as the history of humankind. Its dominance can be traced thousands of years ago in different parts of the world including China, Mesopotamia, Egypt and in the Americas (WB, 2010). For example, in the United Kingdom, the term extension was used to describe adult education programmes organized by Oxford and Cambridge Universities (WB, 2010). Later in the twentieth century the United Kingdom decided to transfer agricultural extension responsibilities to the Ministry of Agriculture (FAO, 2008). The term extension was expanded and used by other European countries in their respective ministries of agriculture. In developing countries, the term agricultural extension was used and recommended by donor agencies that helped to create agricultural universities and establish public agricultural extension and advisory service systems. The most notable agency was the U.S. Agency for International Development (USAID) that played an active role in establishing agricultural universities and extension systems in most of the Sub-Saharan countries. Up to the late 1970s, most of the public agricultural extension system in Sub Saharan Africa carried the title extension and was administered by the Ministry of Agriculture.

2.2 The Paradigm Shift in Agricultural Extension Information and Services

Delivery

The concept of AEI&SD is perceived differently by different scholars. Some refer to it as the practice which involves linking farmers to the markets, and facilitating access to information, skills and technologies for the improvement of livelihoods (IFPRI, 2010). It also entails linking farmers with other key players in the agricultural value chain. AEI&SD comprises of the entire set of organizations that support and facilitate farmers in

their efforts to solve farming problems. The latter definition relates to that of Christoplos (2010) who also describes AEI&SD as the systems that facilitate farmers and other market actors' access to knowledge, information, and technologies. Furthermore, Christoplos posits that, AEI&SD facilitates farmers' interaction with partners in research, education, agribusiness, and other relevant institutions and assists them to develop their own technical, organizational and management skills, and practices.

There has been a change in AEI&SD approaches with the change in the goals of nation's agricultural extension systems. The major changes in AEI&SD approaches included a change in the focus from technology transfer to advisory services, formal education and later facilitation of extension (WB, 2010). Conventionally, AEI&SD was once known as the transfer of scientific research, knowledge, and technologies from the research institutions to farmers with the aim of improving agricultural production and productivity (MEAS, 2013). In the modern era, the roles and functions of AEI&SD have been extended to include enhancing farmers' skills and knowledge for production and processing, and facilitating access to markets and trade. Moreover, it also involves organizing farmers and producer groups, and working with farmers towards sustainable natural resource management practices.

In the 1990s, AEI&SD were challenged for being inefficient, irrelevant, ineffective, and poorly targeted. The need for reform was obvious and therefore most of the national agricultural extension systems responded with three major strategies namely; privatization, decentralization, and programme revitalization (WB, 2010). Although cost reduction was the force behind many changes, the principal objective of extension reforms worldwide was improving the quality in the delivery of services to its clients. The proponents of decentralized AEI&SD, on the one hand, viewed it from democratic perspectives, which

emphasized on empowering local people in controlling and directing their own public programme. On the other hand, it was viewed from administrative perspective, which emphasized on the efficiency gains resulting from improved administration and effectiveness of public programs due to local control (MEAS, 2013). It was believed that, decentralized extension services, when implemented effectively, can transform extension and address a range of generic problems.

2.2.1 Development of agricultural extension information and services delivery in Tanzania

In Tanzania, the provision of AEI&SD is undertaken by both the private and public sectors. The major private sector actors involved in the provision and delivery of extension services include Faith Based-Organization, Non-Governmental Organizations and Community Based Organizations (URT, 2013). Since the private sector is weak and poorly coordinated, the majority of farmers depend on the public extension service providers who are the main financiers of the subsector. The AEI&SD in Tanzania is regulated by a number of statutes, policies, strategies, and guidelines. Some of the statutes and strategies in agricultural extension landscape include the National Agricultural Policy of 2013, the Local Government Act of 1999, the Agricultural Sector Development Programmes phase One and Two as well as the extension services implementation guidelines of the year 2006.

According to the National Agriculture Policy of 2013, AEI&SD was meant to enable producers to realize increased production and productivity through linking a farmer with marketing information and other support services. Despite envisaged policy objectives of improving and sustaining agricultural growth, empirical evidence revealed that, the provision of agricultural extension and delivery of services in the country is hindered by a

number of challenges (URT, 2013; Mvuna,2010; Wambura *et al.*, 2012). Some of the challenges include, lack of strong research-extension-farmers linkage, weak supervision and insufficient manning levels, low participation of the private sector in extension services delivery, and lack of service delivery performance standards and regulations. Others include poor living and working conditions of extension officers, insufficient knowledge regarding technological advancements and weak coordination of agricultural extension services.

In addressing these challenges, the National Agricultural Extension System in Tanzania has been implementing a series of reforms which were intended to cope with the emerging farmers' challenges. Some of the major notable reforms in the provision of AEI&SD include: the application of diverse approaches and methodologies, changes in the structure and management of extension services and involvement of multiple actors in the provision of AEI&SD (URT, 2006).

2.2.2 The organization of AEI&SD in Tanzania

The organization of AEI&SD in Tanzania has been changing with the changing in the policy environment in the country. The AEI&SD was centrally planned and managed at the Ministry level after independence in 1961 and subsequently after the adoption of the Arusha Declaration in 1964. However, with the decentralization by devolution policy and the enactment of Local Government Act No. 9 of 1999 the structure and management of extension services changed from the then Ministry of Agriculture and Livestock Development to the Local Government Authorities under the coordination of the Presidents' Office-Regional Administration and Local Government (PORALG) (Fig 1.). Among other objectives, the reform intended to improve efficiency, accessibility, and equity in the provision of AEI&SD. The main argument in support of the decentralization

was to facilitate farmers' access to various services including bringing agricultural extension services closer to the people (URT, 2009). The central Government remained with the role of formulating and monitoring policy implementation and providing technical backstopping to LGAs.

Despite the undertaken decentralization reforms, scholars (Kyaruzi *et al.*, 2010; Mvena, 2010; Wambura *et al.*, 2012) pointed out that, there was no substantial improvements in the agricultural and livestock production and productivity among small-scale farmers in Tanzania. Ineffective dissemination of technologies, poor market linkages, and weak links between research and extension and poor government support are among the factors that have attributed to such results.

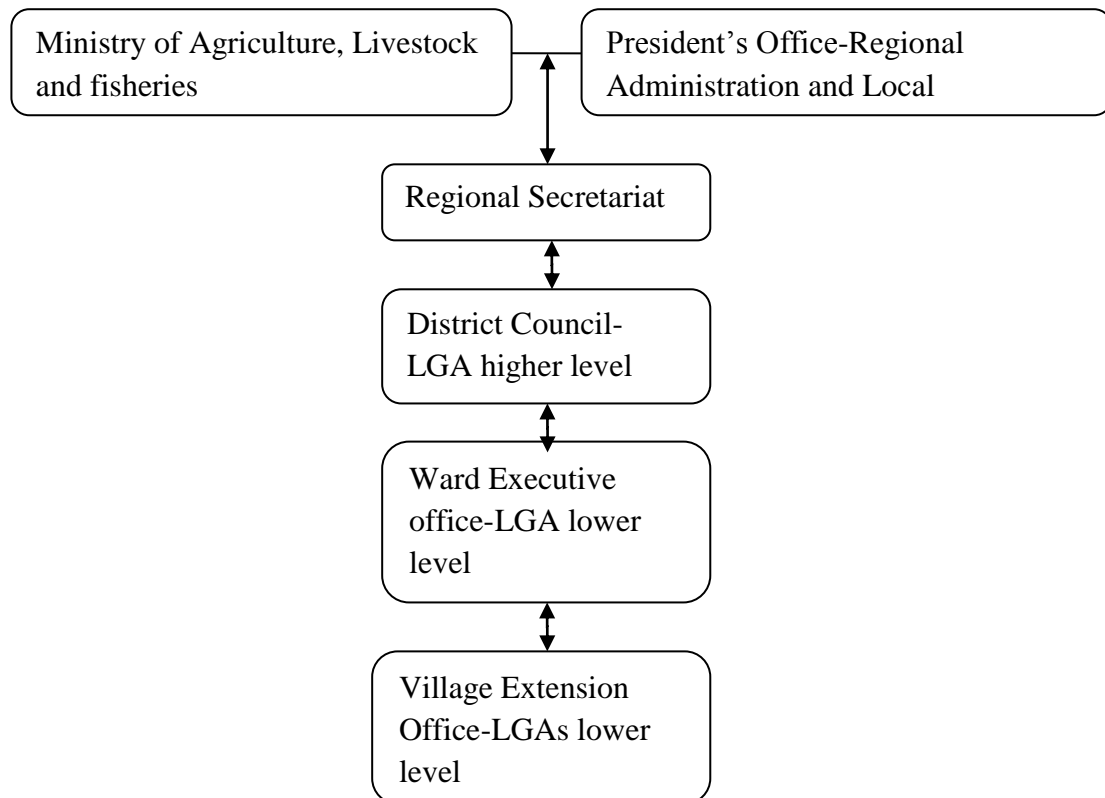


Figure 2: Organization structure of agricultural extension services in Tanzania.

Legend

Down arrow = AEI&SD directives chain of command from higher authorities to LGAs lower level

Up arrow = Reporting chain from LGAs lower level to higher authorities

2.3 Administrative de-linking and its influence on accessibility of AEI&SD

Under the context of decentralized AEI&SD de-linking involved the shift in management, supervision, and financing of agricultural extension services from the Ministry responsible for agriculture to the Local Government Authorities (LGAs). With de-linking process, the Local Government Authorities in Tanzania were responsible for recruiting extension agents, planning, and mobilizing resources. Others included training, preparing staff development programmes, motivating, promoting as well as demoting their agricultural extension staff (URT, 2008). The central government remained with policy formulation, monitoring and provision of technical backstopping. The main object was to bring services closer to the people and to provide services which are more responsive to community needs. In order to maximize efficiency and create strategic fit, Cabral (2011) pointed out that, the placement of roles and functions in a place that can be better implemented is of vital importance.

2.3.1 Management and coordination of agricultural extension information and advisory services

For the sake of maximizing efficiency, the alignment between the devolved functions and the capacity of the strategy implementers is of vital importance. According to Cabral (2011), under decentralized extension services, some of the administrative functions such as strategy development, specialized technical support, as well as monitoring and evaluation are better provided at the central government level than at the peripheral levels. However, the relationship between the central government and the local governments needs to be strengthened since the central and local governments need to support each other for the decentralized extension systems to work effectively. According to Bahiigwa *et al.* (2005), successful implementation of agricultural extension and advisory services depends on a number of factors including the setup of legal and regulatory framework,

stakeholders' participation, management capacity, improved technical capacity, maintenance of operational funding, and accountability. In Tanzania, following the delinking of reforms the management and supervision of agricultural extension services are nested under the Local Government Authorities which according to Kyaruzi *et al.*(2015) are ill-equipped, inadequately funded and have a weak technical capacity.

2.3.2 The funding of agricultural extension information and service delivery in Tanzania

Despite the shift in the management and supervision of AEI&SD, literatures confirmed that, the supervision and coordination of agricultural extension information and services delivery in Tanzania are hindered by inadequacy and lack of funds (URT, 2015). According to the Controller and Auditor General report of 2015, the AEI&SD in Tanzania are poorly funded thus most of the planned activities including the coordination role were not executed as planned. In addition, IFPRI (2011) cites inadequate funding due to overdependence on grants from the central government as one of the most critical challenges facing LGAs during the implementation of decentralized AEI&SD. The bringing of AEI&SD close to the people was anticipated to devise sustainable financing mechanisms that would make services provision more effective and efficient.

2.3.3 Agricultural extension agents' professional development

The presence of sufficient professionals and well-trained staff is essential for the LGAs to realize their potentials in serving the rural farmers (IFPRI, 2011). Despite the Administrative de-linking, professional and staff development among extension workers cadre is still a critical issue. The majority of extension workers lack continuous professional development programmes due to insufficient funding in running the programmes (URT, 2015). Similar situation in other East African countries is reported by

Onyach-Olaa (2007) who surmised that, decentralized AEI&SD in Uganda is associated with the reduced staff satisfaction stemming out of lack of job promotions, resentment against supervision by local councils that are technically not in the field, the perceived unrealistic expectations from political supervisors, and the isolation from the headquarters. However, the positive side, decentralization has enhanced participation of local communities in planning and implementing programmes. It has also ensured closer staff supervision (IFPRI, 2011).

2.3.4 Recruitment of extension agents

Since LGAs are autonomous organizations; under the de-linking reforms, they were given the mandate of hiring and firing technical staffs as they deemed it appropriate. However, in reality the powers have remained illusory since the recruitment of personnel depended on the availability of funds and recruitment permits from the President Office Public Service Management as governed by the Public Recruitment Act No 29 (1) of 2007. Empirical studies have shown that most of the Local Government Authorities had acute shortage of extension personnel and the ratio between farmers and extension officers was high (Mattee *et al*, 2008). Moreover, when assessing the performance of agricultural extension service in Tanzania, URT (2015) confirmed that, despite the extension services reforms the numbers of agricultural extension agents were lower than the number of villages. The shortage of extension officers has a far reaching negative impact on the rate of farmers' adoption to agricultural practices, which in turn, affect agricultural production and productivity. According to the Controller and Auditor General Report (2015), the coordination of AEI&SD is still a challenge due to shortage of agricultural extension staff. For example, despite the PORALG being the coordinator of the decentralized extension information and delivery of services, it has the shortage of technical staff to coordinate and provide technical backstopping to LGAs across the country.

2.4 Influence of Local Government Autonomy on the Quality of Agricultural Extension Information and Services Delivery

According to Adebayo, autonomy connotes the right of self-government or management of one's own affairs. In pursuit of the Constitution of United Republic of Tanzania of 1977 as amended from time to time, the Local Government Act No.9 of 1999 and its subsequent D by D policy, the Local Government Authorities in Tanzania are Autonomous organizations. In order to achieve full autonomy, either the Central government or the Local government authorities are not constitutionally bound to accept dictation or directives from the other. Many writers are however of the view that within the setting of intergovernmental relations, Local Government Authorities are not autonomous and cannot be completely autonomous because of the interdependence of levels of government (Adebayo, 2005). Local autonomy is primarily concerned with, the question of responsibilities, resources and discretion conferred on local authorities. Therefore, the implementation of decentralized AEI&SD is likely to be influenced by the context under which the policy is implemented. With the decentralization the quality of AEI&SD in terms of timelines, and funds allocated, diversity of extension methods and technology adoption rate were anticipated to have improved as the LGAs would independently have the powers to allocate resources and shaping its extension responsibilities in the context of LGAs environment.

2.4.1 Efficiency in provision of agricultural extension services

The increased local government autonomy in Tanzania was believed to increase efficiency on agricultural extension delivery system in terms of processes, human resource capacity, and extension services infrastructure. Before decentralization it was difficult for the central government to mobilize resources to address issues compromising efficiency of agricultural extension services. Okwu and Ibrahim, (2012) pointed out that; an increase in

the local government autonomy is not a blue print solution to addressing efficiency challenges facing the AEI&SD. According to Okwu and Ibrahim (2012), inefficiency in Nigeria agricultural extension services delivery system has been attributed to the absence of agricultural infrastructure, incompetency, and lack of professionalism among agricultural extension staff. It is well established that, the capacity and competency of extension personnel are critical for a robust extension delivery system. Asiedu-Darko (2013) found out that lack of competency among extension agents hindered the effectiveness of extension service in Ashanti Ghana and in the Democratic Republic of Congo. Being the focal point in the delivery of the services, agricultural extension staff needs to be equipped with relevant knowledge and skills of coping with the emerging challenges in the agricultural sector. To substantiate the later, Ragasa *et al.*(2016) pointed out that, there is a positive relationship between competencies and performance of individual extension agents. Though other experts believe that the capacity and performance of extension agents do not only involve individual competencies but they also include a totality of different conditions, structures, institutions, and actions within the systems (Lakai *et al.*, 2012; Leeuwis and Aarts, 2011).

2.4.2 Relevance of agricultural information and technology

The transfer of power closer to agricultural extension services beneficiary has had some bearings on the impact on the management and accountability of the services. Baudi *et al.* (2013) revealed that there was an increase in the relevance of agricultural information and technology as a result of increased local autonomy in agricultural extension service pluralism in two Municipalities in Ghana. According to Baudi *et al.* (2013), agricultural information, input supply, technology, and training were ranked the highest in terms of relevance. Therefore, it was necessary to establish relevance regarding agricultural

information and technologies which are offered to farmers by agricultural extension staff with the influence of increased local government autonomy.

2.4.3 Agricultural extension services financing mechanism

The increase in local government autonomy was anticipated to increase the LGAs revenue base for effective agricultural extension service delivery system. However, Ragasa *et al.* (2016) found out that, despite the decentralization of agricultural extension services in Congo DRC more than half (54%) of public extension officers admitted that agricultural extension services were inadequately funded. In Tanzania, AEI&SD experience the same challenges of underfunding despite that agricultural sector priorities are set at council level (Kyaruzi, 2010; URT, 2015). Moreover, despite a theoretical increase in local government autonomy, the planning and budget process in the LGAs in terms of priority setting are still dominated by the central government. As commented by Venugopal and Yilmaz, (2010); Mollel and Tollenaar, (2013) despite that Tanzania has a strong decentralized system, there is a constant intervention by the central government in planning, budgeting, and LGAs decision making processes.

2.4.4 Adoption of agricultural technology

According to the CAG (2015) report, which assessed the performance on provision of extension service to farmers in Tanzania, the AEI&SD rendered to farmers did not contribute to improved agricultural technologies. Moreover in another study, Chowa *et al.* (2013) found that, farmer's adoption to technological innovation increased with agricultural extension services pluralism due to the availability of many sources of information and knowledge. Therefore, the mixed results in the aspect of agricultural technologies in relation to increased level of autonomy might have been contributed by the implementation context of decentralized extension. For example, Ragasa *et al.* (2016)

pointed out that, despite having a higher ratio of extension agent to farmers, extension agents in the Democratic Republic of Congo failed to deliver knowledge and technologies to rural areas due to lack of coordination, absence of unified and clear policy and mandate. Others included; lack of funding, aging of agricultural extension agents, low competencies of the agents, and lack of mobility and interactions between the agents and key actors.

2.4.5 Inclusiveness of agricultural extension information and services delivery

Inclusiveness of agricultural extension information and services delivery is also a key indicator when assessing the quality of AEI&SD. An increase in the level of local autonomy was meant to make the services more accessible and inclusive to the farmers in spite of their social, political, cultural, and economic conditions. Beall and Piron, (2005) pointed out that; social inclusion is not a solution to social exclusion; as some of the people might willingly decide to self-exclude. Experience in Malawi has shown that, agricultural extension programmes were biased from the design to the implementation stages. Studies (Adhiguru *et al.*, 2009; IFPRI, 2010; Chowa *et al.*, 2013) found that, extension provision and information are particularly biased towards large scale farmers due to the attitude of extension services providers to focus on large scale farmers.

2.4.6 Diversity of agricultural extension methods and approaches

Furthermore, the use of diverse extension methods and approaches increase the effectiveness of AEI&SD (Ragasa *et al.*, 2016). In Tanzania, the government recommends for the use of Farmer Field School as a standard approach in the delivery of agricultural extension information and services. As Davis *et al.* (2009) found out, in Tanzania and Kenya, FFS are more common to women than to men and agricultural productivity is more pronounced among groups using FFS than among those who do not use FFS. Similarly, Ragasa *et al.* (2016); MEAS (2014) found out that despite an increase of local

government autonomy, there is a decrease in food production, a decline in yields of major crops and a fall in productivity and hunger in Congo DRC and Zambia respectively. In Zambia, more than 28% of the people residing in the rural areas buy foods because of a decline in food production.

2.5 Shifts in AEI&SD to Decision Making to Local Government and its Influence on Farmers Empowerment

With political devolution, the locus of decision making shifted from the central government to the LGAs. Therefore, the LGAs were given more powers to make decision along with the integration of previously centralized services into a holistic local government system. The councils were installed as the most important political bodies within its jurisdiction (URT, 2009). Agricultural extension information and delivery of services were inclusive in the integration process, and therefore, the community became a focal point in the decision making of agricultural extension services. It involved empowering farmers in planning and in executing extension service development programmes as well as fostering partnership with civic groups (Shivji and Peter, 2003). It was anticipated that, with the shift and participation of farmers in AEI&SD decision making process, the more agricultural extension information sub-sector would reflect local needs and demands. It is through empowerment that the capacity of farmers to make choices and decisions of desired actions and outcomes would be enhanced (WB, 2005).

The central argument in support of farmer empowerment is that, there is a strong correlation between empowerment and development outcomes such as poverty reduction, improved agricultural opportunities, and better governance (DIIS, 2004). Empowering farmers in analysing and understanding contextual agricultural issues and challenges is seen as pivotal in developing demand-driven advisory services. Some of the farmers'

empowerment indices include; farmers' participation in various decision making avenues, farmers' participation in various fora for agricultural knowledge and skills sharing, capacity to engage in commercial farming, increased yields and income, improvement in farmers' livelihood, and increased knowledge in disease and pest management and control.

2.5.1 Farmer's Participation in Decision Making

The importance of involving the community in decision making process needs not to be reemphasized. Scholars (Aref, 2011; Gaynor, 2013) believe that participation has great potentials in empowering and transforming the material conditions of the vulnerable and marginalized community. The Local Government Reform Programme in Tanzania has set a pace for various institutional and decision making avenues responsible for sector development initiatives. Such avenues include village general meetings, village sector committees, farmers' groups and associations, cooperative societies, and farmers' networks. The potentials of these avenues in transforming the lives of farmers are high when properly planned and executed. As Gaynor (2013) noted, despite the decentralization reforms in Rwanda, the level and extent of community participation in decision making process were questionable. Therefore, the presence of decision making structures needs to be complemented with proper and regular execution; as the experience shows that mere structures cannot solve community problems. Aref (2011) commented that without farmers' participation agricultural development policy is likely to fail. Concerted efforts are needed to make local participation avenue functional. Gaynor (2013) pointed out further that, the results of participation are not automatic and therefore advocates of participation were urged to stimulate a demand for participation.

2.5.2 Fora for agricultural knowledge and skills sharing

In addition for farmer's empowerment to be achieved, a shift in decision making to lower level government should go hand in hand with an increase in the fora for sharing agricultural knowledge and skills. As Hanis *et al.* (2015) pointed out, the learning process is an important element in facilitating decision making at personal, organizational, and societal levels. Similarly, in the agricultural sector, where a farmer is required to make important decision in planning, production, and marketing, knowledge sharing is becoming increasingly important.

As observed by Lwoga *et al.* (2011), farmers have knowledge and skills which are necessary in improving their livelihoods. In that case, they need platforms and resources to enable information sharing among them. In Malawi, Chowa *et al.* (2013) revealed that, agricultural extension pluralism has offered increased opportunities to farmers in terms of access to information and knowledge from diverse sources despite experiencing challenges of coordinating extension message and approaches.

2.5.3 Crops and livestock yields

Moreover, as farmers become close to decision making unit the more agricultural extension information and delivery service will reflect the local demand and impact farmers' production and productivity. Scholars (Moosai *et al.*,2016; Nigussie *et al.*, 2016) found that, there were significant differences in household incomes between farmers connected with extension services and those that were not-connected with extension services when assessing the impact of agricultural extension services in enhancing productivity and poverty alleviation in Ethiopia. The poverty incidence of households among non-extension service users was far greater than users' households. Furthermore, Baloch and Thapa (2016) found that in Pakistan small scale farmers who used extension

services produced better yields compared to medium and large scale farmers with no extension services. World Bank (2010) also found out that in India in areas with decentralized extension services there was substantial increase in the production of high value crops between 1999-2003 and the average farm income increased by 24%. Therefore, it is evident that, there is a high positive correlation between the involvement of farmers in AEI&SD decision making and an increase in yields and productivity.

2.5.4 Capacity to engage in commercial farming

Theoretically, commercialization is a result of two manifolds. Firstly is the demand side which is characterized by higher prices and better access to markets; and secondly the supply side which is characterized by the diffusion of improved technology. The concept of commercial farming refers to an increased share of the marketable surplus in the total farm business income (FAO, 2015). It is about increasing the fraction of crops and animal products which are destined for sale. It also entails increasing inputs and factors of production including machinery and tools, seed, fertilizer, crop protection chemicals, veterinary drugs, and animal feed, which are acquired from the market. In addition, commercialization involves the use of markets in hiring labour, borrowing funds, and obtaining technical advice and market information.

Therefore, one of the important aspects in farmer's empowerment is the capacity of farmers to produce surplus and engage in commercial farming. The shift in agricultural decision making to lower government levels was anticipated to transform agriculture due to an increase in farmers' access to agricultural extension information and advisory services. Studies showed that, farmer engagement in commercial farming is hampered by many challenges including lack of credit to adopt both labour and capital intensive agriculture (Ivy, 2014).

2.5.5 Farmers capacity to initiate demand for AEI&SD

Currently, globally, extension services are experiencing reforms from the supply driven to demand-driven where the farmer becomes the centre of all AEI&SD programmes (World Bank, 2010). A shift in decision making from the central government to the local government was meant, among the other things, to capacitate farmers to articulate the demand for AEI&SD. However, the empowerment of farmers is not automatic; it depends on the design and context of the reform. As Chowa *et al.* (2013) revealed despite an increase in the number of extension services actors, farmers in Malawi had limited capacity to initiate demand for extension services. In most cases, extension information and services delivery was in the form of supply driven and not demand driven.

2.5.6 The contribution of AEI&SD on improved farmer's livelihood

The sustainable livelihood framework entails that, improvement of smallholder farmers livelihood would be achieved only if farmers are able to cope with and recover from stresses and shocks, maintain or enhance their capabilities and assets, without undermining the natural resource base (Hussein and Nelson, 2016). The nature and type of decisions made by the farmers should have an impact on the general farmers' livelihood. In one of the studies WB (2010) noted significant improvement in the social and economic conditions of farmers in India which were facilitated by extension staff under Agricultural Technology Management Agency (ATMA). The ATMA model contributed directly to improving rural livelihood of about 6.7 million households in the project implementation area. Therefore, it was anticipated that, a shift of decision making in agricultural extension information and service delivery would contribute to an increased agricultural production and ultimately improve farmers' livelihood.

2.6 The Influence of Changed of Mode of operations between Central and Local Government Authorities on Provision of Equitable AEI&SD to Farmers

The provision of equitable AEI&SD is one of the great concerns of most national agricultural policies worldwide. In the context of agriculture, equity means fairness and impartiality in the treatment of women and men in terms of rights, benefits, obligations, and opportunities (FAO, 2009). In this study, the concept of equity has been extended to include the category of farming enterprises such as livestock keeping and crop farming since actors in these subsectors experience different challenges in accessing AEI&SD.

There is evidence that there is unfair treatment among different farming groups in most societies when it comes to accessing to agricultural extension information and advisory services. For example, Ragasa (2012); Kabura, (2014); Okanya (2014) found that agricultural extension information and services delivery were male biased. Inequities among different groups among the farming populations are attributed to various factors including the level of education and socio-economic factors (Kiplimo, 2015). These attitudes negatively affect productivity among the farming communities. Moreover, Ragasa *et al.* (2012) in Ethiopia found that, female households and plot managers were less likely to get extension services than was the case to their male counterparts.

The central government must, as a matter of necessity, nurture a favourable environment that would enable Local Government Authorities to optimally tap the local resources, materials, capital and human resources in an equitable manner by changing the way the central and local governments relate. Zhu (2016) pointed out that the central and local government relation is regarded as one of the fundamental institutional arrangements which determine rapid economic development. It reflects the horizontal and vertical power dynamics between the central and local governments and the related consequences of the

autonomy that the Local Government enjoys from the central government control and direction. Striking a balance between the central and the local government relationships has proven to be a challenging assignment among various government officials, scholars, and political analysts (Vincent, 2015). Cognizant of the latter, the Government of Tanzania instituted reforms in the way the central and local government related in handling agricultural issues that impeded agricultural growth and development.

The new relationship, which is involved in the abolition of the existed command relation into a system of intergovernmental relations is characterized by consultations and negotiations supplemented with regulation and legal supervision of LGAs' political and administrative functions (URT, 2009). The change in the power structure between the central and local government was anticipated to improve imbalances and inequity in the access and use of resources in agricultural development.

However, the effectiveness of the central and local governments' relationship in addressing equity issues is not predetermined. As Cabral (2011) pointed out, it depends on the underlying motivations, political dynamics and the capacity of service users to make the government accountable. Therefore, institutional frameworks in which the local and central governments operate influence the costs of interactions between actors, which in turn affect, the way the governments behave in response to citizens' demands (Hong, 2013).

2.7 The Implication of Empirical Review on the Statement of Research Problem and Justification

From the review, it is clearly noted that the effectiveness of AEI&SD during the implementation of D by D policy worldwide is influenced by many factors. The context

under which the reform is undertaken has a significant influence on the effectiveness of policy implementation. There is evidence of both positive and negative results on the effectiveness of AEI&SD worldwide. The choice of decentralization discourse which a particular national agricultural extension system opted has a significant influence on the effectiveness of the system. In Tanzania, the review confirmed that, since the policy inception in 2000 many studies conducted have addressed agricultural extension information in a piecemeal. Few or none focused on assessing the broader policy framework that underlies the implementation of AEI&SD; hence there are hardly any clues on the effectiveness of the policy in addressing the challenges that face farmers in Tanzania. As a result, ascertaining as to whether or not the AEI&SD has been effective in enhancing and pooling of more resources or in opting for alternative policy option has been difficult. Therefore, assessing the factors that influence the effectiveness of AEI&SD during the implementation of D By D policy is a key to this study.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Description of the Study Area

The study was conducted in Arumeru District in Arusha Region specifically at the Meru District Council (MDC) and Arusha District Council (ADC). MDC originally part of the former Arumeru District Council and was established on the 1st of July 2007 as District Council with full mandatory powers. Geographically, MDC lies on the slopes of Mount Meru, which is the second highest Mountain in Tanzania with 14 000 ft. (4516m) above sea level (MDC Socio-Economic Profile report, 2015). The Council lies between Latitude 3'00⁰ – 3'40⁰ South of Equator and Longitude 36⁰ – 550⁰ East of the Greenwich Meridian. According to MDC 2011/12-2015/16 Strategic Plan Document, MDC has a total land area of 1 268.2 sq km out of which 64.1% is under agricultural production, 3% is covered by forest reserves, 16% comprises National Parks, 0.4% is occupied by water bodies and the remaining 3.6% is for human settlement. The Council has two main agricultural seasons. The first season starts in November and ends in January; and the second season starts in March and end in June. MDC gets the average annual rainfall ranging from 500mm to 1 200 mm and the average temperatures of about 25⁰C (January – February) and 22⁰C (June –August). Moreover, the council has 11 perennial rivers, and 143 springs, which are used for irrigation, domestic and livestock (MDC Profile Report, 2015).

The main economic activities in the Council include crop cultivation, fishing, livestock keeping, tourism, and commercial enterprises. Major crops grown in the Council include maize, sorghum, paddy, bulrush millet, legumes, sweet potatoes, cassava, coffee, and chick peas. Politically, the council has one constituency which is represented by one Member of Parliament.

The 2012 Population and Housing Census showed that, MDC had a total population of 268 144 people. Of these 131,264 (49%) were males and 136,880 (51%) were females with an estimated average household size of 5 members and the annual population growth rate of 2.7% (URT, 2013). Administratively, MDC has three divisions, 26 wards, 90 villages, and 337 sub-villages (MDC Socio-Economic Profile report, 2015). The surveyed villages were Poli, Ndatu, Karangai and Kikwe. In May 2016, there were 166 Agricultural Extension Agents and 27 of these were at the District Headquarters, 49 were at ward level and 90 were at the village level. Furthermore, based on the capacity of the Council to deliver services, the Council has one motor vehicle, 15 motor cycles and six computers both for livestock and crop extension agents.

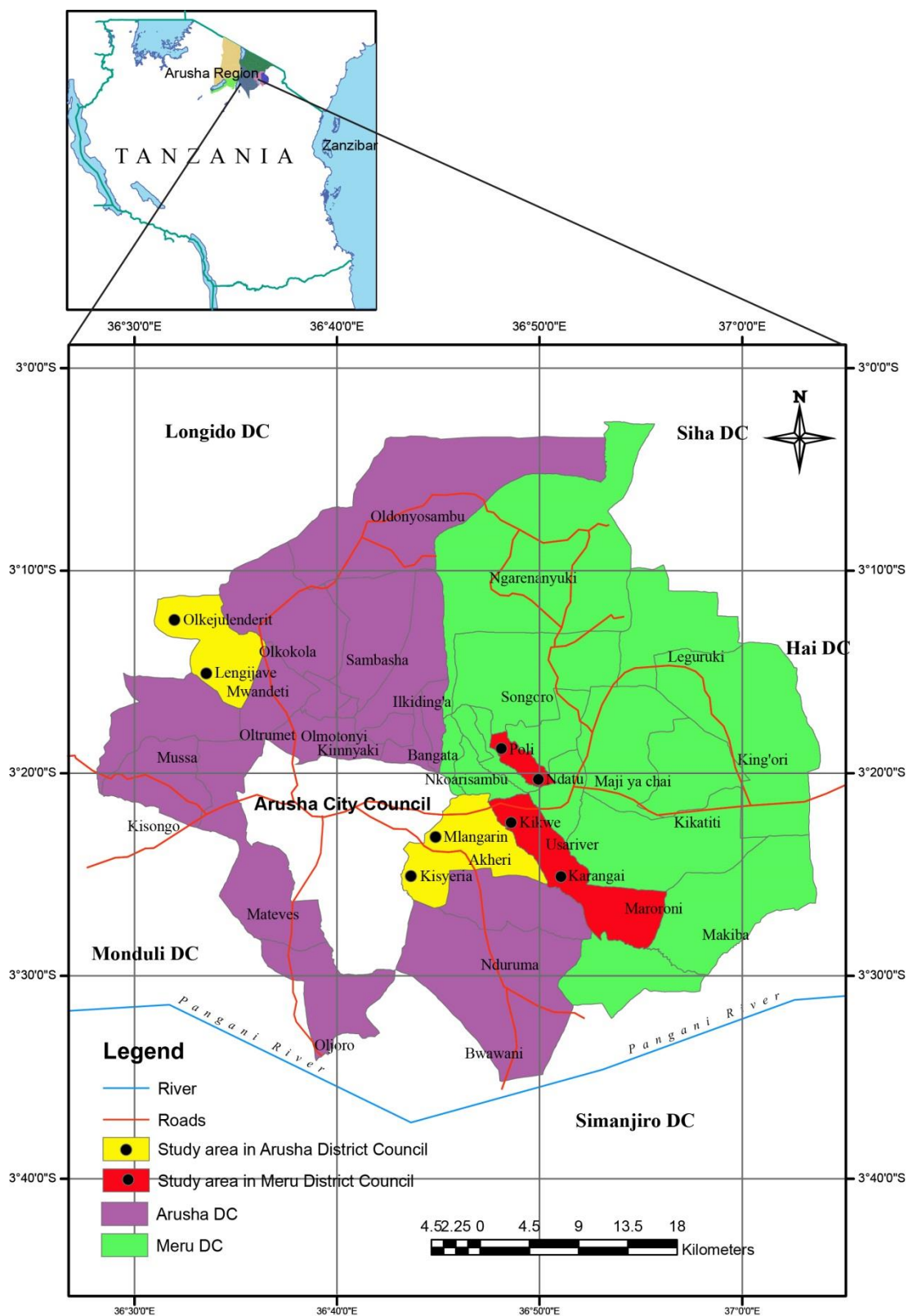


Figure 3: A map of Arumeru District showing study areas

Arusha District Council (ADC) was established on the 1st July, 2007 by the provision of section 8 & 9 of the Local Government ACT of 1982. It (ADC) covers an area of 1 446.69

sq. km and lies between latitude $3^{\circ} 30' 50''$ south of the Equator and longitude 37° to 38° East of the Greenwich. ADC is bordered by Meru District Council to the East, Monduli District Council to the West, Longido District Council to the North-West and Simanjiro District Council of Manyara Region to the South.

ADC has two main agricultural zones, the green belt of the slopes of mount Meru on the South, which is potential for the production of bananas, coffee, and horticultural crops; and the lowland belt with is potential for maize, beans, cassava, peas, rice, and pigeon peas cultivation. There is also livestock keeping which is mainly carried out on a free range basis. ADC gets an average rainfall of 800mm – 1000 annually. The main economic activities are agriculture, livestock keeping, businesses, and tourism.

According to the 2012 National Census, ADC has a population of 315,173 out of whom 149 568 were males and 165 605 were females. It has a population density of 227.4 and a population growth rate of 3.4%. Administratively, the Council is divided into 3 divisions, 27 wards, 71 villages, and 268 sub-villages. In 2015, ADC had 65 extension staffs out of which 14 were at the District headquarters, 21 were at the ward level and 30 were at the village level. Moreover, ADC DAICOs had one motor vehicle, 11 motor cycles, eight computers and four staff houses. The surveyed villages included Lengijave, Olkejulenderit, Kisyeria and Mlangarini. The two councils were purposively selected based on the nature of agriculture practices. The councils practice both crop farming and livestock keeping hence provided pertinent information and experience in the implementation of AEI&SD under the context of D by D policy.

3.2 Research Design

The study employed a cross-sectional research design. According to Agresti and Finlay, (2009), a cross-sectional design allows a combination of various survey methods for gathering both qualitative and quantitative data. The design also offers quick results at minimal cost. Therefore, the data on the factors influencing effectiveness of AEI&SD during the implementation of D by D Policy were collected from farming households in eight villages in Meru and Arusha districts. According to Babbie (2013), the data collected through the cross-sectional design are appropriate for descriptive interpretation and determination of relationships between and within variables (Babbie, 2013).

3.3 Sampling Procedures

This study used two sampling technique. This study used a two stage sampling technique; by first involving selection of the study councils, while the second stage involved the selection of agricultural households.

3.3.1 Stage I: Selection of geographical location

Meru and Arusha district councils were purposively selected from a list of seven councils that implemented the D by D policy in Arusha. Based on ecological factors and the nature of farming activities, two wards and four villages were purposely selected from each council. In each council two wards were purposively selected; one was predominantly crop farming and the other engaged in livestock keeping. In Meru District Council, Poli and Kikwe wards were purposively selected. Poli and Ndatu villages were found in Poli ward which is located in the highland zone and were dominantly engaged in crop farming, while Kikwe and Karangai villages in Kikwe ward are located in the lowland and were predominantly occupied by livestock keeping communities.

In Arusha District Council, Lengijave, Olkejulenderit villages in Olkokola ward are found in the highlands zone which is predominantly occupied by livestock keepers was selected to represent livestock keeping communities while Kisyeria and Mlangarini villages in Mlangarini wards found in the lowland zone were selected to represent crop farming communities. The selection criteria enabled data gathering from agro-pastoralist.

3.3.2 Stage II: Selection of farming households' respondents

According to the 2007/2008 National Agriculture and Livestock Census, Arumeru District had a total of 97 545 agricultural households of which a sample size of 398 households were determined using a formula provided by Yamane (1967) which states $n = \frac{N}{1 + N(e^2)}$ with the level of precision of 0.05 assuming 95% confidence level. Whereas N= number of population size of 97 545 for agricultural household and e is the level of precision at 0.05. Hence, the calculation gave a sample size of 398 agricultural households which was later divided equally to two district councils to arrive at 199 agricultural households. A farming households' list which is kept at the Village Agricultural Office was used in selecting adult respondents for the study.

This means that the sample size consisted of 398 and the returns were 390 farming households' respondents. In addition, 16 key informants were selected purposively due to their position in D by D policy implementation arrangement. The composition of key informants were as follows; there were 10 agricultural extension agents five from the crop farming and five from the livestock keeping sections, two agricultural officers at the District headquarters, two staff members from the President's Office Regional Administration and Local Government (PO-RALG), and two staff members from the Ministry of Agriculture and Fisheries (MALF).

The PO-RALG and MALF staffs were solicited for information on AEI&SD system, agriculture policy and guideline formulation, administration of AEI&SD, coordination as well as monitoring and evaluation of AEI&SD. The extension officers at the two respective LGAs provided information about the implementation of guidelines and policies related to AEI&SD.

3.4 Data Collection

3.4.1 Validity and Reliability Test

Primary data collection was achieved using researcher's checklists, which were used to collect data from focus group discussions (FGDs) and from key informants (KIs). Yet, a diary was used to collect field notes, and semi-structured questionnaires were used to collect quantitative data collection from the respondents. Validity, which refers to how well an instrument measures what it is intended to measure, was achieved in two ways. First, the validity of the semi-structured questionnaire was achieved by giving the prepared questionnaire to the two thesis supervisors. Second, the then read questionnaire was given to experts in the Department of Agricultural Extension and Community Development at Sokoine University of Agriculture to read it and check the logical flow of the questions as per study objectives. Furthermore, the validated questionnaire in English language was translated to Kiswahili by Kiswahili experts in the Institute of Kiswahili Studies (IKS) at the University of Dar es Salaam.

To test the reliability of the semi-structured questionnaire, 25 purposively selected smallholder farmers in Mkuranga village involving 25 respondents of which 12 were females and 13 were males. Reliability is the degree to which an assessment tool produces stable and consistent results. In this study, this was done to ascertain the semi-structured questionnaire's stability and consistency. The collected data from this exercise was coded

and entered in the SPSS and using the split-half reliability analysis the Spearman-Brown formula yields the reliability coefficient, which are expressed as Cronbach alpha correlation coefficients. In this case, pre-testing produced a reliability coefficient Cronbach alpha of 0.78, which according to Radhakrishna *et al.* (2013), a semi-structure questionnaire with a correlation coefficient of Cronbach alpha 0.7 and above is considered ideal and reliable.

3.4.2 Primary data collection

Both quantitative and qualitative data were collected. The data collection was carried out using a semi-structured questionnaire; and checklists were used in the focus group discussions and key informant' interviews. The information collected included; the influence of administrative de-linking on AEI&SD accessibility, the influence of local government autonomy on the quality of AEI&SD, the influence of a shift in AEI&SD decision-making on farmers' empowerment as well as the influence of changed central and local governments in relation to the provision of equitable AEI&SD. Qualitative data were collected through observation checklist, focused group discussions, and key informants interviews. Personal observation was used to collect information related to participation and farmer group formation and the presence of association, implementation of farmer field schools, physical presence of extension agents and crop and livestock characteristics.

In addition, interviews were done with MALF staffs, PO-RALG staffs, DAICOs staff and field agricultural/livestock extension agents as key informants. Information which was collected was about policy and guidelines management and implementation of the extension services under the decentralization, policy, financing, staffs welfare as well as issues monitoring, and evaluation.

3.4.3 Secondary data

Secondary data were collected through reviewing different relevant documents relating to this study. These included agricultural policy, AEI&SD guidelines, Controller and Auditor General (2015) performance audit on the assessment of extension services under decentralized system report, PO-RALG annual development report on the provision of AEI&SD, and local government medium term expenditure implementation framework, and District Agricultural Development Plans. Others were data on distribution of roles and responsibilities of different actors in agricultural extension information service delivery, financing, and the actual policy implementation.

3.5 Data Analysis

This study employed both quantitative and qualitative data analyses methods. The analyses were done based on specific research objectives. Qualitative data were analysed through content analysis which involved designing and summarizing raw data into categories or themes based on valid inferences and interpretation. Moreover, SPSS version 20 statistical computer software was employed for quantitative data analysis using different techniques; simple descriptive statistics, paired sample t-test, McNemar's test, and Wilcoxon on the signed ranked test. A 5% level of significance was used throughout the study, an independent variable with p-value less than 0.05 was considered as significantly associated with the outcome variables. Furthermore, descriptive statistics analysis was also done and the data were plotted on frequency tables, charts, and graphs. The description of each method is described in the next sections.

3.5.1 McNemar's chi-square test

The McNemar test is a nonparametric chi-square procedure used to determine differences on a dichotomous dependent variable between two related groups (Hettmansperger and

McKean, 2011). The McNemar chi-square test is used to analyse pre-test and post-test study designs, and to analyse matched pairs and case-control studies (Hettmansperger and McKean, 2011). The test is used to determine whether or not there is a statistically significant difference between the probabilities of two paired groups which is dependent. For example, the medical researcher can test the effectiveness of Drug A and Drug B across a given period of time as shown below.

		Drug B		
Drug A	Success	Failure	Row totals	
Success	A	b	a +b	
Failure	C	d	c +d	
Column totals	a+c	a +d	N	

Proportion successfully treated with drug A = $(a+b)/n$

Proportion successfully treated with drug B = $(a+c)/n$

The difference between these quantities is $(a+b)/n - (a+c)/n = (b - c)/n$

The cells corresponding to b and c represent what we call discordant pairs and the total $b + c = \#$ of discordant pairs.

- i. If there is no difference between the drugs success rates we expect $b = c$.
- ii. If Drug B is better than Drug A we would expect $b < c$.
- iii. If Drug A is better than Drug B we would expect $b > c$.

At any rate if b and c differ substantially then we have evidence of a difference between the drugs.

In order to run McNemar's chi-square test, three assumptions must be met. The first assumption is that the data should have one categorical dependent variable with two categories. The second assumption is that two groups of independent variables must be

mutually exclusive; and the third assumption is that participants or cases must be randomly selected from the population of interest.

This test has been used because the data analysed consist of dichotomous nonparametric variables with two categories before and after decentralization; and therefore, the analysis results provide a mechanism of assessing whether the proportion differences between the two pairs of data are statistically significant to ascertain effectiveness of the decentralization policy. Like the chi-square test, before calculating McNemars chi-square statistics, the data need to be arranged in a contingency table as shown below:

	After decentralization		
Before	+	-	
Decentralization	+	a	b
	-	c	d

The null hypothesis is that the proportion of subjects with the characteristic (or event) is the same before and after decentralization. This is equivalent to saying that $H_0: b=c$.

Hence:

$$\chi^2 = \frac{(b-c)^2}{b+c} \sim \chi_1^2 \dots\dots\dots (1)$$

Hypothesis and decision rule

$H_0: p_1 = p_2$ (Extension services before and after decentralization are equal)

$H_A: p_1 > p_2$ (Extension services before decentralization were better than after decentralization).

Reject H_0 if b is “large”

$H_A: p_1 < p_2$ (Extension service after decentralization is better than before decentralization.

Then

Reject H_0 if c is "large"

$H_A: p_1 = p_2$ (Extension services before and after decentralization are different)

Reject H_0 if b or c is large

NB: The total number of discordant pairs is $b + c$. If the null hypothesis is true b and c should be equal whereas excessively large values for either b or c provide evidence against the null hypothesis.

3.5.2 Paired sample t-test

A paired sample t -test is a parametric test, which is used to compare two related means. It tests the null hypothesis whether the difference between two related means is zero. According to Shier (2004), a paired t -test is used to compare two population samples means in which observations in one sample can be paired with observations in the other sample. The test has been used to ascertain effectiveness of decentralized AEI&SD by comparing related means of data on AEI&SD before and after the decentralization policy. The study was guided by the null hypothesis that the paired mean of data related to agricultural extension information and service delivery before decentralization and after decentralization were the same. Decision rule: The null hypothesis is rejected if the mean of the two population samples are different at $p\text{-value} \leq .05$.

3.5.3 Wilcoxon signed-rank test

The Wilcoxon signed-rank test is a non-parametric statistical hypothesis test which is used when comparing two related samples, matched samples, or repeated measurements on a single sample to assess whether their population means ranks differ. It can be used to test the equality of matched pairs of observation (Wilcoxon, 1945). According to Kerby (2014), it is an alternative to a paired t-test for matched pairs or the t-test for dependent samples when the population cannot be assumed to be normally distributed. In order for the data to qualify for the Wilcoxon signed ranked test, it needs to meet the following assumptions. First the data should be paired and come from the same population, second each pair is independently selected and third the data are measured at least on an ordinal scale. The Wilcoxon can also be used in situations involving a matched subject design, where subjects are matched on specific criteria. In this study, the Wilcoxon signed ranked test was used to analyse the paired data between male and female farmers and agro-pastoralist to explore equity on the access to agricultural extension services with the change of government relations.

With the Wilcoxon signed ranked test, the researcher was interested in determining the z value and the associated significance levels. In principle, if the significance level is equal to or less than .05 it implies that the difference between the two scores is statistically significant.

Wilcoxon signed ranked test is given by the formula:

$$Z_T = \frac{T - \mu_r}{\sigma_T} \dots\dots\dots (3)$$

Whereas T= Sum of the positive and negative ranks

$$\mu_r = \text{Mean which is given by } \mu_r = n \left(\frac{n+1}{4} \right) \dots\dots\dots (4)$$

$$\sigma_T = \text{Standard deviation which is given by } \sigma_T = \sqrt{\frac{n(n+1)(2n+1)}{24}} \dots\dots(5)$$

In this study, the testing of the influence of changed central local relation on enhancing equity between female and male farmers and between livestock keepers and crop farmers was guided by the following hypothesis:

3.5.3.1 Equity between Male and Female farmers

H₀: There was no significant difference in the access to agricultural extension information services between female and male farmers with changed central –local relation

H₁: There was a significant difference in the access to agricultural extension information services between female and male farmers with changed central –local relation.

3.5.3.2 Equity between crop farmers and livestock keepers

H₀: There was no significant difference in the access to agricultural extension information services between livestock keepers and crop farmers with changed central –local relation

H₁: There was a significant difference in the access to agricultural extension information services between livestock keepers and crop farmers with changed central –local relation

Therefore, when the significance level is equal to or less than .05, it implies that the difference in the access to agricultural extension information and delivery of services between female and male farmers and between crop farmers and livestock keepers is statistically significant. If this happens, the decision will be to reject the null hypothesis and accept the alternative hypothesis that there was a significant difference in the access to agricultural extension information services between two explored pairs

3.6 Binary Logistic Regression Model

In many epidemiologic, biomedical, and other related studies, the outcome variable is binary or categorical variable (Agresti, 2002). In such a situation, it is possible to use statistical tools for estimating the magnitude of the association between the response variable of interest as a function of independent (predictor) variables. The outcome variables for the current study were:

- Farmer's opinions about administrative de-linking of AEI&SD from MALF to LGAs on AEI&SD accessibility.
- Farmer's opinions on the influence of Local Government Authorities' autonomy on the quality of AEI&SD to farmers.
- Farmer's opinions on the influence of the shift of AEI&SD decision making process to LGAs on farmer's empowerment.
- Farmer's opinions on the influence of change in mode of operation between Central and Local government on provision of equitable AEI&SD. These variables are binary with increased or decreased values.

In logistic regression, one is interested in studying how risk factors are associated with the presence or absence of an event (Hosmer and Lemeshow, 2000). It is commonly used for modelling binary data not only to identify risk factors but also to predict the probability of

success. The reason for using the binary regression model was the fact that the dependent variable measured was the categorical with the dummy variables responses. Farmers' perception on access to extension services after delinking of agricultural extension delivery services from MALF to LGAs, the quality of AEI&SD, farmers' empowerment and the enhanced equity between different farmers group were measured using either 'yes' or 'no' response to each aspect of the statement. The total score values on each aspect was summed up. There were 21, 22, 37, and 28 items for access to extension services after delinking of agricultural extension delivery services from MALF to LGAs, the quality of agricultural extension information service, empowerment and enhancement of equity among different farmers group respectively. To identify key determinants of the outcome variable, a dichotomous variable indicating whether the respondents had a positive or a negative opinion on the influence of the policy was calculated. In all outcome variables, the respondents who agreed were assigned 1 and those who disagreed were assigned a 0 value.

The general multiple logistic regression model is given as:

$$\log it[\pi(x)] = \log \left(\frac{\pi(x)}{1-\pi(x)} \right) = \beta_0 + \beta_1 x_1 + \dots + \beta_p x_p \dots \dots \dots (2)$$

Where, $\pi(x)$ is the probability of adherence, x_i 's are covariates and β_i 's are their respective parameters. Whereas x_1 =age, x_2 =sex, x_3 =marital status, x_4 =nature of farming experience, x_5 =farming duration, x_7 = economic activities, x_8 =total income, x_9 =size of the farm, x_{10} = size of household, x_{11} =name of the council.

3.6.1 The effect size

The effect size is a set of statistical techniques for comparing groups' statistics that indicates the relative magnitude of the differences between means, or the amount of the

total variance in the dependent variable that is predictable from the knowledge of the levels of the independent variable (Tabachnick and Fidell, 2007). According to Cohen, (1988), Eta squared (r) measures the proportion of the total variance in a dependent variable that is associated with the membership of different groups defined by an independent variable. Cohen (1988) categorizes effect size into three classifications namely effect size with; $r = 0.1$ indicating small effect, $r = 0.3$ indicating moderate effect size and $r = 0.5$ indicating large effect size.

3.6.2 Chi-square test

The Chi-square statistic is a non-parametric tool designed to analyse group differences when the dependent variable is measured at a nominal level. As Mchugh (2013) pointed out, Chi-square permits the evaluation of both dichotomous independent variables, and of multiple group studies. Specifically, it does not require equality of variances among the study groups or homoscedasticity in the data. Unlike many other non-parametric and some parametric statistics, the calculations needed to compute the Chi-square provide considerable information about how each of the groups performed in the study. This richness of detail allows the researcher to understand the results and thus to derive more detailed information from this statistic than from many others (Mchugh, 2013).

A Chi-square test compares proportions which were actually observed in a study with the expectation of establishing whether they are significantly different. The Chi-square value increases as the difference between observed and expected increase (Onchiri, 2013). The advantages of the Chi-square include its robustness with respect to the distribution of the data, its ease of computation, the detailed information that can be derived from the test, its use in studies for which parametric assumptions cannot be met, and its flexibility in handling data from both two group and multiple group studies. Limitations include its

sample size requirements, its difficulty in interpretation when there are large numbers of categories (20 or more) in the independent or dependent variables, and the tendency of the Cramer's V to produce relatively low correlation measures, even for highly significant results.

The following assumptions need to be met for the use of chi-square test. First the data in the cells should be frequencies, or counts of cases rather than percentages or some other transformation of data. Second, the levels of the variables are mutually exclusive. Third each subject may contribute data to one and only one cell in the chi-square and the study groups must be independent. Moreover, there should be two variables both of which are measured as categories, usually at the nominal level. However, data may be ordinal. Interval or ratio data that have been collapsed into ordinal categories may also be used. In addition, the value of the cell expected should be five or more in at least 80% of the cells, and no cell should have an expected value of less than one.

Having fulfilled the above assumption, the chi-square was used to describe variables relating to the improved delivery of agricultural extension services due to an increase in the local government autonomy between the respondents from Arusha District Council and Meru District Council. In addition, the test was used to describe and compare respondents' empowerment due to the shift in AEI&SD decision making between the two councils.

3.6.3 Content analysis

Qualitative data were analysed through content analysis. Qualitative content analysis involved a process of designing and condensing raw data into categories or themes based on valid inferences and interpretations (Brown and Clarke, 2006). Therefore, in this study,

the data which were collected from focus group discussions and key informants were subjected to content analysis through the following procedures as suggested by Brown and Clarke, (2006)

Step 1: Data collected from focus group discussions and key informants were prepared in the form of a text;

Step 2: Unit of analysis was defined whereas individuals from focus groups and key informant were used as units of analysis;

Step 3: Categories and a coding scheme for all the responses were developed;

Step 4: Coding scheme on a Sample of text;

Step 5: Coding all the text;

Step 6: The assessment of coding consistency was done;

Step 7: Then, the conclusion from the data coded was drawn;

The detailed application of these methods for each specific objective is shown hereunder.

Objectives 1: This objective intended to examine the extent to which administrative de-linking from MALF to LGAs influenced accessibility of AEI&SD to farmers in Tanzania. In this objective, the quantitative data which were collected included access to agricultural inputs, access to financial services, access and linkage to markets, and access to agricultural information technologies before and after de-linking process. These data were analysed using McNemars chi-square test. Moreover, paired t-test was used to analyse data on the average contact days that the extension agents came into contacts with farmers and farmers groups, the number of village meetings held per year before and after delinking the process. Other types of data analysed include the average travelling distance in accessing extension services and the average time taken to be attended by an extension agent from the time a farmer initiated the demand for AEI&SD before and after delinking the process. In addition, the number of extension staffs per village, the type of support

which farmers received from the extension agents; the relevance and suitability of farmer field schools, information sources which farmers used to make decisions, mechanisms of improving the quality of agricultural extension services were analysed using descriptive analyses. Qualitative data on the access to agricultural services and farmers-extension staff contacts which were collected from focus group discussions, key informant interviews and documentary reviews were analysed using content analysis method.

Objective 2: This objective determined the influence of LGAs' autonomy on the quality of AEI&SD to farmers in Tanzania. In this objective, descriptive statistics were determined and chi-square test were used to analyse data on the funding of AEI&SD, inclusiveness of extension services, and diversity of AEI&SD methodology. Other data which were analysed through same methods included productivity of livestock and crops, the application of organic and inorganic fertilizer and methods of preserving and improving soil fertility. Moreover, data related to the relevance of information, skills, knowledge, and technologies which agricultural extension agents delivered to farmers and their qualities were analysed using McNemar test. In addition, paired -test was used to analyse data on farmers' feedbacks frequency from agricultural extension agents in relation to farmers raised demands before and after decentralization. The data collected from focus group discussions, key informant interview and documentary review which included the relevance of information, skills, knowledge and technologies, and inclusiveness of the services were analysed using content analysis method.

Objective 3: This objective assessed the influence of the shift in AEI&SD decision making process from the central government to LGAs' on farmers' empowerment in Tanzania. In this objective, quantitative data were analysed using chi-square; and the qualitative data which were collected through the FGDs and Key Informant interviews

were analysed using content analysis. The quantitative and qualitative data which were analysed included farmers' participation in agricultural development plans, the status of farmers' group and associations. Other types of data were farmers' fora for skills and knowledge sharing, skills and knowledge on crops and livestock, capacity to initiate extension services, crops and livestock yields, income from crop and livestock sales, improved farmers livelihood and disease/pest control and management.

Objective 4: This objective sought to examine the influence of change in the mode of operation between the central and the local government in enhancing the provision of equitable AEI&SD to farmers. In this objective, paired data based on sex and nature of farming engagement mainly crop farming and livestock keeping were analysed using Wilcoxon signed ranked test to determine their mean difference rank. Moreover, qualitative data on access to agricultural extension services between male and female farmers and between livestock keepers and croppers were analysed using content analysis.

3.7 Limitation of the Study

There has been time lapse since the inception of decentralized AEI&SD in 2000. Therefore, some of the responses from respondents depended on their ability to recall on the past events. The use of recall data posed a threat to the reliability of the research results. However, cognizant of that fact, the researcher used triangulation methods to counteract the influence of the recall data and hence increase the reliability of the research results. Data collected through semi structured questionnaire were complemented with data from Focus Group Discussions, Documentary review and Key informants interview.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSIONS

4.1 Respondents Socio-Economic Characteristics of the Respondents

The findings on socio-economic characteristics of the 390 respondents in Arumeru District are presented in Table 1. A total of 390 respondents filled questionnaire. Out of 390, respondents 50% were drawn from Arusha District and came from four villages namely, Lengijave, Olkejulenderit; Kisyeria; and Mlangarini; and 50% of the respondents were drawn from Meru District and came from four villages of Poli, Ndatu, Karangai, and Kikwe (Table 1).

Table 1: Social-economic characteristics of respondents (n= 390)

Variable	Meru DC		Arusha DC		Total		P value
	n	%	n	%	n	%	
Age in years							0.00
30-39	32	16.4	52	26.7	84	21.5	
40-49	62	31.3	67	34.3	129	33.1	
50-59	44	22.6	45	23.1	89	22.8	
<60	57	29.2	31	15.9	88	22.6	
Level of education							0.00
No formal education	2	1.0	24	12.3	26	6.7	
Primary school education	151	77.4	135	69.2	286	73.3	
Secondary school	31	15.9	25	12.8	56	14.4	
Technical/vocational education	9	4.6	6	3.1	15	3.8	
College/University Education	2	1.0	5	2.6	7	1.8	
Farming experience (in years)							0.36
>15	73	37.5	82	42	155	49.7	
< 15	122	62.6	113	57.9	235	50.3	
Sex							0.08
Male	125	64.1	141	72.3	266	68.2	
Female	70	35.9	54	27.7	124	31.8	
Nature of engagement in farming activities							0.00
Part time	41	21.0	18	9.2	59	15.1	
Full time	154	79.0	177	90.8	331	84.9	
Size of the farm							0.00
> 1 hectares	57	29.2	64	32.8	121	31.1	
2 – 3 hectares	84	43.1	63	32.3	147	37.7	
< 3 hectares	56	28.7	66	33.8	122	31.2	
Land ownership							0.00
Inherited	118	60.5	151	77.4	269	69.0	
Bought	17	8.7	12	6.2	29	7.4	
Hired	46	23.6	20	10.3	66	16.9	
Allocated by Village government	14	7.2	12	6.2	26	6.7	
Household size							0.00
>5	131	67.2	104	53.3	235	60.5	
6-10	63	32.3	68	34.9	131	33.6	
11<	0	0.0	23	11.8	23	5.9	

Source: Field data 2015

Table 1 show that, one third 33% of the respondents were between the age categories of 40-49 years which in most cases is the energetic and productive age. There were slight differences in percentages of the respondents in the middle age between Arusha and Arumeru District Councils. 54% of the respondents involved in this study had a middle age category of between 30 and 49 years. According to National Population and Housing

Census report of 2012, the middle age comprises the energetic and productive workforce. This finding conforms to the finding reported by Rehman *et al.*(2013) in a study in Pakistan which assessed the impact of socio-economic characteristics on farmers' access to agricultural information. The study found that majority of the respondents was in the middle age categories. In relation to decentralized agricultural extension policy, this age group category provides promising future for successful policy adoption and implementation. As Lavison (2013) argues, there is a positive correlation between age profile and the adoption of agricultural technology and innovations. Therefore, the young age is more adoptive to agricultural technology and innovations than is the case with those in the old age.

Based on educational attainment, Table 1 shows that majority, (93%) of the respondents reported to have attained formal education, and this is higher at 49% in Meru District than was the case in Arusha District Council which was 43%. Furthermore, 73.3% of the respondents reported to have attained primary education which implies that, the respondents with primary school education and engaged in agricultural activities were the majority in Arumeru District There is a positive correlation between level of academic qualification and the adoption of agricultural innovation (Lavison, 2013: Mwangi and Kariuki, 2015).

Furthermore, Table 1 shows that, 49% of the respondents had farming experience of less than 15 years, but the farming experience of the respondents in the two councils was not statistically significant at $p \leq 0.05$. Yet, 79% of the respondents mentioned that, they were farmers before and after decentralization of agricultural extensions information and service delivery. This implied that, the respondents had experience in farming activities and understood the trends and development of agriculture extension, information and

delivery services. These findings are in agreement with those reported by Rehman *et al.* (2013) who found that the majority of farmers in Pakistan had farming experience of more than 17 years.

In addition, Table 1 shows that, 68% of the respondents were male and 32% were female but their differences were not statistically significant at $p \leq 0.05$ (Table 1.). Observation revealed that female respondents in Meru and Arusha District Councils had limited participation in some of the socio-economic activities. For example, Akarro *et al.* (2010), Kumi and Daymond (2015) found that more males participated in economic activities than females. Traditionally, males are empowered to be family spokesmen and the female can speak on behalf of the family only when the household head is absent.

Again, of the 390 respondents more than two thirds (69%) of them reported to have owned land through inheritance. The number of respondents in this category was higher in Arusha District at 77.4% than was the case in Meru District at 60.5%. These findings indicate that there were strong traditional ties in land allocation and ownership in the study areas. In addition, 37.7% of the respondents reported to have owned land of from 1-2 hectares, and the majority of the respondents owned fragmented pieces of land, which is an indication that there is acute land shortage. These findings correspond to those of Odgaard (2002) who reported that land ownership in the Hehe tribe depends on social relations within the family. Land ownership had a high statistically significant difference at $p \leq 0.05$ (Table 1).

4.2 Socio-economic Factors Influencing Farmers' Perception on Effectiveness of AEI&SD following the Implementation of D by D Policy

The binary logistic regression was used to determine socio-economic factors influencing farmers' perception on the effectiveness of decentralization by devolution policy on agricultural extension information services. Binary logistic regression is a form of regression which is used when the dependent variable is a dichotomy and the independent variables (covariates) are of any type nominal, ordinal, or scale variables (Pallant, 2011). Logistic regression can be used to predict a categorical dependent variable on the basis of continuous and/or categorical independent variables and can be used to determine the effect size of the independent variables on the dependent variable. Yet, it can be used to rank the relative importance of independent variables, to assess interaction effects and to understand the impact of covariate control variables (Murray *et al.*, 2012). The reason for using binary regression model was the fact that the dependent variable which was measured was categorical with the dummy variables responses. Therefore, the total score ranged from 0 to 21 for access, 0 to 22 for quality, 0 to 37 for empowerment and 0 to 28 for equity between different farming groups. In addition, the score was categorized as 1 if the total score is more than half and if the total score is less than half for each variable.

4.2.1 Socio-economic factors influencing farmers' perception on access to AEI&SD with administrative de-linking from MAFC to LGAs

Table 2 shows binary regression results of the selected socio-economic factors influencing farmers' perception on access to agricultural extension information services with de-linking of services from MALF to LGAs. Eleven explanatory variables were included in the model: age, sex, marital status, level of education, farming experience and the nature of farming engagement. Others were economic activities, the net income, farm size, household size and geographical location. The study results had a Variance Inflation

Factor (VIF) ranging from 1.0 to 1.8 which according to Akinwande *et al.*(2015) is a good indicator that the independent variables are not correlated. The multicollinearity practically inflates unnecessarily the standard errors of the coefficients by making some variables statistically insignificant while they were supposed to be significant (Murray, 2012). According to the Akinwande *et al.* (2015), if the independent variables have a VIF value of less than 5 it implies that the variables are not correlated (Pallant, 2011). The -2 log improved from 95.66 with the constant only to -2.263. Chi-square value was 215 with df-11 and was statistically significant at $p \leq 0.05$. Table 2 indicates that, only two variables namely the size of the farm and sex had an influence on the dependent variable. The Cox and Snell R^2 and Nagelkerke R^2 values were 0.57 and 0.68 respectively. This implies that the predictors in the model were accounted for at least 57% to 68% for the access to AEI&SD with administrative de-linking reforms. In addition, the Hosmer-Lemeshow test results had ch-square 12.204 with df=8 and $p=0.142$. According to Pallant (2011), the p value should be greater than 0.005, implying that, the fitting effect between the model and data was good.

Table 2: Socio-economic factors influencing farmer's perception on access to AEI&SD during administrative de-linking from MAFC to LGAs

Variable	B	S.E.	Wald	Sig.	Exp(B)	Predicted % Change	VIF
Constant	-2.263	1.784	1.608	0.21	.104	-73.1	
Age	.319	.417	.588	0.44	1.376	37.6	1.836
Sex(1=Female 0=Male)	-.390	.561	.483	0.05	.677	-32.3	1.120
Marital status	.147	.847	.030	0.22	1.158	15.8	1.260
Level of education	.164	.384	.183	0.67	1.178	-100	1.213
Farming experience	.033	.063	.272	0.60	1.033	17.8	1.476
Nature of farming engagement	.016	.775	.000	0.98	1.017	3.3	1.242
Economic activities (1=Formal employment 0=Non Formal)	.12	.605	0.04	0.09	1.127	12.75	1.078
Net income	.021	.082	.068	0.07	1.02	177.2	1.174
Size of the farm	.11	.304	.001	0.01	1.12	2	1.184
Size of the household	.397	.364	1.188	0.28	1.487	12	1.102
Geographical location (1=Arusha 0=Meru)	-1.314	.707	3.453	0.06	.269	48.7	1.264

Source: Field data 2015

-2 log likelihood = 95.66; Nagelkerke $R^2 = 0.682$; Cox & Snell $R^2 = 0.571$, Model Chi square=215.Df=11, $p \leq 0.05$ Hosmer and Lemeshow Test; chi square=12.204, df=8, $p=0.142$: Dependent variable: Perceive access to agricultural extension services (1=Access, 0=Do not access).

Table 2 shows that out of the eleven explanatory variables which were tested only two variables namely, sex and the size of the farm were statistically significant. Table 2 indicates further that sex had the beta coefficient of $-.390$ and was statistically significant at $p \leq 0.05$. This implies that female respondents were less likelihood of accessing AEI&SD with the implementation of de-linking reforms than males; and it recorded a negative 32% predicted change. This finding conforms to the finding reported by Ragasa *et al.* (2012) in Ethiopia who found that female farmers were less likely to get extension services than their male counterparts.

In addition, age had a positive beta coefficient of $.319$ and was not statistically significant at $p \leq 0.05$. This implies that, as age of the respondents increase by one year, the likelihood of perceiving improved access to agricultural extension information services with the implementation of de-linking reforms also increases by 38%. These findings are in line with those reported by Abdallah and Abdul-rahaman (2016) in Ghana who found that the effect of age as a determinant to access agricultural extension services and adoption of technology in Ghana was limited.

The marital status had a positive beta coefficient of $.147$ indicating that being married increased the respondents' likelihood of perceive improved access to AEI&SD with de-linking reforms and vice versa. The variable had a 16% predicted change but was not statistically significant at $p \leq 0.05$. The study findings are in disagreement with those reported by Denkyirah *et al.* (2016) in Ghana who found that marital status had a significant influence on farmers' access to credit. In addition, Table 2 shows that level of education of the respondents had a beta coefficient of $.164$. This implies that, one unit increase in the respondents' level of education led to 100% negative change in the likelihood of the respondents perceiving improved access to AEI&SD. However, the

variable was not statistically significant at $p \leq 0.05$. The results are in disagreement with those reported by Roberts *et al.* (2017) in Liberia who found that academic qualification had a significant but negative effect to farmers' access to agricultural credits.

Furthermore, the study findings indicate that, the respondents' likelihood to perceive improved access to AEI&SD with de-linking reforms was also linked with farming experiences. The variable had a positive beta coefficient of .033 implying that one unit increase in the respondents farming experience produced 18% positive change in the respondents' likelihood of perceiving improved access to AEI&SD with administrative de-linking despite being statistically insignificant at $p \leq 0.05$. The findings are disagreement with Chauke *et al.* (2013) in the Republic of South Africa who found that farmers access to credit decreased with a unitary increase of other variables, notably farming experience, repayment period, risk and uncertainty, distance between the borrower and the lender, and asset accumulation.

The nature of farming that the respondents were engaged in had a positive beta coefficient of .016 implying that, one unit increase in the engagement in other farming activities produced 3.3% positive change likelihood of the respondents perceiving improved access to AEI&SD with de-linking reforms than those who practice in part time basis. However, the variable was not statistically significant at $p \leq 0.05$. The study findings are in agreement with those reported by Adamides *et al.* (2013) in Cyprus who found that the use of Personal Computers and the internet among farmers was not influenced by the nature of farming engagement; whether it is part time or full time.

In addition, Table 2 shows that economic activities (formal or non-formal) had a positive beta coefficient of .12 implying that, responding with formal employment had a greater

likelihood of perceiving improved access to AEI&SD following de-linking reforms by 12% compared to those with informal employment. Despite such results, the variable was not statistically significant at $p \leq 0.05$. The study findings conform to those by Suvedi *et al.* (2017) in rural Nepal who found that off-farm employment limited farmers' participation in extension activities and the adoption. The respondents' net income had a positive beta coefficient of .021, which implies that, the likelihood of respondents to perceive improved access to AEI&SD with de-linking reforms was greater among those with high net income than among the respondents with low income by 177.2%. However, the study results indicate that, the variable was statistically insignificant at $p \leq 0.05$. The study findings are in contrast to those reported by Kiplimo *et al.* (2015) in Kenya who found that, the total annual household incomes were statistically significant with a negative influence on farmers' access to financial credit services.

In addition, the size of the farm had a positive beta coefficient of .11 implying that, the respondents with large farm sizes had higher likelihood of perceiving improved access to AEI&SD with de-linking reforms than those with small farm sizes. One unit increase in the respondents' farm size increased the respondents' likelihood to perceive improved access to AEI&SD by 2%. The variable was statistically significant at $p \leq 0.05$. The study findings are in disagreement with those reported by Dzadze *et al.* (2012) in Abura-Asebu Kwamankese district in the central region of Ghana who found that, the size of land had a significant influence in farmers' access to agricultural credit. In addition, the size of the household had a positive beta coefficient of .397, which means that one unit increase in the respondents household size increase produced 12% positive change in the likelihood of the respondents to perceive improved access to AEI&SD and vice versa. However, the variable was not statistically significant at $p \leq 0.05$. The study finding is in disagreement

with the one by Abdalah and Awal (2016) in Ghana who found that households' size had a significant influence on farmers' access to agricultural extension services.

Table 2 further shows that the respondents' likelihood to perceive improvement in access to agricultural extension services is influenced by the geographical location of the respondents. The variable had a negative beta coefficient of -1.314 which means that, the respondents from Arusha District Council are less likely by 48% to perceive improved access to AEI&SD with the implementation of de-linking reforms than their counterparts from Meru District. However, the variable was not statistically significant at $p \leq 0.05$. The study finding conforms to those reported by Foti *et al.* (2007) in Zimbabwe who found that farmers' location (whether urban, rural or commercial) significantly affected the demand for private fee for service extension. It was concluded that this variable should be considered when targeting farmers for the provision of commercial extension services.

4.2.2 Socio-economic factors influencing farmers' perception on the quality of AEI&SD after increase in Local Governments Autonomy

Table 3 shows socio-economic factors that influence farmers' perception towards the quality of AEI&SD services with an increase in local government autonomy; two variables out of the eleven tested variables were found to be significant. The predictor variables in the model include, age, sex, marital status, level of education, farming experience, and the nature of farming engagement. In addition, economic activities, net income, the size of the farm, the size of the household and geographical location were also included. The Variance Inflation Factor for all tested variables ranged from 1.0 to 1.8 signifying that the predictor variables are not correlated hence, the results cannot be adversely affected by the cut-off point of less than 5 VIF (Akinwande *et al.*, 2015). The -2 log improved from 113.83 for that of the model with constant only to -2.263. Chi-square

value was 215 with df-11 and was statistically significant at $p \leq 0.05$. Table 3 indicates that, only two variables namely, the size of the farm and sex had an influence on the dependent variable. The cox and snell R^2 and Nagelkerke R^2 values were 0.52 and 0.64 respectively. This implies that the predictors in the model accounted for least 52% to 64% in the quality of agricultural extension information services with an increase in local government autonomy. In addition, the Hosmer-Lemeshow test results were chi-square 9.218 with df=8 and $p=0.324$ greater than 0.005, implying that, the fitting effect between the model and data was good (Pallant, 2011).

Table 3: Socio-economic factors influencing farmers' perception on quality of Agricultural Extension Service services after increase in Local Government Autonomy

Variable	B	S.E.	Wald	Sig.	Exp (B)	Predicted % Change	VIF
Constant	-.023	.344	.005	0.38	1.789	78.9	
Age	-.023	.344	.005	0.95	.977	-2.3	1.836
Sex	-.620	.462	1.803	0.18	.538	-46.2	1.120
Marital status	-.148	.674	.048	0.83	.862	-13.8	1.260
Level of education	.440	.298	2.175	0.14	1.553	55.3	1.213
Farming experience	-.143	.091	2.453	0.12	.867	-13.3	1.476
Farming duration	-.907	.634	2.045	0.15	.404	-59.6	1.242
Economic activities	.156	.525	.088	0.77	1.168	16.8	1.078
Net income	.195	.068	8.324	0.00	1.216	21.6	1.174
Size of the farm	-.076	.309	.061	0.81	.927	-7.3	1.184
Size of the household	-.027	.296	.008	0.93	.974	-2.6	1.102
Geographical location	-1.517	.550	7.611	0.01	.219	-78.1	1.264

Source: Field data 2015

-2 log likelihood = 113.839; Nagelkerke R^2 = 0.64; Cox & Snell R^2 = 0.52, Model Chi square=25.971.Df=11, $p=0.007$, Hosmer and Lemeshow Test;chi square=9.218, df=8, $p=0.324$: Dependent variable: Perceived quality in the delivery of Agricultural Extension Service services (1=improved, 0=was not improved),

Study findings in Table 3 show that, age of the respondents had a negative beta coefficient of -.023. This Implies that, one unit decrease in the age of the respondents produced 2.3% change in the likelihood of the respondents to perceive improvement in the quality of

AEI&SD after an increase in local government autonomy and vice versa. The variable was not statistically significant. The study findings are in disagreement with those reported by Suvedi *et al.* (2017) in rural Nepal who found that farmers' participation and access to quality extension programmes were influenced by age. In addition, sex had a negative beta coefficient of -.0620 implying that female are less likely by 46.2% than male respondents to perceive improved quality in the delivery of AEI&SD after an increase of local government autonomy. However, the variable was not statistically significant at $p \leq 0.05$. The study finding are in agreement with those reported by Mayo (2015) in Limpopo Province in the Republic of South Africa who found that female smallholder farmers were less likely to get timely access to agricultural credit from the land bank compared to male farmers.

Moreover, marital status of the respondents had a negative beta coefficient of .148. The study finding implies that being married decreases the likelihood of the respondents to perceive improved quality in the delivery of AEI&SD with an increase of the local government autonomy by 13.8%. The respondents who were not married were less likely to perceive improvement in the delivery of quality AEI&SD than the married ones, though the variable was not significant at $p \leq 0.05$. The study findings conforms to those reported by Monela (2014) in Morogoro and Mbeya in Tanzania who found that marital status had no significant influence in the farmers' adoption of improved maize and rice seeds.

In addition, Table 3 shows that level of education had a beta coefficient of .440. This implies that, one unit increase in the respondent's level of education increased the respondent's likelihood to perceive improved quality in the AEI&SD after an increase of the local government autonomy. One unit increase produced 55.3% positive change, though it was not statistically significant at $p \leq 0.05$. Moreover, farming experience had a

negative beta coefficient of $-.143$ which means that, one unit decrease in the respondents' farming experience produced 13.3% less likelihood of the respondents to perceive improved AEI&SD with an increase of the local government autonomy than those with more experience. However, the variable was not statically significant at $p \leq 0.05$. These results are in agreement with those reported by Ebewore and Emaziye (2016) who found that the use of good agricultural practices and particularly the use of organic manure was significantly associated with level of education and farming experience.

Furthermore, the study findings indicate that the respondents' likelihood of perceiving improved quality in the AEI&SD after an increase of the local government autonomy decreased with the nature of farming engagement. Those who practice agriculture on part time basis were less likely by 59.6% to perceive improved quality in the AEI&SD compared to those who are engaged on fulltime basis. Table 3 shows that the variable had a negative beta coefficient of $-.907$; and it was not statistically significant at $p \leq 0.05$. The study findings are in disagreement those reported by Ganpat *et al.* (2014) in the Eastern Caribbean who found that farmers' satisfaction with the extension services depended on whether the respondents were engaged in farming on fulltime or part time basis. From the authors, it was noted that, the respondents who practiced farming on part-time basis were more likely to report satisfaction with the extension services compared to their counterparts who worked on full time basis.

Economic activities had a positive beta coefficient of $.156$ implying that, there is 16.8% likelihood of the respondents with formal employment to perceive improvement in the quality in the AEI&SD after an increase of the local government autonomy than those with informal employment. However, the variable was not statistically significant at $p \leq 0.05$. This study finding conforms with the one reported by Demeke (2003) in North-

western Ethiopia who found that off-farm employment negatively and significantly influenced farmers' decision on the adoption of soil conservation practices. Moreover, the respondents' net income had a positive beta coefficient of .195, which implies that, one unit increase in the respondents' net income produced 22% positive change in the likelihood of the respondents to perceive improved quality in the AEI&SD after an increase of the local government autonomy. This means that the respondents with higher net income had a higher likelihood of perceiving improved quality to AEI&SD than those with low net income. The variable was significant at $p \leq 0.05$. The study findings are in agreement with those reported by Temesgen and Tola (2015) in Ethiopia who found that households' total income significantly influenced the respondents' willingness to pay for quality extension services.

In addition, Table 3 shows that, the size of the farm had a negative beta coefficient of -.076. The study results imply that, one unit decrease in the respondents' farm size produced 7.3% change in the respondents' likelihood to perceive improved quality in the delivery of AEI&SD after an increase of the local government autonomy. The variable was not statistically significant at $p \leq 0.05$. The study findings are in agreement with those reported by Monela (2014) in Morogoro and Mbeya who found that the respondents with large land size were much likely to adopt improved maize and rice seeds.

The households' sizes had a negative beta coefficient of -.027 which means that the respondents from small household size were less likely to perceive improvement in the quality of AEI&SD compared to those from large household size by 2.6%. However, the variable was not statistically significant. The findings are in agreement with those reported by Temesgen and Tola (2015) in Ethiopia who found that household size did not significantly influence the respondents' willingness to pay for quality extension services.

In addition, Table 3 shows that geographical location had a negative beta coefficient of -1.517 implying that, the respondents from Arusha District Council were less likely to perceive improvement in the quality of AEI&SD after an increase of the local government autonomy compared to their counterparts from Meru District Council by 78.1%. The variable was statistically significant at $p \leq 0.05$. The study findings conform to those reported by IFPRI (2010) in Nigeria who found that, the quality of agricultural extension information and service delivery was significantly associated with the variation in the socio-economic potential and the capacity or performance of a given state or LGA.

4.2.3 Socio-economic factors influencing farmers' perception on empowerment due to the shift in AEI&SD to LGAs

The regression model Table 4 shows that, eleven explanatory variables were tested to ascertain their influence on the farmers' empowerment as a result of a shift in AEI&SD decision making to LGAs. The variables, which were tested in the model, included, the age, sex, marital status, level of education, farming experience, and the nature of farming engagement. Others were economic activities, the net income, size of the farm, size of the household, and the geographical location. Out of these variables only marital status and the name of the council were statistically significant. The study results had a Variance Inflation Factor (VIF) ranging from 1.0 to 1.8. In addition, the -2 log improved from 113.839 with the constant only to -4.809. Chi-square value was 48.810 with $df=11$ and was statistically significant at $p \leq 0.000$. The Cox and Snell R^2 and Nagelkerke R^2 values were 0.69 and 0.58 respectively. This implies that the predictors in the model were accounted for 58% to 69% of the farmers' empowerment due to a shift in agricultural extension information decision making to LGAs. In addition, the Hosmer-Lemeshow test results were chi-square 3.376 with $df=8$ and $p=0.885$. According to Pallant (2011), the p

value should be greater than 0.005, implying that, the fitting effect between the model and data was good.

Table 4: Socio-economic factors influencing farmers' perception on farmers' empowerment due to the shift in AEI&SD to LGAs

Variable	B	S.E.	Wald	Sig.	Exp (B)	Predicted % Change	VIF
Constant	1.455	1.685	.745	.388	4.283	328.3	
Age	-.343	.486	.497	.481	.710	-29	1.836
Sex	.024	.577	.002	.967	1.024	2.4	1.120
Marital status	-.014	.798	.000	.986	.986	-1.4	1.260
Level of education	.669	.340	3.883	.049	1.953	95.3	1.213
Farming experience	-.152	.167	.829	.363	.859	-14.1	1.476
Farming duration	-1.635	.859	3.626	.037	.195	-80.5	1.242
Economic activities	-.280	.648	.186	.666	.756	-24.4	1.078
Net income	-.007	.081	.006	.936	.993	-0.7	1.174
Size of the farm	.110	.379	.084	.772	1.116	11.6	1.184
Size of the household	-.436	.375	1.355	.044	.646	-35.4	1.102
Geographical location	-1.318	.710	3.449	.043	.268	-73.2	1.264

Source: Field data 2015

-2 log likelihood =97.1109; Nagelkerke $R^2 = 0.70$; Cox & Snell $R^2 = 0.59$, Model Chi square=210. Df=11, $p \leq 0$, Hosmer and Lemeshow Test; chi square=3.376, df=8, $p=0.885$; Dependent variable: Perceive empowerment with shift in agricultural extension information decision making to LGAs (1=Empowered, 0=Not empowered)

Table 4 indicates that, sex had a negative beta coefficient of -.760 though not statistically significant at $p \leq 0.05$. The findings imply that female farmers were by 53.3% less likely than males of perceiving being empowered due to the shift in AEI&SD decision making to LGAs. The study finding is in disagreement with those reported by Omoregbee (2013) in Delta state in Nigeria who found that sex had a higher significant influence on the respondents' status of poverty. And the areas which were gender insensitive were more vulnerable than those that were gender sensitive; and females were more vulnerable than males to incidences of poverty. Moreover, age had a positive beta coefficient of .325, implying that the respondents with older age had 38.4% likelihood of perceiving empowered due to the shift in agricultural extension information services decision making to LGAs. However, the variable was not statistically significant at $p \leq 0.05$. These findings

are in disagreement with those reported by Uddin *et al.*,(2014) in Bangladesh who found that the level of adaptation to climate change and environmental degradation strategies was positively related to age.

Marital status had a negative beta coefficient of -2.232 indicating that a change in marital status decreases the likelihood of the respondents to perceive being empowered due to a shift in the AEI&SD decision making to LGAs by 89%.3. The participants who reported not to have been married had a higher likelihood of reporting not to be empowered than their married counterparts. The variable was statistically significant at $p \leq 0.05$. The findings are in disagreement with those reported by BDHS (2015) in Bangladesh who found that marital status had a significant influence in making female farmers participate in economic and NGOs activities.

In addition, Table 4 shows that level of education had a beta coefficient of .164. The study results imply that, one unit increase in the respondents' level of education produced 57% change in the respondents' likelihood to perceive empowered due to the shift in AEI&SD decision making. The variable was not statistically significant at $p \leq 0.05$. The study finding is in disagreement with Omoregbee (2013) in Delta state in Nigeria who found that the level of education attained by a farmer had a significant influence in determining poverty status. Those with higher academic qualification were better than those in other categories.

Results in Table 4 show that, the respondents' likelihood to be empowered due to the shift in AEI&SD decision making to LGAs increased with an increase of respondents' farming experience. Those with longer experience had higher likelihood of reporting being empowered than with short experience by 6.3%. The variable had a negative beta

coefficient of -0.065 and was statistically insignificant at $p \leq 0.05$. The study findings are in disagreement with those reported by Abid *et al.*, (2015) in Punjab province in Pakistan who found that farming experience had a significant influence in the respondents' perception in the choice of climate adaptation measures.

Furthermore, the nature of farming engagement had a positive beta coefficient of -0.497 implying that, there was 39.2% less likelihood for the respondents who practice agriculture on part time basis to feel empowered due to a shift in AEI&SD to LGAs. However, the variable was not statistically significant at $p \leq 0.05$. The study findings are in disagreement with the findings reported by Jabo *et al.* (2016) in Nigeria who found that the respondents who participated in other nonfarm activities had a greater likelihood of being food-secure than those who only depended on farming activities.

Moreover, results in Table 4 show that, economic activities had a negative beta coefficient of -0.372 implying that, responding to informal employment had a less likelihood of reporting being empowered due to a shift in AEI&SD decision making to LGAs by 31%. The variable was statistically insignificant at $p \leq 0.05$. These study findings are in agreement with those reported by Hlongwane *et al.* (2014) in Limpopo Province in South Africa who found that the informal employment had no significant influence on farmers' participation on maize markets.

The respondents' net income had a positive beta coefficient of 0.128 which implies that, the respondents with high net income had higher likelihood of reporting being empowered due to a shift in AEI&SD making to LGAs than those with the total low net income by 13.7%. However, the study results indicate that, the variable was statistically insignificant at $p \leq 0.05$. The study findings are in disagreement with those reported by Uddin *et al.* (2014)

in Bangladesh who found that the respondents with higher total net income were more adoptive to climate change and environmental degradation strategies than those with low net income.

In addition, the size of the farm had a positive beta coefficient of .015 implying that, the respondents with large farm size had higher likelihood of reporting being empowered due to a shift in AEI&SD decision making to LGAs by 1.5% than those with small farm size. The study finding is in disagreement with the one reported by Omoregbee (2013) in Delta state in Nigeria who found that the size of the farm had a significant influence on the respondents' status of poverty. Those with large land size were better off than those with small farm size.

In addition, the size of the household had a negative beta coefficient of -.188 which means that the respondents with small household size were less likely to perceive empowered due to a shift in the AEI&SD decision making to LGAs by 17.1% than those with small households size. However, the variable was not statistically significant at $p \leq 0.05$. The findings are in disagreement with the findings reported by Uddin *et al.* (2014) in Bangladesh who found that the respondents with large household size had higher likelihood of adopting to climate change and environmental degradation strategies than those with small household size.

Table 2 shows further that the respondents from Arusha District Council were less likely to perceive empowered due to a shift in the AEI&SD decision making than those from Meru District Council by 94.6%. The variable had a negative beta coefficient of -2.928 and was statistically at $p \leq 0.05$. The findings are in agreement with those reported by Bangladesh Demographic and Household Survey (2015) that, the geographic location had

a significant influence in the respondents' participation in economic and NGOs activities. According to BDHS (2015), rural female farmers were more likely to participate in economic and NGOs activities than those in the urban areas.

4.2.4 Socio-economic factors influencing farmers' perception on enhanced equity in provision of AEI&SD due to change in mode of operation between central and local government

Table 5 shows the regression model of the selected socio-economic factors that influence farmers' perception on enhanced equity between different farmers groups due to the change in the mode of operation between the central and local government. The predictive variables which were tested in the model included: age, sex, marital status, level of education, farming experience and the nature of farming engagement. Moreover, other variables were economic activities, net income, the size of the farm, the size of the household and geographical location. The regression test results had a Variance Inflation Factor (VIF) ranging from 1.0 to 1.8 which according to Akinwande *et al.* (2015) is a good indicator that the independent variables are not correlated. The multicollinearity practically inflates unnecessarily the standard errors of the coefficients by making some variables statistically insignificant while they were supposed to be significant (Murray *et al.*, 2012).

According to the Akinwande *et al.* (2015), if the independent variables have the VIF of less than 5; it implies that the variables are not correlated (Pallant, 2011). The -2 log improved from 95.66 with the constant only to -2.263. The Chi-square value was 215 with df-11 and was statistically significant at $p \leq 0.05$. Table 5 indicates further that, only two variables namely the size of the farm and sex had an influence on the dependent variable. The Cox and Snell R^2 and Nagelkerke R^2 values were 0.57 and 0.68 respectively. This

implies that the predictors in the model were accounted for at least 57% to 68% of access to agricultural extension information services with the de-linking reforms. In addition, the Hosmer-Lemeshow test results were chi-square 12.204 with $df=8$ and $p \leq 0.05$. According to Pallant (2011), the p value should be greater than 0.005, implying that, the fitting effect between the model and data was good.

Table 5: Socio-economic factors influencing farmers' perception on change in mode of operation between central and local government on enhancing equity among farmers

Variable	B	S.E.	Wald	Sig.	Exp(B)	Predicted % Change	VIF
Constant	1.455	1.685	.745	.388	4.283	328.3	
Age	-.343	.486	.497	.481	.710	-29	1.836
Sex	.024	.577	.002	.967	1.024	2.4	1.120
Marital status	-.014	.798	.000	.986	.986	-1.4	1.260
Level of education	.669	.340	3.883	.049	1.953	95.3	1.213
Farming experience	-.152	.167	.829	.363	.859	-14.1	1.476
Farming duration	-1.635	.859	3.626	.037	.195	-80.5	1.242
Economic activities	-.280	.648	.186	.666	.756	-24.4	1.078
Net income	-.007	.081	.006	.936	.993	-0.7	1.174
Size of the farm	.110	.379	.084	.772	1.116	11.6	1.184
Size of the household	-.436	.375	1.355	.044	.646	-35.4	1.102
Geographical location	-1.318	.710	3.449	.043	.268	-73.2	1.264

Source: Field data 2015

-2 log likelihood =97.1109; Nagelkerke $R^2 = 0.70$; Cox & Snell $R^2 = 0.59$, Model Chi square=210. $df=11$, $p \leq 0.05$ Hosmer and Lemeshow Test; chi square=8.307, $df=8$, $p \leq 0$; Dependent variable: Perceive enhanced equity due to changed-central local government relation (1=Enhanced, 0=Not enhanced).

The study findings in Table 5 show that, age had a negative beta coefficient of -.343 and predicted a change of 29%. The study findings imply that, the respondents with young age are less likely to perceive enhanced equity between different farmers groups in the mode of operation between the central and local governments by 29%. However, the variable was not statistically significant at $p \leq 0.05$. The study findings are in disagreement with

those reported by Haile (2016) in Ethiopia who found that, age had a significant influence on women decision to participate in agricultural extension services. According to Haile (2016), the respondents' likelihood in participating in the extension services programs increased with an increase of age.

Sex had a positive beta coefficient of 0.24 and predicted 2.4% change. The study findings mean that, male respondents are more likely by 2.4% to perceive that there is enhanced equity between different farmers groups due to the change in the mode of operation between the central and local governments than their female counter parts. Despite such a trend, the variable was statistically insignificant at $p \leq 0.05$. The study findings are in disagreement with the findings of Hassen *et al.*, (2016) in Southwest of Ethiopia in the study of gender and education as predictors of food insecurity among coffee farmers. According to Hassen *et al.*, (2016), the households in which the husband was responsible for purchasing food were more than twice likely to be food insecure than those in which the wife was responsible for purchasing food. In addition, Koirala *et al.* (2015), in Malawi found that technical efficiency was 15% higher for female-headed households than for male headed households when assessing farm productivity and technical efficiency of rural households.

Table 5 further shows that, marital status had a negative beta coefficient of -.014. The study finding indicates that, the likelihood of the respondents to perceive enhanced equity between different farmers groups due to the change in the mode of operation between-the central and the local governments decreased with the percentage change in marital status. The respondents who are not married are less likely to perceive enhanced equity than is the case with married ones by 1.4% though the variable was not statistically significant at $p \leq 0.05$ (Table 5). The study findings are in disagreement with the findings of Mandleni

and Anim (2011) in South Africa who found that, marital status significantly influenced livestock keepers' awareness and decision making on climate change adaption measures.

The education level had a beta coefficient of .669 indicating that the likelihood of respondents to perceive enhanced equity among different farmers groups due to the changed central local government relations increases with an increase of respondents' level of education with the predicted change of 95.3%. The study finding was statistically significant at $p \leq 0.05$. The study findings are in agreement with the findings by Simonyan *et al.* (2011) in Nigeria who found that education level significantly influenced technical efficiency among maize farmers. The technical efficiency of male farmers was positively significantly related to academic qualification as compared to female farmers whose technical efficiency was negatively related to academic qualifications.

In addition, farming experience had a negative beta coefficient of -.152 which means that, the respondents with little farming experience were less likelihood by 14% to perceive enhanced equity between different farming groups due to the changed central-local government relations than those with more farming experience. However, the variable was not statically significant at $p \leq 0.05$. The study findings are in agreement with the findings by Belay *et al.* (2017) in Ethiopia who found that farming experience significantly influenced smallholders farmers' adaption to climate change and adoption measures in the Central Rift Valley of Ethiopia.

The study findings further indicate that, farming duration had a beta coefficient of 1.635 and predicted 80.5% of change. The study findings imply that, the likelihood of the respondents to perceive enhanced equity between different farming groups due to the change in the mode of operation between central and local governments decreased with

the nature of farming engagement. The respondents who practiced agriculture on part time basis were less likely by 80.5% to perceive enhanced equity than those who practice agriculture on fulltime basis. The variable was statistically significant at $p \leq 0.05$. The study findings are in agreement with the findings by Huizenga (2014) in San Francisco, USA who found that, part time farming was associated with substantially lower economic performance compared to full time farming.

Moreover, economic activities had a beta coefficient of -0.280 and predicted 24.4% of change. The study findings imply that, the respondents with informal employment are less likely to perceive enhanced equity between different farming groups due to the changed central-local government relations than those with formal employment by 24.4%. The variable was statistically insignificant at $p \leq 0.05$. This study finding conform with the findings by Jayne and Wanzala, (2003) in north western Ethiopia who found that off-farm employment negatively and significantly influenced farmers' decision in the adoption of soil conservation practices.

Furthermore, net income had a beta coefficient of -0.007 and predicted 0.7% change. The study findings imply that the likelihood of respondents to perceive enhanced equity between different farming groups decreases with a decrease of respondents' total income. Those with low net income are less likely to perceive enhanced equity than those with high net income. However, the variable was not statistically significant at $p \leq 0.05$. The study findings are in agreement with the findings of Awotide *et al.* (2012) in Oyo state, Nigeria who found a significant influence of net income among female and male headed households in the study of gender analysis on net income inequality and poverty among rural farming households. According to Awotide *et al.* (2012), income was more evenly distributed among female headed households than the households of their male

counterparts in the study area. In addition, (Gecho, 2016) in Ethiopia found that, the annual cash income was a key determinant of farmers' participation in income diversification. The respondents with high net income participated more in income diversification than the respondents with low income.

Table 5 further shows that, the size of the farm had a positive beta coefficient of .110 and the predicted 12 % change. The study findings imply that, one unit increase in the respondent's farm size produce 12% change in the respondents' likelihood to perceive enhanced equity between different farming groups. The variable was statistically insignificant at $p \leq 0.05$. The study findings are in agreement with the findings of Kehinde *et al.* (2016) in South West Nigeria who found that the size of the farm significantly influenced farmers' adoption of fertilizers. The farm size positively and significantly influenced male farmers' adoption of fertilizer than was the case with female farmers.

The households' size had a negative beta coefficient of -.436 and predicted 35% change. The study findings mean that, the respondents from small household size are less likely to perceive enhanced equity between different farming groups than those from large household size by 35%. The variable was statistically significant at $p \leq 0.05$. The study findings are in agreement with those reported by Ibrahim (2014) in Iramba and Meatu Districts in Tanzania who found that household size significantly influenced the adoptive capacity of female and male farmers. According to Ibrahim (2014), the respondents with small household size were more adoptive to climate change than those with large household size.

Table 5 further shows that geographical location had a negative beta coefficient of -1.318 implying that, the respondents from Arusha District Council were less likely to perceive

enhanced equity between different farming groups than the respondents from Meru District Council by 73%. The variable was statistically significant at $p \leq 0.05$. Similar findings are reported by Zheng *et al.* 2012) in Northern China who found that, location had a significant influence on the producer's perception and participation behaviour in the cooperatives.

4.3 Administrative de-linking of Agricultural Extension Information and Services Delivery from the MALF to LGAs

The importance of AEI&SD for farmers increased agricultural production and productivity needs not be over-emphasized. Farmers need an array of services including quality agricultural inputs, market information services, credit facilities, and conducive policy and legal frameworks. Access to AEI&SD is a key to growth and sustainable agricultural development (Null *et al.*, 2012; Nyikahadzoi *et al.*, 2012; Adekunle, 2013). However, despite its significant importance in revitalizing the performance of the agricultural sector, access to these services remains a critical issue (Tchouawou and Colverson, 2014). Access to these services by the majority of farmers is limited due to shortages of agricultural extension agents, weak agricultural extension services, financing and poor agricultural infrastructure (Sanga *et al.*, 2013; Imoloame and Olanrewaj, 2014). Countries worldwide have undertaken extension service reforms with a view of making extension services more accessible and responsive to farmers' needs and demands.

In Tanzania, the most notable reform in the national agricultural extension services was carried out in 2000 by devolving AEI&SD. Under decentralization, some of the functions and responsibilities were de-linked from the then MALD to LGAs (URT, 2009). Other levels that were responsible for the management and supervision of extension services include regional secretariat, higher-level local government authorities and lower level

local government authorities at the wards and villages. Therefore, with administrative de-linking reforms, the then MALD was left with the role of policy formulation, monitoring, evaluation, maintaining standards and the provision of technical agricultural extension staff backstopping to LGAs.

Basically, LGAs were given new mandates of recruiting agricultural extension staff, developing professional development programmes, and promotions (URT, 2009). Others included financing of AEI&SD, planning, and budgeting. The main objective of de-linking of agricultural extension information and delivery of services, among other things, was to improve its access to farmers in Tanzania (URT, 2009). This section, therefore, assesses the influence of de-linking process as part of agricultural extension information and services delivery reform to farmers.

4.4 Accessibility of AEI&SD due to Administrative De-linking Process

The outcome of de-linking on agricultural extension information and services delivery accessibility was measured through a number of indicators. The indicators included the number of agricultural extension agents per village, farmers' access to agricultural inputs, access to financial services including agricultural credits, and access and linkages to markets. Other indicators included extension officer's contacts with farmers, distance that farmers walked to access AEI&SD, and the average time it took for a farmer to receive the request for extension services. In this study, descriptive statistical analyses were used to describe the number of agricultural extension staff, McNeymar's chi-square test was used to analyse and compare respondents' accessibility to agricultural inputs, agricultural credits, and linkages to markets before and after de-linking process. In addition, a paired t-test was used to analyse the respondents' contacts with agricultural extension staff, distance that farmers walked to access AEI&SD, the average time it took for a farmer to

receive the requested extension service and the cost of accessing AEI&SD. All these are discussed below.

4.4.1 Number of agricultural extension agents per village

Of the 390 respondents, 83% reported that, de-linking of AEI&SD had not positively influenced an increase in the number of extension staff in their villages. The data gathered from the Annual Meru and Arusha District Council reports of 2015 indicated that, there was a gap between the required versus the available number of agricultural extension staff before and after the delinking of services. For example, in 2015, Meru District Council (MDC) had village agricultural extension agents requirements of 180 but the actual number was only 50% both serving the livestock and crops production sections. Similarly in Arusha District Council (ADC), the requirement was 142 and the actual was 21%. Before decentralization ADC had the requirements of 62 but the actual was 48% and in MDC the requirement was 72 but the actual was 55% villages' agricultural extension staff.

In addition, in the study villages, it was observed that, majority of the villages had either one extension staff or sometimes none. According to the agricultural extension policy of 1997, each village was supposed to have two agricultural extensions staff; one for crops section and the other one for livestock section. Therefore, these findings imply that, there are serious gaps in the number of agricultural extension agents during the implementation of de-linking reforms than before. The shortages of agricultural extension agents after de-linking reforms can be explained by the rapid increase of administrative areas which increased the pressure of bringing social services closer to the communities, which are the cornerstone of the de-linking philosophy. However, observations showed that, an increase of the administrative areas did not match with the increase in the number of agricultural extensions staff. Furthermore, the shift in the recruitment of agricultural extension staff to

LGAs was controlled by the Central Government through the Public Service Act No. 8 Of 2002 as amended by Act No. 18 of 2007, section 29(1). Such recruitment, by LGAs is based on the availability of funds from the government. These study findings are in line with those reported by URT (2015); Mattee (2010) who found that there were inadequate numbers of extension agents in the field compared to the actual requirements in the survey districts in Tanzania.

4.4.2 Access to agricultural inputs

The results from McNeymar's test shown in Table 6 revealed that, before administrative de-linking of agricultural extension services 17.44% of the total respondents reported to have had no access to agricultural inputs and 82.56% reported to have accessed agricultural inputs. In 2015 after administrative de-linking of AEI&SD, 49.27% of the respondents accessed agricultural inputs and 50.77% of the respondents did not.

Table 6: McNeymar's chi square test results for accessibility of agricultural inputs before and after de-linking of services (n=390)

		Current 2015			Chi square Value	P-Value
Before 2000	Access to agricultural inputs					
		Not accessed n (%)	Accessed n (%)	Total		
	Not accessed	17(25)	51(75)	68(17.44)	72.84	0.01
	Accessed	181(56.21)	141(43.79)	322(82.56)		
Total	198(50.77)	192(49.27)				
	Access to financial services					
	Not accessed	0 (0)	43 (100)	43 (11.03)	96.20	0.01
	Accessed	194 (55.91)	153 (44.09)	347(88.97)		
	Total	194 (49.74)	196 (50.26)			
	Access and linkage to markets					
	Not accessed	20 (30.30)	46 (69.70)	66 (16.92)	99.85	0.01
	Accessed	204 (62.96)	120 (37.04)	324 (83.08)		
	Total	224 (57.44)	166 (42.56)			
	Access to agricultural information technology					
	Not accessed	16 (23.88)	51 (76.12)	67 (17.18)	76.08	0.01
	Accessed	185 (57.28)	138 (42.72)	323 (82.82)		
	Total	201 (51.54)	189 (48.46)			

Source: Field data 2015

These study findings revealed that there was a statistically significant difference in the way the respondents accessed agricultural inputs at $p \leq 0.05$ (Table 6). This signifies that, respondents' access to agricultural inputs was not enhanced by the de-linking of agricultural services. Primarily, de-linking of services was designed to improve farmers' access to agricultural services and ultimately increase agricultural production.

Based on the policy objectives, this analysis revealed that, 82.56% of the respondents reported to have had more access to agricultural inputs before de-linking as opposed to 49.27% of the respondents after de-linking. The exclusion of some of the respondents in terms of agricultural inputs access before and after de-linking of AEI&SD can be explained by a number of reasons. Firstly, AEI&SD under the decentralized system had adopted demand-driven approach as opposed to supply-driven, which was dominant before the decentralization process. Secondly, prior to the decentralization reform, agricultural extension staff advised farmers regardless of their needs as most of the farmers worked in organized *Ujamaa* farms. However, during the demand-driven era, farmers had to initiate the demands for services and were obliged to pay for the service which later discouraged majority of farmers to seek for such services.

Observation revealed that, some of the interventions which were advocated during the decentralized AEI&SD were narrow in focus and targeted only certain groups of farming communities. For example, Hepelwa *et al.* (2013) pointed out that, in 2010 the Government of Tanzania through the Agricultural Sector Development Programme adopted agricultural inputs voucher system through the National Agricultural Inputs Voucher System (NAIVS). The system provided subsidies to middle income household farmers both in Meru and Arusha District Councils. The subsidy, included inorganic fertilizers, maize and paddy seeds that aimed at increasing agricultural production and

productivity among farmers. During this time, in Arumeru District Council, a total of 46 000 (47%) farming households out of 97 545 farming households benefited from the programme. However, observations revealed that, NAIVS implementation had a number of challenges such as high prices of agricultural inputs which farmers were asked to pay, poor quality of the inputs and poor timing of the supply of inputs such as fertilizers and insecticides. Furthermore, in the study villages of Mlangarini, Poli, Kikwe, and Lengijave it was noted that, the government supplied agricultural inputs to farmers through NAIVS which benefited only few farmers. Again, those who received the inputs ended selling them to the input dealers (Hepelwa *et al.* 2013). Untimely delivery of agricultural inputs forced majority of farmers in the study areas to seek inputs to private suppliers including agro input dealers. To this one of FGD participants said:

The governments rarely supplies us with agricultural inputs, we normally depend on private vendors. But the challenge with private vendors is that sometimes they supply us with fake and defective agricultural inputs. For example, you may buy seeds which do not germinate (FGD participant- Mlangarini village-01.09.2015).

These findings correspond with those of IFPRI (2010) who found that, despite decentralization of agricultural extension services in Nigeria, only 46.4% of the farming households accessed and used modern agricultural inputs such as improved seeds, chemical fertilizers and pesticides. Contrary to this, a study by Nambiro *et al.* (2006) in Nairobi, Kenya, found that there was improved access to agricultural inputs with increased level of decentralization.

4.4.3 Access to financial services

Table 6 shows that, 11.03% of the total 390 respondents indicated to have had no access to financial services before de-linking of AEI&SD and the remaining, 88.97% reported to

have had access to financial services. Furthermore, 11.03% of the respondents who previously reported to have not accessed financial services before de-linking process reported to have accessed them after the de-linking of agricultural services. In addition, of the 347 respondents who reported to have accessed financial services before de-linking more than a half, (55.91%) indicated to have not accessed financial services after de-linking of the services. The differences in the proportion between the respondents who accessed financial services before and after de-linking agricultural services were statistically significant at $p \leq 0.05$ (Table 6).

The study findings show that there was a significant decrease in the percentage of farmers who accessed financial services after delinking of agricultural services. Hence, holding other factors constant, de-linking of agricultural services did not improved farmers' access to financial services. These findings conform to those of Madafu (2015) and AfDB (2010) who found that, access to formal credits in Tanzania was confined to large urban centres with high collateral requirements. Moreover, information asymmetry, high operation cost in rural areas, and incapability of customers hindered farmers from accessing financial services. Despite that, previously the government had regulated the financial sector by subsidizing agricultural credit window, which in turn, made most of the farmers to have access to credits easily. However, in all the study villages the respondents complained about the lack of accessibility to financial information services and this was associated with high interest rates and stringent conditions.

4.4.4 Access and linkage to agricultural market

In addition, McNeymar chi-square test in Table 6 shows that before de-linking 16.92% of the total 390 respondents reported to have not been linked to and accessed the markets while 83.08% reported to have accessed the markets. Moreover, of the 66 respondents

who reported to have no access to markets before de-linking, more than two thirds 69.70% reported to have accessed the markets after de linking services. In addition, it was found that 37.04 % of the 324 respondents who indicated to have accessed and been linked to markets before de-linking had accessed and had been linked to the markets since 2015. Furthermore, in 2015, less than half, that is, 42.6% of the respondents reported to have accessed and were linked to the markets after de-linking of AEI&SD. McNeymar's chi-square test results indicated that there was a decrease in the proportion of farmers who reported to have accessed and been linked to agricultural markets after de-linking of agricultural services was statistically significant at $p \leq 0.05$.

Currently, Tanzania is more connected with road networks which can enhance linkages and farmers connections to the markets. Poor access and linkages to the markets are made worse because of limited and inaccurate marketing information and inefficient cooperative societies among others things. For example, Baghat and Dhar (2012) found that, timely information on agricultural marketing accessibility was essential for increased farmer's productivity in west Garo hills District of Meghalaya in India. On the other hand, Mwangi *et al.* (2015) recommended that in order to promote market access, policy makers should formulate policies that promote group membership, improve physical infrastructure, and facilitate access to credit as well as promote market-led extension services especially among women and the youths. Therefore, connections to road networks are important in enhancing linkages and access to the markets for increased production.

4.4.5 Access to information on agricultural technologies

McNeymar's chi-square tests results in Table 6 show that there was a significant decrease in the proportion of the respondents who reported to have accessed information on agricultural technologies after de-linking of AEI&SD. About 17.18% of the 390

respondents reported to have not accessed information on agricultural technologies before de-linking, while 82.82% indicated to have accessed information on agricultural technologies. On the other hand, 76.12% of the respondents reported to have accessed information in 2015 while 23.88% reported not to have done so. Moreover, less than half, (i.e. 42.72%) of the 82.82% of the respondents who reported to have accessed information on agricultural technologies before de-linking reforms reported to have done so in 2015 after the de-linking of agricultural services; and 57.28% reported otherwise. The study findings revealed that 82.82% of the total 390 respondents reported to have accessed information on agricultural technologies before de-linking, and only 48.46% of them indicated to have accessed it in 2015 after the de-linking.

Generally, about half (51.54%) of the respondents had the view that de-linking of AEI&SD had not positively influenced access to information on agricultural technologies. Several factors could have contributed to this. The first was shortages of agricultural extension staff coupled with lack of innovative extension service approaches. The second was the cost of technology adoption, and the thirdly was weak farmers' social networks as well as weak local government commitment and coordination of farmers. For example, the respondents in the study villages complained about the absence of agricultural extension staff and weak local government coordination as opposed to when MALF managed and supervised the staff. Also, the African Development Bank report of 2010 found that agricultural extension services in Tanzania is characterized by weak research-extension-farmer linkages, poor public-private coordination and poor technological diffusion. According to World Technology Achievement Index (WTAI) report of 2015, Tanzania was listed as the marginalized and was ranked 157 out of 213 countries with a technology index of 0.102 indicating poor technological achievement. In connection to the latter, 57.28% of the 390 respondents reported to use old technologies, which limited their

capacity and efforts to increase agricultural production and productivity. These data were supported by one FGD participants who said:

Decentralization of agricultural extension services has done nothing with regard to us accessing agricultural technologies. We are still using our old technologies just like our ancestors did (FGD participants-Ndatu Village-15.07.2015)

4.4.6 Farmers contacts with extension agents

Table 7: Average extension agents contact with respondents before and after administrative de-linking of AEI&SD (n=390)

Extension staff contact with the respondents	Mean Score	Mean Score	95% confidence interval		t	Sd	df	P value
	Before 2000	2015	Lower	Upper				
Number of contact days AEA spent in a farmer group per village per month.	2.39	1.48	0.76	1.54	12.44	1.44	389	0.01
Number of contact days AEA spent per farmer in per month.	2.17	1.02	0.99	1.31	14.15	1.60	389	0.01
Number of meetings Village Extension Agents held per village per year	2.69	1.48	1.06	1.35	16.22	1.47	389	0.01
Number of organized field demonstration days held per year	2.80	1.51	1.17	1.39	23.06	1.09	389	0.01
Average time lapsed after AEA attended farmers' request	1.67	2.18	-0.70	-0.40	-	1.50	389	0.01
Travel distance a farmer made to access agricultural extension services.	6.89	7.44	-0.51	-0.42	-7.28	.90	389	0.01

Source: Field data 2015

Farmers contact with agricultural extension agents was one of the indices used to measure access to AEI&SD before and after de-linking reforms. The contacts that agricultural extension agent made to farmers was assessed through a number of indicators. Such

indicators included contacts days AEA spent in the farmers group and individuals per village per month, the number of meetings AEA held per village per year, and the number of organized field demonstrations held per year. Others were the average time which lapsed after AEA had attended the respondents' request, and the travelling distance respondent walked to access AEI&SD.

Table 7 shows paired t-test results of average mean frequency scores of contacts that AEA made to the respondents before and after de-linking of AEI&SD. A paired-sample t-test is used to compare the mean scores for the same group of people on two different occasions or when matched pairs (Pallant, 2007). Therefore, change in the mean score whether increasing or decreasing between two different points signifies intervention in terms of improvement or the opposite.

Results in Table 7 revealed that the mean difference for all the six performance indices which were used to measure effectiveness of extension-farmers contacts before and after de-linking process were statistically significant at 5% level of confidence. However, despite the results being statistically significant, they provided little clue on the degree to which the two variables (de-linking and AEI&SD) were associated to one another. This aspect is critical in ascertaining the impact of the reform on the extension service delivery. Pallant (2007) provides evidence that, with large samples, even a small difference between groups can be statistically significant though not necessary having any practical or theoretical significance. Therefore with the view of the information given, the researcher calculated the effective size to determine the influence of the policy reform on agricultural extension information accessibility. The Cohen (1988) scale and classification were used, with $r=0.01$ indicating small effective size, $r=0.06$ indicating moderate effect size, and $r=0.14$ indicating large effect size. Based on Cohen (1988) classification, the effect size

analysis showed that, all indices tested had r above 0.14. This suggests that de-linking reform had large effect size and therefore provided justification that, the difference in the mean scores between two periods had been contributed by the de-linking reforms.

4.4.6.1 Average number of AEA contacts days' to famers group per month

Based on the average number of contact days that agricultural extension agent had with the farmers' group per month before and after de-linking, the data in Table 7 show that the number of days AEA spent in a farmer group per village per month before 2000 had a mean score of 2.39 while in the 2015 it had 1.48. The mean difference on the average contacts days AEA spent per farmers' group per village between two periods was 0.91 and was statistically significant at $p \leq 0.05$. The findings indicate a decrease in the mean scores of the average contacts days in a month that the AEA spent per farmers' group per village with a 95% confidence interval stretching from 0.76 to 1.54 upper bound. The contacts days an agricultural extension agent had with a famers' group in the village per month was lowered by one meeting per month after the de linking of extension services.

The decrease in the mean score between two periods under study can be explained by the shortage of extension staff and poor management and supervision compared to the period before de-linking when the management and coordination was under the central government. In addition, de-linking of extension services went hand in hand with the proliferation of extension administrative and management levels. In fact, such levels included regional, district, division, ward and villages with an officer in charge for agricultural extension management and coordination. The increase in the levels not only increased the cost and burden for running extension services, but also it brought new lines of responsibilities which were more managerial in nature and therefore extension officers spent more time in the offices than in the fields.

In the surveyed areas of Ndatu, Lengijave, Kikwe, Poli and Elkujerenderit, the researcher visited and witnessed villagers complaining that, Agricultural extension agents spent more time in the offices doing paper work such as report preparations, report writing and action plans. It was anticipated that, with the de-linking process and bringing supervision and management of extension officers to the lower levels, farmers could have more access to and contacts with farmers. However, the reality in the ground was contrary to the policy expectations. Moreover, the average mean score difference between two periods had $r=0.2$ and as Cohen (1988) indicated the de-linking reform signifies large effect size. The results obtained imply that, despite the difference in the mean score being statistically significant, to a large extent, the de-linking process had contributed to the difference in the findings. The results findings are in disagreement with those of Aboagye (2015) who confirmed that the de-linking of agricultural services increased the frequency of agricultural extension agent's contacts with farmers' groups.

4.4.6.2 Average number of contacts days to individual farmer per month

The results in Table 7 show that, there was a statistically significant decrease in the average number of contacts that the extension agents had to individual farmers per month from 2000 before with the mean score of 2.17 to 2015 currently with the mean score of 1.02. The mean difference score between two periods in relation to the average number of AEA contacts days per individual farmer per month was 1.15 which was statistically significant at $p \leq 0.05$. Based on 95% confidence interval the difference stretched from 0.99 as the lower limit to 1.31 as the upper limit. As per Cohen (1988) approach of calculating the effect size of de-linking reform on frequency of AEA to individual farmer, the mean difference was found to have $r=0.3$ which indicates large effect size. Therefore, it is apparent that, despite that other factor might have contributed to the reduction in the AEA frequency to an individual farmer; the de-linking reform had large contribution to the

existing AEA to farmers' contact. The results obtained are in agreement with those reported by Gido *et al.* (2014) in a comparative study between organic and conventional farmers who found a significant decrease in the number of contact days among small holder farmers between conventional and organic farmers. Organic farmers had a mean of three contacts with extension providers as opposed to conventional farmers who had a mean of one contact day during the year.

The decrease in the number of contacts days per month that AEO had before the delinking process has been attributed to increased number of farming enterprises in relation to staff disposition in the village. In addition, continuously the Local Government Authorities increased the number of administrative areas such as villages and wards with no additional number of staff. For example, it was noted that in Meru District Council, the number of villages and wards increased from 69 to 89 and wards from 17 to 26 respectively. The increased number of administrative areas did not correspond with the policy requirements which needed every village to have two agricultural extension agents; one for crops and the other for livestock. Basically, most of the surveyed villages had acute shortage of agricultural extension staffs. The situation was critical in Lengijave village which is a pastoralist village where the researcher found a case where a large number of cattle died because the respondents gave a wrong vaccine after consulting an agro-dealer in Arusha town, which is located 40 kilometres away from the village centre. The situation could have been averted if there was a policy pronouncement regarding extension agents' disposition.

4.4.6.3 Number of meetings that village AEA held per year in a village

Regarding the number of meetings that agricultural extension agent held per year in villages, the results in Table 7 show that, the mean score of the number of meetings that

AEA held per year per village before delinking was 2.69 and currently in 2015 it was 1.48. The mean difference in the number of meetings that the village AEA held in the village per year was 1.21 and this was statistically significant at $p \leq 0.05$ ranging from 1.06 lower limit to 1.35 upper limit. The findings indicated a significant decrease in the average number of meetings that AEA held with farmers in the village per year. The calculated eta squared statistics for determining the magnitude of association between the de-linking reform and the number of meeting that AEA held had $r=0.50$ indicating high policy influence. Therefore, it is clear that, the instituted de-linking reform has important bearing on the attitude and performance of AEA. The findings are in disagreement with those reported by Saeed *et al.* (2006) who posited that, decentralization of extension systems increased mobilization of agricultural extension agents to provide advisory services to farmers.

These study findings can be explained by a number of reasons including increased the ratio between the number of farmers to the extension officers and inadequate resources to enable extension workers execute their duties as required. In 1970s and early 1990s, majority of farmers were organized in cooperative societies and practiced communal farming under the so called '*Ujamaa*' and rural development ideology. During that period, it was easy for an extension officer to organize agricultural knowledge dissemination under the umbrella of village meetings or cooperative societies. However, it was noted that, with both political and extension service pluralism, it has been very difficult to organize village meeting as farmers had a mixed of feelings regarding village meetings convened by village government and chaired by a representative of political parties called village chairperson. In most cases, the villagers associated the meeting with propagation of specific political agenda. It was reported by members of the village government that poor attendances of the villagers during organized village general meetings deter extension

agents plans and strategy of sharing and disseminating agricultural knowledge and information with farmers. The situation is alarming in areas with strong political competition between the ruling and opposition parties.

Moreover, shortages of agricultural extension agents explain the reduction of extension agents meetings with farmers. According to Davis *et al.* (2010), Tanzania is estimated to have the overall farmers to extension worker ratio of 2 500. In addition, the number of agricultural extension agents is 10 089 compared to the required number of 15 853 (URT, 2015). The general impression from both farmers and extension of agents indicates that, shortage of extension agents is one of bottlenecks towards effective extension agents's contacts with farmers. This reality in the ground is in line with what is reported by Mattee *et al.* (2008) and URT (2015) who assessed the performance of AEI&SD under the Agricultural Sector Development Programme and the state of agricultural extension services respectively. According Mattee *et al.* (2008) despite the extension services reforms, the numbers of agricultural extension agents were low compared to the number of villages. This assertion is justified by the observations from farmers during focus group discussions who claimed that:

We have never seen such a person and I'm not sure if at all we have one in this village. We, farmers we have been neglected by the government and we are suffering a lot .We are just doing agriculture as routine work based on old years' experiences (FGD-Ndatu village-15.07.2015).

4.4.6.4 Number of organized field demonstration days per year

According to the data in Table 7, there is no sufficient evidence to substantiate that, de-linking reform has influenced positively the implementation of organized demonstration days to farmers by AEA. The results revealed that, there was a statistically significant

decrease in the average number of field demonstration days per year from the average mean score of 2.80 before the de-linking to the mean score of 1.51 after the delinking. The data show that there was a mean difference of 1.28 which was statistically significant at $p \leq 0.05$ ranging from 1.17 lower limits to 1.39 upper limits. The mean difference had an eta squared value of .50, which according to Cohen (1988) classification, implies that the administrative de-linking reform had a large effect size.

The magnitude of the association between variables provided an impression that if it could have been properly designed and executed the de-linking reform would have addressed most of the challenges facing extension services delivery in Tanzania. Similar findings are reported by Kyaruzi *et al.* (2010) who revealed that extension methods that attract attention and stimulate desire for further information, such as farmers' field days, agricultural shows, folk media and film, cinema or film shows and brochures/leaflets distribution, were not commonly used in the study area. The decrease in the number of demonstration days might be attributed to the increased use of Farmer Field Schools (FFSs) an approach which was not popular before the delinking of AEI&SD. Again, in the surveyed areas, the researcher found most of the villages had already established FFSs but there was a challenge of encouraging more farmers to join and make use of the FFSs. In Ndatu Village, the researcher witnessed a group of farmers expressing their dissatisfaction with the relevance of FFSs which were established and facilitated by public extension officers. The respondents had a view that, most of the FFSs were compared to those which were established by Sasakawa Global 2000 which was one of the Non-Governmental Organizations that operated in the village up to the late 2009. In addition, the respondents testified that the majority of them were not interested in joining the groups because they did not get any new information, while others reported not to have been interested due to group's leadership challenges.

4.4.6.5 Distance in accessing agricultural extension information and services delivery

The results in Table 7 indicate that, there was a statistically significant increase in the average mean distance in accessing AEI&SD from an average mean score of 6.89 before the delinking to an average mean score of 7.44 currently. The mean difference in the actual distance that was walked to access AEI&SD between the two periods was -.55 which was significant at $p \leq 0.05$ ranging from -.70 to -.40. This implies that the respondents currently walk longer distances to access AEI&SD than used to before. The researcher performed an effect size analysis to determine whether the increase in the distance between the two periods under study had been contributed by the delinking reform. According to the findings, the mean difference had the eta squared value of 0.50 which according to Cohen (1988) signifies large reform effect size. The magnitude of association between variables under study was too strong. The results showed a negative sign both in t and mean scores. It should be recalled that, the negative sign of a t-value tells us nothing more than the direction of the difference in the sample means. Therefore the study results, show that, instead of reducing the distance that farmers travelled in accessing agricultural extension information and services delivery, now farmers travel longer distances than before in accessing public AEI&SD. It might be puzzling as to why the situation remains this way despite some improvement in road infrastructural networks and an increase in the number of agricultural extension service points. It appears that, despite the increase in AEI&SD in the study area, the majority of these are operated by private agro-dealers contrary to the focus of this study which was limited to public extension services.

It is acknowledged that, in other extension literature decentralization of extension services includes extension pluralism, which also involves non-state actors such as agro-dealers,

non-governmental organizations, and faith based organizations. But experience from the field has shown that farmers still walk long distances searching for reliable and affordable AEI&SD and ultimately distance influence farmers' demand and access to it. These findings are supported by Gido *et al.* (2014) who revealed that distance to the nearest extension service provider significantly influenced the demand for AEI&SD. To justify this observation one of the farmers was quoted saying that:

If you want to access extension services you need to travel to National Artificial Inseminations Centre (NAIC) about 30 km or to Tengeru which is about 40 km from here. At Tengeru you will meet with agro chemicals dealers who will offer advice on crops and animals production. (FGD-Lengijave village-27.08.2015)

An increase in the distance travelled by farmers in accessing AEI&SD can be explained by the prevalence of inefficient extension services systems at the grass root level. Despite having many administrative levels following the de-linking of extension services it is still possible to find an extension officer without working facilities due to the inadequacy of extension service funding, which compromises the attainment of the envisaged reform objectives. As a result, extension officer's capacity is impaired in serving farmers timely. Moreover, agricultural challenges which emerged overtime expedited farmers' urge to look for better services especially when the available supply is inefficient. Things such as emergence of new pests and diseases that public agricultural extension agents are incapable to handle are just a few of these challenges.

4.4.6.6 Average time lapsed by AEA to attend farmers' request

The study results (Table 7) show that, the average mean score of the time lapse of AEA attending farmers' request was 1.67 before the de-linking and was 2.18 after the delinking in 2015. The results in Table 7 indicated a statistically significant increase in the average

time taken to be attended by an agricultural extension agent at $p \leq 0.05$ from the time the service was requested. The mean increase was -.51 with a 95% confidence interval stretching from -.51 to -.42. The mean difference had $r=0.50$ which indicates a large reform effect size. Therefore, the consideration of other factors that might have resulted to an increase in the lapse in time between the two periods was essential as the delinking reform had a significant contribution.

Contrary to the reform expectations, the findings suggest that, after de-linking of extension services farmers have to wait longer than before to be attended by agricultural extension. Instead of being more efficient in terms of timing, things are worse after than before the delinking. The results are in contrast with Birner *et al.* (2006), extension services performance measurement framework which postulates about the importance of time, efficiency and effectiveness in service delivery. Also, Anderson and Feder (2003) reported further that, effective extension involves adequate and timely access to relevant advice by farmers. Poor response and mismanagement of time by extension officers is attributed to various reasons including the scattered nature of the farmers against the limited number of extension agents, majority of who lack working facilities. Also, there were poor roads infrastructure to facilitate connectivity between different points; and lack of commitment among agricultural extension agents. During the study, it was observed that some of the villages were very remote with poor road networks. Most of the villages in such locations lacked extension officers as the majority of extension officers prefer to stay in areas where there is connectivity and other basic services.

4.4.7 Costs of accessing agricultural extension information and services delivery

The researcher did a descriptive analysis to determine respondents' opinion on the influence of costs in accessing AEI&SD before and after the de-linking process. The

results revealed that, majority (83%) of the respondents reported not to have been relieved in terms of costs of accessing AEI&SD. Before the de-linking reform, the Government of Tanzania took a series of measures which were geared at reducing the costs and provided a relief to farmers. Some of the measures included the provision of agricultural subsidies in the 1980s, which was later abandoned following the implementations of International Monetary Fund (IMF) and World Bank Structural Adjustment Programmes, and Economic Growth reforms (Heidhues and Obare, 2011). Therefore, majority of respondents reporting not to be relieved in terms of cost for accessing AEI&SD imply that, farmers either incur more costs or have not noticed any costs relief when accessing AEI&SD between the two periods under study.

The results can further be attributed to several factors including absence of mechanism that is geared at supporting farmer's efforts in terms of subsidies. As it has been explained earlier, before the de-linking the government subsidized agricultural production through specific programmes and ultimately reduced production costs. In addition, the services were more in the form of supply driven but with the delinking a farmer had to initiate demand which in most cases is associated with cost such as airtime for calling extension officers, service charges which are inclusive of transport cost.

In the surveyed villages majority of the respondents were pastoralist of Elkujeranderit and Lengijave, the researcher noticed the respondents incurring transport cost to Arusha town which is located 40 km from the village centre searching for vaccines or refunding the cost for livestock specialist from the nearby villages. The demand –driven nature of decentralized AEI&SD to the greatest extent, contributed to such trends. Similar experience is reported by some literature worldwide. For example, Masangano and Mthinda (2012) confirmed that, a well-designed decentralized demand driven extension

services deliberately creates a cost recovery mechanism to sustain agricultural extension service financing. In Malawi, the Malawian National Agricultural Extension Policy of 2000 emphasized the importance of extension services cost sharing by having a policy statement; “Those who benefit pay.” As a result, only those who are capable to pay for the cost can access extension services. During a focus group discussion in one of the group said;

Since the public agricultural extension agents are not easily accessible, we normally call private extension agents for urgent solutions. Although consultation cost is very high we still keep in touch with them because they are the only ones available at our village. (FGD-Kisyeria Village-22.08.2015).

4.4.8 Type of support farmers received from agricultural extension agents before and after the de-linking reforms

The researcher did a multiple response analysis to ascertain the level of effectiveness of the support which farmers received from agricultural extension agents before and after the de-linking of AEI&SD. The researcher compared the identified list of services between the two periods. The majority 69.5% of the respondents reported not to have gotten any type of support from the agricultural extension agents. The findings suggest that the respondents were disconnected with the provisions of the earmarked services with the implementation of the de-linking reform than before. Due to limited number of agricultural extension agents, inefficient AEI&SD support system, and high cost in accessing extension services with de-linking reforms, the respondents shifted demand to their fellow farmers. It was confirmed in the surveyed areas that the respondents were supported by their fellow farmers in making various agricultural decisions. These results are in line with the ones reported by Lwoga *et al.* (2011) and Bernard *et al.* (2014) who

revealed that most of the farmers in Tanzania rely on family, neighbours, and parents as the main reliable source of information.

Unlike in Tanzania, where there is limited number of public extension officers who can offer reliable and credible support to farmers (URT, 2015), a World Bank study (2007) revealed that, delinked public AEI&SD in Indonesia has a positive impact on supporting farmers in diseases/pests control and management and in the application of fertilizer and other best agricultural practices.

Based on market information services, research findings revealed that, a few 4.4% of the respondents reported that de-linking of extension services had not significantly contributed to an increase of access to the market information services. This implies that, the access to services had either remained the same or the respondents had gotten more market information services before the de-linking than after. In the surveyed areas, farmers were noted to use radio, fellow farmers and middlemen as the main marketing information sources. The importance of reliable marketing information sources to farmers cannot be underestimated. Ronald *et al.* (2014) found that majority of farmers need information about marketing of their products.

Moreover, Omoregbee (2011) found that, the use of market information facilitated spatial distribution of products from farm gate to consumers in the cities and between markets. Therefore, there is a compelling need to establish market information services to assist both farmers and traders to adjust to liberalized marketing in the short term and to assist farmers to better plan their production in the long term. Similarly, in the current study, farmers took other initiatives in searching for alternative marketing information sources such as fellow farmers and national radio so as to fill extension agents' gap.

4.4.9 Sources of information that farmers rely on when making agricultural decisions before and after de-linking reforms

Descriptive and trend analyses were used to determine farmers' decision making basis in relation to technical, financial, marketing, training and disease control decisions before and after the de-linking of agricultural extension services. From the surveyed villages, the trends showed that the respondents' behaviour in relation to information source varied with the nature of agricultural decision undertaken. However in Table 8, the findings show that, about one third (35.6%) of the respondents were reported to use information from their fellow farmers for various decisions making about agricultural practices after than before the de-linking reforms. The results are in agreement with those found in a study by Ronald *et al.* (2014) whose assessment on farmers' information needs for kilombo rice farmers found that farmers used their fellow farmers, family or parents, personal experience, or neighbours as their main source of agricultural decision making. The findings can be explained by a number of reasons including shortage of extension officers following increased number of villages during the implementation of de-linking reform. During the survey period, most of the villages were found to have higher extension requirements than the actual available number of agricultural extension agents.

As a result of good frequencies coverage with specific programmes addressing agricultural issues community and National TBC1 Radio were reported to have high influence in disseminating agricultural information to the majority of the respondents now than before the de-linking reforms. The results relate with Familusi and Owoeye, (2014); Adio *et al.* (2016) who found that, farmers mostly used radio for pests, diseases and weed control, fishing disaster control and mitigation, fertilizer procurement and application, post-harvest technology, sourcing for labour, as well as agricultural credits. In the surveyed villages, the respondents testified to have received marketing price information from various

regions through a specific programme which is broadcast early in the morning via TBC1 Radio One and the Community Radio.

In addition, the results in Table 8 reveal that, cooperative societies and farmers' associations recorded low contribution of 0.3% and 0.5% respectively as farmers' information source during the implementation of the de-linking reforms than before the delinking process. The research findings are in disagreement with those reported by Ogunleye (2015) who found that farmers in the cooperative societies benefited through the provision of input, accessibility to loan and marketing of produce. Moreover, Ogbeide (2015) found out that there was a significant relationship between the co-operative society and the growth in size of the rural business in the rural community. The results brought up a new challenge to cooperative societies reformers and other interested parties that, farmers still have little confidence and rarely use these institutions as their main information source for critical agricultural decision making. One of the probable factors for such phenomena might include farmers' loss of trust on cooperative societies and associations due to past experiences as most of them were associated with mismanagement and embezzlement of funds. This observation is confirmed by one of the farmers in a FGD who commented:

I will never bring again my crops at that warehouse as it reminds me of my stolen crops without compensation. When I filed a case at primary court, it was not worked out (FGD-Kikwe Village-02.08.2015).

This argument shows why farmers have been disconnected from farmers' associations and cooperative societies, and therefore they cannot benefit from them.

**Table 8: Farmer's information sources under administrative de-linking reforms
(n=390)**

Information sources	Frequency	Percent
National radio (TBC1)	130	33.3
Community radio	68	17.4
National television	20	5.1
Private television	14	3.6
Village government	72	18.5
Flyers	22	5.6
Leaflets	3	0.8
Fellow farmers	139	35.6
Farmers groups	46	11.8
Agricultural extension offices	29	7.4
Newspapers	20	5.1
Market agents	9	2.3
Farmers association	1	0.3
Cooperatives	2	0.5
Others	8	2.1
Total	583	100.0

Source: Field data 2015

NB: The total numbers of responses exceed 390 due to multiple responses

4.4.10 Involvement of farmers in participatory extension approaches

Regarding participatory extension approaches, the study used a descriptive analysis to determine involvement of the respondents in the Farmer Field Schools (FFSs), which popularly advocated participatory extension approach under the decentralized system. Theoretically, farmers under the FFS were organized in groups to study a particular topic of interest. The topics covered varied from conservation agriculture, organic agriculture, and animal husbandry to income generating activities.

In order to determine farmers involvement, the analysis was done based on the number of FFSs that agricultural extension agents had initiated in a particular village, the number of farmers who attended the FFSs, the number of hours that agricultural extension agents spent in teaching smallholder farmers in the FFSs, and the quantity of crops and livestock types that were grown or raised as a result of the knowledge and skills provided by

agricultural extension agents. The results revealed that, the majority (83%) of the farmers reported that agricultural extension agents had initiated few FFSs, 80%, reported that there was a low turn up of farmers who attended FFSs and 84% cited limited hours that agricultural extension agents spent with the farmers. In addition, though it is difficult to substantiate the contribution of FFSs in agricultural productivity (as its results are a product of compounded factors), majority (82%) of the respondents reported that, FFS had not contributed significantly to an increase of overall crop and livestock productivity. The study's result is in disagreement with those reported in the URT (2013) report which indicated that Farmer Field Schools had a strong impact on farmers in terms of technological adoption and increased income as a result of increased production. The reason for disagreement between these two studies might be attributed to many factors including sampling frame. The URT's (2013) sampling frame was a group of farmers in the Farmer Field School while this study involved the sampling of household farmers regardless of their membership to Farmer Field Schools.

Despite the concerted effort by the Ministry of Agriculture Livestock and Fisheries in promoting the application of FFSs in all Local Government Authorities, on average the majority of farmers did not see the impact of FFSs in terms of yields and agricultural transformation under the context of decentralized AEI&SD. The ineffectiveness of FFS in bringing out the expected results as confirmed by the majority of the respondents might be attributed to many factors, but the probable one is poor LGA preparation and lack of a sustainable mechanism to facilitate the programme. Scaling up of Farmer Field School approach to more villages and farming household is another challenge towards harnessing FFS potentials. The findings are cemented by one female farmer's argument given during one of the FGD while giggling:

Do you think the newly brought agricultural extension agents are meant to stay with farmers in the fields? We normally see them when introduced in the village assembly from there they disappear. There is no sense of accountability at all (FGD-Kikwe Village-02.08.2015)

Generally, the results reveal that, 89% of the respondents had the view that despite the delinking of AEI&SD from the Ministry of Agriculture, Livestock and Fisheries farmers still do not see its impact in terms of accessing extension services. These results are in agreement with the findings by Aboagye (2015) in one of his studies in Sunyani Municipality in Ghana who revealed that decentralized extension services did not bring any positive impact on accessibility to agricultural extension services. However, the results are not in line with those reported by Gebrehimot (2015) who found that decentralization of AEI&SD has improved farmer access to the services in Ethiopia and highly decentralized area in Kenya.

4.4.11 Summary of key findings regarding accessibility of AEI&SD to famers due to administrative de-linking process

The McNeymar test findings revealed a significant decrease in the respondents' access to agricultural inputs, agricultural credits, financial services, agricultural information technologies and linkages to markets. In addition, the paired t-test results showed a significant decrease in the respondents' contacts with agricultural extension staff, and increased distance that farmers walked to access agricultural extension services with the implementation of the de-linking reforms. Moreover, the findings revealed an increase in time taken by farmers to receive the requested extension service and increased the costs in accessing agricultural extension information and delivery services. All indices which were used to measure AEI&SD accessibility during the implementation of the de-linking reforms showed a statistically significant decrease at $p \leq 0.005$. This indicates that the

respondents were more accessible to agricultural extension information services before than during the implementation of the reform. Regarding the number of extension services staff allocated per village, the study found fewer number of agricultural extension staffs per village compared to the number of administrative areas. The study findings show that, farmers' accessibility to AEI&SD was hindered by a number of factors as indicated below.

- i. Slow pace in recruiting agricultural extension agents to match with the increased number of administrative areas.
- ii. Inconsistency in policy implementation, the study findings show that, the Ministry responsible for agriculture was still implementing some of the devolved responsibilities such as recruitment of agricultural personnel hence delaying in filling of the identified staff gaps in villages.
- iii. Limited farmers' access to agricultural extension information and service delivery of due to costs embedded in de-linked agricultural extension information services which advocated for demand-driven approach.
- iv. Agricultural input supply system, for example, the National Agricultural Inputs Voucher System (NAIVS) was insensitive to farming groups diversities as a result it excluded some of the respondents in accessing agricultural inputs.
- v. Untimely delivery of agricultural inputs forced majority of farmers in the study areas to seek inputs from private suppliers including agro input dealers.
- vi. Information asymmetry, high interest rates, and stringent conditions limited farmers accessibility to financial services.
- vii. Limited and accurate marketing information and inefficient cooperative societies hindered farmers' accessibility and linkage to the markets.
- viii. Shortages of agricultural extension agents, coupled with lack of innovative extension service approaches, and the cost of technological adoption hindered farmers' accessibility to agricultural information technologies.

- ix. Shortages of agricultural extension agents and poor management and supervision by LGAs weakened farmers-agricultural extension staff contacts.
- x. Inadequate funding and ill-retooling weakened the provision of extension services as a result the respondents walked long distance searching for services.
- xi. Lack of working facilities, and poor road infrastructure increased average time that extension agents responded to a farmer's requests and demand.
- xii. Limited number of agricultural extension agents, inefficient agricultural extension information and delivery services support system, and high cost in accessing extension services limited AEA support to farmers
- xiii. Unreliable marketing information sources

4.5 Influence of LGA Autonomy on the Quality of Agricultural Extension Information and Services Delivery in Tanzania

This section assesses the influence of LGAs local autonomy in maintaining the quality of AEI&SD. The LGAs autonomy through D by D was expected to increase the quality of the AEI&SD among small farmers. The influence of LGAs autonomy on the quality of services were measured using a number of indices that included responsiveness of the agricultural extension services, the existence of a feedback mechanism, relevance and quality of delivered agricultural information and technologies, and knowledge and agricultural skills that are delivered to farmers. Others included efficiency in the delivery of services, funds allocated to finance agricultural extension services, the adoption of technologies from extension staff, diversities of extension methodologies used and inclusiveness in the delivery of services.

One of the primary objectives of decentralizing AEI&SD was to improve the quality of service delivery. To achieve this goal, LGAs were given more autonomy to manage and

administer agricultural extension and delivery of services through D by D policy. LGAs autonomy is primarily concerned with, dispensing responsibilities, resources and discretion conferred on it. Other Acts that granted autonomy to LGAs included the Local Government Act No. 9 of 1999, Local Government Finance Act of 1982 as amended in 1999, and Local Governance Financial Memorandum of 2009. The autonomy granted to LGAs connoted the right of self-government or management of its own affairs.

Additionally, in assessing respondents' opinions on the influence of LGAs autonomy, a number of tests were undertaken including the paired t-test, MCNeymar chi-square test and descriptive statistics analysis. The paired t-test measured the effectiveness of feedback mechanism before and after the increase in LGAs autonomy and AEA timely response from the respondent's demands. Moreover, MCNeymar chi-square test measured the relevance of information delivered by the AEAs on crops and livestock, relevance of delivered technologies on crops and livestock, and the quality of agricultural information. Other measures were on the quality of knowledge and skills offered on crops and livestock production. Furthermore, descriptive analysis was used to test the use of various methods and approaches to deliver knowledge and skills to the respondents, the adoption of technologies and efficiency of AEAS. In addition, for the case of paired t-test and MCNeymar chi-square test, the researcher calculated eta statistics to determine the magnitude of association between the increase in LGAs autonomy and the quality of decentralized agricultural extension information which was delivered to the respondents. All the tested variables indicated that, LGAs autonomy had an influence on the quality of decentralized agricultural extension information delivered to respondents. A discussion of the findings is presented in the next section.

4.5.1 Responsiveness of the AEA from the time farmers demand was initiated

Responsiveness of the AEAs is one of the indicators on the quality of the delivery of AEI&SD. Paired t-test was used to assess responsiveness of the agricultural extension staff by measuring the average time they used to respond to the respondents' initiated extension service request when under LGAs autonomy. The results in Table 9 show that, the average mean score time that AEA attended farmers requests before the LGAs autonomy was 1.67 and in 2015 was 2.18, the results were statistically significant at $p \leq 0.05$. The study findings imply that, with the increase in LGAs autonomy the respondents had to wait longer before agricultural extension staff responded to their requests. The study findings are in disagreement with those reported by Birner *et al.* (2006) who postulated about the importance of time during the delivery of AEI&SD. In addition, Anderson and Feder (2003) found that, effective extension services delivery involved timely access by farmers to relevant agricultural advice and information.

The respondents' opinions regarding delay and irresponsiveness of the AEAs were attributed to a number of reasons including the scattered nature of the respondents' farm and limited number of extension staff. Moreover, the majority of them lacked working tools and transport facilities contrary to when AEI&SD were under the management of the then MALD. During the KI interviews at the MALF one of the officers said:

Despite meagre resources that we had when agricultural extension information and service delivery were under our supervision, we managed to coordinate the delivery of extension services up to the village level. During that period majority of agricultural extension agents at the village and ward levels were supplied with working tools and facilities such as motorcycles. (KI- MALF-14.08.2015).

Moreover, in the surveyed areas, it was observed that some of the villages were remote with poor road networks and could not be easily accessed by agricultural extension staff and some of agricultural extension staff were reluctant to work in those areas.

Table 9: Paired t-test results on the response of AEA on farmers initiated demand before and after increase in local government autonomy

Extension officers contact with farmers	Mean Score Before 2000	Mean Score 2015	95% confidence interval of difference		t	Sd	df	P value
			Lower	Upper				
Responsiveness of AEA from the time farmers initiated request	1.67	2.18	-.70	-.40	-11.20	1.50	390	0.01
Extension agents frequency in giving feedback to farmers	2.14	1.03	.82	1.10	13.61	1.40	390	0.01

Source: Field data 2015

Table 9 shows that the respondents received more feedback from the AEAs about agricultural extension information before the decentralized of AEI&SD than after when the LGAs assumed autonomy. The mean feedback frequency score before LGAs autonomy was 2.14, while after decentralization was 1.03. The study findings revealed a mean difference score of 1.10 which was statistically significant at $p \leq 0.05$. Moreover, the study findings were subjected to eta statistical analysis to determine the magnitude of association between LGAs autonomy and efficiency in feedback mechanism and the result was $r=0.3$. Using Cohen (1988) scale $r= 0.01$ indicating small effective size, $r = 0.06$ indicating moderate effect size and $r= 0.14$ indicating large effect size. The obtained eta statistics result $r=0.3$ implies that the LGAs autonomy had significantly influenced the decreases in feedback frequency which the AEA used to have with farmers. This means that the respondents received more feedback about agricultural extension and services

before decentralization than after decentralization reforms. For example, one FGDs participant at Mlangarini Village said that:

The practice of giving feedback to farmers is hardly done as there is no AEA. How can someone get feedback from an agricultural extension staff if we do not have one in the village? (FGD-Mlangarini Village-06.08.2015).

These results are in disagreement with those reported by Saeed *et al.* (2006) who found that increased feedback frequency of agricultural extension staff among farmers occurred with the increased local government autonomy due to the decentralization of AEI&SD. The increase in LGAs autonomy both at upper and low levels was anticipated to increase the powers of LGAs to manage and supervise agricultural extension information and delivery of services. However, this was contrary to what this study found. The reasons for this were insufficient extension services coordination at the LGAs higher and lower levels and shortage of agricultural extension staff to serve farmers.

It was observed further that, despite the rhetoric about agricultural extension services institutional arrangement during decentralization and increase in LGAs autonomy, there were no funds allocated for agricultural extension services coordination at upper and lower levels. This impeded the capacity of the LGAs to coordinate and supervise AEA in their villages. In one of the KI discussion, the District Agricultural Extension Coordinator in Meru was quoted saying:

We have not received extension block grants for a couple of years now. The situation is critical in recent years than before. This makes our role as coordinators become difficult as we cannot monitor the implementation of various directives at lower levels. (KI- DAEC Meru-20.07.2015).

The agricultural extension guidelines for example, requires each AEA to prepare annual action plan indicating all agricultural extension activities to be performed in a particular year. Yet, there were no plans for the supervision of AEA action plan due to shortage of funds for supervisors to visit AEA in their areas of jurisdiction. Furthermore, it was observed that, in Meru and Arusha the annual plans and budgets had not allocated the AEA's coordination and supervision funds from their own sources for more than 8 years despite significant contribution of the agricultural sector into the total LGAs revenue. This situation hindered coordination of the agricultural extension services subsector as opposed to when the services were supervised and managed by MALF. Under the Local Government Finance Act of 1982 as amended in 1999, the LGAs are entitled to receive funds from the central government in the form of block grants to facilitate the coordination and implementation of agricultural extension information and delivery of services but they rarely receive them. During the interview, the District Agriculture Officer in Arusha District Council noted that:

The reliability of funds from the central government for extension services coordination was critical and not predictable. (KI-DALDO-Arusha-01.07.2015).

In addition, one respondent in Kisyeria Village complained that:

Our village for a long time had no agricultural extension agents for advising farmers. For us agricultural extension feedback is a new concept. (FGD- Kisyeria village-27.07.2015).

4.5.2 Agricultural information and technologies that AEA deliver before and after decentralization

This section provides the study findings based on McNeymar's chi-square test results on the relevance of agricultural information on crops and livestock that the AEA's delivered

to the respondents before and after the decentralized agricultural extension services. Of the 390 respondents, most (78.97%) reported to have received more relevant information on crops when management and administration of agricultural services extension were under MALF than after decentralization. In addition, the results in Table 10 reveal that, after the decentralization of AEI&SD less than half (44.10%) of the respondents reported to have received relevant information and technologies on crops and livestock. The proportion of the respondents who received more relevant AEI&SD was higher before than after the decentralization and it was statistically significant at $p \leq 0.05$ level.

Table 10: The McNeymar's chi-square test to compare the relevance of agricultural information and technologies that AEAs delivered before and after decentralization

	After 2015			Chi square Value	P-Value
Before 2000	Relevance of information on crops				
	Not Relevant n(%)	Relevant n(%)	Total		
Not Relevant	20(24.39)	62(75.6)	82(21.)	71.1385	0.01
Relevant	168(64.29)	110(35.7)	308(79)		
Total	218(55.90)	172(44.1)			
	Relevance of information on livestock				
Not Relevant	10(10.87)	82(89.13)	92(23.6)	58.1729	0.01
Relevant	213(71.48)	85(28.52)	298(76.4)		
Total	223(57.18)	167(42.82)			
	Relevance of technology on crops				
Not Relevant	10(10.99)	81(89.01)	91(23.3)	35.7209	0.01
Relevant	177(59.20)	122(40.80)	299(76.7)		
Total	187(47.95)	203(52.05)			
	Relevance of technology on livestock				
Not Relevant	6(10.00)	54(90.00)	60(15.4)	105.6571	0.01
Relevant	226(68.48)	104(31.52)	330(84.6)		
Total	232(59.49)	158(40.51)			

Source: Field data 2015

In addition, the study findings in Table 10 show that, of the 390 respondents, majority (76.4%) reported to have received more relevant information on livestock when agricultural extension services were managed and administered by MALF than when it became under LGAs administration. Furthermore, 23.6% of the respondents reported to have not received relevant information on livestock before the decentralization. Again, the study findings indicate that, after decentralization of agricultural extension services only 42.8% of the respondents mentioned to have received relevant information on livestock keeping. This variable was statistically significant at $p \leq 0.05$ (Table 10). The decrease on the number of the respondents receiving relevant information on livestock implies that LGAs' increased autonomy did not significantly contribute to the improvement in the dissemination of livestock information among farmers in the study area.

Similarly, the study findings indicate that before the LGAs autonomy 76.6% of the respondents reported to have received more relevant technologies on crop production than after decentralization. Furthermore, of the 390 respondents, about a half 52.1% of them reported to have received more relevant technologies on crops after decentralization. The difference in the numbers of the respondents reporting to have received relevant technologies before and after the decentralisation was statistically significant at $p \leq 0.05$ (Table 10). This implies that before the decentralization, the respondents were more accessible to relevant crop and livestock technologies than after the decentralization under LGAs autonomy. Furthermore, of the 390 respondents' majority, 84.6% reported to have received more relevant technologies on livestock keeping before decentralization than after LGAs autonomy. On the other hand, of the 390 respondents 40.5% indicated to have received relevant technologies on crop and livestock after the decentralization. The study findings indicated that there was a significant decrease in the number of the respondents reporting to have received relevant technologies on livestock keeping from the period

when agricultural extension services were administered by the then MALD. The decrease in relevance was statistically significant at $p \leq 0.05$ (Table 10). This implies that the decentralization of AEI&SD did not enhance the respondents' or farmers' access to relevant livestock technologies.

The respondents' opinions on the relevance of AEI&SD they received from AEA had declined with the decentralization and an increase of the LGAs autonomy. This could have been attributed to a number of reasons. First, there was information asymmetry due to poor AEAs distribution in the study areas which resulted into respondents' shift of demand to other sources. Secondly, the absence or shortages of AEA impeded the respondents' access to agricultural information and technologies, as, one of the FGD participants in Olkujerenderit Village indicated:

We lost cattle here because we had wrong information about a vaccine from one agro-chemical dealer. (FGD- Olkujerenderit village-05.07.2015).

In addition, another FGD participant in Ndatu Village reported:

Pesticides for maize and beans were a problem. We only get information on their use from fellow farmers or neighbouring villages. (FGD-Ndatu village-15.07.2015).

In the 2000s, the government established agricultural resource centres in some wards to up-scale agricultural information technologies to farmers. But most of the centres failed because of insufficient funding. In addition, very few wards established the centres. For example, in 2015 it was observed that, only three wards out of 26 had an agricultural resource centre in Meru and only four in Arusha District that had 27 wards. The study findings are in disagreement with the findings of Baudi *et al.* (2013) who found that, there

was an increase in the relevance of agricultural information and technology with the decentralization of agricultural extension services and an increase in LGAs autonomy in two municipalities in Ghana. According to Baudi *et al.* (2013), the decentralization of agricultural extension information and delivery of services had high relevance in the input supply, agricultural technology and training.

4.5.3 Quality of information, knowledge and skills that the AEAs delivered to crop and livestock keepers before and after LGAs autonomy

Table 11 shows the respondents' opinion regarding the quality of agricultural information, skills, and knowledge that AEAs delivered to the respondents before and after the LGAs autonomy. The study findings indicate that, majority (82.1%) of the 390 respondents reported to have received quality information before the LGAs autonomy and only 54.8% of the respondents reported to have received quality information after the LGAs autonomy. This variable was statistically significant at $p \leq 0.05$ (Table 11). In addition, 83.1% of the respondents reported to have received quality skills on livestock production before decentralization as opposed to 40% who reported to have received quality skills on livestock production after the decentralization. The difference in opinion between the respondents who reported on the quality of skills on livestock production delivered by the AEAs to the respondents before and after LGAs autonomy was statistically significant at $p \leq 0.05$ (Table 11). These study findings imply that, the majority of the respondents admitted that, the increase in LGAs autonomy had not significantly influenced the quality of skills delivered by the AEAs to farmers. Moreover, Table 11 indicates that, 82.0% of the respondents reported to have received quality skills on crop production before LGAs autonomy as opposed to 56.67% who reported to have received quality skills after the decentralization. The number of respondents who reported to have received quality skills

on crops production before and after the increase in LGAs autonomy was statistically significant at $p \leq 0.05$ (Table 11).

Furthermore, 77.7% of the respondents indicated that they received quality knowledge on crop production and 80.5% said so for livestock production before the increase in LGAs autonomy. On the contrary, 58.2% of the respondents reported to have received quality knowledge on crop production and 51.54% on livestock with the increase in LGAs autonomy. The differences in opinion between the respondents' who reported to have received quality knowledge on livestock production and crop production before and after the increase in LGAs autonomy were statistically significant at $p \leq 0.05$ (Table 11). These study findings imply that despite the increase in the LGAs autonomy, the respondents had the view that quality of information, skills and knowledge on crop and livestock production was better before the decentralization than was the case afterwards. Several factors might have contributed to these findings including weak organization and coordination of agricultural extension staff at the grass root level. For example, study observation show that the knowledge sources in Meru and Arusha District Councils were Tengeru Horticultural Training Institute, The World Vegetable Centre for Africa, and Nelson Mandela Institute of Science and Technology. Despite their presence the contribution of these agricultural information sources was not significant due to weak coordination and linkages. These study findings conform with the findings in a study by Ragasa *et al.* (2016) in Democratic Republic of Congo (DRC) who found that despite having high extension agent-to-farmer ratio and the use a pluralistic extension system, the DRC failed to deliver knowledge and technologies to rural areas due to lack of coordination of extension knowledge actors.

In the surveyed district, observations show that, the respondents used fellow farmers and agricultural inputs dealers as their primary sources of much of their agricultural information after the decentralisation when the then MALD provided coordination of agricultural research institute and linked with farmers at the grass root. One staff at MALF said:

D by D institutional arrangement has reduced powers that MALF had before for managing and administering the implementation of agricultural extension services at the grass root levels (KI- MALF-14.08.2015).

The MALF staff opinions are in contrast with the findings by Nambiro *et al.* (2006) who found that there was an improvement in the quality of information, skills, and knowledge delivered to farmers by extension staff after the decentralization of AEI&SD.

Table 11: McNeymar's chi-square test to compare quality of information, skills and knowledge delivered to respondents before and after increase in LGA Autonomy

	Before			Chi square Value	P-Value
In 2015	Quality of agricultural information				
	Poor n (%)	Good n (%)	Total		
Poor	13(18.57)	57(81.43)	70(17.95)	51.0727	
Good	163(50.94)	157(49.06)	320(82.05)		0.01
Total	176(45.13)	214(54.87)			
	Quality of skills on livestock production				
Poor	0(0)	66(100)	66(16.92)	95.6954	0.01
Good	236(72.84)	88(27.16)	324(83.08)		
Total	236(60.51)	154(39.49)			
	Quality of skills on crop production				
Poor	1(1.43)	69(98.57)	70(17.95)	41.3544	0.01
Good	168(52.50)	152(47.50)	320(82.05)		
Total	169(43.33)	221(56.67)			
	Quality of knowledge on crop production				
Poor	14(16.09)	73(83.91)	87(22.31)	26.0180	0.01
Good	149(49.17)	154(50.83)	303(77.69)		
Total	163(41.79)	227(58.21)			
	Quality of knowledge on livestock production				
Poor	0(0)	76(100)	76(19.49)	48.1849	0.01
Good	189(60.19)	125(39.81)	314(80.51)		
Total	189(48.46)	201(51.54)			

Source: Field data 2015

4.5.4 Funds allocated to agricultural extension services in village development agricultural plans

Attempts were made to examine whether there was an increase in the flow of funds to implement agricultural extension services in the villages as a result of the increase in LGAs autonomy. The findings indicate that majority 86.9% of the 390 respondents had an opinion that an increase in the LGAs autonomy did not contribute to an increase of funds allocated for agricultural extension services. However, the findings showed that, the

difference between the two LGAs were not statistically significant at $p \leq 0.05$ (Table 12). These study findings are in agreement with those in a study by Ragasa *et al.* (2016) in Congo DRC who found that despite the decentralization of agricultural extension services more than a half (54%) of the Government based agricultural extension staff admitted not to have received funds from the Government for AEI&SD. It was expected that the increase of the LGAs autonomy could have led to the allocation of more funds to the agricultural sector since the agricultural sector was a priority at the council level. Despite the significant contribution of the agricultural sector on LGAs source of revenues, the sector received insignificant funding for agricultural development plans. For example, according to the budget analysis reports for 2007 to 2015 in Meru and Arusha District Councils neither of the councils allocated funds for the development of agricultural extension services from own sources for eight consecutive years.(Table 12).

Table 12: Funds allocated for agricultural extension information and service delivery from 2007-2015

FY	Funding Sources	Amount Budgeted	Amount Received	Amount Spent
2007/2008	Agricultural Extension Block Grant (AEBG)*	82,490,000	82,490,000	82,490,000
	District own sources	0	0	0
2008/2009	AEBG	167,082,000	167,082,000	167,082,000
	District own sources	0	0	0
2009/2010	AEBG	167,082,000	167,082,000	167,082,000
	District own sources	0	0	0
2010/2011	AEBG	122,116,000	122,116,000	122,116,000
	District own sources	0	0	0
2011/2012	AEBG	0	0	0
	District own sources	0	0	0
2012/2013	AEBG	0	0	0
	District own sources	0	0	0
2013/2014	AEBG	49,3200,000	49,3200,000	49,3200,000
	District own sources	0	0	0
2014/2015	AEBG	0	0	0
	District own sources	0	0	0

Source: Meru and Arusha District Council reports from 2007-20015; AEBG*- Agricultural Extension Block Grant

The study findings can be explained by a number of reasons. Firstly, LGAs have been devolved with unlimited functions and responsibilities, but with limited funds to implement the assigned responsibilities. Secondly, despite the increase in LGAs

autonomy, planning and budgeting is predominantly carried out by the Central Government. Studies by Yilmaz and Venugopal (2010) in Turkey and Mollel (2013) in Tanzania found that, in reality Tanzania and Turkey have strong decentralized system; however, there is constant Central Government interference in decision making, planning and budgeting for LGAs. Thirdly, most LGAs do not see agricultural extensions services as a priority. In an interview with one DALDO in Meru District the following was reported:

There were complaints of underfunding which hindered the implementation of agricultural extension plans. For example, the officer noted that, the councillors who approve development plans and budgets do not see the importance of allocating funds for agricultural extension services. (KI-DALDO-MERU-20.07.2015).

The PO-RALG directed all LGAs to allocate 10% of their collected revenues to agricultural extension services for agricultural development. However, budget analysis from the two councils showed that, more than 70% of the revenues were obtained from agricultural products sales but none were remitted for agricultural extension development.

4.5.5 Opinion about adoption of technologies from extension agents

The study findings show that, 73.6% of the 390 respondents indicated that an increase in LGAs autonomy had not contributed to the adoption of technologies as result of the work of agricultural extension staff. Out of these, 81% were from Meru District and 66.2% were from Arusha District. The chi-square test shows that these findings were statistically significant at $p \leq 0.05$ (Table 13). Decentralization of agricultural extension services was expected to increase the rate of technological adoption by farmers through making agricultural extension staff close to the farmers to facilitate the adoption of technology.

The study findings are in agreement with the findings in a Report of 2015 by CAG which assessed the performance on the provision of decentralized extension services to farmers in Tanzania (URT, 2015). The report referred to found that agricultural extension services which were rendered to farmers had not contributed to the adoption of improved agricultural technologies. However, the findings of the current study are in disagreement with those in a study by Cardey *et al.* (2013) in Malawi who found that, farmers' adoption of technologies increased through the use of agricultural extension services. During FGD one participant said:

Farmers' adoption of technologies in our village is hindered by inadequate agricultural extension services, poor infrastructure, few agriculture extension staff, and not having an agriculture resource centre (FGD- Mlangarini- 06.08.2015).

The presence of an agricultural extension staff in a village cannot alone be held responsible for the adoption of technologies. For example, Ragasa *et al.* (2016) in Congo DRC found that, the numbers of extension staff alone cannot contribute to effective agricultural technological adoption. The latter study showed that, despite having many extension staff, the Democratic Republic of Congo failed to deliver knowledge and technologies to farmers in rural areas due to lack of coordination, absence of unified and clear policies and mandates, and lack of funding. Others were old age and low competencies of agricultural extension staff, and poor mobility and interactions of agricultural extension staff with key actors (Ragasa *et al.*, 2016).

4.5.6 Inclusiveness of agricultural extension information and services delivery

This study assessed the respondents' opinions on inclusiveness of agricultural extension information and advisory services. Social inclusion assessment was important in

understanding the way farmers accessed AEI&SD based on their socio-economic characteristics. According to Shookner (2000), inclusion lens with cultural, economic, political, functional, participatory, relational and structural dimensions guide the analysis of legislation, policies, programmes and practices to determine the inclusion of the respondents.

Of the 390 respondents, 72% indicated that agricultural extension services under the decentralized system and increased LGAs autonomy were not inclusive. Of these 83.1% were from Meru and 62.1% were from Arusha district. The differences in the respondents' opinions regarding inclusiveness of AEI&SD between the two councils were statistically significantly at $p \leq 0.05$ (Table 13). These study findings imply that, despite the Government's initiatives of devolving power to lower levels, majority of farmers felt excluded from the services. These findings conform to those of Adhiguru (2009), IFPRI (2010) Chowa et al. (2013) who found that, the provision of agricultural extension information was biased towards large scale farmers. Unlike these studies findings, this study found that, the nature of exclusiveness ranged from the low capacity of the respondents to pay for the associated shared costs to limited access to agricultural extension information services delivery due to shortages of agricultural extension staff.

Observations show that, in some villages such as Ndatu and Kikwe in Meru District respondents were reluctant to join farmers' groups because of the past experiences of failure. Others said farmers' groups could not add any productive value. In addition, the respondents in Mlangarini and Kisyeria villages complained that, sharing of costs was unacceptable as they were given free agricultural extension services and inputs before the decentralization. The officials at PORALG admitted that:

There were faults during the operationalisation of decentralized agricultural extension information and service delivery. We always ignore the fact that, the community is diversely made of people with different socio-economic characteristics which later have an important bearing in effective policy implementations. (KI- PORALG-30.07.2015).

Table 13: Chi-square results on respondents opinions on quality of AEI&SD with increase in LGAs autonomy

Empowerment variables	Meru		Arusha		Total		P value
	N	%	n	%	N	%	
Increased funds allocated to agricultural extension services in Village Development Agricultural Plans							
Yes	31	15.9	20	10.3	51	13.1	0.099
No	164	84.1	175	89.7	339	86.9	
Adoption of technologies from extension agents							
Yes	69	35.4	37	19.0	106	27.2	0.000
No	129	66.2	158	81.0	287	73.6	
Inclusiveness of agricultural extension services							
Yes	74	37.9	33	16.9	107	27.4	0.000
No	121	62.1	162	83.1	283	72.6	
Use of various methods and approaches to deliver knowledge and skills to farmers							
Yes	49	25.1	30	15.4	79	20.3	0.000
No	146	74.9	165	84.6	311	79.7	
Crops and livestock productivity as a result of increased local government autonomy							
Yes	59	30.3	30	15.4	89	22.8	0.027
No	136	69.7	165	84.6	301	77.2	
Efficiency of the agricultural extension services							
Yes	64	32.8	34	17.4	98	25.1	0.000
No	131	67.2	161	82.6	292	74.9	
Total	195	100.0	195	100.0	390	100.0	

Source: Field data 2015

4.5.7 Use of various methods and approaches to deliver knowledge and skills to farmers

Few, (20.3%) of the 390 respondents indicated that agricultural extension staff used a variety of methods and approaches to deliver agricultural knowledge and skills to the farmers. Of these, 25.1% and 15.4% were from Meru and Arusha districts respectively, and their responses were statistically significantly at $p \leq 0.05$ (Table 13). There is strong evidence that, most of the AEAAs in the villages used limited methods and approaches to deliver agricultural knowledge and skills which negatively influenced the effectiveness of extension services. According to Ragasa *et al.* (2016), a combination or a mixture of agricultural extension delivery methods makes agricultural extension service delivery more effective. In Tanzania, the government recommends the use of Farmer Field Schools as a standard approach to delivery agricultural extension information and services. Davis *et al.* (2012 as cited by Badibanga *et al.* 2016) found that, in Tanzania and Kenya FFSs are more common to women than men and agricultural productivity is high for farmers' groups which use FFSs.

Despite the dominance of FFSs as the commendable approach by MALD who is responsible for issuing agricultural guidelines and policies, observation shows that, there are other methods that can be used to deliver knowledge and skills to farmers such as ICTs, and print materials (Manda, 2002; Mntambo, 2007; Matovelo, 2008). Therefore, AEAAs limited use of variety of methods to AEI&SD is attributed to unwillingness by extension agents to comply with the stipulated guidelines from MALF. In one of the KI discussions, the village agricultural extension staff was noted saying:

We are always flooded with a lot of circulars and guidelines to implement without being given proper orientation on how to use them. How can somebody blame me

for noncompliance with the stipulated guidelines which have a lot of details to be comprehended? (FGD- Kikwe Village-30.07.2015).

The above statement implies that, in some instances the agricultural extension some staff experience difficulties in implementing some of the guidelines and directives from higher authorities because of the technicality of the directives and there was limited orientation to make such directives functional.

4.5.8 Crops and livestock productivity due to increased LGAs autonomy

The quality of AEI&SD was also assessed based on the AEAs capacity to transform agricultural production and productivity. Very few (30.3% and 15.4%) of the 390 respondents from Meru and Arusha districts respectively indicated that there was an increase in crop production with the increase of LGAs autonomy. The findings in the two district councils were statistically significantly at $p \leq 0.05$ (Table.13). Furthermore, few 22.8% of the 390 respondents indicated that there was an increase in crop production resulting from increase of LGAs autonomy. Moreover, these findings conform to data reviewed in the two councils which showed insignificant increase in production of some selected crops in the studied area (Table 16). This confirms that, the increase in local government autonomy had not significantly influenced an increase in crop and livestock production in the study areas. It is clear that, crop and livestock production is the function of a number of factors including efficient management of agricultural extension services. Theoretically, the increase in LGAs autonomy could have an impact on crop and livestock production due to improved management. These results are in agreement with those by MEAS (2014) and Ragasa *et al.* (2016) who found that despite decentralization and increased local autonomy, there was a decrease in food production in Zambia and Congo DRC. In line with this, one FGD participant said:

We have not benefited from the shift in management of agricultural extension services from the central government to the LGAs. (FGD-Ndatu village-15.07.2015).

Apart from poor management of agricultural extension services, a change in weather patterns was also noted as significantly affecting crop and livestock production; as one FGD participant pointed out:

There is a drop in productivity both in crops and livestock for almost five years consecutively. As a result we have been experiencing famine in this village. Unfortunately, agricultural extension staffs are nowhere to be seen to guide us in coping with this situation.(FGD- Ndatu village-15.07.2015).

4.5.9 Efficiency on the agricultural extensions services offered to farmers

Less than one third, (25.1%) of the 390 respondents reported that there were notable improvements in the efficiency in the delivery of agricultural extension services as a result of increase of LGAs autonomy. The variable was statistically significantly at $p \leq 0.05$ (Table 13). These study findings imply that, the LGAs autonomy did not improve efficiency of agricultural extension services delivery to farmers. In addition, observation revealed that, farmers walked long distances to access agricultural extension services, agricultural extension staff lacked working tools and facilities and others disseminated old technologies. Moreover, due to underfunding of the services most of the surveyed villages were found with few agricultural extension staff, and who lacked fuel and maintenance costs for their transport facilities. In support of this view one of the ward agricultural extension agents had this to say during an in depth interview:

Despite coordinating agricultural extension services in four villages in my ward, I don't have transport facility to visit and supervise the implementation of extension

services at the village level. Some time, instead of going to the villages, I'm requesting VAEA to come at the ward. My opinion is that, this is not the efficient and effective way of doing the work. (FGD- Kikwe Village-26.07.2015).

These study findings conform to those of Okwu and Ibrahim (2011) in Nigeria who found that there was inadequacy of decentralized agricultural extension services which were attributed to the absence of agricultural infrastructure, lack of enough agricultural extension staff and lack of transport for the agricultural extension staff to reach their farmers in the respective areas. Moreover, IFPRI (2011) found that, despite the ambitions of the decentralized agricultural extension services in India, there was limited attempt to increase the accountability of agricultural extension staff to their clients and increase the relevance of extension activities. In this case, there was poor financing of agricultural extension infrastructure and shortages of staff. Since LGAs had unlimited needs and demands with limited funding, it gave less weight to extension services programmes compared to administrative issues.

4.5.10 Summary of key issues regarding influence of LGA Autonomy on the quality AEI&SD in Tanzania

It was expected that, the increase in LGAs autonomy through D by D would have increased the quality in AEI&SD to small farmers. The delivery of quality agricultural extension information services to farming households due to increased LGAs Autonomy in the study villages was negatively influenced by an array of factors as follows;

- i. Irresponsiveness and delay of AEA responding to farmers request.
- ii. Ineffective agricultural extension information feedback mechanism.
- iii. Irrelevance of agricultural information technologies to livestock keepers and croppers.

- iv. Poor quality and adoption rate of agricultural information, knowledge and skills delivered to farmers.
- v. LGAs allocation of insufficient fund to cater for agricultural extension information despite the major contribution of the agricultural sector to the local revenue source.
- vi. Limited use of diverse methods and approaches in the delivery of agricultural extension information as per farmers' context.

4.6 Respondents' Opinions on the Influence of the Shift of AEI&SD Decision making Process to LGAs on Farmers' Empowerment

This part presents study findings on the influence of the shift of decision making on agricultural extension information and delivery of services from CG to LGAs on farmers empowerment. Empowerment is defined as the expansion of people's ability to make strategic life choices in the context where this ability is denied to them (Kabeer, 1999). In this study, farmers' empowerment was assessed based on the World Bank framework of 2005 which is centred on three main aspects: First whether there are opportunities of making agricultural choices, secondly, whether the opportunities have been used to make choices, and thirdly, whether the choices have resulted into the desired results.

The indicators which were used to assess the influence of the shift in agricultural extension decision making on farmers empowerment included: respondents' participation in agricultural sector development plans, the status of farmers' organization and associations, fora for knowledge and skills sharing, and capacity to engage in commercial farming. Others were an increase in the farmers' yields and income as a result of the sales of crop and livestock products farmers' livelihood improvement, capacity to initiate demand for extension services, farmer's knowledge and skills on crop and livestock

production and knowledge and skills on disease/pest identification and control. The detailed description of each empowerment indicator is shown in the next section.

Table 14: Respondents opinion on empowerment as a result of shift in agricultural extension decision making to the village level (n=390)

Variables	Meru %	Arusha %	Total %	P-value
Participation in agricultural development plans				0.03
Yes	18	12	30	
No	32	38	70	
Increased farmers' associations				0.01
Yes	17	8	25	
No	33	42	75	
Increased farmers' groups				0.01
YES	25	7	32	
NO	25	43	68	
Farmers becoming more organized in farmers' associations				0.01
YES	19	6	25	
NO	31	44	75	
Farmers becoming more organized in farmers' groups				0.01
YES	22	6	28	
NO	28	44	72	
Increased farmers' fora for knowledge sharing				0.01
YES	27	8	35	
NO	23	42	65	
Increased farmers' fora for skills sharing				0.01
YES	27	8	25	
NO	23	42	75	
Increased knowledge in crop production				0.01
YES	18	7	25	
NO	32	43	75	

Source: Field data 2015

4.6.1 Respondents' participation in agricultural development plans

In this study, farmers' participation refers to the involvement of farmers in decision making on agricultural sector development. The participation involved attending village

general meetings, village sector committees, ward development committees and full council either directly or indirectly.

Of the 390 respondents 30% reported that, the shift in agricultural extension information decision making from the Central Government to the village government has resulted in the increase in farmers' participation in agricultural development plans. Out the 30 percent 18% of the respondents were from Meru and 12% were from Arusha District Councils. The differences of the findings between the two councils were statistically significant at $p \leq 0.005$ (Table 14). About 70% of the respondents had the opinion that, despite the shift in agricultural extension decision making to the village, farmers participated in the agricultural development plans. The results are in agreement with those by Gaynor (2013) in Rwanda who found that despite having a clear participation framework through Decentralization Policy and Local Government Act of 2005 the level of community participation in decision making process was questionable. In addition, during the interview with PORALG officials, one participant was quoted saying:

The capital grant assessment report has indicated that, the majority of LGAs are not complying with the statutory requirement especially those related to involvement of the community in development planning. Experience shows that, most of the interventions are initiated at the District level instead of the grassroots level as a result they lack sustainability. We have noted and we will work on it.

(KI-PORALG.30.07.2015)

The reasons for the farmers' low participation in decision-making appeared to be more political. Observations revealed that, most farmers tended to ignore meetings that the village chairperson convened especially if the latter was from a political party that most of the farmers opposed. Also, in other villages, it was observed that, the village meetings

were not regularly convened as per the statutory requirements. The local government statute requires that each village convenes a minimum of one village meeting per quarter. Out of the eight surveyed villages' only one village in Meru District Council convened meeting as directed by the local government statutes. Further observations showed that, in the village that held meetings, the attendance list indicated that, majority attendees were males when in reality most agricultural activities in the study villages were done by females. Farmers' participation is believed to have a great potential in empowering and transforming the material conditions of the vulnerable and marginalized communities (Aref *et al.*, 2011; Gaynor, 2013). Empirical evidence has revealed that, without farmer's participation agricultural development policy is likely to fail (Aref *et al.*, 2011).

4.6.2 The status of farmer's organizations and associations due to a shift in agricultural decision making process to the villages

Of the 390 respondents 25% reported that, the shift in agricultural extension decision making to the villages has led to an increase of the number of farmers' association in the villages. Out of the 25 percent, 17% of the respondents were from Meru and 8% were from Arusha District Councils. In addition, 32% of the respondents reported to have been an increase in the number of farmers' group as a result of the shift in agricultural extension information decision making to the village level. Of the 32 percent 25% were from Meru and 7% were from Arusha District Councils. The number of respondents who reported to have been an increase in the number of both farmers' groups and associations between the two councils was statistically significant different at $p \leq 0.05$ (Table 14). Similar findings are reported by Mwaura (2014) in Uganda who found that, despite being popularly advocated as the best mechanism for agricultural information dissemination under decentralized system, the number and participation of farmers in farming groups was very low at 16% of the total households.

Despite the provision in the policy which provides opportunities to establish and enhance farmers groups and associations, Table 14 shows that 75% and 68% of the respondents said that there is no increase in the number of farmers' associations and farmers' groups respectively. Several factors were attributed to above results: first due to reluctance of respondents to join farmers' groups and associations. Secondly, many of the group leaders were given responsibilities without proper leadership orientation. Further observation revealed that, mistrust among group members, and leadership malpractices had contributed to such results. For example, in one of the FGDs at Mlangarini Village in Arusha District one participant said:

We have been encouraged to organize ourselves in groups both for farming and savings associations. In my opinion, I see these groups are facing serious management challenges as most of us we lack leadership and management skills. The previous treasurer was alleged of fraud and now he has a case at the District Magistrate Court. (FGD-Lengijave Village-27.08.2015)

4.6.3 Status of farmers' fora for knowledge and skills sharing

About 35% of the respondents reported that there was an increase of farmers' participation in fora for agricultural knowledge and skills sharing due to the shift in decision making of agricultural extension information services to the villages. Of the 35% percent 28% were from Meru and 7% were from Arusha District Council. The difference in the number of respondents who reported an increase in the fora for knowledge and skills sharing in the two respective councils were statistically significant at $p \leq 0.05$ (Table 14). These study findings suggest that, about two thirds 65% of the respondents had the view that, the shift in agricultural extension decision making to the lower level had not contributed to an increased farmers' participation in the avenue for agricultural knowledge and skills sharing. The results are in contrast to those reported by Karamadin (2015) in Japan who

found an increased integrated knowledge creation and sharing by agricultural agencies at lower community levels and its impact were seen to have improved farmers' production and productivity.

Despite information in Table 10 showing an increase in the established number of farmers' organizations in Meru and Arusha District Councils, the number was negligible compared to the actual requirements in the guidelines. Observations show that, a limited increase in farmers' fora for agricultural knowledge and skills sharing in the study villages area were attributed to many reasons including ineffective enforcement of the laid down procedures and guidelines. The Ministry responsible for agriculture formulated a number of guidelines which advocated for the establishment and promotion of knowledge and skills sharing fora. During the interview with one of the MALF officials regarding the low number of established agricultural fora for knowledge and skills sharing noted:

The Ministry has made deliberate efforts to formulate guidelines that will promote knowledge and skills sharing among farmers. For example, there are farmers' competition guidelines, the FFSs guideline and the establishment of ward agricultural resource centres. Currently, the Ministry is focusing on making the guidelines become fully functional. (KI-MALF-14.08.2015)

If these guidelines were put into practice, they could to a greater extent have contributed to increased farmers' exchange fora for agricultural technologies information and ultimately improved agricultural production and productivity.

Observation in the eight surveyed villages showed that, most of the issued guidelines were not implemented by agricultural extension staff. For example, the FFSs implementation guideline provides that each Village Extension Officer is obliged to establish a minimum

of eight farmers' groups in a village, but this directive is not properly executed as in some of the surveyed villages there were no Village Extension Officers. In addition, each ward was required by the guideline to establish agricultural Resource Centre but only 7 were established out of 53 wards of the Meru and Arusha District Councils.

Table 15: Selected knowledge and skills sharing fora before and after a shift in agricultural extension services decision making to LGAs

Type of organization	ADC in 2000	ADC in 2015	MDC in 2000	MDC in 2016
Producer cooperatives	0	0	19	19
Farmers' groups	62	98	22	46
Network of farmers' groups	0	2	0	0
Total	62	100	41	65

Source: ADC and MDC reports

In addition, 25% of the respondents both in Meru and Arusha District Council reported that the shift in agricultural extension information and delivery of services decision making to the lower level had resulted in the increased farmers' knowledge and skills on crop and livestock production. Out of 25% percent of the respondents 18% were from Meru and 7% were from Arusha District Councils. The difference in the number of respondents between the two councils on this aspect was statistically significant at $p \leq 0.05$. This implies that, 75% of the respondents disagree with the argument that the shift in agricultural extension information decision making to the village level has resulted in increased farmers' knowledge and skills on crops and livestock production. The study findings are in disagreement with those reported by Chowa *et al.* (2013) in Malawi who found that agricultural extension pluralism has offered increased opportunities to farmers in terms of access to information and knowledge from diverse sources despite experiencing challenges of coordinating extension message and approaches. Unlike the scope of this study, which was limited to public AEI&SD in Tanzania, Chowa *et al.*

(2011) in Malawi covered all agricultural extension service providers. The anticipated increase in farmers' knowledge and skill avenues as a result of a shift in decision making were sought to have a positive impact on increased farmers' knowledge and skills to facilitate agricultural transformation.

Observations revealed that, shortage and ill-equipped agricultural resource centres, shortage of agricultural extension agents, and inadequate supervision and coordination of AEI&SD at the lower level are some of the reasons attributed to such findings. In the eight surveyed villages, none had established agricultural resource centres. Furthermore, some of the village extension officers had no work plan guiding their daily operations. The agriculture and livestock officers at the district levels had no adequate answers to respond to such phenomena.

4.6.4 Capacity to engage in commercial farming

Table 16 shows that, 34% of the respondents believe that a shift in agricultural extension decision making to the lower level has led to the transformation of subsistence crop farming system into commercial farming. On the other hand, 32% of the respondents had the view that, there was transformation from subsistence livestock keeping to commercial livestock keeping as a result of a shift in agricultural extension decision making. Regarding transformation of commercial crop system 25% of the respondents were from Meru and 9% were from Arusha District Council, and in livestock commercial farming 24% of the respondents were from Meru and 8% were from Arusha District Councils. The differences in the number of respondents in the two District Councils who supported the argument were statistically significant at $p \leq 0.05$ (Table 16). This implies that, 66% and 68% of the respondents disagreed that the shift in agricultural extension information and delivery of services decision making from central to lower levels have led to the increased

farmers' capacity to engage in commercial crop farming and livestock keeping respectively. Empirical evidence shows that commercialization of agriculture is one of the best indicators for agricultural development (FAO, 2015). The shift in AEI&SD decision making to the lower levels was sought to transform farmers from subsistence farming to commercial farming through continuous engagement with agricultural extension agents. These study findings conform to those by Drafor (2014) who found that there was low participation of smallholder farmers in the commercial farming in two farming communities in Ghana. According to Drafor (2014), low farmers' participation in commercial farming was attributed to lack of credit to engage in commercial farming since it is both labour and capital intensive. In this study, low level of farmer's engagement in commercial farming was due to the high cost of technology for agricultural transformation, and the nature of land tenure system. Field observation revealed that, 75% of the respondents practiced subsistence farming in fragmented pieces of hired or inherited land. Yet, other respondents were reported to lack capital to buy agricultural inputs and engage in mechanized agriculture. During an FGD at Lengijave Village one participant said:

Commercial farming is both capital and labour intensive. How can I manage and for sure I don't have a reliable source to get capital for investment. In the nearest town there is a financial institution which offers credit for whatever activity you want to establish, but they have very stringent conditions that I do not qualifying for a loan. (FGD-Lengijave Village-27.08.2015)

Table 16: Respondents opinions on the status of farmers empowerment as a result of a shift in agricultural extension decision making to the village level (n=390)

Variables	Meru DC %	Arusha DC %	Total %	P-Value
Increased farmers' capacity to engage in commercial livestock keeping				0.00
YES	24	8	32	
NO	25	43	68	
Increased farmers' capacity to engage in commercial crop farming				0.00
YES	25	9	34	
NO	26	40	66	
Crop farmers increasing their yields				0.00
YES	23	9	32	
NO	26	42	68	
Improved smallholders' livelihood				0.00
YES	18	7	25	
NO	32.	43	75	
Increased incomes from crop sales				0.00
YES	26	10	36	
	24	40	64	
Increased incomes from livestock sales				0.00
YES	25	9	34	
NO	26	40	66	
Livestock keepers increasing their yields				0.00
YES	24	10	34	
NO	26	40	66	
Increased the capacity of farmers to ask for more extension services in crop- related areas				0.00
YES	26	11	37	
NO	25	38	63	
Increased the capacity of farmers to ask for more extension services in livestock- related areas				0.00
YES	23	10	33	
NO	28	39	67	

Source: Field data 2015

4.6.5 Farmers' yields as a result of a shift in AEI&SD decision making

There was further assessment as to whether the shift of decision making on agricultural extension information and delivery of services from the Central Government to lower levels has resulted in to increased crop and livestock yields. Of the 390 respondents 32% and 34% agreed that, the shift in AEI&SD decision making had resulted in increased yields in crops and livestock respectively. Out of 32 % of the respondents who reported an increase in crop yields as a result of the shift in agricultural extension decision making,

23% were from Meru and 9% from Arusha respectively. In addition, regarding the increase in livestock yields 24% were from Meru and 10% were from Arusha District Council. The difference in the number of the respondents who reported an increase in both crop and livestock yields in the two districts was statistically significant at $p \leq 0.05$ (Table 16). These findings imply that on average, 67% of the respondents had the view that a shift in AEI&SD decision making had not positively influenced the increase in farmers' yields.

The research findings are in disagreement with Baloch (2016) for a study done in Pakistan where it was found that small scale farmers under decentralized extension services produced better yields compared to medium and large scale farmers with no extension services. In addition, the results are in disagreement with the results of a study by the World Bank (2010) who found that in areas with decentralized extension services in India had a substantial increase in the production of high value crops and the average farm income increase of 24%. Moreover, Hasan *et al.* (2013) in Uganda found that farmers' participation in the extension programmes had significantly raised agricultural productivity and reduced the incidences of poverty. These empirical results provided justification that, if well designed and executed, decentralized extension services and the shift of AEI&SD decision making to lower levels has high potential of transforming agricultural production and productivity.

Several factors may attribute to the disparities in these findings with those of previous studies of a similar nature. Among them include understaffing which disconnected farmers from agricultural extension services. Some of the villages were found to have neither crop nor livestock extension officers. In Ndatu Village in one of the FGDs, one participant said:

I have never seen such a person, and I'm not sure if at all we have one in this village (FGD- Ndatu Village-15.07.2015)

In addition, the respondents reported that, for the past eight years consecutively climate and weather change had significantly affected crops and livestock yields in their study area.

4.6.6 Farmers' income as a result of a shift in AEI&SD decision making

Of the 390 respondents, 36% and 34% reported that the shift in agricultural extension decision making has resulted in the increase of farmers' income emanating from the sales of crops and livestock products respectively. Out of 36% of the respondents who reported of an increase in income as a result of crop sales 26% were from Meru and 10% from Arusha District Council. Moreover, of 34% of the respondents who reported an increase in income as a result of livestock sales, 25% were from Meru and 9% were from Arusha District Council. The differences in the number of respondents who reported increases in income as a result of sales in crop and livestock products in Meru and Arusha District Councils were statistically significant at $p \leq 0.05$. Similar findings are reported by Nigussie *et al.*, (2016) in Ethiopia who found that, there were significant differences in household income between farmers who were connected to extension services and those who were not connected. The poverty incidence between households not using extension services was far greater than those of households using extension services. In addition, when assessing the livelihood of subsistence farmers among the new European Union member states Davidova *et al.* (2012) found that, the contribution of subsistence farming toward households' income was insignificant. The decentralization reform and the shift in agricultural extension information decision making among the other things was expected to help to improve farmers' material condition in terms of yields and income.

Similarly, negligible contribution of the reform on increased respondents' income can be explained by a number of reasons including poor technological adoption which resulted in poor agricultural yields. In the studied villages it was further observed that the majority of the respondents practiced subsistence farming in very fragmented pieces of land ranging from 1 to 2 hectares which offered little surplus for commercialization. The nature of land tenure system was also seen as a stumbling block towards transforming the agricultural sector in the study area as the majority of respondents either hired or inherited land from their ancestors. This limited the respondents' capacity to think strategically into developing the land. In addition, the researcher observed that most of the livestock keepers were not able to meet their basic needs despite having large herds of cattle. The number of cattle has not been able to change the material condition of the majority of livestock keepers as they get less from livestock markets. In the surveyed villages, one participant was quoted saying:

We have been discouraged in increasing production because we are not sure where to send our surplus produce because of the unreliable markets.

(FGD-Mlangarini Village-30.08.2015)

4.6.7 Farmers livelihood due to the shift in agricultural extension information decision making

Twenty-five percent of the 390 respondents reported that there were improvements in farmers' livelihood as a result of the shift in AEI&SD decision making from the Ministry responsible for agriculture to LGAs. Out of them 18% were from Meru and 7% were from Arusha District Council. The difference in the number of respondents reported to have improved their livelihood as a result of the shift in agricultural decision making in two the District Councils was statistically significant at $p \leq 0.05$. These findings imply that, 75% of the respondents had the view that their social welfare and material conditions are yet to be

improved despite the initiated policy reforms. These results are in disagreement with those reported by World Bank (2010) who found a significant social and economic impact among the farmers which was facilitated by extension staff under Agricultural Technology Management Agency (ATMA) in India the ATMA model contributed directly to the improvement of rural livelihood for about 6.7 million households in project implementation area.

The low number of respondents was in agreement with the view that, the shift in agricultural extension information and delivery of services had led to the improved farming. Improvement in households' livelihood conditions was attributed to a number of reasons. Firstly, it is a result of the ineffective coverage of agricultural extension staff in the villages to boost agricultural production and productivity. Secondly, there are unfavourable market conditions which exploited farmers who had experienced excessive taxation from the farm gate. One of the respondents in the FGD said.

We lost a lot of income through double taxation from the farm and again at the community market. And some time we are not given genuine receipt from the LGA. This has been more than too much. (FGD- Mlangarini Village-01.09.2015)

4.6.8 Farmers capacity to initiate demand from extension services

The shift in AEI&SD decision making from the Ministry responsible for agriculture to LGAs was also meant to build farmer capacity to articulate demand for the services. Currently, extension service is undergoing reforms globally from supply driven to demand-driven whereby the farmer becomes the centre of all agricultural extension information programmes and delivery of services (World Bank,2010). It was thus deemed necessary to assess whether or not the shift in decision making to lower level of

government had contributed to increased capacity of farmers asking for extension services relating to both livestock and crop farming.

About 37% of the 390 respondents agreed that, the shift had resulted in an increased capacity of farmers to initiate demand for crop-related services and 33% for livestock related services. Out of 37 percent who had a positive opinion on this matter 26% were from Meru and 11% were from Arusha. Moreover, with regard to the initiation of livestock related services 23% were from Meru and 10% were from Arusha District Council. The difference in the number of respondents who showed an increase in the capacity of farmers to initiate demand for both livestock and crop related services in Meru and Arusha District Councils were statistically significant at $p \leq 0.05$ (Table 16).

These findings conform to the findings by Chowa *et al.* (2013) in Malawi who found that, despite an increase in the number of extension services actors, farmers had limited capacity to initiate demand for extension services. Although farmers worked in groups, service providers did not seek to strengthen these groups to enable active interaction and to link them to input and produce markets. This limited farmers' capacity to continue with innovations after the pulling out of the service providers. Poor coordination between service providers limited the exploitation of potential synergies amongst actors (Chowa *et al.*, 2013). These findings imply that on average, 65 of the respondents had the view that, despite the envisaged policy objective of strengthening farmers' capacity to initiate demands for the agricultural extension services, the result is not convincing. Moreover, observation revealed that, during discussions there were conflicting views among the respondents' on the effectiveness of the intervention between livestock keepers and crop farmers. Despite the crop farmers inability of initiating demand for extension services, the livestock keepers displayed the opposite results. The limited capacity of the farmers to

initiate demand for extension services was attributed to an array of factors ranging from those centred on farmers themselves to those caused by extension agents.

On the side of the farmers, it was noted that some of the respondents reported not to have initiated the demand for extension services for fear of the associated costs. Other factors included lack of information and low awareness level among farmers on how and when to initiate extension services. It is worth noting that, farmers need certain skills to be able to identify problems whenever they arise. However, majority of them rarely possessed such skills.

In addition, the limited number of extension staff also hindered farmers' initiative of initiating for agricultural extension information and delivery of services. Again, despite the Ministry was responsible for agriculture initiative in issuing agricultural extension circulars, training manuals and guidelines which promoted a link between agricultural extension staff and farmers, it was observed that, some of the agricultural extension agents were found not to be in possession of such documents. For the few who had them, they rarely made use of them. In an interview some of the ward extension officers had the view that, the responsible Ministry in charge of decentralized agricultural extension services needed to consider the necessary ingredients in the operationalization of the formulated policies and guidelines. They commented that:

Policy and guideline implementers need to be adequately prepared and equipped with the necessary tools for effective achievement of the intended objectives. (KI-AEA -Kisyeria village-22.08.2015.)

4.6.9 Farmers knowledge and skills on disease/pest control

It was also necessary to assess whether the shifts in agricultural extension information decision making has led to increased farmers' knowledge and skills on disease control. It was revealed that, 28% of the 390 respondents reported that the shift in agricultural extension decision making has led to an increase of farmers' knowledge and skills on disease identification and control (Table 19). Moreover, 26% of the respondents reported an increase in farmers' knowledge and skills on crop pest identifications and 22% reported an increase in farmers' knowledge and skills on pest control. Yet, 28% of the respondents reported that, the shift in agricultural extension information decision making has led to an increase in farmers' knowledge and skills on livestock endo-parasite identifications and 25% of the respondents on control respectively. In addition, 28% of the respondents reported to have increased the knowledge on ecto-parasite identification and control. The difference in the number of respondents who reported an increase in the respondents' knowledge and skills on pest/disease identification and control due to the shift in agricultural extension decision making at the village in all parameter tested was statistically significant at $p \leq 0.05$ (Table 17).

These results imply that, on average more than 73% of the respondents had the view that the shift in agricultural extension information from the Ministry responsible for agriculture to LGAs had not significantly contributed to an increase in farmers' knowledge and skills on disease and pest control and management. These findings are in agreement with those reported by Coudel and Devautour (2010), Okonya and Kroschel (2016) who assessed farmer's knowledge and skills on disease, insect pest management practices under integrated pest and disease control in Iran and Uganda respectively. The latter studies found that farmers had little knowledge and skills on disease, pest identification and control despite the introduced interventions which were meant to improve farmer's

knowledge and skills on pests/disease and pest control. These findings might have been attributed to a number of reasons including inadequacy of extension officers to facilitate farmers in identification, and control of pests and disease. In the surveyed villages, it was observed that pests/disease control was still a problem. Farmers usually walked long distances to search for agricultural extension staff to assist in pests/disease identification and control. In one of the FGDs, one participant complained:

If you want to access extension services, you need to travel to the National Artificial Insemination Centre (NAIC) about 30 Km or to Tengeru which is about 40 Km away from here. At Tengeru you can meet with agro- chemical dealers who can offer advice on crops and animals production issues. (FGD- Lengijave Village-27.08.2015).

Table 17: Respondents opinions on pest/disease identification and control due to the shift in agricultural extension decision making to the village level (n=390)

Variables	Meru DC %	Arusha DC %	Total %	P-Value
Increased knowledge and skills in crop disease identification				0.01
YES	20	8	28	
NO	30	42	72	
Increased knowledge and skills in crop disease control				0.01
YES	21	7	28	
NO	29	43	72	
Increased knowledge and skills in crop pests identification				0.01
YES	18	8	26	
NO	32	42	74	
Increased knowledge and skills in crop pests control				0.01
YES	16	6	22	
NO	34	44	78	
Increased knowledge and skills in livestock disease identification				0.01
YES	20	8	28	
NO	30	42	72	
Increased knowledge and skills in livestock disease control				0.01
YES	19	9	28	
NO	31	41	72	
Increased knowledge and skills in livestock ecto-parasites identification				0.01
YES	19	9	28	
NO	31	41	72	
Increased knowledge and skills in livestock endo-parasite identification				0.01
YES	19	9	28	
NO	31	41	72	
Increased knowledge and skills in livestock endo-parasite control				0.01
YES	17	8	25	
NO	33	42	75	

Source: Field data 2015

4.6.10 Summary of key issues regarding the influence of the shift of agricultural extension service decision making process from central government to the LGAs on farmers' empowerment

The study findings show that, the empowerment of farmers due to the shift in AEI&SD to LGAs is influenced by the number of factors. Some of the setbacks towards empowering farmers in rural areas under decentralized AEI&SD context included;:

- i. Poor involvement of farmers in village agricultural sector development plans and budget priority setting.
- ii. Weak and limited number of farmers groups and associations due to reluctance of farmers and inadequate enforcement of laid down procedures and guidelines.
- iii. Weak and limited farmers' fora for agricultural knowledge and skills sharing.
- iv. Inadequate capital and nature of land tenure system which limited farmer's capacity to engage in commercial farming.
- v. Inadequate coverage of extension staffs and unfavourable market environment contributed to poor farmers' livelihood.
- vi. Information asymmetry, limited number of agricultural extension staff and cost for extension services limited capacity of farmers to initiate demand for extension services.
- vii. Limited knowledge and skills on disease/pest identification and control.

4.7 Respondents' Opinions on the Influence of Change in Mode of Operation between Central Government and Local Government on Provision of equitable AEI&SD

The changes in the mode of operation between the Central and Local Government under decentralized AEI&SD was characterized by the abolishment of the existed command relation into new system of intergovernmental relation. The new mode of operation was

characterized by consultations and negotiations supplemented with regulation and legal supervision of LGAs' political and administrative functions.

This study assessed the extent to which the implementation of the policies influenced the enhancement of equity among different farmer groups in the surveyed areas due to decentralization policy objectives. The Wilcoxon signed ranked test was used to assess equity in AEI&SD among different farmers' groups. The Wilcoxon signed ranked test is a non-parametric test appropriate for analysing data from repeated measures design with two conditions. It is used when the data are not normally distributed; if the variances for the two conditions are markedly different; or if the data are the measurements on an ordinal scale (Field, 2009). The sign test has the null hypothesis that both samples are from the same population. The sign test compares the two dependent observations and counts the number of negative and positive differences. It uses the standard normal distributed z-value to test the level of significance and rank the differences from the smallest (including negative) to the largest absolute difference, from 1 to n, of the sample size. If the research hypothesis is true, it is anticipated that, the positive ranks compares to that of before. The Wilcoxon signed rank test pulls all differences, ranks them and applies a negative sign to all the ranks where the difference between the two observations is negative (Field, 2009).

The variables used to assess equity included farmers access and linkage to markets, access to agricultural inputs and access to land. Others were access to financial services, and access to agricultural information technologies. The detailed discussion of each variable is presented in the next section.

Table 18: Wilcoxon signed ranked test results for accessing AEI&SD based on gender (n=390)

Variable	Male Farmers median score	Female Farmers Median Score	z-value	Respondents p-value
Male and female respondents access to markets	4.0	3.3	-5.80	0.01
Male and female respondents linkage to markets	3.4	3.3	-5.98	0.01
Male and female respondents access to agricultural inputs	4.0	4.0	-2.93	0.09
Male and female respondents access to financial services	4.0	4.0	-2.65	0.08
Male and female respondents access to land	3.6	3.3	-7.23	0.01
Male and female respondents access to agricultural technologies	4.0	3.3	-4.32	0.01

Source: Field data 2015

Of the 390 respondents 32% were females and 68% were males, though the questions were administered to all the respondents regardless of their gender. The study findings in Table 18 show that, the number of the respondents who reported improvement in male farmers' access to the markets due to a change in the mode of operation between the Central and Local Government had higher median rank than those reported improvement of farmers' access among females. Those who reported improvement in male farmers' access had the median rank of 4.0 and the median rank of 3.3 among female farmers' access to markets. The difference in the number of the respondents who reported improvement in access to markets between female and male farmers was statistically significant at $p \leq 0.05$ and z score of -5.80. Furthermore, the study assessed the linkage to agricultural markets between male and female farmers. The findings revealed that, the number of respondents who reported improvement in male farmers' linkage to market got higher median value than those who reported improvement in female farmers' linkage to market. Those who reported improvement in male linkage to the market had the median rank of 3.4 and for those who reported improvement on female farmers had the median of

3.3. The difference in the number of the respondents who reported improvement in linkage to markets between male and female farmers due to change in the mode of operation between Central And Local Government from the commanding to intergovernmental relations was statistically significant at $p \leq 0.05$ with z score of -5.98 (Table 18). These study findings imply that, despite the changed central-local government relation from the command to intergovernmental relations on average still 86% of the respondents had the view that, access and linkages to the markets were not the same. Male farmers had more access and linkages to the market than their female counterparts.

The above study findings are in line with those reported by Fischer and Qaim (2012) in Kenya who found that, with the commercialization of agriculture, women were increasingly disadvantaged because of persistent gender disparities in accessing productive resources. In addition, Vargas Hill and Vigner (2014) study of traditional perennial exports of cocoa in Ghana and coffee in Uganda show that women face barriers in accessing input markets, particularly for labour and non-labour inputs, and which influenced their choices of production technology. In Uganda, the low quantities marketed, and lack of access to bicycles, limited female coffee farmers to effectively market their coffee. The study findings can be explained by a number of factors including socio-cultural values in the study areas. Study observations show that, womens access and linkages to markets were limited to crops such as maize, beans, potatoes and carrots. Due to socio-cultural values, women in the study areas were restricted to engage in marketing of coffee while men did all the marketing of coffee and beans. Commodities generating lower average revenues are more likely to be controlled by women, whereas commodities that are high revenue generators were likely to be under the control of men, who often sold them in the formal markets (Njuki *et al.*, 2011). Furthermore, observations in the study areas revealed that, even if a woman had inherited land with trees on it she was supposed

to seek for the consent and approval from a previous owner who would be a father or an uncle for harvesting and selling the trees. Women could not make decisions relating to marketing of those products in terms of the amount to sell, the price to offer and the place to be sold. In Ndatu village a FGD participant showed dissatisfaction by saying that:

We and children spend most of our time in farming. But when it comes to marketing of products, men comes up and sell them. Experience shows that some men marry more wives and others remain in town and squander the money. (FGD- Ndatu village-15.07.2015)

In addition, observation from the study show that, weak farmer groups and associations in the study villages have aggravated inequality between male and female farmers' access and linkages to markets. According to Jones *et al.* (2012) study in Malawi farmer's groups and associations have greater potentials in connecting women with the markets and they can be better linked to and access resources and markets, develop relationships, and overcome gender constraints. Responding to the observed situation, the village extension officer in Ndatu village said:

We have been struggling to encourage farmers to join farmer groups and associations as a solution to various agricultural challenges including marketing of their agricultural products. But the responses has not been positive as most of farmers are hesitant due to past experiences associated with farmers 'associations' malpractices (KI- AEA -Ndatu village-15.08.2015)

Moreover, regarding accessing land in the study areas, the study findings indicate that, the respondents who reported improvement on female farmers' access to land due to changed central-government relation had higher median rank than those who reported improvement in female access to land. The number of respondents who reported improvement in male

access to land had the median score value of 4.0 while those who reported improvement on female access to land had the median score value of 3.3. The differences in the number of the respondents who reported improvement in males and females access to land were statistically significant at $p \leq 0.05$ and z score value of -7.23. The study findings are in line with those reported in a study by ILC (2012) in Rwanda and Burundi which found that women were particularly vulnerable, because of systematic discrimination in relation to the recognition of their land rights, in public discourse and in decision-making, also in relation to their relative cash poverty, and their physical vulnerability. In addition, the study by Patel (2012) in Brazil showed, women had systematically less access to land and capital despite having sophisticated knowledge in the farming system. This therefore shows that resource allocation between male and female farmers is still a challenge in different parts of the world. Behrman *et al.* (2012) in Chile posited that land deals that create new opportunities for women can make positive transformations, but those that take resources away from women can reduce the welfare of women and their families, even if there are some income gains for men.

Male dominance in the study areas can best be explained by disparity between females and males' access to land. For example, observation in the surveyed villages in Meru and Arusha District Council revealed that, even where a female possessed land prior to being married, once she is married she the property she owned is automatically transferred to men who are the household heads. During the FGDs with the respondents in Mlangarini village, one participant said:

I was given this piece of land by my father before he died; when I got married we shared all what we had with my husband including the piece of land and other stuffs from my parents. Now the land belongs to our family and it is under the custodian of my husband. Whenever we want to develop the land or sell it we have

to discuss together and then reach an agreement (FGD- Mlangarini village- 01.09.2015).

In addition, during the interview with village extension staff in Poli village it was noted that though the traditional values allowed women to inherit land but since the land is scarce in most cases males play a leading role when it comes to land ownership. Commenting on the situation the village extension staff said:

Land is the source of life in this village. It provides platforms for various undertaking both crops and animal husbandry. Even though socio cultural values provides equal land ownership chances between male and female but in reality most of the land is owned by males who are the household's heads (KI- AEA -Poli village-19.08.2015)

It was observed that, 90% of land in the study villages was owned by men who were household heads and much of this land was acquired through inheritance or buying.

In addition, Table 18 shows that, male farmers' access to agricultural technologies due to a change in the mode of operation between the central and Local Government from commanding to intergovernmental relations was relatively higher as opposed to that of female farmers. The number of respondents reported improvement in male farmers' access to agricultural technologies recorded the median score of four while those reported improvement in females' access to agricultural technologies had a median score of three point three. The difference in the number between the respondents who reported improvement in access in agricultural technologies between females and males due to a change of in the mode of operation between the Central and Local Government was statistically significant at $p \leq 0.05$ and z score of -4.32. These study findings conform to

those of Ragasa *et al.* (2012); Kabura (2014); Okanya (2014) who differently found that agricultural extension information and delivery services were male biased. For example Ragasa *et al.* (2012) while studying gender difference in access to agricultural extension services in Ethiopia found that, female farmers were less likely to get extension services than their male counterparts.

These study findings have partly been attributed to lack of access to resources among female farmers including ownership of farming enterprises. During the survey it was revealed that, most of the farming enterprises belonged to families which were mostly controlled by males. These were the ones who also got much of the agricultural extension information and delivery of services from the extension agents. For example, one agent in Ndatu village was recorded saying:

Most of our clients in this village are men. Because of the tradition they are the household heads and custodians of family land and cattle. They are the ones who receive the most agricultural extension information and services (FGD- Ndatu village-15.07.2015).

Moreover, the difference between female and male farmers' access to agricultural inputs and finances was statistically significant at $p \leq 0.09$ and $p \leq 0.08$, respectively (Table 18). The median scores for females and males in terms of access to agricultural inputs and financial services were the same. The median score rank was 4.0 implying that there was no change resulting from the implementation of decentralization reform.

4.7.1 Wilcoxon signed ranked test results for accessing agricultural extension information and delivery of services between crop farmers and livestock-keepers due to change in mode of operation between central and local government

The Wilcoxon signed rank test was used to test the respondents' opinions on the accessibility of AEI&SD between crop farmers and livestock keepers due to changed central-local relations. The aspects that were measured for the access to agricultural extension information and delivery of services included access to agricultural technologies, agricultural information, land, financial services, and agricultural inputs.

The study results presented in Table 19 show that, the respondents who kept livestock had higher median rank of 3.5 than those who grew crops of 3.2 who had median rank of 3.5 for accessing agricultural inputs due to change in the mode of operation between the Central and Local Government relations. Those who reported improvement in livestock access to agricultural inputs had the median rank of three point five, which was higher than 3.2 for those who reported for crop farmers. The differences in ranking between crop growers and livestock keepers were statistically significant at $p \leq 0.05$ with a z score of -4.41. The study findings imply that, slightly more of the respondents who kept livestock were of the opinion that they did not access agricultural inputs as opposed to their crop growers' counterparts during a change in the mode of operation between the Central and Local Government.

Observations show that in the study areas, most livestock keepers bought their livestock inputs from private vendors who sometimes supplied agricultural inputs. The most common inputs supplied were veterinary medications, roughage concentrate and milk processing handlings. These study findings conform to those by Tegegne *et al.* (2006) in

Ethiopia who found that livestock keepers had reliable access to livestock inputs compared to crop farmers. Though the findings indicated that, the private sector supply was limited to supplies of veterinary drugs, roughage and concentrate feeds, as well as processing equipment utensils and therefore public sector remained to be the main supplier of livestock input.

Table 19: Wilcoxon signed ranked test results based on crop farmers and livestock-keepers access to AEI&SD (n=390)

Variables	z-value	Crop farmers median score	Livestock-keepers median Score	p-value
Crop farmers and livestock keepers access to agricultural inputs	-4.41	3.2	3.4	0.01
Crop farmers and livestock keepers access to financial services	-2.81	3.4	3.6	0.05
Crop farmers and livestock keepers access to land	-3.17	3.4	3.5	0.01
Crop farmers and livestock keepers access to agricultural technologies	-4.05	3.4	3.6	0.01
Crop farmers and livestock keepers access to agricultural information	-4.32	3.3	3.5	0.01

Source: Field data 2015

The opinions of crop farmers and livestock keepers about access to agricultural inputs can be explained by the nature of farming activities they undertook. It was observed that, most of the livestock extension staffs gave advice to livestock keepers than to crop farmers because of the incentives and associated benefits they received when discharging their responsibilities. Further observation revealed that, it was an opportunity for a livestock extension staff to supplement incomes from the service charges and selling of livestock and other medications than it was for crop extension staff. Also, most crop growers did not seek AEI&SD from the crop extension staff; something which was common for livestock keepers. During FGDs at Lengijave village one participant noted saying:

I receive regular support from our livestock extension staff about agricultural inputs and information than I do from our crop livestock extension staff. Whenever,

I detect something unusual in crop field I normally consult my fellow farmers whom we share some experiences and it works. The livestock extension staff are readily available because we pay for their transport, and other charges (FGD-Lengijave village-27.08.2015)

In addition, Table 19 shows wilcoxon signed ranked test results on access to financial services due to a change in the mode of operation between Central and Local Government. The respondents who kept livestock had a median rank of 3.6 while crop growers had the median rank of 3.4. The differences in the ranking between crop farmers and livestock keepers' access to financial services was statistically significant at $p \leq 0.05$ with a z score of -2.81. Similar findings were reported by Tegegne *et al.* (2006) who found that, livestock keepers in Ethiopia were more connected with credit facilities. In the study areas observation showed that, the main suppliers of financial services to the respondents were microfinance institutions, food security projects, small-scale micro enterprises and NGOs. According to Schultze *et al.* (2007), the liquidity derived from keeping livestock was not matched by any other agricultural activities because cattle could be disposed of quickly and easily at any time and bring incomes to farmers than crops.

The livestock keeper's access to micro credit facilities and rural financial services in the study villages was mainly attributed to the beliefs of the lender (Financial Institutions). The lender had the belief that, it was more risk to provide loan to crop farmers than to livestock keepers due to liquidity and tangibility of livestock in case the lender defaulted to pay the loan on time. It was further observed that, most of the rural financial institutions had stringent conditions which limited crop farmers from accessing financial services.

Moreover, Table 19 shows Wilcoxon signed ranked test results on access to land. Crop growers had a lower median ranking score of 3.4 than livestock keepers whose score on access to land was 3.5. The difference in the ranking on access to land between livestock keepers and crop growers due to a change in the mode of operation between the Central and Local Government was statistically significant at $p \leq 0.05$ and z score -3.17.

These study findings are in disagreement with Benjaminsen *et al.* (2009) in Kilosa District in Tanzania who found that pastoral access to wetlands is decreasing due to the expansion of cultivated areas and the promotion of agriculture. Moreover, Mwamfupe (2015) in Longido Tanzania found that livestock keepers were more insecure in terms of land access due emerging process of land grabbing which contravened with local rights, marginalizing rural farmers and pastoralists who depend on land, water and other natural resources. According to Mwamfupe (*Ibid*) the problem of lack of security of tenure facing pastoral groups is best exemplified by the eviction of the Maasai pastoralists from eight villages in Loliondo District of northern Tanzania.

Despite the disparity shown in the study findings on access to land between croppers and livestock keepers, the respondents' opinions might have also been influenced by the agro-ecological factors. The respondents' resided in two distinct agro-ecological zones practicing animal husbandry and crop farming. Due to availability of water and fertility of land the upper zone was heavily populated and practiced crop farming as opposed to the lower zone, which was sparsely populated, dry and dominated by livestock keepers. The lower zone had more unoccupied land compared to the upper zone which prompted respondents growing crops to think that livestock keepers had more access to land than them. In FGDs at Ndatu village one participant complained:

We are heavily squeezed; the land in Meru (referring to the upper zone) is no longer supportive for our livelihood. Our population has tremendously increased over the last ten year. Now we are looking for other alternative land allocated for us a possibility for alternative land. With land conflicts of 1990s the government looked alternative land in Kilindi District in Tanga region but most farmers did not stay there long didn't stay longer due to unsupportive environment most came back here (FGD- Ndatu village-15.07.2015).

Adio (2016) defines agricultural information as the various sets of information and messages that are relevant to agricultural production activities of farmers such as crop production and protection, animal production and management, and natural resource production and conservation. In this study, agricultural information is used to refer to agricultural related data which are transformed into meaningful and useful contexts or forms for effective decision making in agriculture or farming related activities.

The study findings on respondents' access to agricultural information as a result of a changed central-local relations indicated that, livestock keepers had higher median rank score of 3.6 compared to crop growers who had a ranking score of 3.4. The difference in the ranking on access to agricultural information between livestock keepers and crop growers was statistically significant at $p \leq 0.05$ with a z score of -4.05. Furthermore, with regards to access to agricultural technologies due to a change in the mode of operation between central and local government, Table 19 reveals that, the respondents who grew crops showed improvement in accessing agricultural technologies by scoring low median scores of 3.3 compared to those who kept livestock. The differences in the ranking on access to agricultural technologies between crop growers and livestock keepers was statistically significant at $p \leq 0.01$ with a z score value of -4.32. Agricultural technology

refers to tools and machines and equipment which is used in agricultural process. It focuses on technological processes which are used in agriculture to create an understanding of how processes, equipment and structures are used by people, soil, plants, animals and their products to conserve the environment, to sustain and maintain the quality of life and to promote economic, aesthetic and sound cultural values (RSA, 2005).

The study findings imply that, despite the change in the mode of operation between Central and Local Government there was still inequity between crop growers and livestock keepers in accessing agricultural technologies. The results are in line with those reported by IFPRI (2010) who found that despite a wide range of reform initiatives in agricultural extension in the past decades in India, the coverage of access to, and quality of information provided to marginalized and poor farmers was uneven. Furthermore, a study by Kabur (2014) in Tanzania found that farmers' extension program was low among pastoralists than was the case with the agro pastoralists. Several reasons can be given; one was the level of willingness between the two groups to initiate demand for extension services and the incentives that livestock extension officers get when delivering services to their clients.

In the interview with one village extension officer it was said:

The level of aggressiveness in initiating extension services is higher among livestock keepers compared to crop growers. I often receive calls from livestock keepers than I do from crop growers. This has been attributed by several factors including the practice of crop growers of relying on their fellow farmers when they encounter challenges in their fields (KI- AEA Kisyeria village-22.08.2015).

Moreover, during the FGD in Langijave village one participant was noted saying that:

I practice both crop farming and keeps livestock, but when it comes to seeking agricultural advices and information I am more eager to consult livestock extension staff than I do with crop extension staff so as to minimize the associated cost. For the crops I usually get advice from my fellow farmers (FGD- Lengijave village-15.07.2015).

Observation revealed that, livestock keepers sought more information and services about their livestock than did crop growers. Most crop growers sought information about crop husbandry from their fellow farmers than from agricultural extension agents.

4.7.2 Summary of key findings regarding the influence of change in mode of operation between Central and Local Government on enhancing provision of equitable AEI&SD

The main assumption underpinning this objective was the change in the mode of operation between the Central Government and the Local Government would have been triggered in addressing inequity between different farmers' groups. The Wilcoxon signed rank test was used to assess equity in the provision of AEI&SD between crop farmers and livestock keepers in one hand, and between female farmers and male farmers on the other hand. The study results have indicated that, there is still persistence inequity in the provision of AEI&SD between different groups which has been attributed to various factors including; the socio-cultural values in the study area, the land tenure system, lack of access to resource ownership, irresponsiveness and biasness of agricultural extension staffs. Other include the nature of farming enterprises undertaken, the agro-ecological factors and willingness of different farming groups to initiate demand for agricultural extension services.

4.8 Theoretical implication of the study findings

This study is based on a combination of theoretical perspectives: the principal-agent theory and institutional theory. Since decentralization reform is a complex undertaking and its implementation varies across countries globally, the use of these theories provide a sufficient framework for assessing factors influencing the effectiveness of agricultural extension information and service delivery during the implementation of D by D policy in Tanzania. The implication of these theories on study findings are discussed hereunder.

4.8.1 The Principal-agent theory

The Principal-Agent theory is one of the dominant theoretical perspectives for analyzing and organizing relationships in public governance. Masanyiwa (2014) argues that the theory was initially developed by economists and widely applied by sociologists, political scientists and lawyers. The theory states that a Principal determines the work and the Agent undertakes the work with the expectations that the agent will make decisions that are in the best interest of the Principal (Jensen and Meckling, 1976; Eisenhardt, 1985; 1989) as cited by Macias (2012). For this study, the theory helped in examining how the design of agricultural extension information and service delivery (AEI&SD) during the implementation of D by D policy took into considerations the contextual needs of different actors as a mechanism of reducing and sharing the risks for effective maximization of the policy outcomes.

The study findings conform to the Principal–Agent theory in the sense that, the effectiveness of decentralized AEI & SD has been influenced by a number of factors both at policy level and in implementation stages. For example, HO:₁ stated that:

There is no statistically significance influence of administrative de-linking of AEI&SD from MALF to LGAs on its accessibility to farmers.

The underlying assumptions underpinning administrative de-linking of AEI&SD from MALF (Principal) to LGAs (Agent) for improving farmers' production and productivity was that, staff development, planning, budgeting, recruiting, and financing for AEI&SD was the responsibility of agent. However, McNemars results reveal that, all indices used to measure AEI&SD accessibility namely, access to agricultural inputs, financial services, agricultural information transfer, market access and linkages were statistically insignificant at $p \leq 0.05$ with administrative de-linking of AEI&SD. This meant that the Principal did not adequately enhance the Agent to perform those roles. Furthermore, results from McNemars' test show that, before the administrative de-linking of AEI&SD, of the 390 respondents, most, 82.6% reported that they had access to agricultural inputs before. In 2015, during administrative de-linking of AEI&SD, about half, 49.3% of the respondents indicated that they had access to agricultural inputs. Hence, there was a drop of 33.3% indicating a failure of the principal to effectively provide enough resources to the agents for effective staff development, planning, budgeting, recruiting, and financing for AEI&SD to smallholder farmers. These study findings were statistically significant at $p \leq 0.05$. This trend was similar in AEI&SD accessibility, which implied that, the respondents in the study areas had more access to AEI&SD before its administrative de-linking than after.

Hypothesis HO: ₃ stated that:

There is no statistically significance influence of shifting of AEI&SD decision making process to LGAs on farmers' empowerment.

Under this assumption, the Principal (LGAs) relegated decision making powers about AEI&SD to village governments, who is the agent. The objective was to involve farmers in making decisions about AEI&SD with a view for improving agricultural production and productivity. The variable that was tested included farmers' participation in agricultural

development priority setting, income generation, and participating in agricultural fora for knowledge and skills sharing and development. Yet, others included capacity to initiate demand for AEI&SD, formation of farmers groups and association and involvement in integrated pests management. The study findings revealed that, despite a shift in AEI&SD decision making from the Principal (LGAs) to the Agent (village governments) who is close to farmers, most, 76% of the respondents reported that such had an insignificant influence on farmers' decision making powers (empowerment).

Hypothesis HO: 4 stated that:

There is no statistically significance influence of change in the mode of operation between the central government and local government authorities regarding equitable provisioning of AEI&SD to farmers.

For this hypothesis, the mode of operation between the Principal (Central Government) and the Agent (LGAs) regarding equitable provision of AEI&SD to farmers changed from issuing commands to that of collaborative relationship between the two parties. Regarding this study findings, equitable provision of AEI&SD between different farmers group was measured based on their access to: land; agricultural inputs; financial services; agricultural information; and markets linkages. Wilcoxon signed ranked test results indicated that, respondents who reported improvement in livestock keepers access to AEI&SD had higher score ranks compared to those who reported to crops growers. The differences in provision of equitable AEI&SD were noted in access to: land; agricultural inputs; financial services; agricultural information; and markets linkages. The difference between those reported livestock keepers and crop growers' access were statistically significant at $p \leq 0.05$ for market access and linkages, access to land, agricultural inputs, and agricultural information transfer and at $p \leq 0.05$ for financial services respectively. Moreover, Wilcoxon signed ranked test findings indicated that, respondents who reported improvement in male

access to agricultural information, markets, and land had higher score ranks compared to those who reported to females and it was statistically significant at $p \leq 0.05$. The wilcoxon signed ranked test study findings revealed that, despite the change in mode of operation between the principal and the agent, there is in equity in provision of AEI&SD to farmers in study areas. Based on the Principal-Agent theory, ineffective outcome in a Principal-Agent relationship is attributed by inadequate monitoring of the Agent performance by the principal and poor incentive instituted by the Principal to the Agent. In this study therefore, the findings revealed that, inadequate financing of AEI&SD by the Principal (MALF and PORALG) has attributed to poor performance of the Agents (LGAs and village extension agents) due to insufficient monitoring and implementation of AEI&SD.

4.8.2 The New Institutional Economic (NIE) theory

The new institutional economics theory is a relatively new multidisciplinary field that includes aspects of economics, history, sociology, political science, business organization and law. Coase, (2000) argues that the development of this approach can be traced back to 1937. Other contributors in the development of the NIE include (Gruchy,1978; North, 2000 and Hodgson, 2016). The NIE can be distinguished from the old institutional economics approaches by its ability to integrate institutional agents as a key factor in determining economic performance. The country's institutions have an influence on our behavior and therefore on outcomes such as economic performance, efficiency, economic growth and development. Williamson (2000) pointed out that NIE operates at macro and micro levels. The macro-level deals with the institutional environment or the rules of the game, which affect the behavior and performance of economic actors and in which organizational forms and transactions are embedded. At macro-level the focus of analysis is on set of fundamental political, social, and legal ground rules that establish the basis for production, exchange and distribution. The micro-level analysis, on the other hand, also

known as the institutional arrangement deals with the institutions of governance. The macro and micro analysis framework was instrumental in analyzing and understanding factors influencing the effectiveness of decentralized AEI&SD to farmers.

Hypothesis HO: 2 stated that:

There is no statistically significance influence of LGAs autonomy on the quality of AEI&SD to farmers.

Under this hypothesis it was believed that, the increase in LGAs autonomy would have improved the quality of AEI&SD to farmers. A number of variables namely; responsiveness of AEI&SD, existence of feedback mechanism to farmers, relevance and quality of agricultural information delivered to farmers, as well as the quality of agricultural knowledge and skills that are delivered to farmers. Yet, others included funds allocated to finance AEI&SD, adoption of agricultural technologies from extension staff, and diversities of extension methodologies. The study findings revealed that, despite increase in LGAs autonomy, the AEI&SD was of poor quality. For example the paired t-test results indicated that, the feedback frequency to farmers before increase in LGAs autonomy had a mean score of 2.14 compared to 1.03 after increase in LGAs autonomy. The difference in the frequency of feedback to farmers between before and after increase in LGAs autonomy had a mean score of 1.11 and it was statistically significant at $p \leq 0.05$. Moreover, McNeymar chi-square test results indicated that, of the 390 respondents, majority 76.4%, reported to have received more relevant information on livestock when AEI&SD were managed and administered by MALF compared to 43% who received relevant information with increase in LGAs autonomy. Similarly, the study findings indicated that, before the LGAs autonomy 76.6% of the respondents reported to have received more relevant technologies on crop production compared to 52. % after increase in LGAs autonomy. The decrease in the number of the respondents receiving relevant

information on livestock implied that LGAs increase autonomy did not significantly contributed to the improvement in quality of AEI&SD.

Based on the NIE theory, the implementation of decentralized agricultural extension services is likely to be influenced by the context under which the policy is implemented. In this study, the increase in LGAs autonomy is governed by number of Acts and regulations such as Local government Act. No 9 of 1999, Local Government Finance Act of 1982 and its regulations. These Acts affects the behavior and performance of D by D actors for effective decentralized AEI&SD. Therefore, since the D by D institutional environment change with time, there is a need of reviewing the rule of the game to make the reform more effective.

CHAPTER FIVE

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The decentralized AEI&SD among other objectives was meant to improve the quality and quantity of AEI&SD through enhancing its efficiency and effectiveness. Moreover, the decentralized AEI&SD was envisioned to make the farmers the centre of all agricultural decision making by bringing the services closer to the beneficiaries. However, it was evident that, since its inception in 2000s and its subsequent implementation, the envisaged objectives have not been adequately met. Further the implementation encountered a number of challenges which negatively influenced its effectiveness. From the study, it was found that some of the factors that impeded policy effectiveness were stemming out of the policy design while others were due to non-compliance to the policy. Based on the foregoing specific observations the following conclusions have been drawn.

5.1.1 The influence of administrative de-linking from MALF to LGAs on AEI&SD accessibility to farmers

The main assumptions underpinning administrative de-linking of AEI&SD agricultural services from the Ministry responsible for Agriculture to LGAs were to improve accessibility of AEI&SD to rural farmers. The de-linking of AEI&SD involved transferring of the functions that were primarily carried out by the Ministry responsible for agriculture such as recruitment of AEA, planning and budgeting for AEI&SD, financing as well as developing extension agents professional and career development programmes to the Local Government. However, most of the variables tested through Mneymar chi-square test, paired t-test were statistically significant indicating that, farmers had more access to AEI&SD before administrative de-linking than during the implementation of the

delinking reforms. These findings suggest that administrative de-linking has not been able to increase farmers' access to AEI&SD. Several factors have attributed to the ineffectiveness of administrative de-linking on the accessibility of AEI&SD. Such factors include but not limited to high cost of accessing AEI&SD, limited number of AEA, in adequate funding of AEI&SD, poor coordination and management of AEI&SD and limited and inaccurate marketing information.

5.1.2 The influence of LGAs' autonomy on the quality of AEI&SD to farmers.

It was envisaged that, the increase in LGAs autonomy through Decentralized AEI&SD would have a positive influence on the quality of AEI&SD to small farmers. However, the prevalence of ill-functioning of AEI&SD suggests that, the increase in LGAs Autonomy has not sufficiently and significantly influenced the provision of quality AEI&SD to farmers. Some of the noted AEI&SD malfunctioning included; ineffective feedback mechanism to farmers, irresponsiveness of AEA, irrelevance of agricultural information and technologies to farmers unlike the time when the AEI&SD were under the management of the Ministry, insufficient AEI&SD funding and poor adoption rate of agricultural information and technology among framers. Generally, the respondents had the opinion that they accessed quality AEI&SD before an increase in the local government autonomy than during the increase in LGAs autonomy.

5.1.3 The influence of Shift in AEI&SD decision making process to LGAs on farmers' empowerment

The study findings revealed that, the shift in AEI&SD decision making process from the Central Government to LGAs did not significantly influenced farmers' empowerment in the study area. The decentralized extension services had created a number of opportunities in terms of systems and structure with the view of empowering farmers in

the rural areas. However surprisingly, this study found that, the respondents' utilization of the designed and initiated systems and structures was constrained by a number of challenges both at policy design and operational levels and hence hindered farmers' empowerment.

5.1.4 The influence of change in mode of operation between central and LGAs of enhancing provision of equitable AEI&SD

Despite the change in the mode of operation between the Central and The Local Government from commanding to intergovernmental relation, the study found that, there were still some discrepancies in the delivery of AEI&SD. The respondents attested that, there was unequal access in the delivery of services between livestock keepers and crop farmers as well as between males versus female farmers. The disparity in the delivery of extension services between different farming groups in the study area is a justification that, the envisaged policy objective of promoting and enhancing equity in the delivery AEI&SD was not adequately met.

5.2 Recommendations

Based on the above conclusions, the following recommendations are made to enhance effectiveness of AEI&SD under the context of D by D policy in the study areas.

5.2.1 The influence of administrative de-linking from MALF to LGAs on AEI&SD accessibility to farmers

- i. Devolution of functions and responsibilities should go hand in hand with the devolution of resources to make the decentralized AEI&SD work effectively. Therefore, the President's Office Recruitment Secretariat should devolve recruitment functions and the Ministry responsible for agriculture should devolve

financial resources to enable AEI&SD to be effectively coordinated and implemented by LGAs under the context of D by D.

- ii. The Ministry responsible for Agriculture should review agricultural extension guidelines to address farming needs and their socio-economic status.
- iii. PO-RALG should ensure that, the establishment of new administrative areas goes hand in hand with an increase in staffs including agricultural extension agents.

5.2.2 The influence of LGAs' autonomy on the quality of AEI&SD to farmers

- i. The Ministry responsible for Agriculture and PO-RALG should strengthen the provision of technical backstopping and quality control, monitoring and evaluation of AEI&SD to LGAs for quality delivery of AEI&SD to farmers.
- ii. The LGAs should establish rural information centres to ensure timely access of relevant agricultural information among farmers.

5.2.3 The influence of Shift in AEI&SD decision making process to LGAs on farmers' empowerment

- i. Community radio should be encouraged to have special programmes on AEI&SD to enable farmers to make informed decisions.
- ii. LGAs should strengthen cooperative societies and farming groups to facilitate promotion of agricultural information technologies sharing and access to marketing information.

5.2.4 The influence of change in mode of operation between central and LGAs of enhancing provision of equitable AEI&SD

- i. The PO-RALG should revisit and review power structure relationship in decentralizing AEI&SD for the provision of equitable information and services

- ii. The Ministry responsible for agriculture should mainstream equity frameworks in the agricultural extension guidelines.

5.2.5 Suggestions for further study

Since this study limited itself to the factors influencing effectiveness of D by D on public AEIDS, further areas of study are suggested below.

- i. Further studies to include other extension actors such as the private sector, Faith Based Organization, and Non-Governmental Organization for assessing the policy influences on the delivery of agricultural extension.
- ii. Since the selection of the study areas was based on their involvement in the first phase of the implementation of the policy, the same study could be replicated to other LGAs involved in the second phase of the policy implementation
- iii. Similar study be done in other sectors such as health, education, water, and land to see how they have been influenced by the implementation of the D by D policy.

REFERENCES

- Abdallah, A. and Abdul-rahman, A. (2016). Determinants of access to agricultural extension services : Evidence from smallholder rural women in northern Ghana. *Asian Journal of Agricultural Extension, Economics & Sociology* 9(3):1–8.
[http://www.journalrepository.org/media/journals/AJAEES_25/2016/Jan/Abdallah932015AJAEES23478.pdf] site visited on 12/2/2016.
- Abid, M., Scheffran, J., U. A. Schneider, U.A. and M. Ashfaq, M. (2015). Farmers' perceptions of and adaptation strategies to climate change and their determinants : the case of Punjab province, Pakistan. *Earth System Dynamics* 5: 1359–1406 [<https://www.earth-syst-dynam.net/6/225/2015/esdd-5-1359-2014.pdf>] Site visited on 6/6/2016.
- Aboagye, P.Y. (2015). Promise and Reality of Decentralization: The case of farmers' access to agricultural advisory services in the Sunyani municipality of Ghana. Dissertation for Award of MSc Degree at Lund University, Lund, Sweden, 70pp. [<http://lup.lub.lu.se/student-papers/record/5470656>] site visited on 12/4/2017.
- Adamides, G., Stylianou, A., Kosmas, P. C., Constantinos D. and Apostolopoulos, C. D. (2013). Factors Affecting PC and internet usage by the rural population of Cyprus. *Agricultural Economics Review* 14(1): 16–36.

- Adejo, P.E., Okwu, O. J. and Ibrahim, M.K. (2012). Challenges and prospects of privatization of agricultural extension service delivery in Nigeria. *Journal of Agricultural Extension and Rural Development* 4(3): 63–68. [http://www.eng.auth.gr/mattas/14_1_2.pdf] site visited on 7/8/2017.
- Adesiji, G.B., Akinsorotan, A. O. and Omokore, D. F. (2010). Farmers' assessment of extension services in Ogun State, Nigeria. *Journal of Agricultural and Food Information* 11(2): 143–156.
- Adhiguru, P., Birthal, P.S. and Ganesh Kumar, B. (2009). Strengthening pluralistic agricultural information delivery systems in India. *Agricultural Economics Research Review* 22: 71–79.
- Agresti, A. and Corporation, E. (2002). *Categorical Data Analysis*, John Wiley and Sons Inc., New Jersey. 710pp.
- Agresti, A. and Finlay, B. (2009). *Statistical method for the social sciences*. 4th ed. Pearson Prentice Hall. New Jersey, 609pp.
- Akinwande, M.O., Dikko, H.G. and Samson, A. (2015). Variance inflation factor : As a condition for the inclusion of suppressor variable (s) in regression analysis. *Open Journal of Statistics* 5: 754–767. [https://file.scirp.org/pdf/OJS_2015122416050944.pdf] site visited on 23/3/2017.

- Akramov, K.T. (2009). Decentralization, agricultural services and determinants of input use in Nigeria, Discussion Paper 00941
[<http://www.ifpri.org/publication/decentralization-agricultural-services-and-determinants-input-use-nigeria-0>] site visited on 12/3/2017.
- Alper, O. (2014). Notes on concept of decentralisation. *European Scientific Journal* 10(10):415-423. [<https://eujournal.org/index.php/esj/article/view/3149>] site visited on 4/5/2017.
- Anderson, J. and Feder, G. (2003). Rural extension services. agriculture and rural development. World Bank Research Working Paper 2976, World Bank, Washington DC.33pp.
[[468741366218/120520322_20041117164046/additional/multi0page.pdf](https://openknowledge.worldbank.org/handle/document/468741366218/120520322_20041117164046/additional/multi0page.pdf)] site visited on 4/6/2016.
- Aref, F. (2011). Barriers to community capacity building for tourism development in communities in Shiraz, Iran. *Journal of Sustainable Tourism* 19(3): 347-359.
- Asiedu-Darko, E. (2013). Agricultural extension delivery in Ghana: a Case Study of factors affecting it in Ashanti, eastern and northern regions of Ghana. *Journal of Agricultural Extension and Rural Development* 5(2):37–41.[<http://www.academicjournals.org/JAERD>] site visited on 4/5/2017.

- Awotide, B. A., Awoyemi, T. T. and Oluwatayo, I.B. (2012). Gender analysis of income inequality and poverty among rural households in Nigeria: Evidence from Akinyele local government Area, Oyo State' *New York Science Journal* 5(10):13–19. [<http://www.sciencepub.net/newyork>] site visited on 14/2/2017.
- Babbie, E. (2013). *The Practice of Social Research* (13th edn). Belmont, California. 120pp.
- Bahiigwa, G., Rigby, D. and Woodhouse, P. (2005). Right target, wrong mechanism? Agricultural modernization and poverty reduction in Uganda. *World Development* 33(3): 481–496.
- Baloch, M.A. and Thapa, G. B. (2016). The effect of agricultural extension services: Date farmers' case in Balochistan, Pakistan. *Journal of the Saudi Society of Agricultural Sciences* 17(3): 282-289.
- Bashaasha, B., Mangheni, M. and Nkonya, E. (2011). Decentralization and rural service delivery in Uganda', IFPRI Discussion Paper, (February), p. 32. [<http://www.ifpri.org/sites/default/files/publications/ifpridp01063.pdf>] site visited on site visited on 14/2/2017.
- Beall, J. and Piron, L. H. (2005). DFID Social Exclusion Review, (May), pp. 8–9. [<https://www.odi.org/resources/docs/2301.pdf>] site visited on site visited on 15/7/2017.

- Belay, A., Recha, J. W., Woldeamanuel, T. and Morton, J. F. (2017). Smallholder Farmers' Adaptation to climate change and determinants of their adaptation decisions in the Central Rift Valley of Ethiopia. *Agriculture & Food Security* 6(1):1-13.
- Benard, R., Dulle, F and Ngalapa, H. (2014). Assessment of information needs of rice farmers in Tanzania; A case study of Kilombero District, Morogoro. *Library Philosophy and Practice* (e-journal). 1071.
[<http://digitalcommons.unl.edu/libphilprac/1071>] site visited on 12/3/2016.
- Bhagat, D. and Dhar, U. R. (2012). Factors affecting market accessibility of small farmers in West Garo Hills District of Meghalaya. *Management Convergence* 3(1): 47-56.
- Birner, R., K., Davis, J., Pender, E., Nkonya, P., Anandajayasekaram, J., Ekboir, A., Mbabu, D., Spielman, D. and Benin, S. (2006). From best practice to best fit: A Framework for designing and analyzing pluralistic agricultural advisory services. IFPRI Discussion Paper 37. Washington, DC: International Food Policy Research Institute.
[<http://www.ifpri.org/sites/default/files/publications/dsgdp37.pdf>] site visited on 12/3/2016.
- Buadi, Donus K. Anaman, Kwabena A. Kwarteng, Joseph A. (2013). Farmers' perceptions of the quality of extension services provided by non-governmental organisations in two municipalities in the central region of Ghana. *Agricultural Systems* 120: 20-26.

- Cabral, L. (2011). Decentralisation in Africa: Scope, motivations and impact on service delivery and poverty, in future agricultures consortium, pp. 1–14. [<https://opendocs.ids.ac.uk/opendocs/handle/123456789/2325>] site visited on 12/1/2017.
- Chauke, P. K., Motlhatlhana, M.L., Pfumayaramba, T.K and Anim, F.D.K. (2013). Factors influencing access to credit: a Case Study of smallholder farmers in the capricorn district of South Africa. *African Journal of Agricultural Research* 8(7): 582–585.
- Chowa, C., Garforth, C. and Cardey, S. (2013). Farmer experience of pluralistic agricultural extension, Malawi. *Journal of Agricultural Education and Extension* 19(2):147-166.
- Christoplos, I. (2010). Mobilizing the potential of rural and agricultural extension, FAO Report. [<http://www.fao.org/docrep/012/i1444e/i1444e00.pdf>.] site visited on 12/1/2017.
- Coaser, R. (2000). The New Institutional Economics. Chapter 1 in: Menard C, (ed), Institutions, contracts and organizations: Perspectives from New Institutional Economics. Edward Elgar, Cheltenham, UK.
- Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences*, Lawrence Earlbaum Associate, New Jersey.134pp.

- Davidova,S.,Fredriksson,L.,Gorton,M.,Mishev, P. and Petrovici,D.(2012).Subsistence farming, incomes, and agricultural livelihoods in the new member states of the European Union.*Environ.Plan.CGov.Policy*30,209–227.
[<http://dx.doi.org/10.1068/c1195r>.] site visited on 1/11/2016.
- Davis, K., Nkonya, E.,Kato, E.,Mekonnen, D.A.,Odeno, M, Miiro, R. and Nkuba, J. (2012). Impact of farmer field schools on agricultural productivity, poverty, and farmer empowerment in East Africa, (June).
[<https://pdfs.semanticscholar.org/d0c7/9ae04439217101c80170383c2375976ee1f1.pdf>] site visited on 12/11/2016.
- Denkyirah, E.K., Adu, D.T.,Aziz, A. A., Denkyirah, E.K., and Okoffo, E.D. (2016). Analysis of the factors influencing smallholder rice farmers: Access to credit in the upper east region of Ghana. *Asian Journal of Agricultural Extension, Economics & Sociology* 10(4) 2320-7027
- Danish Istitute for International Studies (2004). Farmers’ empowerment; Experience, Lesson learned and ways forwad. Copenhagen. [<http://www.fao.org/3/a-i3766e.pdf>] site visited on 2/4/2016.
- Drafor, I. (2014). Gender and small-farmer commercialisation: The case of two farming communities in Ghana. *Journal of Development and Agricultural Economics* 6(4):184-192.
- Dzadze, P., Osei Mensah J., Aidoo R. and Nurah G. K. (2012). ‘Factors determining access to formal credit in Ghana: a Case study of Smallholder farmers in

the Abura-Asebu Kwamankese District of Central Region of Ghana.
Journal of Development and Agricultural Economics 4(14): 416-423

Eisenhardt, K.M. (1985). Control: Organizational and economic approaches. *Management Science* 31(2):134–149.

Eisenhardt, M.K. (1989). Agency theory: An assessment and review. *Academy of Management Review* 14(1): 57-70.

Ernstson, H., Sörlin, S. and Elmqvist, T. (2008). Social movements and ecosystem Services - The Role of social network structure in protecting and managing urban green areas in Stockholm. *Ecology and Society* 13(2):360–371

Falleti, T.G. (2004). A Sequential theory of decentralization (Working Paper No. 314-July).
[\[https://kellogg.nd.edu/sites/default/files/old_files/documents/314_0.pdf\]](https://kellogg.nd.edu/sites/default/files/old_files/documents/314_0.pdf)
 site visited on 12/11/2016.

Familusi, E.B. and Owoeye, P.O. (2014). An Assessment of the use of radio and other means of information dissemination among the residents of Ado-Ekiti, Nigeria. *Library Philosophy and Practice* 1:1-29.
[\[https://search.proquest.com/docview/1738006104?accountid=26662%250A\]](https://search.proquest.com/docview/1738006104?accountid=26662%250A) site visited on 12/12/2016

FAO (2008). Farmer field schools on integrated pest management for cotton in India. Rome. [\[http://www.fao.org/3/a-i3766e.pdf\]](http://www.fao.org/3/a-i3766e.pdf) site visited on 2/4/2016.

FAO (2015). Promise and Reality of Decentralization: The Case of farmers' access to agricultural advisory services in the Sunyani Municipality of Ghana. [<https://lup.lub.lu.se/student-papers/search/publication/5470656>] site visited on 2/4/2016.

Foti, R., Nyakudya, I., Moyo, M., Chikuvire, J. and Mlambo, N. (2007). Determinants of farmer demand for fee-for-service extension in Zimbabwe: The Case of Mashonaland Central province. *Journal of International Agricultural and Extension Services* 14(1):95–104.

Gaynor, N. (2013). Local governance, conflict and peace building in the Democratic Republic of the Congo. [http://doras.dcu.ie/view/people/Gaynor,_Niamh.html] site visited on 2/4/2016.

Gecho, Y. (2016). Rural farm households' income diversification: The Case of Wolaita Zone, Southern Ethiopia. *Social science* 2(2): 6–17.

Gido, E.O. (2014). Demand for agricultural extension services among small-scale maize farmers: Micro-level evidence from Kenya. *The Journal of Agricultural Education and Extension* 21(2): 177–192.

Glendenning, C.J. (2010). Review of agricultural extension in India are farmers' information needs being met? [<https://ideas.repec.org/p/fpr/ifprid/1048.html>] site visited on 8/9/2016.

- Glendenning, C. J. and Babu, S.C. (2011). Decentralization of public-sector agricultural extension in India: the Case of the District-level Agricultural Technology Management Agency (ATMA), IFPRI-Discussion Papers; 2011. (1067): vii + 23 pp. many ref., (February).
[<http://www.ifpri.org/sites/default/files/publications/ifpridp01067.pdf>] site visited on 4/1/2018.
- Green, E. (2015). Decentralization and development in contemporary Uganda. *Regional and Federal Studies* 25(5): 491–508.
- Gussai, H. S. (2015). Ujamaa: Planning and managing development schemes in Africa, Tanzania as a case study. *The Journal of Pan African Studies* 8(1):1-19.
- Haile, F. (2016). Factors affecting women farmers' participation in agricultural extension services for improving the production in rural district of Dendi West Shoa Zone, Ethiopia. *International Journal of Agricultural Research, Sustainability, and Food Sufficiency* 3(4):69–82.
- Hasan, M., Imai, K. and Sato, T. (2013). Impacts of agricultural extension on crop productivity, poverty and vulnerability: Evidence from Uganda. Discussion Paper DP2012-34.[
<https://ideas.repec.org/p/kob/dpaper/dp2012-34.html>] site visited on 2/2/2017.
- Hassen, K., Zinab, B. and Belachew, T. (2016). Gender and education as predictors of food insecurity among coffee farming households of the Jimmazonne ,

Southwest of Ethiopia. *BMC Nutrition*. *BMC Nutrition* 2(75):1–7.

[<https://doi.org/10.1186/s40795-016-0116-0>] site visited on 2/3/2017

Heidhues, F. and Obare, G. (2011). Lessons from structural adjustment programmes and their Effects in Africa. *Quarterly Journal of International Agriculture* 50(1): 55-64.

Hepelwa, S. A., Selijio, O. and Mduma, J. K. (2013). The Voucher system and the agricultural production in Tanzania: Is the model adopted effective? Evidence from the panel data and analysis. University of Dar es Salaam, Dar es Salaam. 24pp.

Hettmansperger, T. P. and McKean, J. W. (2011). *Robust Nonparametric Statistical Methods* (2nd Edition). Chapman-Hill, London. 288pp.

Hiskey, J.T. (2010). *The promise of decentralised governance. making decentralization work: democracy, development and security*. Lynne Rienner Publishers, London, 120pp.

Hlongwane, J.J., Ledwaba, L.J. and Belete, A. (2014). Analyzing the factors affecting the market participation of maize Farmers: a Case study of small-scale farmers in greater Giyani local municipality of the Mopani District, Limpopo Province. *African Journal of Agricultural Research* 9(10): 895–899.

Hosmer, D.W. and Lemeshow, S. (2000). *Applied Logistic Regression* (2nd ed)_John Wiley & Sons, Inc, London. 130pp.

- Hu, G., Pan, W., Lu, M. and Wang, J. (2009). The widely shared definition of e-government. *The Electronic Library* 27(6), pp. 968–985.
- Ibrahim, A. (2014). Gendered analysis of the determinants of adaptive capacity to climate change among smallholder farmers in Meatu and Iramba Districts, Tanzania. Dissertation for Award of MSc Degree at Sokoien University of Agriculture, Morogoro, Tanzania. 139pp.
- Immaculate N Maina (2012). Adoption of Improved Agricultural Technologies among Smallholder Farm Households in Nakuru District, Kenya. *Journal of Agricultural Extension and Rural Development* 4(8):147–163.
- Imoloame, E.O. and Olanrewaju, A.O. (2014). Improving agricultural extension services in Moro local government Area of Kwara State, Nigeria. *Journal of Agricultural Extension and Rural Development* 6(3):108-114.
- Ivy, D. (2014). Gender and small-farmer commercialisation: The case of two farming communities in Ghana. *Journal of Development and Agricultural Economics* 6(4):184–192.
- Jayne, T.S., Govereh, J., Wanzala, M. and Demeke, M. (2003). Fertilizer market development: A comparative analysis of Ethiopia, Kenya, and Zambia. *Food Policy* 28(4):293–316.
- Jensen, M.C. and Meckling, W.H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics* 3(4):305–360.

- Kabura, P.J. (2014). Extension program needs by farmers in Tanzania: a Descriptive study. Dissertation for Award of MSc Degree at Iowa State University, Iowa, United States of America, 119pp.
- Kehinde, A.S., Obun, C.O., Inuwa, M. and Babadoye, O. (2016). Growth Performance ,Haematological and Serum Biochemical Indices of Cockerel Chicks Fed Ginger (ZingiberOfficinale) Additive in Diets. *Animal Research International* 8(2):1398–1404.
- Kenya, R. (2012). Kenya National Bureau of Statistics economic survey report 2012. Kenya national Bureau of Statistics, Nairobi, 110pp.
- Kerby, D.S. (2014). The simple difference formula: an approach to teaching nonparametric correlation. *Innovative Teaching* 3(1): 1-1.
- Kherallah, M. and Kirsten, J. F. (2002). The New Institutional Economics: Applications for agricultural policy research in developing countries[<https://ageconsearch.umn.edu/bitstream/16217/1/ms010041.pdf>] site visited on 12/2/2018.
- Semana, A. R. (1998). Equity implications of reforms on the financing and delivery of agricultural extension: a case study of two districts in Uganda. Kampala, Dissertation for Award of MSc Degree at Makerere University, Kampala, Uganda, 129pp.

- Kimaro, H.C. and Sahay, S. (2007). An Institutional perspective on the process of decentralization of health information systems: a Case study from Tanzania. *Information Technology for Development* 13(4):363–390.
- Kiplimo, J.C. (2015). Determinants of access to credit by smallholder farmers in Eastern and Western Kenya. *Journal of Development and Agricultural Economics* 7(9), pp. 303–313.
- Kumi, E. and Daymond, A. (2015). Farmers’ perceptions of the effectiveness of the Cocoa disease and pest control programme (CODAPEC) in Ghana and its effects on poverty reduction. *American Journal of Experimental Agriculture* 7(5):257–274.
- Kyaruzi, A.A., Mlozi, M.R.S. and Busindi, I.M. (2010). Gender based effectiveness of agricultural extension agents’ contacts with smallholder farmers in extension services delivery: A case of Kilosa District, Tanzania. *Journal of Continuing Education and Extension* 2(3): 85–93.
- Lakai, D., Jayaratne, K. S. U., Moore, G. and Kistler, M. J. (2012). Barriers and effective educational strategies to develop extension agents TM professional competencies. [<https://eric.ed.gov/?id=EJ1042572>] site visited on 3/2/2018.
- Lavison, R. K. (2013). Factors influencing the adoption of organic fertilizers in vegetable production in Accra. Dissertation for Award of Doctor of Philosophy, Legan Ghana,

131pp.[<http://ugspace.ug.edu.gh/handle/123456789/5410>]site visted on 2/2/2017.

Leeuwis, C. and Aarts, N. (2011). Rethinking communication in innovation processes: creating space for change in complex systems. *The Journal of Agricultural Education and Extension* 17(1):21–36.

Losindilo, E., Mussa, A.S. and Akarro, R.R.J. (2010). Some factors that hinder women participation in social, political and economic activities in Tanzania, *Arts and Social Sciences Journal* 1(4):1-10.

Lwoga, T. E., Stilwell, C. and Ngulube, P. (2011). Access and use of agricultural information and knowledge in Tanzania. *Library Review*, 60(5):383–395.

Macias, A. (2012). A case study using principal-agent theory to explore how a public , four year University interacts with a system office, Dissertation for Award of MSc University of Nevada, Las Vegas- Theses.191pp.

Madafu, E.G. (2015). Access to bank credit by smallholder farmers in Tanzania: Challenges, opportunities and prospects a case of Mvomero District. Dissertation for Award of MSc at Mzumbe University, Morogoro, Tanzania. 125pp.

Manda, P.A. (2002). Information and agricultural development in Tanzania. *Journal of Information Development* 18(3): 181-186.

- Mandleni, B. and Anim, F.D.K. (2011). Climate change awareness and decision on adaptation measures by livestock farmers in South Africa *Journal of Agricultural Science* 3(3):258–268.
- Masangano, C. and Mthinda C. (2012). Pluralistic extension system in Malawi IFPRI Discussion Paper 01171, April 2012.[www.ifpri.org/publication/pluralistic-extension-system-malawi] site visited on 2/2/2017
- Masanyiwa, Z. (2013). Institutional arrangements for decentralized water and health services delivery in rural Tanzania: Differences and constraints. [<http://edepot.wur.nl/256378%5Cnhttp://basicresearchjournals.org/socialscience/pdf/Masanyiwaetal.pdf>] site visited on 6/2/2018.
- Masanyiwa, Z.S. (2014). Decision making under the Tree: Gender perspectives on decentralization reforms in service delivery in rural Tanzania, [<http://edepot.wur.nl/299127>] site visited on 4/2/2017.
- Matovelo, D.S. (2008). Enhancing farmer's access to and use of agriculture information for empowerment and improve livelihoods: a Case of Morogoro Region. Dissertation for Award of Doctor of Philosophy at University of Dar es salaam, Dar es Salaam, Tanzania, 311pp.
- Mattee, A.Z., Ngetti, M.S. and Rwambali, E.A. (2008). Progress towards the achievement of ASDP outputs and Outcomes. Dar Es salaam.121pp.

- Mbo'o-Tchouawou, M. and Colverson, K. (2014). Increasing access to agricultural extension and advisory services: How effective are new approaches in reaching women farmers in rural areas?
[https://cgspace.cgiar.org/bitstream/handle/10568/35495/PR_extensionservices.pdf?sequence=5] site visited on 2/3/2017.
- Mchugh, M.L. (2013). Lessons in Biostatistics: The Chi-square test of independence, *Biochemical medical* 23(2): 143–149.
- Meru District Council (2011). Socio-Economic Profile. Arusha
- Ministry of Agriculture (2013) National Agricultural Policy. Dar es Salaam. 121pp.
- Mlozi, M.R.S., Rumisha, S. F., Mlacha, T., Bwana, V. M, Shayo, E. S., Mayala, B. K, Malima, R. C, Mashoto, K, O. and Mboera, L. E. G. (2015). Challenges and Opportunities for Implementing an Intersectoral Approach in Malaria Control in Tanzania. *Tanzania Journal of Health Research* 17(1):1–16.
- Mntambo, B.D. (2007). Socio-economic, institutional and behavioural determinants of accessibility and utilization of agricultural information by women farmers in Korogwe District. Dissertation for Award for MSc Degree at Sokine University of Agriculture, Morogoro, Tanzania, 112pp.
- Mollet H.A. and Tollenaar, A. (2013). Decentralization in Tanzania: Design and application in planning decisions. *International Journal of Public Administration* 36(5): 344-353.

- Mollel, H.A. (2010). Participation for local development: The reality of decentralisation in Tanzania. [<https://openaccess.leidenuniv.nl/handle/1887/16269>] site visited on 2/5/2017
- Monela, A.G. (2014). Access to and adoption of improved seeds by smallholder farmers in Tanzania. Dissertation for Award for MSc Degree at Sokine University of Agriculture, Morogoro, Tanzania, 59pp.
- Mookherjee, D. (2015). Political decentralization, *Annual Review of Economics*, 7(1): 231–249.
- Murray, C. J. L. (2012). Supplementary appendix comprehensive systematic analysis of global epidemiology : Definitions, methods, simplification of DALYs, and comparative results from the global burden of disease study 2010', *Lancet*, 9859, pp. 1–131. [<https://www.freelists.org/archives/interphen/04-2014/pdfNcqXgOaefH.pdf>.] site visited on 2/5/2017.
- Mwangi, M. and Kariuki, S. (2015). Factors Determining adoption of new agricultural technology by smallholder farmers in developing countries. *Journal of Economics and sustainable development* 6(5):208-216.
- Mwaura, F. (2014). Effect of farmer group membership on agricultural technology adoption and crop productivity in Uganda. *African Crop Science Journal* 22(4): 917 – 927.

Nabli, M.K. and Nugent, J.B. (1989). The new institutional economics and its application to development. *World Development* 17(9):1333–1347.

National Institute of Population Research and Training (NIPORT), Mitra and Associates, and ICF International (2015). Bangladesh demographic and health survey 2014: Key Indicators.
[<https://dhsprogram.com/pubs/pdf/FR311/FR311.pdf>] site visited on 23/1/2017.

Norman, S. and Massoi, L. (2010). Decentralisation by Devolution: Reflections on community involvement in planning process in Tanzania', 5(June), [www.academicjournals.org/article/article1379609341_Norman%20and%20Massoi.pdf] site visited on 12/3/2017.

North, D.C. (1995). The New Institutional Economics and Third World Development', in Harriss, J. and Hunter, J., C.L. (ed.) *The New Institutional Economics and Third World Development*, [<https://www.taylorfrancis.com/books/9780203444290>] site visited on 2/3/2017.

North, D.C. (2000). Big-Bang transformations of economic systems - An introductory note. *Journal of Institutional and Theoretical Economics* 156(1):3-8.

Null, C., Meeks, R., Migue, E. and Zwane, A. Z. (2012). Safe drinking water. Who is willing to pay the price? International initiative for impact evaluation, systematic.

[http://www.3ieimpact.org/media/filer_public/2012/05/28/sr006.pdf] site visited on 2/3/2017.

Nyikahadzoi, K., Mango, S., Siziba, S. and Adekunhle, A. (2012). Impact of integrated agricultural research and development on adoption of soil fertility management technologies among smallholder farmers of Southern Africa, *Journal of Agricultural Extension and Rural Development* 4(19):512-521.

Odgaard, R. (2002). Scrambling for land in Tanzania: Processes of formalisation and legitimisation of land rights. *The European Journal of Development Research* 14(2):71-88.

Olorunnishola, A. E., Abu, Y., Yusuf, S.K. and Nansoh, H. (2016). Use of agricultural information sources and services by farmers for improve productivity in Kwara State', *Library Philosophy and Practice*. 1456:1-18[<http://digitalcommons.unl.edu/libphilprac%5Cnhttp://digitalcommons.unl.edu/libphilprac/1456>] site visited on 2/3/2017.

Onchiri, S. (2013). Conceptual model on application of chi-square test in education and social sciences. *Educational Research and Reviews* 8(15):1231–1241.

Onyach-Olaa, M. (2007). The Success and challenges of decentralization in uganda', in dissemination workshop for the project on making rural services work for the poor: The Role of rural institutions and their governance for agricultural-led development. Kampala, Uganda.

[<https://pdfs.semanticscholar.org/9f3b/83190024391d177626a070f29ba08768843b.pdf>] site visited on 2/3/2017.

Pallangyo, W. and Rees, C.J. (2010). Local government reform programs and human resource capacity building in Africa: Evidence from local government authorities (LGAs) in Tanzania. *International Journal of Public Administration* 33(12–13):728–739.

Pallant, J. (2011). *SPSS Survival Manual: A step by step guide to data analysis using SPSS for windows* (3rd ed.). Open University Press, McGraw Hill, 115pp.

Qamar, M.K. (2005). *Modernizing national agricultural extension systems: a Practical guide for policy-makers of developing countries*.
[<http://ftp.fao.org/docrep/fao/008/a0219e/a0219e00.pdf>] site visited on 2/2/2018.

Robert. C. (2000). The New Institutional Economics', in C.M. (ed) *Institutions, contracts and Organization: Perspectives from New Institutional Economics*. UK: Cheltenham.

Raabe, K. (2008). *Reforming the agricultural extension system in India what do we know about what works where and why ?*, Food Policy, (July 2008).
[<https://books.google.co.tz/books?id=5C3N3iOL8-4C>] site visited on 2/2/2018.

- Ragasa, C., Ulimwengu, J., Randriamamony, J. and Babibanga, T. (2016). Factors affecting performance of agricultural extension: Evidence from Democratic Republic of Congo. *The Journal of Agricultural Education and Extension* 22(2):113–143.
- Ragasa, C. (2012). Gender and Institutional Dimensions of Agricultural Technology Adoption : A Review of literature and synthesis of 35 case studies', international association of agricultural economists (IAAE) Triennial Conference, (January 2012), pp. 1–57.
[<https://ideas.repec.org/p/ags/iaae12/126747.html>] site visited on 2/2/2018
- Radhakrishna, R.B., Fransisco, C.L. and Bagget, C.D. (2013). *Analysis of Research Designs Used in Agricultural and Extension education: Proceedings of the 30th National Agricultural Education Research Conference*. 541pp.
[<https://scholar.google.com/scholar?lookup=&q=radhakrishna..>] cited on 04/9/2017.
- Rahimi, S., Nguyen, T. and Rahmani, A.M. (2016). End-to-end security scheme for mobility enabled healthcare Internet of Things. *Future Generation Computer Systems* 1(1):1-49.
- Regmi, K., Naidoo, J., Pilkington, P.A. and Greer, A. (2010). Decentralization and district health services in Nepal: Understanding the views of service users and service providers. *Journal of Public Health* 32(3):406–417.

- Rehman, F., Muhammad, S., Ashraf, I., Mahmood, C. K., Ruby, T. and Bibi, I. (2013). Effect of farmers's socioeconomic characteristics on access to agricultural information: Empirical evidence from Pakistan. *Journal of Animal and Plant science* 23(1):324–329.
- Ribot, J.C. (2002). Democratic decentralization of natural resources: Institutionalizing popular participation.
[https://commdev.org/userfiles/files/1076_file_13.pdf] site visited on 2/2/2018
- Rivera, W.M. (2002). The invisible frontier: the Current limits of decentralization and privatization in developing countries.
[<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.491.742&rep=rep1&type=pdf>] site visited on 2/2/2018.
- Rivera, W.M. (2008). The Business of the public sector: extension in transition and the balance of powers. *Journal of International Agricultural and Extension Education* 15(2):19–31.
- Roberts, L.C., Otieno, D.J. and Nyikal, R.A. (2017). An Analysis of determinants of access to and use of credit by smallholder farmers in Suakoko District, Liberia. *African Journal of Agricultural Research* 12(24):2093–2100.
- Rondinelli, D.A. (1981). Administrative Decentralisation and Economic Development: the Sudan's Experiment with Devolution. *The Journal of Modern African Studies* 19(4):560- 595.

- Schenck, R. and Huizenga, D. (Eds.), (2014). Proceedings of the 9th international conference on life cycle assessment in the Agri-Food sector (LCA Food 2014), San Francisco, USA. ACLCA, Vashon, WA, USA., 8-10 October 2014, 8pp.
- Schout, A. and North, D. C. (1991). Institutions, institutional change and economic performance. *The Economic Journal* 101(409):1538-1587.
- Shier, D. (2004). Well log normalization: methods and guidelines, *Petrophysics*, 45(3), pp. 268–280.
[<http://www.onepetro.org/mslib/servlet/onepetropreview?id=SPWLA-2004-v45n3a4>] site visited on 4/12/2016.
- Shivji, I.G. and Peter, C.M. (2003). Village democracy initiative report Dodoma. Dodoma.
[[http://www.scirp.org/\(S\(oyulxb452alnt1aej1nfow45\)\)/reference/ReferencesPapers.aspx?ReferenceID=2040527](http://www.scirp.org/(S(oyulxb452alnt1aej1nfow45))/reference/ReferencesPapers.aspx?ReferenceID=2040527)] site visited on 3/1/2018.
- Shookner, M. (2002). An inclusion lens: Workbook for looking at social and economic exclusion and inclusion. population and public health branch, Atlantic Region, HealthCanada. [[http:// www.hc-sc.gc.ca/hppb/regions/atlantic/documents/index.html](http://www.hc-sc.gc.ca/hppb/regions/atlantic/documents/index.html)] site visited on 3/1/2018.
- Simonyan, J.B., Umoren, B.D. and Okoye, B.C. (2011). Gender differentials in technical efficiency among maize farmers in essienudim local government area,

- Nigeria. *International Journal of Economics and Management Sciences* 1(2):17–23.
- Studies, R.D. (2016). Level of use of organic manure by farmers in Isoko North. *International Journal of Agricultural Extension and Rural Development Studies* 3(1):1–11.
- Tabachnick, B.G., and Fidell, L.S. (2007). Multivariate analysis of variance and covariance. *Using Multivariate Statistics* 3:402–407.
- Temesgen, D. and Tola, T. (2015). Determinates of smallholder farmers willingness to pay for agricultural extension services: a case study from Eastern Ethiopia. *African Journal of Agricultural Research* 10(20):2152-2158.
- Tidemand, P. and DANIDA (2010). Health sector decentralisation, human resource management, (November), .
[\[http://um.dk/Danida/Human%20rights%20and%20democracy/.DRAFT%20NOTE\]](http://um.dk/Danida/Human%20rights%20and%20democracy/.DRAFT%20NOTE) site visited on 2/2/2017.
- Uddin, M., Bokelmann, W. and Entsminger, J. (2014). factors affecting farmers' adaptation strategies to environmental degradation and climate change effects: A farm level study in Bangladesh', *Climate* 2(4):223–241.
- URT (2009). Local Government Reform Programme II (Decentralization by Devolution): Vision, Goals and Strategy. Dodoma, 89pp.
- URT (2006). National Strategy for Growth and Reduction of Poverty (NSGRP-MKUKUTA). Government printers, Dar es Salaam. 150pp.

- URT (2008). The Status of Implementation of Decentralization by Devolution on Mainland Tanzania and the Way Forward: A paper presented by the Permanent Secretary, PMO-RALG, during the National Convention on Public Sector Reforms June 17–18. Ubungo Plaza, Dar es Salaam, pp. 1–23.
- URT (2011). MKUKUTA Annual Implementation Report 2010/11: Delivering on Commitments and Implementation. Government printer, Dar es Salaam, 192pp.
- Venugopal, V. and Yilmaz, S. (2010). Decentralization in Tanzania: An assessment of local government discretion and accountability. *Public Administration and Development* 30(3):215–231.
- Venugopal, V., and Yilmaz, S. (2010). Decentralization in Tanzania: An assessment of local government discretion and accountability. *Public Administration and Development* 30(3): 215-231.
- Vincent, C. (2015). Local government capacity building and development: Lessons, challenges and opportunities. *Journal of Political Sciences & Public Affairs* 3(1): 1–5.
- Wambura, R., Acker, D., and Mwasyetete, K., (2012). Extension systems in Tanzania: identifying gaps in research', in background papers for collaborative research workshop.
[<https://www.ajol.info/index.php/tjags/article/download/153335/142926>]
site visited on 3/2/2018.

Wilcoxon, F. (1945). Individual comparisons by ranking methods. *Biometrics Bulletin* 1(6):60-80.

Williamson, O.E. (2000). The New Institutional Economics: taking stock, looking ahead. *Journal of Economic Literature* 38(3):95–613.

World Bank and IFPRI. (2010). Gender and governance in rural services. Washington, D.C.

[https://siteresources.worldbank.org/INTARD/gender_and_gov_in_rural_services.pdf] site visited on 3/2/2018.

Yamane, T. (1967). *Elementary Sampling Theory*, Prentice Hall, New Jersey, 405pp.

Zhu, Z. (2016). *China's New Diplomacy: Rationale, Strategies and Significance* (2nd ed), Routledge, London, 2996pp

APPENDICES

Appendix 1: Questionnaire for Farming Households

Dear Respondent

The purpose of this questionnaire is to elicit information on factors influencing the effectiveness of decentralization by devolution policy on the agricultural extension delivery services in Tanzania. This study is purely an academic and all responses will be treated confidential and individual anonymity will be safeguarded. It will take approximately 25-30 minutes to complete this questionnaire. Please take time to complete this questionnaire. If you have questions or want further information, please contact the researcher hereunder.

Noel C. Komba,
P .O BOX 70049,
Dar es salaam.
Mobile No. 0767 410885
Email n_komba@yahoo.com

PART 1: GENERAL INFORMATION

1.1 LOCATION OF FARMING HOUSEHOLD

Interviewers name.....

Name of the farmer.....

Name of the Village.....

Name of a Ward

Name of a Council Date.....

1.2 Age of the respondent.....

1.3 Sex of respondent (Please tick where appropriate)

(1.) Male ()

(2.) Female ()

1.4 Marital status

(1.) Single () (2.) Married () (3.)Widower () (4.)Separated () (5.) Others.....

1.5 Academic qualification (Please tick where appropriate)

(1.) No school attended ()

(2.) Primary School Education ()

(3.) Secondary School Education ()

(4.) Technical and Vocational Training ()

(5.) College/University Education ()

1.6 Farming experience in years (Please tick where appropriate)

(1.) 2-5 ()

(2.) 6-9 ()

(3.) 10-13 ()

(4.) 14-17 ()

(5.) 18-21 ()

(6.) 22-25 ()

(7.) 26 and More ()

1.7 Are you a part-time or full-time farmer? (Please tick \surd where appropriate)

- (1.) Part-Time ()
 (2.) Full-Time ()

1.8 What other economic activities do you have apart from farming?

- (1.) Business ()
 (2.) Employment- Civil Servant
 (3.) Employment –Private Sector
 (3.) Other (please specify).....

1.9 How much do you earn from the following activities

	Income levels	2012	2013	2014
1.	Employment			
2.	Cattle keeping			
3.	keeping chicken			
4.	keeping goats			
5.	keeping pigs			
6.	keeping sheep			
7.	Business			
8.	Remittances			

2.0 Livestock kept and number

	Type	Number
1.	Cattle	
2.	Sheep	
3.	Goats	
4.	Pigs	
5.	Chicken (Local)	
6.	Broilers	
8.	Layers	

2.1 What is the size of your farm?

- (1.) Less than an acre ()
 (2.) Between 1 and 2 acres ()
 (3.) More than 1 acre ()

2.2 What is the size of the household**2.3 How did you acquire your farm?**

- (1.) Inherited ()
 (2.) Bought ()
 (3.) Hired ()
 (4.) Allocated by the village government ()

PART. II: Farmers opinions about de-linking of agricultural extension services from MAFC to LGAs on agricultural extension service accessibility.

3. Rank in the order level of accessibility of the following services as a result of delinking of agricultural extension services before and after decentralization 1=Not improved at all 2=Improved, 3=Very much improved

		Before 2000	Current
1.	Access to agricultural inputs		
2.	Access to financial services		
3.	Access to credits		
4.	Access and linkage to markets		
5.	Access to agricultural technologies		

4. On average how many times do you come into contact with the Extension officer before and after decentralization?

S/N	Extension officers contact with farmers	Before	Current
1.	Average number of contacts days AEA to famers group in the village per month.		
2.	Average number of contacts days AEA to individual farmer in the village per month.		
3.	Average number of meetings that Village Extension agents hold per year in a village		
4.	Average number of organized field demonstration days per year		

5. What is the travelling distance in accessing agricultural extension services before and after decentralized extension services?

Before.....

After.....

6. What is the average time taken to be attended by agricultural extension agents from the time you requested services before and after decentralization of agricultural extension services.

Before.....

After.....

Please tick “YES” or “No” where appropriately. The questions are about delinking of agricultural extension delivery services from MAFC to LGAs.

S.N	Question	Response	
		YES	NO
7.	Do you think that de linking of agricultural extension services from MAFC to LGAs has increased number of agricultural extension service providers in this village?		
10.	Do you think that de linking of agricultural extension services from MAFC to LGAs has increased farmers’ access to agricultural inputs?		
11.	Do you think that de linking of agricultural extension services from MAFC to LGAs has increased farmers’ access to agricultural technologies?		
12.	Do you think that de linking of agricultural extension services from MAFC to LGAs has increased farmers’ linkage to markets?		
13.	Do you think that de linking of agricultural extension services from MAFC to LGAs has increased farmers’ access to markets?		
14.	Do you think that de linking of agricultural extension services from MAFC to LGAs has increased farmers’ access to financial services?		
15.	Do you think that de linking of agricultural extension services from MAFC to LGAs has increased farmers’ access to credits?		
16.	Do you think that de linking of agricultural extension services from MAFC to LGAs has increased number of contact days of agricultural extension agents to farmers’ groups in this village?		
17.	Do you think that de linking of agricultural extension services from MAFC to LGAs has increased the number of contact days of agricultural extension agents to individual farmers’ in this village?		
18.	Do you think that de linking of agricultural extension services from MAFC to LGAs has reduced the cost that farmers’ incur for calling agricultural extension agents in this village?		

19.	Do you think that de linking of agricultural extension services from MAFC to LGAs has increased the visits of Village Extension Worker to farmers?		
20.	Do you think that de linking of agricultural extension services from MAFC to LGAs has increased number of meetings by Village Extension agents with individual farmers?		
21.	Do you think that de linking of agricultural extension services from MAFC to LGAs has increased number of meetings that Village Extension agents hold per year in this village?		
22.	Do you think that de linking of agricultural extension services from MAFC to LGAs has increased the number of organized field demonstration days per year ?		
23.	Do you think that de linking of agricultural extension services from MAFC to LGAs has reduced the distance that farmers travel to seek advice from agricultural extension agents?		
24.	Do you think that de linking of agricultural extension services from MAFC to LGAs has improved agricultural extension service teaching of farmers?		
25.	Do you think that de linking of agricultural extension services from MAFC to LGAs has increased the number of FFSs that agricultural extension agents have started in this village?		
26.	Do you think that de linking of agricultural extension services from MAFC to LGAs has increased the number of smallholder farmers attending FFSs?		
27.	Do you think that de linking of agricultural extension services from MAFC to LGAs has increased the number of hours that agricultural extension agents spend in teaching smallholder farmers in FFSs?		
28.	Do you think that de linking of agricultural extension services from MAFC to LGAs has increased crops that agricultural extension agents provide skills and knowledge in FFSs?		
29.	Do you think that de linking of agricultural extension services from MAFC to LGAs has increased livestock types that agricultural extension agents provide skills and knowledge in FFSs?		

30. Indicate the type of support that agricultural extension agents provide you. (You may choose more than one)

Advice	()
Monitoring	()
Visits	()
Genetic	()
Material	()
Farming Skills	()
Training	()
Disease	()
Control & Management	()
Research on	()
Crops/ Livestock	()
Breeding	()
Marketing	()
Others (Specify.....)	

31. Indicate the sources of information you use when making the following decisions. (Tick ✓ as many as applicable)

	Technical Decision	Financial Decisions	Marketing Decisions	Disease Control	Training
National radio					
Community radio					
National Television					
Private Television					
Village Government					
Flyers					
Leaflets					
Fellow farmers					
Farmers groups					
Agricultural extension agents					
Newspapers					
Market Agents					
Farmers Associations					
Co-operative					
Others specify					

PART.III. Farmers opinions on the influence of Local Government Authorities' autonomy on the Quality of Agricultural Extension Service Delivery to Farmers in Tanzania

Please tick "YES" or "No" where appropriately.

S.N	Question	Response	
		YES	NO
32.	Do you think that the increase in LGAs' autonomy has increased the efficiency on agricultural extensions services offered to farmers?		
33.	Do you think that the increase in LGAs' autonomy has enabled extension agents to attend farmers on time?		
34.	Do you think that the increase in LGAs' autonomy has increased funds allocated to agricultural extension services in Village Agricultural Development Plans?		
35.	Do you think that the increase in LGAs' autonomy has increased funds allocated to agricultural extension services in Village Agricultural Development Budget?		
36.	Do you think that the increase in LGAs' autonomy has led to crop farmers adopting more technologies delivered by extension agents?		
37.	Do you think that the increase in LGAs' autonomy has led to agricultural extension services becoming more inclusive?		
38.	Do you think that the increase of LGAs' autonomy has led to farmers receiving feedback regularly on their production constrains?		
39.	Do you think that the increase of LGAs' autonomy on agricultural extension services has led to agricultural extension agents to use various methods to deliver knowledge on crops to farmers?		
40.	Do you think that the increase of LGAs' autonomy on agricultural extension services has led to agricultural extension agents to use various methods to deliver skills on crops to farmers?		
41.	Do you think that the increase of LGAs' autonomy on agricultural extension services has led to agricultural extension agents to use various approaches to deliver knowledge on livestock to farmers?		
42.	Do you think that the increase of LGAs' autonomy on agricultural extension services has led to agricultural extension agents to use various approaches to deliver skills on livestock to farmers?		

43.	Do you think that the increase of LGAs' autonomy on agricultural extension services has led to crop farmers seeing the relevance of information on crops that agricultural extension agents deliver?		
44.	Do you think that the increase of LGAs' autonomy on agricultural extension services has led to livestock keepers seeing the relevance of information on livestock that livestock extension agents deliver?		
45.	Do you think that the increase of LGAs' autonomy on agricultural extension services has led to livestock keepers seeing the relevance of technologies on livestock that livestock extension agents deliver?		
46.	Do you think that the increase of LGAs' autonomy on agricultural extension services has led to crop farmers seeing the relevance of technologies on crop production that agricultural extension agents deliver?		
47.	Do you think that the increase of LGAs' autonomy on agricultural extension services has increased crop productivity in this village?		
48.	Do you think that the increase of LGAs' autonomy on agricultural extension services has increased livestock productivity in this village?		
49.	Do you think that the increase of LGAs' autonomy on agricultural extension services has increased farmers' use of organic fertilizers in this village?		
50.	Do you think that the increase of LGAs' autonomy on agricultural extension services has increased farmers' use of organic manure in this village?		
51.	Do you think that the increase of LGAs' autonomy on agricultural extension services has increased efforts to improve soil fertility improvement in this village?		
52.	Do you think that the increase of LGAs' autonomy on agricultural extension services has increased soil conservation in this village?		
53.	Do you think that the increase of LGAs' autonomy on agricultural extension services has increased environmental awareness in this village?		
54.	Do you think that the increase of LGAs' autonomy on agricultural extension services has increased efforts of planting trees to avoid desertification in this village?		

55. Please rank in order how often you receive feedback from agricultural extension agent in relation to agricultural practices before and after 1= No at all, 2=1- 2 times in a month, 3=3-4 times in a month, 4=5times and above,

S/N	Feedback	Before 2000	Current

56. Rank in order of suitability of Farmer Field School as the recommend extension approach you have been involved with: 3= Very suitable (VS); 2=Suitable (S); 1=Unsuitable (US)

57. Rank in the order of relevance regarding the information and technologies that agricultural extension agents deliver before and after decentralization 3=Very relevant 2=Relevant, 1=Not relevant

S/N	Information on crops	Before 2000	Current
1	Information on livestock		
2	Information on crops		
	Technologies on livestock		
3	Technologies on crops		

58. Overall how would you rate the quality of information, skills and knowledge delivered to farmers by extension agents under LGAs Rank before and after decentralization 1=poor 2=average ,3=Excellent

		Before 2000	Current
1.	Agricultural information delivered to farmers		
2.	Skills on livestock production		
3.	Skills on crop production		
4.	Knowledge on crop production		
5.	Knowledge on livestock production		

59. What issues needs to be done to improve the quality of agricultural extension services under LGAs? Tick all that is appropriate.

1. Recruitment of extension agents (both crops and livestock specialist)
2. Promote career development through short-term and long-term training programme.
3. Equipping extension agents with working facilities.
4. Providing incentives to extension agents to awaken their morale.
5. Promoting the use of FFS.
6. Close supervision of extension agents by higher level local government.

PART. IV. Farmers opinions on the influence of the shift of Agricultural Extension Service Decision Making process to Local Government Authorities on Farmers' Empowerment

Please tick "YES" or "No" where appropriately.

S.N	Question	Response	
		YES	NO
60	Do you think that the shift in decision-making from the central government to the villages has led to increased farmers' participation in agricultural development priority setting?		
61.	Do you think that the shift in decision-making from the central government to the villages has led to increased farmers' associations?		
62.	Do you think that the shift in decision-making from the central government to the villages has led to increased farmers' groups?		
63	Do you think that the shift in decision-making from the central government to the villages has led to farmers becoming organized in farmers' associations?		
64.	Do you think that the shift in decision-making from the central government to the villages has led to farmers becoming organized in farmers' groups?		
65.	Do you think that the shift in decision-making from the central government to the villages has led to increased farmers' fora for knowledge sharing?		
66.	Do you think that the shift in decision-making from the central government to the villages has led to increased farmers' fora for skills sharing?		
67.	Do you think that the shift in decision-making from the central government to the villages has led to increased farmers' capacity to engage in livestock keeping?		
68.	Do you think that the shift in decision-making from the central government to the villages has led to increased farmers' capacity to engage in commercial agriculture?		

69.	Do you think that the shift in decision-making from the central government to the villages has led to more farmers joining farmer groups?		
70.	Do you think that the shift in decision-making from the central government to the villages has led to more farmers joining farmer groups?		
71.	Do you think that the shift in decision-making from the central government to the villages has led to crop farmers increasing their yields?		
72.	Do you think that the shift in decision-making from the central government to the villages has led to livestock keepers increasing their yields?		
73.	Do you think that the shift in decision-making from the central government to the villages has led to farmers increasing incomes from crop production?		
74.	Do you think that the shift in decision-making from the central government to the villages has led to farmers increasing incomes from livestock keeping?		
75.	Do you think that the shift in decision-making from the central government to the villages has increased the capacity of farmers to ask for more extension services in crop- related areas ?		
76.	Do you think that the shift in decision-making from the central government to the villages has increased the capacity of farmers to ask for more extension services in livestock- related areas ?		
77.	Do you think that the shift in decision-making from the central government to the villages has led to farmers in receiving timely crop-related information?		
78.	Do you think that the shift in decision-making from the central government to the villages has led to farmers in receiving timely livestock-related information?		
79.	Do you think that the shift in decision-making from the central government to the villages has led to farmers in receiving relevant crop-related technologies?		
80.	Do you think that the shift in decision-making from the central government to the villages has led to farmers receiving relevant livestock-related technologies?		
81.	Do you think that the shift in decision-making from the central government to the villages has led to farmers receiving relevant climate-related information?		
82.	Do you think that the shift in decision-making from the central government to the villages increased skills and knowledge in crop production in this village?		
83.	Do you think that the shift in decision-making from the central government to the villages has increased farmers skills and knowledge in crop disease identification in this village?		
84.	Do you think that the shift in decision-making from the central government to the villages increased skills and knowledge in crop disease control in this village?		
85.	Do you think that the shift in decision-making from the central government to the villages increased skills and knowledge in crop pest's identification in this village?		
86.	Do you think that the shift in decision-making from the central government to the villages increased skills and knowledge in crop pests control in this village?		

87.	Do you think that the shift in decision-making from the central government to the villages increased skills and knowledge in livestock production in this village?		
88.	Do you think that the shift in decision-making from the central government to the villages increased skills and knowledge in livestock disease identification in this village?		
89.	Do you think that the shift in decision-making from the central government to the villages increased skills and knowledge in livestock disease control in this village?		
90.	Do you think that the shift in decision-making from the central government to the villages has increased skills and knowledge in livestock ecto-parasites identification in this village?		
91.	Do you think that the shift in decision-making from the central government to the villages has increased skills and knowledge in livestock disease control in this village?		
92.	Do you think that the shift in decision-making from the central government to the villages has increased skills and knowledge in livestock endo-parasite identification in this village?		
93.	Do you think that the shift in decision-making from the central government to the villages has increased skills and knowledge in livestock endo-parasite control in this village?		
94.	Do you think that the shift in decision-making from the central government to the villages has improved smallholders' livelihood in this village?		
95.	Do you think that the shift in decision-making from the central government to the villages has increased incomes from crop sales in this village?		
96.	Do you think that the shift in decision-making from the central government to the villages has increased incomes from livestock sales in this village?		

PART V. Farmers Opinions on the influence of changed Central- Local relation on enhancing equity of Agricultural Extension Service Delivery.

(1. Strongly Agree, 2. = agree, 3. = Undecided, 4. = Disagree, 5. = Strongly Disagree.

S.N	Question
97	Do you think the change in Central-Local relations from commanding to inter-governmental relations have improved farmers access to agricultural inputs?
98.	Do you think the change in Central-Local relations from commanding to inter-governmental relations have improved farmers access to accessing agricultural credits?
99.	Do you think the change in Central-Local relations from commanding to inter-governmental relations have improved farmers access to financial services?
100.	Do you think the change in Central-Local relations from commanding to inter-governmental relations have improved farmers access to land?
101	Do you think the change in Central-Local relations from commanding to inter-governmental relations have improved farmers access to crop-related?
102	Do you think the change in Central-Local relations from commanding to inter-governmental relations have improved farmers access to agricultural technologies?
103	Do you think the change in Central-Local relations from commanding to inter-governmental relations have improved livestock keepers access to agricultural inputs?
104	Do you think the change in Central-Local relations from commanding to inter-governmental relations have improved livestock keepers access to accessing agricultural credits?

105.	Do you think the change in Central-Local relations from commanding to inter-governmental relations have improved livestock keepers access to financial services?
106.	Do you think the change in Central-Local relations from commanding to inter-governmental relations have improved livestock keepers access to land?
107.	Do you think the change in Central-Local relations from commanding to inter-governmental relations have improved livestock keepers access to crop-related?
108.	Do you think the change in Central-Local relations from commanding to inter-governmental relations have improved livestock keepers access to agricultural technologies?
109.	
	Do you think the change in Central-Local relations from commanding to inter-governmental relations have improved male access to agricultural informations?
110.	Do you think the change in Central-Local relations from commanding to inter-governmental relations have improved male access to agricultural technologies?
111.	Do you think the change in Central-Local relations from commanding to inter-governmental relations have improved male access to land?
112.	Do you think the change in Central-Local relations from commanding to inter-governmental relations have improved male access to agricultural credit?
113.	Do you think the change in Central-Local relations from commanding to inter-governmental relations have improved male access to financial services?
114.	Do you think the change in Central-Local relations from commanding to inter-governmental relations have improved male access to agricultural inputs?
115.	Do you think the change in Central-Local relations from commanding to inter-governmental relations have improved male access to accessing markets?
116.	Do you think the change in Central-Local relations from commanding to inter-governmental relations have improved male linkage to markets?
117.	Do you think the change in Central-Local relations from commanding to inter-governmental relations have improved female access to agricultural informations?
118.	Do you think the change in Central-Local relations from commanding to inter-governmental relations have improved female access to agricultural technologies?
119.	Do you think the change in Central-Local relations from commanding to inter-governmental relations have improved female access to land?
120.	Do you think the change in Central-Local relations from commanding to inter-governmental relations have improved female access to agricultural credit?
121.	Do you think the change in Central-Local relations from commanding to inter-governmental relations have improved female access to financial services?
122.	Do you think the change in Central-Local relations from commanding to inter-governmental relations have improved female access to agricultural inputs?
123.	Do you think the change in Central-Local relations from commanding to inter-governmental relations have improved female access to accessing markets?
124.	Do you think the change in Central-Local relations from commanding to inter-governmental relations have improved female linkage to markets?

**Appendix 2: District Level Information Checklist Arusha and Meru District
Council**

1. Total staff strength (Number of staff and their qualifications)

Professional Qualifications	Arusha 2000	DC Before 2000	Currently 2016	Meru Before 2007	Dc Before 2007	Currently 2016
PhD						
MSc						
BSc						
Diploma						
Certificate						
Others						
Total						

2. Total number of staff at different levels: Present vs. (Requirements)

Level	Arusha Before 2000	DC Before 2000	Currently 2016	Meru Before 2007	Dc Before 2007	Currently 2016
District level						
Divisional level						
Ward level						
Village level						
Total						

3. Change in capacity to deliver extension services:

Number of staff having access to:	Arusha Before 2000	DC Before 2000	Currently	Meru Before 2007	Dc Before 2007	Current
Motor vehicles						
Motor cycles						
Bicycles						
Computer						
Office space						
Housing						

4. Provide financial flow under decentralised Extension Services from 2007/8to 2014/15 using this format:

A. Arusha District Council

FY	Block Grant	Amount Budgeted/ Approved	Amount Received	Amount Spent
2002/2003	AEBG			
	District own sources			
2003/2004	AEBG			
	District own sources			
2004/2005	AEBG			
	District own sources			
2005/2006	AEBG			
	District own sources			
2006/2007	AEBG			
	District own sources			
2007/2008	AEBG			
	District own sources			
2008/2009	AEBG			
	District own sources			
2009/2010	AEBG			
	District own sources			
2010/2011	AEBG			
	District own sources			
2011/2012	AEBG			
	District own sources			
2012/2013	AEBG			
	District own sources			

Appendix 3: Focus Group Discussion checklist

1. What is the status of farmers' access to agricultural extension services between before and after de-linking reforms with a special focus of the following service:
 - Agricultural inputs
 - Agricultural technologies
 - Agricultural information's
 - Agricultural financial services
 - Access and linkage to markets

2. What is the status of farmers-extension agent contacts in the village before and after de-linking reforms based on the following?
 - Farmers-extension agents contacts per individuals per month
 - Farmers-extension agents' contacts per group per month
 - Farmers –extension agents contacts per group per year
 - Farmers –extension agents contacts per individual per year

3. How do you describe the effectiveness of agricultural extension services before and after increase in local government autonomy based on the following indicators;
 - Timeliness
 - Responsiveness
 - Feedback to farmers
 - Promotion of best agricultural practices
 - Relevance of agricultural information and technologies

4. How do you rate the quality of agricultural information services with de-linking of agricultural extension services?

5. Do you have the forum for skills and knowledge sharing as a result of shift in agricultural extension decision making to lower level government?

6. Have you ever participated in agricultural extension priority setting as a result of shift in agricultural extension decision making?
7. How do you comment of the effectiveness of shift in agricultural extension services decision making based on the following variables?
 - Crops and livestock productivity
 - Yields
 - Income as a result of sales on crops and livestock products
 - Farmers livelihood
 - Capacity of farmers to initiate demand for extension services
 - Participate in agricultural extension decision making
 - Pest and disease identification and control
8. How do you describe the effectiveness of changed central-local relation in terms of male and female access to the following services?
 - Financial services
 - Agricultural inputs
 - Access to land
 - Access to agricultural information and technologies
 - Access and linkages to markets
9. How do you describe the effectiveness of changed central-local relation in terms of livestock keepers and crop farmers' access to the following services?
 - Financial services
 - Agricultural inputs
 - Access to land
 - Access to agricultural information and technologies
 - Access and linkages to markets

Appendix 4: Key Informant Checklist

PO-RALG AND MALF STAFF

1. What is the role of your role with regard to implementation of decentralized agriculture extension information and delivery of services?
2. How frequently do you conduct monitoring and supervision of agricultural extension information and service delivery in LGAs with implementation of D by D policy
3. Do you have feedback mechanism from grassroots level for enhancing agricultural extension information effectiveness?
4. What is your opinion regarding funding of agricultural extension information and services delivery with implementation of D by D policy
5. How does the policy and guideline formulation process take into account the needs and aspiration of the beneficiary
6. What the capacity of your office to undertake the new mandated roles during the implementation of Decentralized agricultural extension information and service delivery.
7. How frequently do you capacitate LGAs in terms of resources and skills development as part of technical backstopping
8. What the criteria for allocating agricultural extension block grants to LGAs
9. Overall, how do you rank the effectiveness of agricultural extension information and service delivery with implementation of D by D policy?

AGRICULTURAL EXTENSION AGENTS AT WARD AND VILLAGE LEVEL

1. Overall how do you comment on the effectiveness of agricultural extension and service delivery before and during the implementation of D by D policy?
2. How do you prepare agricultural extension information and service delivery plans and budget?
3. Can you explain how you engage farmers in preparation of agricultural extension priority setting?
4. How often are you visited by agricultural extension expert from the District Agriculture office and PO-RALG and MALF?
5. How often do you receive coordination funds from district agricultural office?
6. What challenges are you experiencing with implementation of decentralized agricultural extension information and service delivery?