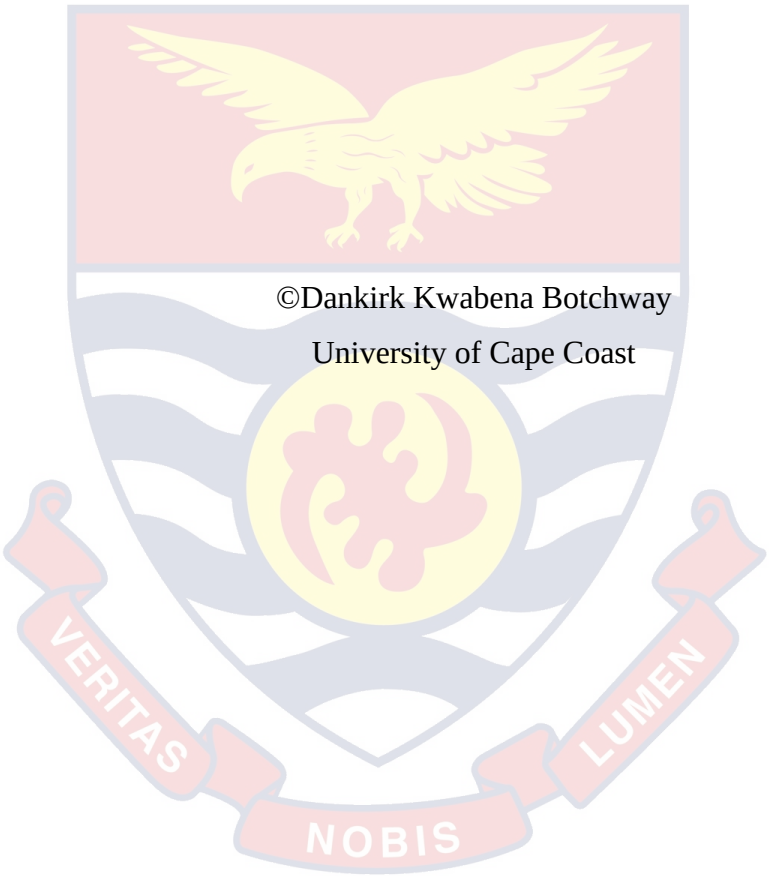
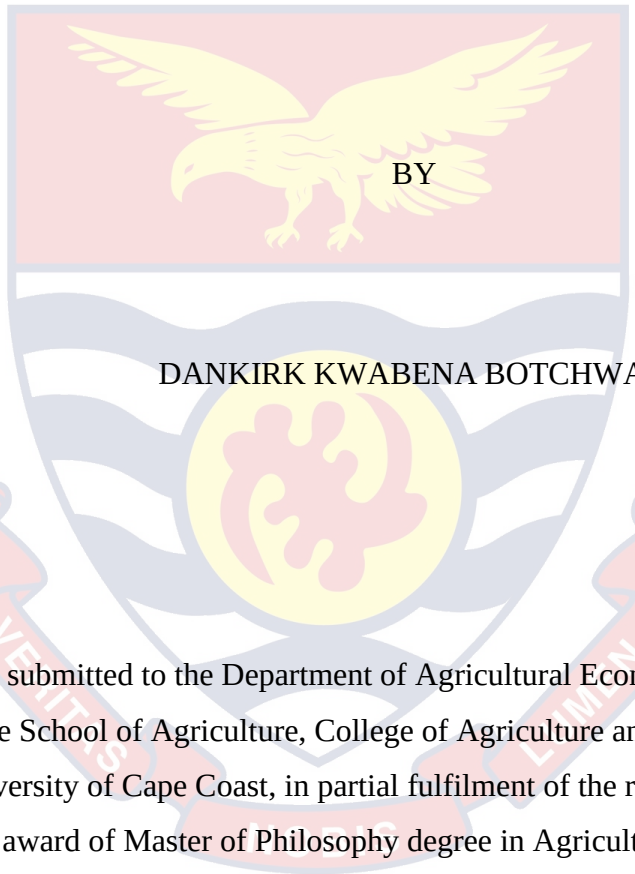


UNIVERSITY OF CAPE COAST

FACTORS AFFECTING PUBLIC SECTOR AGRICULTURAL EXTENSION AGENTS' PERFORMANCE UNDER THE DECENTRALISED SYSTEM IN THE WESTERN REGION OF GHANA



BY

DANKIRK KWABENA BOTCHWAY

Thesis submitted to the Department of Agricultural Economics and Extension of the School of Agriculture, College of Agriculture and Natural Sciences, University of Cape Coast, in partial fulfilment of the requirements for the award of Master of Philosophy degree in Agricultural Extension

AUGUST 2019

DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of my own original work and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature:……. Date:……..

Name:……

Supervisors' Declaration

We hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

Principal Supervisor's Signature:…….. Date:……..

Name:…….

Co-Supervisor's Signature:…… Date:……

Name……..

ABSTRACT

Agricultural extension planning, management, resource-raising and, or allocation in Ghana is executed by the Department Of Agriculture (DA) through local government (LG) for public sector AEAs to be effectively responsive to the contextual needs of farmers under the decentralised system. The study determined public sector AEAs' performance and factors that affected such performance under the decentralised system in the Western Region. Using a cross-sectional survey, a population of 59 AEAs and randomly selected 334 farmer group representatives were interviewed with questionnaires and structured interview schedules in six districts. The results showed that, public sector AEAs' performance was *good* on the indicators used by the study except stakeholder inclusion and participation in extension activities, which had a *satisfactory* performance. The best predictor variables of AEAs' performance in the region were *individual capacity*, *organisational capacity* and *partnership and linkages*. The study concluded that there is no statistical significant difference in the AEAs' performance among the districts. Again, not all the factors considered by the study affected AEAs' performance in the Western Region. The study recommended among others that, agricultural policy makers and decision takers are to plan, work and develop the identified predicted variables for utilisation when prioritising and sequencing interventions to improve public sector AEAs' performance under the decentralised system to achieve the SDGs of poverty eradication and food security in the Western Region.

KEY WORDS

Agricultural Extension Agents (AEAs)

Decentralisation

Department of Agriculture (DA)

Food Security

Performance

Poverty Eradication

ACKNOWLEDGEMENTS

My sincerest indebted gratitude goes to my Principal Supervisor, Prof. J. A. Kwarteng of the Department of Agricultural Economics and Extension, University of Cape Coast, whose inspiration, counsel and contributions made the write-up of this thesis possible.

Again, I express my enormous sincere gratitude and respect to my Co-Supervisor, Dr. Martin Bosompem of the Department of Agricultural Economics and Extension, University of Cape Coast, whose encouragement, contributions, suggestions and constructive criticisms has resulted to the successful completion of this work.

I also acknowledge my Head of Department, Prof. (Dr.) De-Graft Acquah and all the Lecturers in the department whose diverse suggestions helped me wrote this thesis.

I acknowledge all the Directors of the Department of Agriculture in all the six districts used for the study, the AEAs/YAEAs and their respective farmer group representatives who responded to the questionnaire and the structured interview schedule to provide the information I needed. I say, thank you very much.

The last acknowledgment goes to Mr. Emmanuel Arkoh Jackson of the Chapter One Media who did the editing and the type setting of this work.

DEDICATION

This thesis is dedicated to my lovely family, Samuel Kojo Abban, Mary Afia Anowah, Mary Maamele Botchway, Kirksten and brothers, Seth, Mumuni, Isaac, Paul and Amos. God bless you all.

TABLE OF CONTENTS

CHAPTER TWO: LITERATURE REVIEW

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

AEAs	:	Agricultural Extension Agents
AEWs	:	Agricultural Extension Workers
AIS	:	Agricultural Information System
CSIR	:	Council for Scientific and Industrial Research
DA	:	Department of Agriculture
DADUs	:	District Agricultural Development Units
DAES	:	Directorate of Agricultural Extension Services
DAs	:	District Assemblies
FAO	:	Food and Agriculture Organization
FASDEP	:	Food and Agricultural Sector Development Programme
FBOs	:	Farmer Business Organisations
FFS	:	Farmer Field School
GSS	:	Ghana Statistical Service
ICT	:	Information and Communication Technology
IFAD	:	International Fund for Agricultural Development
IFPRI	:	International Food Policy and Research Institute
ILO	:	International Labour Organization
IMF	:	International Monetary Fund
LG	:	Local Government
LI	:	Legislative Instrument
MEAS	:	Modernising Extension and Advisory Services
MLGRD	:	Ministry of Local Government and Rural Development
MoFA	:	Ministry of Food and Agriculture

NFE	:	Non-Formal Education
NGO	:	Non-Governmental Organization
OBG	:	Oxford Business Group
RCC	:	Regional Co-ordination Council
RDA	:	Regional Directorate of Agriculture
SPSS	:	Statistical Product and Service Solutions
STEPRI	:	Science and Technology Policy Research Institute
T & V	:	Training and Visit
UN	:	United Nations
USAID	:	United States Agency for International Development
WHO	:	World Health Organisation
WiAD	:	Women-in-Agricultural Development
W/R	:	Western Region
YAEAs	:	Youth in Agricultural Extension Agents
YiAP	:	Youth in Agricultural Programme

CHAPTER ONE

INTRODUCTION

The justification of the need for a decentralised system is as a result of the overly-centralized planning and administrative functions and the failure of centralised governments to create proper incentives to serve as a catalyst for economic growth (Aboagye, 2015; Cheema and Rondinelli, 2007; Lai and Cistulli, 2005; Larson and Ribot, 2004; Crook and Sverrisson, 2001). Many academics and researchers have advocated for a decentralised system from the 1980s in response to the revived global interest in governance and the need for human-focused approaches to development (Work, 2002). It is of no doubt as Cohen *et al*. (1981) (as cited in Parker, 1995, p.18) reported that Robert de Lamennais described centralised states as "apoplexy in the centre and a paralysis at the extremities". Centralised state failure was particularly illustrated by the poor performance of the agricultural sector in many developing countries (World Bank, 2000a).

Background to the Study

Agriculture has been an economic backbone of many developing countries and its extension aspect has been a strategic mechanism used to confront the issues of poverty and food insecurity by governments and international organisations that provide aid to them. Berdegue and Escobar (2001) pointed out that effective provision and utilisation of agricultural extension have direct and, or indirect effects on rural poverty reduction. Governments, non-government organisations (NGOs) and international organisations have been addressing poverty and food insecurity issues at every

level as public, social and economic good of which agricultural extension, as according to FAO (2003b) is central to its alleviation and security respectively.

FAO (2006) asserts that extreme poverty (i.e. less than $ 1a day per capita income) has remained a central factor affecting household food security and livelihoods of over 900 million undernourished people living worldwide. As a result, countries like Columbia, Philippines, Indonesia, Poland and Tunisia according to World Bank (2000a), practice decentralisation, claiming that "when agriculture extension is decentralised, there is fairly good balance in fiscal, administrative and political decentralisation, and it significantly promotes participation".

Majority of the countries in sub-Saharan Africa have implemented one or more decentralisation policy reforms, the focuses of which have changed over the years (Awortwi, 2010). In Ghana, the government in 1988 embarked on the implementation of a comprehensive decentralisation policy and local government reform programme with the aim of establishing efficient decentralised government machinery as a means to provide strong support for participatory development (Ministry of Local Government & Rural Development [MLGRD], 2003). Thus, a strong political and legal framework for the practice of decentralisation has been enshrined in the 1992 Republican constitution and in the new local government (LG) Act of 2016 (Act 936) (MLGRD, 2016).

The Directorate of Agricultural Extension Services (DAES) of the MoFA in 1997 adopted a decentralised agricultural extension services delivery approach to improve the effectiveness of extension services (Aboagye, 2015; Okorley, 2007) under the decentralised system in Ghana. Hence, the MoFA devolved its powers to the district level offices (i.e., District Agricultural Development Units [DADUs]) to enable them design and implement their own agricultural extension activities within the framework of national agricultural development policy and manage their own resources (STEPRI, 2014). According to Aboagye (2015), further steps to decentralise the provision of agricultural advisory services have been consolidated since 2012. This has made agricultural extension planning, management, resource raising and, or allocation a responsibility of the District Agricultural Development Units (DADUs) of the Department of Agriculture and the District Assembly.

Act 936 defines and regulates the planning procedure of the District Assemblies (DAs) to promote participatory development. The decentralised administrative departments' responsibilities are regulated by the assembly, and therefore, the Regional Coordinating Councils (Council for Scientific and Industrial Research-Science and Technology Policy Research Institute [CSIR-STEPRI], 2014). Thus, the departmental head of the Department of Agriculture (DA), a decentralised public service office, is responsible for the proper and effective performance of the department's functions through the District Assembly as specified in the Local Government Instrument 2009 (LI 1961).

Outcomes of decentralisation as noted by Rondinelli and Nellis (1986) (cited in Aboagye, 2015): 'are usually a priori rationalisations based on plausibility' and according to Okorley (2007) and Manor (1999), the likelihood of success is contingent on a number of factors. In the context of decentralisation, many scholars and researchers (Aboagye, 2015; Okorley, 2007; Birner, Davis, Pender, Nkonya, Anandajayasekeram, Ekboir, Mbabu, Speilman, Horna, Benin & Kisamba-Mugerwa, 2006; Lai & Cistulli, 2005) have categorised them into political (external) and organisational (internal) factors.

The political factors included the level of decentralisation, presence of well-developed institutions at the local level and the presence of a clear legal framework. The organisational factors also included stakeholder participation, institutional capacity building, resource mobilisation and accountability. Kwarteng & Boateng (2012) and Thach, Ismail, Uli & Idris (2007) have also talked about individual factors. According to Okorley (2007), these factors and other inter-related ones contribute to the successful operation of decentralised agricultural extension organisations and in the execution of the AEAs duties.

Agricultural extension service delivery depends on the performance of agricultural extension agents. FAO (2006) reveals that, the whole agricultural extension process is dependent upon agricultural extension agents who are the critical elements in all extension activities. Probably inspired by FAO (2006), Birner *et al*. (2006) and Okorley (2007) conclusions, Ragasa, Ulimwengu, Randriamamonjy and Badibanga (2016) looked at an assessment of the job performance of agricultural extension systems and the factors that best

explained it. They grouped the factors as enabling institutional environment and governance, partnership and linkages, organisational capacity, management and learning, and advisory delivery methods. These factors, according to Ragasa *et al*. (2016) and Birner *et al.* (2006), affected the performance of agricultural extension systems, and thus, in the execution of the extension agents' task.

This research used the identified factors of Ragasa *et al.* (2016), Kwarteng and Boateng (2012) and Thach *et al*. (2007) to determine how they affect the performance of public sector AEAs in the Western Region of Ghana, and identify which one(s) is a, or, are predictor(s) of their performance in the decentralised agricultural system.

Statement of the Problem

There have been various institutional structure reforms of agricultural extension in Ghana since the 1980s with the focus on promoting grassroots farmer and stakeholder participation in agriculture extension activities. The failure of these reforms and policy approaches to meet goals of the MoFA in achieving the global and national objectives of poverty alleviation and food security coupled with inadequate personnel and limited budgets have led to the continuous modification of these approaches and policies in Ghana (Okorley, 2007). In recent years, agricultural national budgets have increased consistently between 2011 and 2016 at an average annual rate of $36.1m. In 2015 and 2016, the national agricultural budget reached GHc 412m ($106.3m) and GHc 502m ($129.5m) respectively (Oxford Business Group, 2017) to aid in achieving the objectives of the agricultural sector.

The decentralised agricultural extension policy reform provides agricultural extension approaches and strategies that enhance demand-driven and human-centred services to meet global and national policy goals related to poverty eradication and food security in Ghana. The administration and implementation of the policy's approaches and strategies mainly depend on the AEAs of agricultural organisations. IMF (2003), have reported that there have been new and complex demands on agriculture extension in Ghana due to the general change from the 'top-down' to 'bottom-up' approach to rural development and poverty alleviation.

Decentralisation in Ghana sought to put in place a more conducive institutional structure that will enable the public sector AEAs to respond more effectively to the contextual needs of farmers and the entire agriculture industry. But the Modernising Extension and Advisory Services (MEAS) (McNamara, Dale, Keane, & Ferguson, 2012) had cautioned Ghana that public sector agricultural extension delivery may either be improved or worsen as a result of the practice of decentralisation. According to the Oxford Business Group (2017), Ghana is decentralising and agricultural investment plans and data collection are occurring at the district level for each zone to develop a tailored programme that suits its people.

The implementation and practice of the decentralisation policy by local government, through the Regional Coordinating Councils has, if any, very few empirical evidences on the performance of public sector AEAs to provide policy makers and planners insights on how to prioritise agricultural extension investments in the new administrative (*devolution*) decentralised

policy environment. Within the 15 years period (1997 to 2012) of practicing decentralisation at the *deconcentration* level, Okorley (2007) used a single case study of a successful decentralised DADU in the Assin district to look at the framework of decentralised extension service delivery.

Okorley (2007) identified need-based approach to programme development, accountability, stakeholder participation, and expansion of extension focus and roles. The others were group-based extension approach, sector pluralistic extension system, institutional capacity building, and resource management. According to Okorley, these are interrelated external and internal factors not reported in literature but have influenced the successful performance of the case extension organisation.

After Ghana's administrative decentralisation was taken to the *devolution* level and was consolidated in 2012, Aboagye (2015) used the Sunyani municipality in the Brong Ahafo Region to understand how the internal, external, and their interrelated factors of decentralised systems affect farmers' access to extension services from the public sector AEAs. Aboagye reported that, the factors literature claim to be contributing to a successful operation of a decentralised extension delivery by public sector AEAs have negatively influenced farmers' access to extension services.

Ragasa, Ulimwengu, Randriamamonjy and Badibanga (2016) looked at an assessment of the job performance of agricultural extension system and the factors that best explained the variations in performance in the Democratic Republic of Congo. Using a statistical and systematic approach, one of the

interrelated internal and external factors reported by Okorley (2007) was identified as the factor that best explain the variations in the job performance of the extension organisations and thus, in the execution of the AEAs roles.

Based on the findings and conclusions of Ragasa *et al.* (2016), Okorley (2007) as well as the contradictory conclusions of Aboagye (2015) which has created a research gap, this study seeks to find out how the identified factors act together to affect the performance of public sector AEAs from 2012 to 2017 in the W/R under the decentralised system in Ghana. Again, Adams (2014) have asserted that there have been less data on the roles and performance of extension workers in Ghana and sporadic criticisms that extension is not being able to perform the necessary changes in the rural communities. Hence, the study also seeks to contribute to the few data on the performance of extension agents in the context of decentralised agricultural extension service delivery in the W/R of Ghana.

General Objective

The main objective of the study is to determine the performance of public sector AEAs and the factors that affect such performance under the decentralised system in the W/R of Ghana.

Specific Objectives

The specific objectives of the study are to:

1. determine the performance of public sector AEAs under the decentralised system in terms of:

- stakeholder inclusion and participation in extension activities;
- agricultural advisory services for food production, nutrition, family health and youth development;
- facilitation of knowledge to transfer technology for information sharing on production and marketing; and
- farmer group formation and development.

2. Identify the factors that affect the performance of public sector AEAs in terms of:

- enabling institutional environment and governance,
- partnerships and linkages,
- individual capacity,
- organisational capacity, and
- advisory delivery methods.

3. Find out public sector AEAs' perception of problems associated with decentralised agricultural extension service delivery in the W/R.

4. Compare district extension units AEAs' performance across locations under the decentralised system in the W/R.

5. Explore the relationship between public sector AEAs' performance and the factors affecting decentralised extension service delivery under the decentralised system in the W/R.

6. Identify the predictor(s) of the performance of public sector AEAs under the decentralised system in the W/R.

Research Questions

1. What has been the performance of public sector AEAs under the decentralised system in the W/R in terms of stakeholder inclusion and participation; advisory services for food production, nutrition, family health and youth development; facilitation of knowledge to transfer technology for information sharing on production and marketing; and farmer group formation and development?

2. What are the factors that affect the performance of public sector AEAs under the decentralised system in the W/R in terms of enabling institutional environment and governance, partnerships and linkages, individual capacity, organisational capacity, and advisory delivery methods?

3. What is the public sector AEAs' perception about problems associated with decentralised agricultural extension service delivery in the W/R?

4. What have been the differences and, or similarities in district extension units AEAs' performance across locations under the decentralised system in the W/R?

5. What are the relationships between public sector AEAs' performance and factors affecting public sector AEAs' performance under the decentralised system in the W/R?

6. What factor(s) is a, or are predictor(s) of public sector AEAs' performance under the decentralised system in the W/R?

Research Hypotheses

1. H_0: There is no statistically significant difference in the performance of public sector AEAs across the six district extension units under the decentralised extension system in the W/R of Ghana.

H_1. There is a statistically significant difference in the performance of public sector AEAs across the six district extension units under the decentralised extension system in the W/R of Ghana.

2. H_0: Enabling institutional environment and governance, partnerships and linkages, individual capacity, organisational capacity, and advisory delivery methods do not significantly affect public sector AEAs' performance in the W/R of Ghana.

H_1. Enabling institutional environment and governance, partnerships and linkages, individual capacity, organizational capacity, and advisory delivery methods significantly affect public sector AEAs' performance in the W/R of Ghana.

Significance of the Study

The study will help public sector AEAs understand farmers' perceptions about the extension activities and services they deliver to clientele. It will contribute to unearthing competencies relevant to public sector AEAs in carrying out their assigned duties. This will aid them strive to acquire such competencies. The study will help reveal how the DADUs are performing in terms of extension services delivery to farmers. It will also throw light on the

predictors of public sector AEAs' performance under the decentralised system in the W/R of Ghana.

Furthermore, the study will provide policy makers and planners insights on how to prioritise agricultural extension investments in the decentralised policy environment and help strengthen extension organisational structure that will ensure effective agricultural extension agents and farmers interaction, both formal and informal, for the best achievement of extension goals. It will also guide agricultural extension managers and trainers in their effort to facilitate and direct extension agents' knowledge acquisition effort.

Delimitation of the Study

The selection of extension workers was delimited to the public sector AEAs of the DA. They are the public agricultural extension agents who work as frontline staff and grassroots' administrators of agricultural extension activities in their operational areas within district agricultural extension units in Ghana with no profit. Farmer respondents were delimited to only farmer groups' representatives in the W/R to gauge public sector AEAs' performance from their perspective. The study focused on the performance of public sector AEAs and the factors that affected such performance under the decentralised system in Ghana. The area of study was delimited to only six districts out of the twenty-two in the W/R where cash and tree crop cultivation as well as livestock breeding are highly predominant.

Limitation of the study

The limitations that extenuated the study included constraints of resources, fund and time which prevented the study from being extended to cover other districts in the region to add their side of the situation to the data obtained. The study could not cover all farmer group members as respondents in the six districts where the study was conducted. It only captured the farmer group representatives who included the group chairman and the secretary for each captured group. Also, the study was not able to measure the achievement of the expected short term outcomes of AEAs' performance to achieve the SDGs numbers one and two.

Organisation of the Study

This research report is organised into five chapters. Chapter One forms the introduction covering background to the study, statement of the problem, research objectives, research question, the assumptions and significance of the study. The significance of the study justifies the reasons for the study. This chapter highlights the delimitations and limitations of the study.

Chapter Two is a literature review of the study. It brings out what previous researchers have found in relation to decentralisation and public sector AEAs' performance. It covers how various independent variables: enabling institutional environment and governance, partnerships and linkages, individual capacity, organisational capacity, and advisory delivery methods influence performance of AEAs from a global point of view narrowed down to the local level. It also covers the underpinning theories and conceptual framework which form the bases of this research.

Chapter Three informs on research methodology covering; research design, target population, sampling procedure which is discussed in detail to show how the sample for this study was selected. It also covers methods of data collection, validity and reliability of data collection instruments, data processing and the statistical tools for data analysis. Chapter Four covers data analysis, presentation and interpretation of findings based on the data collected. The variable indicators of public sector AEAs' performance included stakeholder inclusion and participation, advisory services provision for food production, family health, nutrition and youth development, facilitation of knowledge to transfer technology, and farmer group formation and development.

The factors affecting public sector AEAs' performance include enabling institutional environment and governance, partnerships and linkages, individual and organisational capacity, advisory delivery methods and the demographic characteristics of the AEAs. Chapter Five covers summary and discussions of the findings, conclusions and recommendations. It also provides suggestions for further studies.

CHAPTER TWO

LITERATURE REVIEW

Introduction

The chapter provides an overview of various aspects of agricultural extension services delivery as related to the purpose of the study. The chapter looks into agricultural extension, decentralisation and the performance of public sector AEAs under the decentralised system in terms of stakeholder inclusion and participation in agricultural extension activities; advisory services for food production, nutrition, family health and youth development; facilitation of knowledge to transfer technology for information sharing on production and marketing; and farmer group formation and development.

It also looks at the factors that affect the performance of public sector AEAs in terms of enabling institutional environment and governance, partnerships and linkages, individual capacity, organisational capacity, and advisory delivery methods. The chapter discusses the perceived problems associated with the execution of the public sector AEAs roles and, or functions under the decentralised system. It also compares the performance of public sector AEAs in different districts and localities of the region and discusses the predictors of job performance of extension workers and the measures of performance. It again looks at the underpinning theories and the conceptual framework of the study. The chapter finally presents the summary of the literature review.

Definition of Agricultural Extension in Today's Context

Agricultural extension is a component of agricultural education mostly known for serving rural farmers. Many scholars have conducted studies on various aspects related to agricultural extension. Many definitions, philosophies, and approaches to agricultural extension and the views of what extension is all about have changed over time. Extension originally was conceived as a service to "extend" research-based knowledge to the rural sector to improve the lives of farmers. It thus included components of technology transfer, broader rural development goals, management skills, and non-formal education (Davis, 2008). The traditional view of extension in Africa was very much focused on increasing production, improving yields, training farmers, and transferring technology.

Today's understanding of extension goes beyond technology transfer to facilitation; beyond training to learning, and includes assisting farmer groups to form, dealing with marketing issues, and partnering with a broad range of service providers and other agencies (Christoplos, 2010). Birner *et al.* (2006) explained agricultural extension as the entire set of organisations that support and facilitate people engaged in agricultural production to solve problems and obtain information, acquire skills and technologies to improve their livelihoods and well-being. Christoplos (2010) also defined agricultural extension as a system that facilitates the access of farmers, their organisations and other market actors to knowledge, information and technologies, interaction with partners in research, education, agribusiness, and other relevant institutions; and assists them to develop their own technical, organisational and management skills and practices.

Decentralisation and Agriculture Extension

Smith (1997) explains decentralisation as central government giving its powers of decision-taking and policy-making to appropriate levels of subsidiarity to bridge the gap between suppliers and users of goods and services in the social set-up. The levels of decentralisation from the lowest to the highest respectively are deconcentration, delegation, privatisation and devolution (Awortwe, 2010; Okorley, 2007). The decentralisation approach is as a result of political and quality management ideologies as presented by Lauglo (1995) (as cited in Okorley). Lauglo described four quality management rationales for the practice of decentralised agricultural extension. The rationales included *professionalism* where autonomy is given to members of the profession to have decision-making powers; *management by objectives* which aim to promote efficiency and goal oriented activities.

The others are *market mechanisms* which emphasise market competition and *deconcentration* where political authority and management tasks from government are transferred to local officials to improve participatory decision making and ensure that government authorities are closer to local demands and needs. Lauglo (1995) (cited in Okorley, 2007) and Pellini (2000) explained that, these ideologies overlap and as such, political rationales can be combined with quality management rationales to support public and private service provision in a decentralised environment.

Ghana's level of decentralisation is devolution (Aboagye, 2015) and government has devolved the powers of policy-making and decision-taking of the MoFA to local government for agricultural investment plans and data collection to occur at the district level for each zone to develop a tailored

programme that suits its people (STEPRI, 2014). The Local Governance Act of 2016 (Act 936) with the Local Government Instrument 2009 (LI 1961) empowers the district assembly to handle matters related to recruitment, remuneration, training, promotion and discipline of employees of public services departments. The assembly handles issues related to the co-ordination of personnel plans and assessment of personnel needs of the DA as they discharge their duties (MLGRD, 2016).

The DA provide quarterly reports on the implementation of the decision of the District Assembly to its Executive Committee through the office of the District Chief Executive to the Regional Co-ordinating Council and the MoFA (MLGRD, 2016; STEPRI, 2014). To promote participatory development, the DA collaborate and co-operate with other decentralised and non-decentralised departments, state-owned enterprises and other public corporations operating in the districts to ensure co-ordinated approach to the development and management of the district to avoid duplication. This ensures a more convenient and cost-effective implementation of developmental programmes and projects to bring about participatory development (MLGRD, 2016).

Performance of Public Sector AEAs under the Decentralised System

Performance of AEAs in this research was measured in relation to their reported objectives, activities and services provided to the general public. The reported objectives of AEAs and their organisations have gone beyond technology transfer to facilitation, beyond training to learning, and include assisting farmers to partner broad range of agencies, form farmer learning

groups and be responsive to all farmers' needs as asserted by Christoplos (2010) and other writers of the profession.

The performance indicators used by the study in the context of today's extension service delivery and decentralisation have been spelt out by Abou (2015) and Birner *et al.*, (2006) as stakeholder inclusion and participation in agriculture extension activities; advisory services for food production, nutrition, family health and youth development; facilitation of knowledge to transfer technology for information sharing on production and marketing; and farmer group formation and development. A literature review on these roles of the public sector AEAs has carefully been done to determine their relevance to the service provision within the framework of decentralised extension system.

Stakeholder inclusion and participation in agriculture extension

Stakeholder participation is explained as a process where those affected by the outcome of a programme influence, take part or share control over setting priorities, making policies, allocating resources and ensuring access to public goods and services (Okorley, 2007). It is a vehicle for influencing decisions that affect the lives of citizens and an avenue for ensuring the success of a project. However, it can also be a method to co-opt dissent, a mechanism for ensuring the receptivity, sensitivity, and even accountability of social services to consumers.

Armitage, Berkes and Doubleday (2007) indicated that citizen participation is a process by which citizens' act in response to public concerns, voice their opinions about decisions that affect them, and take responsibility for changes to their community. Their support, they pointed out is key for the

sustainability of a community project. According to Ananda & Herath, (2003), a stakeholder is any individual or group of organised people, who share a common interest in a particular issue or system. Stakeholders who participate in extension are essentially farmers and other public or private sector organisations, groups or individuals (Okorley, 2007).

When power relations are constrained and capacity of actors weakened, services are bound to fail. Successful services for the poor emerge from institutional relationships in which actors are accountable to one another (World Bank, 2003). It is advocated that, to function successfully, AEAs in decentralised extension organisations must give farmers and other actors control over programme activities (Rivera & Alex, 2004a; World Bank, 2000a). Involvement of farmers in the programme planning processes is essential because it gives them the opportunity to accurately express their felt needs and determine how such needs can be addressed.

Leeuwis and Van den Ban (2004) explained that farmers can participate in different ways arranged from receiving information from other farmers to self-mobilisation, where farmers can independently initiate, and the role of extension is to support. According to Swanson and Samy (2004), besides farmers, other important stakeholders in extension are research institutions, commercial organisations, public service organisations, and support organisations. Participation in the planning and implementation of extension programs by all stakeholders, particularly, farmers ensure user ownership of programs relevant to local needs, improves accountability, program effectiveness and strengthens farmers' capabilities (Swanson &

Samy, 2004; World Bank, 2004; World Bank, 2000a; Anthholt and Zijp, 1995).

According to Rivera (2007), farmers can participate by being involved in the program development process such as identifying needs, setting and designing program goals and program implementation. Where both public and private stakeholders such as research institutions and commercial organisations (agricultural and food processors, input distributors and retailers) also participate in extension processes, diverse views, skills and resources become available to improve programme implementation and this strengthens networks for better service delivery (Leeuwis and van Den Ban, 2004).

Leeuwis and van Den Ban (2004) contend that it may not be possible for all stakeholders to be given decision-making powers and control over extension programs as a result of resource constraints, conflict management requirements and the need for leadership to ensure successful implementation of program objectives. There is also the concern that not all stakeholders might necessarily want to participate (Davis, 1997). These concerns notwithstanding, Rivera (2007) argues that for the purpose of enhancing participatory processes, there is the need for a two-way communication between extension agents and farmers to ensure that extension delivery does not just become one of technology transfer but that which ultimately empowers farmers through knowledge. With such knowledge, farmers will be able to hold extension agents and their organisations accountable and demand better services.

Involving stakeholders in decision-making by increasing interactions through workshops, seminars and meetings with AEAs are identified to be the means by which stakeholders can participate in agricultural extension activities Okorley, (2007). Establishment of communication network between AEAs and stakeholders by means of direct contacts, newsletters, joint group discussions, evaluation and reporting mechanisms controlled by district extension agents are examined. Farmers' involvement in initiating, implementing and evaluating their own development projects is another aspect of participation in agricultural extension activities which draw farmers closer to AEAs for support services.

The important relationship between farmer's participation in agricultural projects on one hand, and economic development and poverty alleviation on the other hand, cannot be over emphasized. Community participatory approaches engaging multiple stakeholders to enhance food security have begun to gain momentum in multiple settings in recent years. In planning of extension programmes, it is crucial to include stakeholders from both private and public sectors of the community to solicit diverse views, skills and resources for programme implementation.

Involving stakeholders not only take advantage of collective ideas and increase the likelihood of acceptance of decisions, but also strengthen networks for extension service provision (FAO, 2003b). This calls for public sector AEAs to establish contacts with relevant organisations and agencies, both public and private through seminars, workshops, public forums and meetings as means of gaining stakeholder input into extension planning and decisions-making to gather relevant information. This promotes interactivity

to ensure stakeholder participation in agricultural extension activities to improve public sector AEAs' performance.

Advisory services for food production, nutrition, family health and youth development

Birner *et al*. (2006) define advisory services as "the set of institutions that support and facilitate people engaged in agricultural production to solve problems and obtain information, skills and technologies to improve their livelihoods and well-being". This connotes a service orientation, distinct from the traditional models of 'top-down' technology transfer. The role of extension has gone beyond technology transfer to facilitation, beyond training to learning and includes assisting farmer groups to form, deal with marketing issues, address public interest issues in rural areas such as food security and agricultural production, food safety, nutrition, family health and youth development in agriculture (Kuyper and Schnieder, 2016; W.H.O, 2016; Abou, 2015; Christoplos, 2010; Swanson and Rajalati, 2010).

Farmers constitute the major part of the supply base of raw materials for industries in many developing countries. They are at the focal point when it comes to improving productivity and food production. Thus, according to Abou (2015), the extension goal of many developing countries is to help small scale farm households and the rural poor to improve their livelihood by increasing their income, achieving food security, empowering and increasing their access to health services and education for their children and, or youth. The AEAs' role in the provision of these services can never be underestimated.

Notwithstanding the broad range of agricultural services provided to farmers by extension officials, Anderson and Feder (2004) and Waddington, Snilstveit, White & Anderson (2010) noted that it is difficult to assess AEAs impact on agricultural performance at the farm level since there are multiple factors that affect farm performance in complex ways. These factors may include climatic conditions, availability and prices of farm inputs, access to markets and farmers' characteristics. But according to Birkhaeuser, Evenson, & Feder (1991), there are available evidences that points to a positive impact of extension services on farmers' productivity and technology adoption.

A recent evaluation of the impact of agricultural extension services on grape production in Mendoza, Argentina, shows that in spite of the insignificant treatment effect on yields, advisory services had positive effects on productivity especially for those who recorded low yields prior to the implementation of the extension program (Cerdán-Infantes, Maffoili & Ubfal, 2008). The advisory services yielded increased quality of grapes particularly for large-scale producers. Thus, it is imperative that all farmers have access to advisory services. Aside this traditional role of AEAs supporting food access by increasing productivity, the concept of food access must consider whether accessible foods meet nutritional requirement in order to achieve nutritional security.

AEAs address food and nutrition security issues by helping farmers to produce diverse foods for household own consumption. AEAs improve the availability of nutrient dense foods in markets. Kuyper and Schnieder (2016) assert that donor initiatives such as the Comprehensive Africa Agricultural

Development Programme (CAADP) and Gates Foundation's Nutritious Food Systems require agricultural development projects to deliver improved nutrition outcomes. AEAs support farmers to specialise in producing nutrient-dense foods demanded by markets. They also produce nutrition educational materials made of labelled pictures of hundreds of locally available foods that can be prepared from locally cultivated food crops (Kuyper & Schnieder, 2016).

For agricultural extension to serve the entire farm household to achieve food and nutrition security, a strong healthy family is essential. According to the W.H.O (2016), the family needs to understand that, what they eat, how they cook, their personal and environmental hygiene have great influence on their health. AEAs interact and demonstrate to farm households the safe use of pesticides and fertilizers, how animals should be kept away from where children play, where food is prepared and where it is consumed. They teach farm household to wash their hands after handling animals and their manure, chemicals, fertilizers and other toxics before cooking, eating and feeding children (Kuyper and Schnieder, 2016). But due to the way agriculture is practiced traditionally by many farm households, most educated youth find agriculture as an unattractive occupation.

Youth is the transition from childhood to adulthood, encompassing processes of sexual maturation and growing social and economic autonomy from parents. It ranges anywhere from 8-40 years but the UN and the ILO defined youth as persons between 15-24 years of age for cross country comparisons and analyses (FAO, 2014). Youth development in agriculture in

recent years has gained a global interest in many developing nations such as Ghana. It is believed that young farmers can play an important role in ensuring food security if they are encouraged to get into farming and agriculture. According to IFAD (2012) and Paisley (2013), rural youth over the past few years have been shying away from agriculture, and as such, there is a growing interest to find ways of engaging and incorporating the youth in agriculture.

Retaining the youth in agriculture to reduce the large migration of the rural youth from farming to urban areas has been a current big focus of governments in the developing world. Agriculture extension services effectively address this issue by encouraging and supporting youth participation in agriculture. Public sector AEAs under the decentralised system develop, encourage and support the youth through many agricultural development initiatives to be involved in agriculture as a source of employment to achieve food, nutrition and health security. This will help change the negative perceptions about farming as a work for the uneducated and unskilled labourers engaged in a glamour less vocation with extremely low returns.

As such, this study looked at public sector AEAs' performance related to advisory services in terms of technical information provided on how to increase food production and improve farm household nutrition, technical advice on input supply and usage from dealers who sell broad range of products, technical information on accessing credit facilities and education for the youth to be developed into agriculture.

Facilitation of knowledge to transfer technology for information sharing on production and marketing

According to Burgelman, Christensen & Wheelman (2008), 'technology' is the theoretical and practical knowledge, skills and artefacts that can be used to develop products and services as well as their production and delivery system. Technology is embodied in people, materials, cognitive and physical processes, products, equipment and tools. Through facilitation, this theoretical and practical knowledge, skills and artefacts used for the production of goods and services need to be accessible to farmers, their organisations, their market actors and other stakeholders.

It is argued in today's agricultural extension context that agriculture extension activities should facilitate the access of farmers, their organisations and other market actors to knowledge, information and technologies; facilitate their interaction with partners in research, education, agribusiness and other relevant institutions; and assist them to develop their own technical, organisational and management skills and practices (Christoplos, 2010; Davis, 2008; and Birner *et al*., 2006). Thus, one of the main goals of agricultural extension is to facilitate and disseminate information, knowledge and technology to its clientele. The AEAs' role of acquiring, practicing and disseminating information, knowledge and technology is very pivotal to their successful performance.

The practice of extension is based upon three major paradigms: public led technology transfer with training and visit (T &V) system, public and private advisory services; non-formal education (NFE) involving farmer field schools (FFS); and facilitation extension where extension agents work as

knowledge brokers in facilitating the teaching-learning process among all types of farmers and the rural young (Abou, 2015). AEAs help farmers and other stakeholders acquire knowledge about a technology, facilitate decisions to try it out and help farmers to make decisions on whether to take it up or reject it. They facilitate the empowerment of farmers to adapt to technologies to fit their own socio-economic and agro ecological conditions and pass on the technology to other farmers.

This describes Rogers' (2003) innovation decision process in farmer-decision making which is used as a model to assess farmer decisions on technologies before full adoption. As such, this research used this task dimension of the AEAs to determine their performance in relation to new knowledge and technology facilitated to share information and, or disseminated to improve farm management practices, reduce production and marketing cost in the effort to improve agricultural productivity to increase farm income through communication.

Farmer group formation and development

From the traditional perspective of training farmers and disseminating technologies in the 1980s and early 1990s, extension has more recently expanded to include helping farmers to form groups to deal with problems regarding the marketing of agricultural products and partner with a broad range of agricultural service providers (Birner *et al*., 2006). For AEAs to reach larger numbers of farmers, they work through groups. According to Annan (2012), membership of a group varies, and it is advantageous to have a small number of people forming it. A group size of between 20 and 30 is ideal and

manageable in order to provide a face-to-face interaction, better communication and the free flow of information.

This has been a well-established practice in extension and has numerous potential benefits which include mutual support around common interest and problem solving, enabling joint activities as shared labour on members' farms and providing a voice for community members with outside organisations. According to Anandajayasekeram, Pusker, Sindu & Hoekstra (2008), Place, Swallow, Wangila & Barrett (2002), and Stringfellow, Lucey, Mckone & Hussain, (1997), groups allow farmers to obtain new technologies, benefit from economies of scale, enter into stable relationships with suppliers and set rules for natural resource management. Madukwe (2006) explains that group formation enhances the dissemination of agro-information either by public or private interventions to a wider spectrum of users, including women and youth, unlike the formal extension systems.

Groups are valuable as a form of collective action to farmers, providing resources such as credit, labour and information (Anandajayasekeram *et al.,* 2008). In the decentralised extension context, Sanginga, Lilja and Tumwine (2001) assert that working with groups is a more decentralised process and less 'top-down' than working with individuals. In areas where farmer research groups exist, technology development and dissemination have been found to improve and contribute to greater diffusion of information (Anandajayasekeram *et al.* 2008; Andima, Makini, Okoko, Muyonga, Wanyama, Masinde and Makwono, 2002). AEAs facilitate farmer group formation and development to improve farmers' capacity to analyse their problems and needs. This improves farmers' ability to influence

extension activities and research agenda through dialogues and exchange of information between members.

Farmer group formation and development help create opportunities for continuing dialogue between farmers, researchers and extension staff (Anandajayasekeram *et al*., 2008). In relation to the task performance of AEAs on this function, the study is interested in whether public sector AEAs form and develop farmer groups to work with, whether public sector AEAs use the farmer groups in the implementation of extension activities, whether public sector AEAs give opportunity to farmer group representatives to be part of the district's extension planning and decision making processes, and whether public sector AEAs are able to develop their groups into farmer business organisations (FBOs).

Again, the research is also interested in the public sector AEAs role of establishing linkages and partnership with support agencies and institutions for their groups' members to have the opportunities to be empowered. The research also looks at the level of farmer group influence over district development plans related to agriculture, group management practices in terms of vision, goals, objectives and work plans setting.

Factors Affecting Public Sector Agricultural Extension Agents' Performance under the Decentralised Extension System

Recent literature (Ragasa *et al*., 2016; Aboagye, 2015; Chowdhury, Odame, & Leeuwis, 2014; Benson & Jafry, 2013; Kwarteng & Boateng, 2012; Faure, Desjeux & Gasselin, 2012; Davis & Heemskerk 2012; Okorley, 2007; Thach, Ismail Uli, & Idris, 2007; and Birner *et al.*, 2006) have shown that

factors such as enabling institutional environment and governance, partnership and linkages, individual capacity, organisational capacity, and advisory delivery methods are critical elements that act together to influence the total performance of AEAs and the entire extension system. These factors, according to Birner *et.al*, (2006) are 'choice variables' which policymakers and extension managers can influence directly. The literature review discusses these factors succinctly below.

Enabling institutional environment and governance

National decentralised extension policies and strategies have been developed in several African countries, such as Ghana, Kenya and Malawi. The policies are implemented through institutional and governance designs which explicitly describe *commonly shared* mission, objectives, roles, and responsibilities. The institutional designs and their interconnectivity to achieve shared mission and objectives of national decentralised extension policies or strategies through roles and responsibilities are influenced by the levels of decentralisation being deconcentration, delegation and devolution, the degree of autonomy and flexibility (Ragasa *et al*., 2016), and the presence of a clear legal framework (Okorley, 2007). Good institutional designs have clearly defined and measurable targets of performance to monitor and evaluate progress in areas of improvements.

In assessing extension performance, few authors highlight the need to look at enabling institutional environment and governance. A performance review conducted by Faure, Desjeux, and Gasselin (2012) highlights large knowledge gaps on institutional environment and governance that affect

workings and performance of agricultural extension. In this paper, indicators to explore how enabling institutional environment and governance affect performance of public sector AEAs are: (1) AEAs awareness of the presence of policy strategies adopted by extension organizations, (2) presence of performance targets set, and (3) implementation and enforcement of the performance targets set. These indicators are selected to reflect public sector AEAs awareness of policy and its strategies as well as the presence or absence of performance targets set to be met by public sector AEAs in the public sector agricultural extension units. These indicators are easy to collect in a survey setting and are easily understood by respondents as argued by Ragasa *et al*. (2016).

Partnerships and linkages

Due to the complexity of agricultural development and food security issues, an integrated approach involving collaboration among actors and sectors is required. There is a growing literature on the importance of linkages within the agricultural information system (AIS) perspective, and specifically, according to Davis & Heemskerk (2012), on its implications to the brokering role, forging partnerships, and new capacities within extension. Rivera and Sulaiman (2009) highlight the need for strengthening attitudes and skills to enable innovation through partnership and linkages whilst Leeuwis and Aarts (2011) stress the crucial importance of partnership and linkages in enhancing the learning of negotiation, network building, social learning, and dealing with dynamics of power and conflict.

However, the case study by Chowdhury, Odame, and Leeuwis (2014) shows the challenges in transforming public extension agencies, particularly with the agricultural information systems (AIS) framework. Chowa, Garforth, and Cardey (2013) and Benson and Jafry (2013) illustrated the difficulties and complexities of forging partnerships and coordination in the face of pluralistic advisory systems. As indicated by these studies, there is scarce empirical research on how partnerships and linkages are formed and developed by public sector AEAs and how they affect extension service provision and performance. Hence, this research looked at partnerships and linkages established by extension agents in relation to connectivity and coordination with actors within and outside their operational areas of work. The study tested the statistical significance of partnerships and linkages in explaining public sector AEAs' performance.

The study by Ragasa, *et al*. (2016) on factors affecting performance of agricultural extension system revealed that partnerships and linkages have been shown to be important in extension agents' performance. They revealed that interactions with other extension agents, NGOs, agro-dealers and agribusinesses, and local political authorities are particularly important. The findings suggested that there was a need for greater recognition of the importance of partnering and linking with other actors who are potential sources of services, information, technical support, and market outlets. Policies and investments to help extension agents and organisations link more to each other are critical. For example, providing means of transportation, good communication networks, and reducing the time and transaction costs for

extension agents to go to the field, visit farmers and interact with other actors were shown to be very important based on analyses.

Individual capacity

Studies conducted by Khalil, Ismail, Suandi & Silong (2008), Thach, Ismail, Uli and Idris (2007) and Boyd (2003) show that individual competence and skills are positively related to extension agents' performance. According to Cole (1996), capacity is the competence to make informed decisions and the skill to attract and manage resources to achieve goals. Extension staff must have adequate capacity and must be trained in agriculture to be able to assist farmers with improved crop varieties, planting techniques, efficient input use, market conditions, and more effective production management techniques (Anderson, 2007). Aside this, they must be knowledgeable in communication and facilitation, problem-solving and critical thinking skills, teamwork and human relations in order to effectively interact with farmers and other stakeholders (Kwarteng and Boateng, 2012; Kroma, 2003).

Experts, according to Lakai, Jayaratne, Moore, and Kistler (2012), Leeuwis and Aarts (2011) and Smits (2002) emphasise that capacity and performance include totality of different conditions, structures, institutions and actors within a system which are categorised into 'hardware' (new technical devices and practices), 'software' (new knowledge and modes of thinking), and 'orgware' (new social institutions and forms of organisation)

Organisational capacity

Capacity is the competence (ability) to make informed decisions, attract and manage resources to achieve goals. According to Cole (1996),

organisational capacity includes effective organisational management system having the ability to run its operations and ensure that resources are well managed to achieve set goals. United Nations (2005) asserts that most developing countries lack organisational capacity in the public sector. It is believed that in most developing countries, extension services have serious shortage of trained managerial and technical staff to carry out responsibilities for extension. Staff employed lack competence and motivation due to poorly defined human resource development and management systems (United Nations, 2005). World Bank (2000a) highlights the fact that the lack of managerial ability at the local level is a major limitation to extension decentralisation in developing countries in general, specifically in Africa.

According to World Bank (2000a), training of extension workers improves the competencies of staff and promotes the attitudinal change required for decentralisation reforms. According to Garforth (2004), training is essentially required to meet the needs of extension staff in the new policy environment. Tossou and Zinnah (2005) and United Nations (2005) suggest that extension staff need other knowledge to do with communication and facilitation, networking, critical thinking, problem solving and human relations in the decentralised policy environment. The extension organisations' role to help the extension staff acquire such competencies is what matters.

Leadership ability of district managerial staff to provide support to AEAs for change, facilitate innovation, use funds properly and diversify sources of funds to overcome shortages are requirements of extension organisations to enhance AEAs' performance. Availability of physical resources for agricultural extension provision is also a very important aspect

of extension organisations' capacity to enable AEAs deliver services relevant to farmers. For extension agents and their organisations to provide services that are relevant to the needs of farmers, they must have the requisite technical and managerial capacity (Kwarteng and Boateng, 2012).

A major problem in developing countries is allocation of inadequate resources, including funds and qualified extension staff to deliver extension services (Anderson and Feder, 2004). The insufficient funding for the delivery of extension services, inability to fully mobilize funds, failure to cost effectively deliver services and meet farmers' needs are evidences of weak organisational capacity (Parker, 1995). According to Feder, Willett and Zijp (2001), government budgetary support for agricultural extension in developing countries remains inadequate. Extension organisations require adequate funding to be able to organise staff training programs and embark on farmer outreach programs. Mbega (2015) and Swanson (2006) claim that AEAs have been reporting of irregular flow of funds that affect their performance schedules.

Where there are little funds for recurrent costs and field operations, extension officers' scale down field activities and this affects the availability and quality of extension services (Anderson and Feder, 2004; Bentz, 1997). Local extension organisations can raise funds through the introduction of fee-for-service or cost-sharing arrangements, where farmers are made to pay all or part of the cost of services they receive from public extension units. They can also acquire additional resources by involving all stakeholders in extension program planning through partnerships and collaborations (Anderson and Feder, 2004; Deshler, 1997). Adequate funding for decentralised extension

service delivery enhances the performance of extension agents. A case study of Columbian extension decentralisation showed improvement when the fund for extension organisation was doubled (World Bank, 2000a).

Several studies (Pasteur 2002; Saviroff and Lindarte, 2002; Tapa and Ojha, 2002; Sharma, Swanson & Sadamate, 2001) show that enhanced technical and management capacity help improve the motivation, confidence and attitudes of extension staff. The capacity of extension staff can be built through staff training, informal learning, information and communication technology, research extension linkage and enhancing staff motivation and commitment. Career development opportunities, which enhance promotion prospects, also motivate staff to develop their skills and perform better (Leeuwis and van den Ban, 2004).

Ragasa, *et al*. (2016) noted that organisational capacity is significant in explaining performance of extension agents and organisations. The indicators used in the study are (1) funds received, (2) number of staff, (3) quality of staff such as education and training, (4) availability of motorbikes, vehicles and other field logistics, (5) presence and enforcement of systems of sanctions and rewards, and (6) qualities of the supervisors such as education, leadership style, and amount of supervision to agents.

This research has used these indicators related to the capacity of an organisation to determine how they affect the performance of the public sector AEAs in the execution of their roles under the decentralised system in the W/R. To deliver extension activities effectively, extension organisations need to function well. According to Maddy, Niemann, Lindquist and Bateman (2012), extension professionals need to develop the capacity of their

organisations by establishing structure, organising processes, developing and monitoring resources to lead to change to effectively and efficiently obtain extension outcomes.

Management should also understand and be able to convey information about the vision, mission and goals of the extension services, communicate effectively with staff and clients, conduct staff appraisal and keep staff informed of their performance. Management of agricultural organisations should effectively implement rewards and sanctions systems for extension workers, find out staff needs for human resource development and others to address them, and organise staff meetings in a timely manner to seek staff input. It is affirmed that the presence of system of rewards and sanctions, funds and training received are linked to better performance (Ragasa *et al*., 2016).

Advisory delivery methods

Advisory delivery methods are ways through which AEAs and their organisations choose to deliver services and facilitate knowledge sharing. There have been strong evidences from literature which show that social networks and group-based approaches are effective channels for agricultural extension (Meinzen-Dick, Quisumbing, Behrman, Biermayr-Jensano, Wilde, Noordeloos, Ragasa & Beintema, 2012; Quisumbing & Kumar, 2011; Pandolfelli, Meinzen-Dick, Dohrn, 2008). Ragasa and Sengupta (2012) have concluded that the mix or combination of delivery methods rather than concentrating on one is the most effective delivery method.

A related topic is the role of ICT as a delivery method. World Bank (2012) provides a collection of examples where ICT is playing a major role in agricultural extension and knowledge sharing in the agriculture sector and in the rural areas. The steps and processes involved in soft systems methodology used for the analysis, design, and implementation of a successful web-and mobile-based advisory information system in Tanzania have been described in literature by Sanga, Tumbo, and Mlozi (2013). Aker (2011) has also described the potential opportunities and constraints of using ICTs mechanisms (such as voice, text, internet, and mobile money transfers) and has highlighted in literature that, there are limited rigorous evaluation and field experiments to assess the value addition and contribution of ICTs for agricultural extension.

There are limited empirical studies on the effect of ICTs on extension service provision. For example, it is not clear whether ICTs complement or substitute other delivery methods or whether extension agents using ICTs visit farmers and their farms less or more frequently. The study used the W/R of Ghana data to test whether different delivery methods such as group-based approaches, community meetings, home or farm visits, and, or ICTs substitute or complement each other and whether these methods matter in affecting public sector AEAs' performance.

Perceived Problems of Decentralised Agricultural Extension Service Delivery

Sarker and Itohara (2009) indicated that extension will be more effective in helping to improve farmers' livelihoods if there is a clear understanding of what farmers want to know and how they want it to be

delivered to them. One of the most critical elements that drive DADUs' extension programmes is the understanding of the key agricultural needs of farm households (Okorley, 2007). Public sector AEAs assist farmers to diagnose their farm or farm-related problems and provide advice on solutions to such problems but according to Ponniah *et al*. (2008) (cited in Annan, 2012) what has been lacking is organised feedback from clientele. Because extension field work is location specific and demands quick decisions and actions, relevant data collated by management from farmers need to be provided to AEAs as a source of feedback to the activities they perform.

Alonge (2006) identified ill trained and ill-equipped village extension staff working in unfavourable environments as constraints that affected extension services performance in many developing countries. Poor resource farmers have access to only the village extension worker. According to Annan (2012) there has been inadequate level of staffing to meet the demands and requirements of agricultural extension in Ghana. Speranza, Kiteme and Opondo (2009) claim that, for the past 15 years, the number of staff of public sector agricultural extension organisations have declined due to public employment freeze and reduced funding for agricultural extension operations. According to the Agriculture Sector Progress Report-MoFA (2017), the MoFA has total staff strength of 1,675 at post representing 47.6% out of the required staff of 3,517 thus leaving a deficit of 1,842 (52.4%) unfilled positions.

The provision of quality agricultural extension services in Ghana is constrained by a number of factors including lack of recruitment for retirements and death of extension officers, lack of incentives, ill-equipped

extension agents, lack of re-training and logistics, and under-utilisation of information and communication technologies (ICTs) (Annan, 2012). Extension staffs do not have enough ability to respond to all farmers needs adequately due to poor transport facilities, poor road infrastructure, large operational areas to cover, few or inadequate staff, lack of enough facilitation and congested schedule (Annan, 2012).

Weak commitment of local assemblies in planning and implementing extension programmes at the local level as a result of lack of political will on the part of some government officials (World Bank, 2000a) has been one of the problems of most public sector AEAs. Ghana's decentralised extension services according to Annan (2012) have no strong legal policy guidelines covering its operations and that extension services strategies are largely exotic and not demand driven. It is noted that putting in place a legal and policy framework is one basic new and indispensable way of conducting extension in developing countries (Qamar, 2005) to help streamline the confusion currently existing in the effort to transfer agricultural knowledge to farmers, particularly in the areas of service provision, programme development and funding.

Poor delivery of agricultural extension services is also mentioned by Sanga, Mlozi, Tumbo, Mussa and Haug, (2013) as among the constraints contributing to low agricultural production. Gautam (2000) revealed that "some farmers indicated that they do not want any extension advice and some do not want the current service to continue". Qamar (2003) reported that the challenges most agricultural extension services face are mostly of a technical and logistic nature, such as insect-pests invasions, outbreaks of serious

diseases, severe climatic effects, natural disasters, or intensive campaigns for an increase in agricultural production.

Comparing Districts Extension Units AEAs' Performance across Locations

The few studies conducted on decentralised public extension service delivery in Ghana that relate to performance assessment and evaluation are studied in single metropolis, municipal and district assemblies. For instance, Okorley (2007) used a single-case study of a successful decentralised district extension organisation in the Central Region, specifically, in the Assin district to look at the framework of decentralised extension service delivery. Okorley identified need-based approach to programme development, accountability, stakeholder participation, expansion of extension focus and roles, cross sector pluralistic extension system, institutional capacity building, resource management and group-based extension approach as interrelated factors that influenced the successful performance of the case extension organisation.

Similarly, Aboagye (2015) used the Sunyani municipality in the Brong Ahafo Region to understand how the internal, external and their interrelated factors in a decentralised system affect farmers' access to extension services from the public sector. Aboagye reported that, the factors literatures claim to be contributing to successful operation of decentralised extension delivery have negatively influenced farmers' access to extension services in Ghana. This report implies that decentralisation is not contributing to successful performance of public sector AEAs and their organisations. Based on these research works, it can be argued that comparing public sector

AEAs' performance across different locations on the same policy reform can provide different results where different districts respond better to the policy reform than others.

Assuming-Brempong, Sarpong & Asante (2006) reported that, the awareness of the decentralised policy and its devolution of responsibilities could even differ in responses between public sector AEAs and their directors across locations and within directorates. In the case of Aboagye (2015), it was observed that farmers in one locality were satisfied with the availability of extension services than those in other localities within the same municipality. This explains how performance of AEAs across locations and within directorates may provide different results. As a result, this research compared the district extension units AEAs performance across the six locations within the W/R where the study was undertaken to determine whether there were statistically significant differences in the different extension units AEAs' performance and if so, what were the contributing factors of such performance, or otherwise.

Predictors of Job Performance of Extension Workers

According to Rezaie, Alambeigi and Rezvanfar (2008), predictors of performance are defined as cognitive abilities and job knowledge. Extension workers must possess the ability to lead. They need to enhance their skills and abilities for the leadership role to influence their performance and successes (Oyinlade, 2006; Sallam and Akram, 2005). Performance is generally discussed within the contexts of leader behaviour, motivation, task design, goal setting, and most other primary areas of organisational research. In this

work, the term performance is used in the context of leader behaviour and task design.

Dubrin (2007) describes leadership as a process whereby an individual influences a group of individuals to achieve a common goal. Leadership in the field of agricultural extension has a critical strategic importance since it deals with developing groups of farmers in the community. According to Armstrong (2006), Dhanakumars (2001) and Linder (2001), a leader must be competent and correlated with high performance. Competency remains one of the important variables to use in order to explain the performance of the agricultural extension worker as a leader to farmers. The result of regression analysis in the study of analysis of the job performance of the agricultural extension experts of Iran conducted by Rezaie, Alambeigi and Rezvanfer (2008) revealed that job competency contributed 48.6% of the variance in job performance of extension workers.

Consequently, competencies could potentially be used to integrate and link an organisation's main human resource processes such as extension performance management, training and leadership development, succession planning and rewards to agriculture extension and rural development strategy (Linder, 2001). Similarly, findings of Riggo and Taylor (2000) highlight that, possession of social competence leads to a good prediction of job performance. Other findings of a study indicated that among all individual factors, social skills were the strongest contributor in explaining the extension workers' performance (Thach *et al*., 2007). Extension workers must be competent in the technical area of their job in terms of knowledge and skills in

new technology. Boyd (2003) stated that, successful extension workers should have strong technical knowledge and skills.

Belay and Abebaw (2004) admit that higher rates of technology adoption by clients are achieved when extension workers possess adequate technical competencies. Again, Olsen, Bhattacharya & Scharf (2006) contend that cultural competency has also become a necessity for service providers, professionals and agencies. Since extension is a non-formal educational (NFE) function that applies to any institution or agency that disseminates information with the intention of upgrading knowledge, attitudes, skills and aspirations of the people (Rivera and Qamar, 2003), cultural competency indeed appear to be a necessity for extension agency and extension worker as well.

Dhanakumars (2001) and Linder (2001) reported that job performance and extension competencies are positively related. Similarly, Armstrong (2006) affirmed that competencies are contributing factors to high levels of individual and organisational performance. On the other hand, Liles & Mustian (2004) assert that, by developing a set of competencies for extension workers and incorporating those competencies into training, the capacity of an extension organisation to better serve its clients can be improved. According to Terry and Israel (2004), extension agents' performance is the key to the success of extension organisations and they suggested that extension agents must develop and maintain skills in assessing and responding to the needs of clientele to ensure that they receive the most accurate and current information.

Various studies have indicated that performance is dependent on many factors. Based on literature, to perform well in extension work, extension agents need to have the following elements: motivation, technical knowledge

and skills, extension method skills, program development skills, social skills, and external contact ability. It is obvious that those agents who work harder will perform better if they are motivated and satisfied with their jobs. In addition, Mbega (2015) reported that the high proportion of AEAs with low volume of work is due to lack of incentives for high level performance and, or lack of sanctions for poor performance in the public sector.

Moreover, Lindner and Dooley (2002) noted that effective performance in skills requires application of related knowledge and help make possible the acquisition of new knowledge. The Texas and University System (2005) asserts that social skills of extension agents such as establishing effective working relationships with co-workers, colleagues, supervisors, volunteers, clientele and key community leaders were important in determining performance. Extension agents also need competencies in program planning and development (Boyd, 2004). Finally, it is noted that extension agents' external contact ability significantly affects the desired result and increases the effectiveness of extension work.

This study investigated some predicting variables of AEAs' performance under decentralisation. The variables included (a) enabling institutional environment and governance, (b) partnership and linkages, (c) individual capacity, (d) organisational capacity, and (e) advisory delivery methods.

Measures of Performance

Measuring job performance is the process of determining how closely records of behaviours and, or outcomes have been achieved during a period

and assigning them with corresponding numbers. Birner *et al.*'s (2006) framework illustrates the different layers of variables upon which agricultural extension services are designed and structured to reach high performance outcomes of extension. The ultimate goal of strengthening agricultural extension is to improve AEAs' performance in facilitating knowledge and transferring technology to be adopted, enhancing agricultural productivity growth, improving income, and food and nutrition security in a sustainable way. Performance of extension agents is measured at the level of consistency of the reported objectives of their extension organisation and the actual activities and services the agents perform and provide to their clients.

Ifenkwe (2012) focused on analysing factors affecting performance of agricultural extension staff in Abia State, Nigeria, but directly, did not really measure performance. Instead, extension agents were asked to rate the level of importance (low, medium, or high) of 20 competencies thought to be necessary attributes for effective field performance.

Okwoche and Asogwa (2012) used self-ratings of agents based on eight dimensions of performance namely quantity of work, dependability, work schedule, work allocation, poise, composure, organisation, and customer satisfaction but the assessment was done by the agent's immediate supervisor on a 5-point Likert-type scale instead of self-rating. The indicators collected were the number of farmers trained, number of villages visited, number of technologies disseminated, number of trainings conducted, number of demonstration plots organised, and number of training materials produced and disseminated.

This research is measuring performance under the decentralised system in terms of public sector AEAs ability to: (1) encourage and include stakeholders to participate in all extension activities; (2) provide advisory services in relation to food and nutrition security, family health and youth development; (3) facilitate farmers' knowledge to transfer technology in relation to information sharing on production and marketing; and (4) promote farmer group formation and development. Performance measures of these task dimensions executed by public sector AEAs for the general public are considered in relation to the identified variables of Birner *et al.* (2006) framework upon which policymakers design extension services to reach high performance levels.

Theoretical Models of the Study

In line with this study's aim of identifying the factors affecting public sector agricultural extension agents' performance under the decentralised system in Ghana, the soufflé theory of decentralisation and other performance theories were used by the study.

The soufflé theory of decentralisation

This theory identifies and integrates the political and organisational factors required for the success of decentralised systems (Okorley, 2007; Parker 1995). Just as a soufflé requires the right combination of milk, eggs and heat to rise, so as the study equally integrates the empirical factors identified to investigate how they affect the performance of public sector AEAs under the decentralised system in Ghana. The framework to design and analyse extension service delivery considers enabling institutional environment and

governance structure, capacity, management and advisory delivery methods as design elements upon which policymakers have to make decisions to reform extension services to reach high levels of performance (Birner *et al.* 2006).

These factors as pointed out by literature, if identified and are equally integrated, will likely produce beneficial outcomes in a decentralised environment (Aboagye, 2015; Okorley, 2007; Smith, 1997; Parker, 1995). The soufflé theory attempts to equally bring together the identified factors of decentralisation to investigate how they act together to affect public sector AEAs' performance to produce likely important outcomes that may lead to the achievement of the sustainable development goals (SDGs) of eradicating poverty and increasing food security.

Performance theories

Performance theories underpinning the study are the human capital theory and the sustainable resource theory which form part of the economic theory of performance. The human capital theory postulates that entities must add short and long-term value to the development of knowledge and expertise in individuals or groups from investments (Swanson, 1999) to provide valuable returns that can be calculated. The sustainable resource theory explains that economic entities need to add value to create sustainable long-term economic performance. These theoretical models rest on the assumption that extension organisations empower their staff and the entire system to improve performance of AEAs.

The study has modified these theories to develop a simplified conceptual framework to be used to investigate how the empirical factors

identified in a decentralised system interlinks, relates and act together to have effect on public sector AEAs' overall performance outcomes that may lead to the achievement of the SDGs of poverty eradication and food security in the W/R.

Conceptual Framework Illustrating Factors Affecting AEAs' Performance under the Decentralised System

The ultimate goal of strengthening agricultural extension is to improve AEAs' performance in order to enable them facilitate technology adoption, enhance agricultural productivity growth, improve incomes, food security and nutrition in a sustainable way to eradicate poverty. Effective delivery of agricultural extension services by public sector AEAs is influenced by factors such as enabling institutional environment and governance, individual capacity, organisational capacity, partnerships and linkages, and advisory delivery methods (Ragasa et al. 2016; Aboagye, 2015; Okorley, 2007; Thach et al., 2007). These factors are the study's independent variables and are in correlation with the study's dependent variable, public sector AEAs' performance. Bosompem (2006) also argues that demographic factors such as sex, age, work experience, education and job position can also significantly affect agricultural performance. The study examines the associations the demographic factors of the AEAs have with their performance.

According to the soufflé theory, the right combinations of these factors significantly affect public sector AEAs' performance in terms of executing their roles of including stakeholders to participate in extension activities; providing advisory services for food production, nutrition, family

health and youth development in agriculture; facilitating farmers' knowledge to transfer technology for information sharing on production and marketing; as well as forming and developing farmer groups to work with.

The performance theories (human capital and sustainable resource theories) explain how capacities building in individuals and in organisations are also significant in explaining AEAs' performance. The significant effects of these factors may result to intermediate outcomes of increase in food production, new knowledge acquisition, increase in household income, development of farmer-based organisations and improvement in farm management practices. This, in the long-run, may result to the achievement of the long-term objectives of food security and poverty eradication.

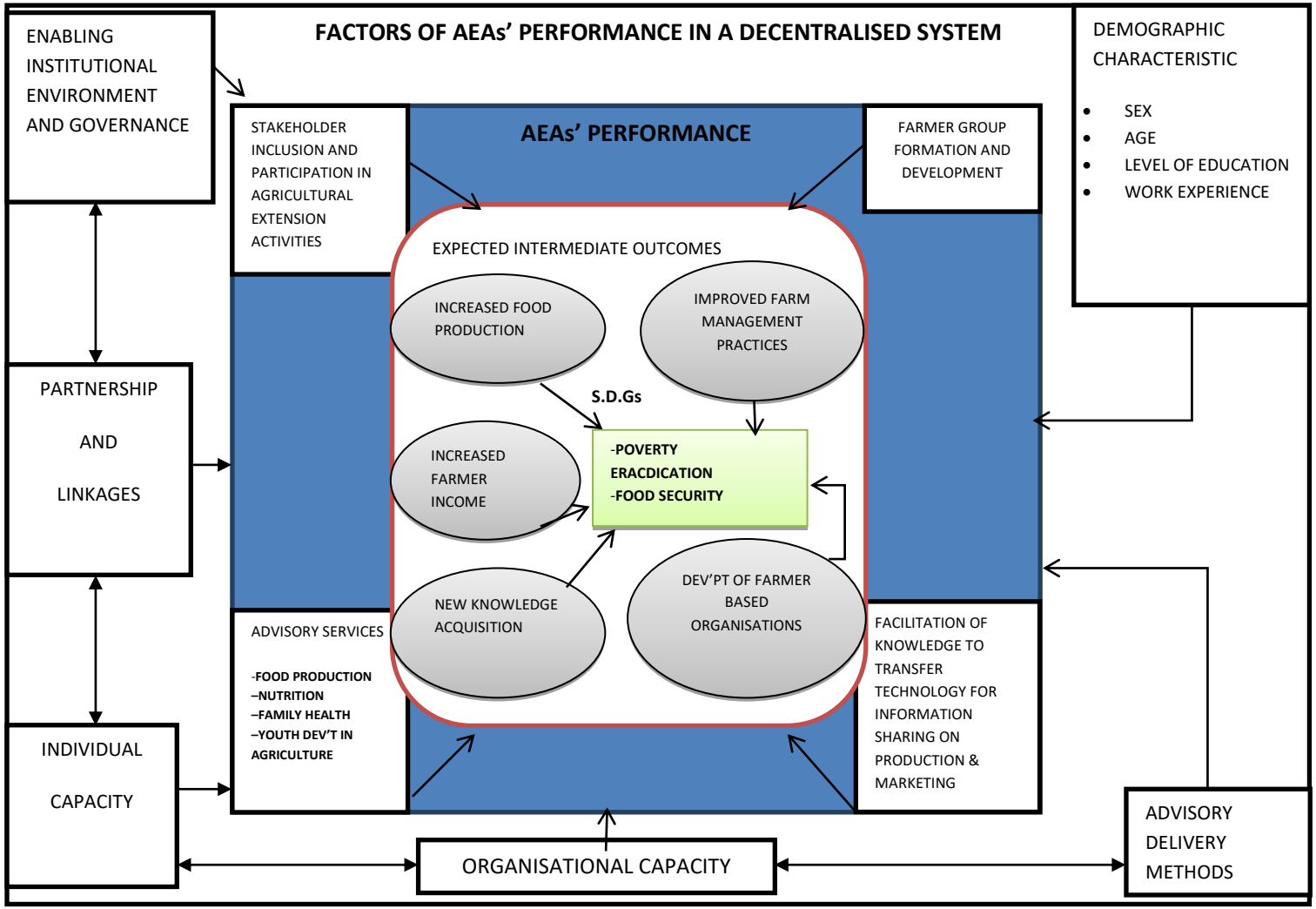


Figure 1: Conceptual framework showing factors affecting public sector AEAs' performance under the decentralised system

Source: Authors Construct, (2019)

Summary

For decentralisation to result in improved access to extension services there must be a clear legal framework and adequate institutional capacity for extension officers to deliver relevant services. Stakeholders must participate in planning, implementing and evaluating extension services through accountability mechanisms with adequate funding to ensure the sustainability of decentralised extension systems. Extension policy and strategy, as well as performance targets, are embodiment in vision, thinking, and commitment on agriculture extension, and are key determinants of the AEAs' performance.

Thus, the performance attributes of the study are stakeholder inclusion and participation in extension activities; advisory services for food production, nutrition, family health and youth development; facilitation of knowledge to transfer technology for information sharing on production and marketing; and farmer group formation and development. The performance attributes are related to empirical factors identified to be having influence on successful decentralised extension service delivery. These factors are enabling institutional environment and governance; partnership and linkages; individual capacity; organisational capacity; and advisory delivery methods.

Given the more prominent role as knowledge broker, extension agents and their organisations are increasingly required to form and establish partnerships and linkages with sources and users of knowledge. Extension staff must have adequate capacity in technical agriculture with communication and facilitation skills to effectively interact with farmers and other actors of the industry. Organisational capacity does not only include physical and

financial capacity but also involves effective organisational management system to run the operations and ensure that resources are well managed.

Sustainable funding and resourcing of extension organisations are important for management and staff to perform well. The quality of learning and education, age and sex of agents can also affect the capacity and performance of agents in their service provision. The perceived problems of decentralised extension service delivery have been identified as lack of recruitment for retirements and deaths, inadequate incentives, ill-equipped extension staff, lack of re-training and logistics and under-utilisation of ICTs. There has also been poor delivery of extension services with low production.

The measures of AEAs' performance are at the level of consistency of the reported objectives with their activities they provide to clientele. Predicting performance variables of the study are enabling institutional environment and governance, partnership and linkages, individual capacity, organisational capacity advisory delivery methods and other demographic characteristics. The underpinning theories of the study are the soufflé theory of decentralisation, the human capital theory and sustainable resource theory which form part of the economic theory of performance. The chapter concluded with the schematic framework upon which the research was based.

CHAPTER THREE

RESEARCH METHODS

Introduction

This chapter presents the methods adopted by the researcher to achieve the objectives set for the study. It covers the following areas; research design, study area, population, sampling procedure, data collection instruments, data collection procedure, data processing and analysis.

Research Design

The study adopted a descriptive research design, using a survey to gather factual information and experiences (Cohen, Manion & Morrison, 2007) with the focus on the Western Region. A cross-sectional survey method was employed for the process of data collection. This method has been adopted on the basis that it allows collection of data from different groups of respondents at one point in time to determine the relationship between and among variables (Cohen *et al*., 2007; Babbie, 1990). According to Cohen *et al*. (2007), a cross-sectional survey produces a 'snapshot' of a population at a particular point in time. It is a method that tells us about the population at a given point in time and provides aggregate data. It is less expensive, produce findings more quickly and it is less likely to suffer from control effects.

Quantitative method of data collection is used to answer research questions or phenomena that can be expressed in terms of quantity. This method has been adopted so that collected data can be described and presented in terms of summary frequencies to report what has been found. Moreover, the method facilitates the use of inferential statistics which strive to make

inferences and predictions based on the gathered data (Cohen *et al.,* 2007). Thus, to this end, the researcher with few constructed questions was able to obtain self-reported answers that were used to generate data in respect to factors that affect public sector AEAs' performances.

Study Area

The study focused on the Western Region (W/R). The W/R is one of the then ten regions of Ghana with Sekondi-Takoradi as its capital. The geographic location of the region is at the south of Ghana between latitudes 5º 30' 0.00º N and longitudes 2 º30'0.00º W and spreads from the border of Ivory Coast in the west to the Central Region in the east, Ashanti and Brong-Ahafo Regions at the north. The southern part of the region is the 192km coastline of the Gulf of Guinea of which the Cape Three Points near Busua in the Ahanta West Municipality is found, where crude oil is being drilled in Ghana. About 75% of the vegetative cover comprises of the rainforest and semi-deciduous forest with precisely 24 forest reserves and has such rivers as Ankobra, Bia, Pra in the east and Tano around its national border at the west. The remaining 25% are Guinea and Coastal savannah. The region covers about 10% of Ghana's total land surface (Ghana Statistical Service [GSS], 2013).

It is the wettest region in Ghana with a high double rainfall pattern averaging 1600mm per annum. Although there are intermittent minor rains all year round, the peaks of the rainfall are between May to July and September to

Figure 2: Map of Western Region showing selected six districts (coloured) of the study area.

Source GSS (2013)

October. The region has moderate temperatures ranging from 22ºC at nightfall to 34ºC at day with a humidity range from 70 % to 90% in most parts. The region produces almost all cultivated tropical food crops, domestic livestock and fish in its forest areas and at the coast respectively. The total land area of the region is 23,921km^2.

Based on the 2010 population census, it is estimated that the region has a total population of 2,376,021 with a population density of 99/ km^2. Agriculture is the principal occupation which engages more than 50% of workers in all districts of the region except Jomoro (46.4%) and Shama-Ahanta East (45.8%) (GSS, 2013). The region is the largest producer of cocoa and other crops such as rubber, coconut and oil-palm in the country. The region also produces a wide variety of minerals such as gold, bauxite, iron, diamonds and manganese. The region has two (2) metropolitan assemblies, three (3) municipal assemblies and seventeen (17) district assemblies which sum up to twenty-two (22) different political sectors (GSS, 2013).

Population

Population is aggregate of people or things that researchers have in mind from which one can obtain information and draw conclusions (Fraenkel and Wallen, 2000). In this case, the study population was all the AEAs employed by the agricultural ministry to work in the DADUs and have been executing decentralised extension functions since 2012 in the Western Region. The unit of analysis was public sector AEAs. To measure public sector AEAs' performance effectively, farmers who received extension services from the DADU AEAs' in the W/R since 2012 were considered a second set of the population for the study.

Sample and Sampling Procedure

Due to the nature and the number of available public sector AEAs in the region, the researcher numbered the twenty-two (22) districts in the W/R and employed the lottery technique to select six districts randomly in this order: Amenfi West (1), Mpohor (2), Amenfi Central (3), Bibiani/Anhwiaso/Bekwai (4), Amenfi East (5) and Wassa East (6). Bibiani/Anhwiaso/Bekwai is at the north-east; Amenfi West, Amenfi Central and Amenfi East are at the central parts. Mpohor and Wassa East are at the south-eastern sector of the region. Within these districts, the required number of public sector AEAs and farmers of the study can be attained.

The remaining districts included Sefwi Akontombra, Prestea-Huni Valley, Ahanta West, Aowin/Suaman, Bia, Bia East, Bia West, Ellembelle, Jomoro, Juaboso and Shama. The others were Nzema East, Sefwi Wiawso, Tarkwa-Nsuaem, Shama Ahanta East and Sekondi-Takoradi. A multiple-stage sampling procedure was adopted. At the first stage, a simple random procedure was used to select the six districts. A census approach was used to include all the AEAs found to be available in the six randomly selected districts of the region. Public sector AEAs are the units of analysis.

To build up a satisfactory sample for a specific purpose (Cohen et al., 2007), the stage two used a simple random sampling technique to select three farmer groups from each district AEA based on the farmer group sample frame provided using the lottery approach. At the third stage, a stratified sampling technique was used to select farmer group representatives of the randomly selected farmer-based groups to respond to the structured interview schedule developed to collect data on public sector AEAs' performance for the

study. They are the recipients of the public sector AEAs services rendered. The sampling procedure was used for the purpose of triangulation to collect data that can well be used to measure AEAs' performance under the decentralised system in the W/R.

Sample Size

According to the Regional Directorate of Agriculture (RDA) after a personal visit in 2018**,** there are about 310 active farmer-based groups engaged in crop, fish and livestock production in the W/R. Averagely, it was established that each district has about 10-15 active farmer-based groups with 12-20 active members for each group. Cohen *et al*. (2007) suggest that for a population above 2,500 to 4,999 cases, a study requires 25% of the total population as a sample size to ensure representativeness. It is established that the larger the sample size, the better, so that parametric statistics can be used in the data analysis to provide greater reliability (Cohen *et al*. 2007, p.103).

At a confidence level of 95% with 5% confidence interval, such a population must have a sample size of 333 to reduce a sampling error at a minimum due to the issue of generalization (Cohen *et al*., 2007, p.104). On the basis of this, a sample size of 334 farmer group representatives and a census of all the 59 public sector AEAs found in the six (6) randomly selected districts were considered appropriate for the study. The overall sample size was 334 farmer group representatives with 59 public sector AEAs captured using a census approach. In all, the respondents were 393.

Data Collection Instruments

Primary data collection method was used. Self-administered questionnaires and structured interview schedules were used to explore factors that affected public sector AEAs' performance under the decentralised system. The questionnaires were constructed to collect data from the AEAs of the DADUs in each randomly selected district in the W/R. The structured interview schedule was meant to collect data on public sector AEAs' performance from the farmers who received extension services from the respondent AEAs in the randomly selected districts. The data collection instruments were constructed using a six point Likert-type scale from *not agree* (0) to *strongly agree* (5). Participants provided their own responses.

Table 1- *Likert-type scales and their interpretations*

Scale	Interval	Perception on AEAs performance under the decentralised system.	Interpretation of perceived responses on performance.	Interpretation of perceived AEAs responses on factors affecting performance.
5	4.45-5.00	Strongly Agree	Very Good	Very High
4	3.45-4.44	Agree	Good	High
3	2.45-3.44	Moderately Agree	Satisfactory	Moderately High
2	1.45-2.44	Less Agree	Fair	Low
1	1.00-1.44	Least Agree	Poor	Very Low
0	0	Not Agree	-	-

Source: Author's Construct (2018).

The questionnaire was made up of four parts. The first part sought information about the personal background of the respondents. The second part was to collect information on the performance of AEAs under the

decentralised system in the W/R. The third part focused on the factors that affected the performance of public sector AEAs under the decentralised system in the W/R. The fourth part concentrated on the public sector AEAs perceived problems of decentralised agriculture extension delivery in the W/R. For the farmers, the structured interview schedule was made up of two parts. The first part sought information about the personal background of the respondents. The second part collected information on the performance of AEAs under the decentralised system in relation to the services they render to clientele in the W/R.

Pre- testing of the Instruments

The questionnaire and the structured interview schedule were pre-tested at Komenda-Edina-Eguafo-Abirem municipality and Ajumako-Enyan-Essiam district in the Central Region before they were actually used. This was necessary to check the validity and reliability of the instruments. The questionnaires were administered to 10 public sector AEA representative respondents of the population. The structured interview schedules were administered to 20 farmer group representative respondents using a stratified sample approach. This was to establish whether the instruments measured what they were intended to measure. The 30 respondents consisted of 10 AEAs (five each from the municipality and the district respectively) and 20 farmer group representatives (10 each from the municipality and the district). The pre-testing of the instrument was conducted in August, 2018.

Reliability of a scale gives an indication of how free it is from random error (Pallant, 2001) or the extent to which the scale produces consistent results if repeated measures are taken. Using SPSS (Statistical Product and

Service Solutions) version 22.0, Cronbach alpha co-efficient which measures internal consistency was used to measure the degree to which all items on the scale measure an underlying construct. The rule is that individual consistency reliability should be 0.7 or higher. Following the reliability results of the pre-test, as presented by Table 2, the final data collection instruments were developed for the collection of the main data for the study.

Table 2- *Summary of reliability analysis of the research instruments using Crombach's Alpha coefficient (SPSS v.22.0)*

	AEAs (N=10)		Farmer Group Representatives (n=20)	
Construct	Alpha	Number of Items	Alpha	Number of Items
Stakeholder inclusion and participation in agricultural extension activities	0.989	12	0.735	12
Advisory services for food production, nutrition, family health and youth development in agriculture	0.687	25	0.702	25
Facilitation of knowledge to transfer technology for information sharing on production and marketing	0.713	6	0.786	6
Farmer group formation and development	0.971	6	0.887	6
Enabling institutional environment and governance	0.802	12	-	-
Partnership and linkages	0.735	9	-	-
Individual capacity	0.861	9	-	-
Organisational capacity	0.970	13	-	-
Advisory delivery methods	0.765	8	-	-
AEAs perceived problems of decentralised extension service delivery	0.690	9	-	-

Source: Pilot Study, Botchway (2019)

Data Collection Procedure

The questionnaire and the structured interview schedule were sent to the DADUs of the MoFA by the researcher who made his intentions known to the respondents. The researcher, with the help of a field assistant, visited the AEAs of the DADUs of the MoFA to distribute the questionnaires. For the farmers of the respective AEAs, the research team conducted the interview one-on-one using the structured interview schedule which was translated in the local dialect for their responses to be ticked or written on the schedule. The whole data collection took a period of two and half months, precisely, from the second week of October, 2018 to the end of December, 2018.

Data Processing and Analysis

Data collected were arranged, edited, coded, cleaned and entered in computer using SPSS Version 22 software programme. The responses were screened for correctness and then assigned numerical values based on the Likert-type scale which represented various attributes being measured. The statistical analytical techniques that were used to analyse each of the specific objectives are as follows:

To know the background of AEAs and their performance under the decentralised system in terms of stakeholder inclusion and participation in extension activities; advisory services for food production, nutrition, family health and youth development; facilitation of knowledge to transfer technology for information sharing on production and marketing; and farmer group formation and development as objective one, frequencies, means, weighted means, variances and standard deviations were computed from the responses of the respondents. These described public sector AEAs background

and their performance in relation to the four task dimensions of the extension work in today's context under the decentralised system used by the study.

Objective two was to identify the factors that affect the performance of public sector AEAs. Frequencies, means, weighted means, variances and standard deviations were computed to describe how these factors affected public sector AEAs' performance under the decentralised system. Objective three looked at perceptions of AEAs' problems associated with decentralised agricultural extension service delivery. Frequencies, means and variances were computed to describe public sector AEAs' perceptions of problems of decentralised agricultural extension service delivery and their performance as they execute their duties.

Objective four compared AEAs' performance across the six locations in the W/R where the study was conducted under the decentralised system. Weighted means, variances and a one-way analysis of variance (ANOVA) were used. The objective is linked to the hypothesis one which has the assumption that there is no statistically significant difference in the performance of public sector AEAs across district extension units within the decentralised extension system in the W/R using a one-way ANOVA test. The hypothesis was tested at an alpha level of 0.05. To explore whether there was any significant relationship between public sector AEAs' performance and the factors affecting AEAs' performance under the decentralised system in the W/R as objective five Pearson product moment coefficient (r), Spearman Rho and Point Biserial correlations were used.

To identify the predictors of public sector AEAs' performance under the decentralised extension system as objective six, multiple regression analysis using the stepwise step of entry method was employed to predict the value of the dependent variable based on the values of the independent variables. The objective is linked to hypothesis two of the study which assumes that the identified factors do not affect public sector AEAs' performance under the decentralised system. All hypotheses, significant differences and relationships were tested using 0.05 alpha levels. The regression equation used for predicting the dependent variable (public sector AEAs' performance) was: $Y = a + \beta_{eg}X_{eg} + \beta_{pl}X_{pl} + \beta_{ic}X_{ic} + \beta_{oc}X_{oc} + \beta_{adm}X_{adm} + \beta_{a}X_{a} + \beta_{s}X_{s} + \beta_{p}X_{p} + \beta_{we}X_{we} + \beta_{ed}X_{ed} + \varepsilon_{i}$ ……(1) where:

Y= AEAs' performance,
a = constant,
β_{eg}……β_{ed}= beta coefficients of predictor variables,
X_{eg} = Enabling institutional environment and governance,
X_{pl} = Partnership and linkages,
X_{ic} = Individual capacity,
X_{oc} = Organisational capacity,
X_{adm} = Advisory delivery methods,
X_{a} = Age
X_{s} = Sex,
X_{P} = Position,
X_{we} = Work experience,
X_{ed} = Level of education, and
ε_i = Error term.

Table 3 - *Summary of statistical tools for analysing each objective*

Specific Objectives	Statistical tools for analysis
1. To determine the performance of AEAs under the decentralised system in terms of stakeholder inclusion and participation, advisory services, facilitation of knowledge and technology transfer and farmer group formation and development.	Frequencies, means, weighted means, variances and standard deviations.
2. To identify the factors that affects the performance of AEAs in terms of enabling institutional environment and governance; partnership and linkages; individual and organizational capacity; and advisory delivery methods.	Frequencies, means, weighted means, variances and standard deviations.
3. To find out AEAs perceptions of problems associated with decentralised agricultural extension service delivery.	Frequencies, means, weighted means and variances.
4. To compare district extension units' AEAs' performance across the six (6) locations where the study was conducted in the W/R under the decentralised system.	Weighted means, variances and one-way analysis of variance (ANOVA).
5. To explore to identify the relationship between public sector AEAs' performance and any of the factors affecting decentralised extension service delivery under the decentralised system in the W/R.	Pearson product moment correlational coefficient (r), Spearman Rho (ρ) and Point Biserial.
6. To identify the predictors of AEAs performance under the decentralised extension system.	Multiple regression analysis using ordinary least square (OLS) stepwise step of entry method.
Research Hypotheses	**Statistical tool**
1. H_0: There is no statistically significant difference in the performance of public sector AEAs across six districts extension units within the W/R under the decentralised extension system in Ghana. H_1: There is a statistically significant difference in the performance of public sector AEAs across six districts extension units within the W/R under the decentralised extension system in Ghana.	One-way analysis of variance (ANOVA).
2. H_0: Enabling institutional environment and governance, partnerships and linkages, individual capacity, organizational capacity, and advisory delivery methods do not significantly affect the performance of public sector AEAs. H_1: Enabling institutional environment and governance, partnerships and linkages, individual capacity, organizational capacity, and advisory delivery methods significantly affect the performance of AEAs.	OLS with stepwise step of entry.

Source: Author's Construct, 2019

Ethical Concerns

The researcher did not subject the respondents to situations harmful or uncomfortable to participants. The participation in this research was voluntary and people had the right to refuse or disclose certain information about them. By seeking the consent of the participants, it helped in explaining how the purpose and the nature of the research benefited the participants. I avoided deception in a case of limited finance or volatile situations which could have led to inadequate collection of data. I guarded the research in relation to upholding integrity and confidentiality.

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

This chapter discusses the major findings of the research based on the specific objectives of the study carried out to determine the performance of public sector AEAs and the factors affecting such performance under the decentralised system in the W/R.

Performance of Public Sector AEAs in the W/R under the Decentralised System

This section presents and discusses the major findings on the performance of public sector AEAs in the W/R based on the perceptions of both public sector AEAs and farmers within the study area. The indicators used to measure performance of the public sector AEAs included stakeholder inclusion and participation in agricultural extension activities; advisory services for food production, nutrition, family health and youth development in agriculture; facilitation of knowledge to transfer technology for information sharing on production and marketing; and farmer group formation and development.

Public sector AEAs' performance on stakeholder inclusion and participation in agriculture extension activities

A stakeholder according to Ananda & Herath (2003) is any individual or group of organised people, who share common interest in a particular issue or system. Farmers, organised groups, public and private sector organisations are essentially the stakeholders who participate in extension activities. To

function successfully, public sector AEAs in the contest of decentralisation, include stakeholders in extension activities to promote participation. Table 4 presents farmers and AEAs perceptions about public sector AEAs' performance on stakeholder inclusion and participation in extension activities in the W/R.

Table 4 shows that farmers and AEAs *agreed* that public sector AEAs have been executing their roles well when it comes to farmers' participation in extension meetings ($\bar{x}$ =3.60, SD = 0.92**)** **(** μ =3.80, σ = 0.77), stakeholders' involvement and participation in the district's programme planning processes ($\bar{x}$ =3.58, SD=0.88) (μ=3.78, σ = 0.83) and providing farmers the opportunity to voice their opinion about decisions that affect their livelihood ($\bar{x}$=3.55, SD=0.98) (μ=3.89, σ =0.74). These *good* performance results are buttressed by Okorley's (2007) assertion that extension organisations have designed interested innovative ways to improve farmer participation as they recognize the importance of stakeholder participation in agricultural extension activities through the planning process, public farmers' forum, workshops, meetings and seminars to ensure better interaction to improve performance.

However, both AEAs and farmers *moderately agreed* to providing farmers the opportunity to participate in the monitoring of extension activities adopted in the operational areas (μ=3.07, σ=0.76) ($\bar{x}$ =2.99, SD=1.07) and involving retailers in the participation of extension processes (μ=2.67, σ=1.00) ($\bar{x}$ =2.90, SD=1.09). As such, these and other items from Table 4 explain why the overall *mean* values of AEAs (μ = 3.38, σ = 0.42) and farmers ($\bar{x}$=3.27, SD =0.62) show a *moderately agreed* AEAs' performance on

stakeholder inclusion and participation in agricultural extension activities (12 items). The implication is that public sector AEAs' performance on stakeholder inclusion and participation in agricultural extension activities is *satisfactory* in the districts where the study was conducted in the W/R under the decentralised system in Ghana.

Aboagye (2015) argues that only few farmers get the opportunity to participate as stakeholders in the various extension processes under the decentralised system in Ghana. Aboagye reported that farmers become part of forums when public sector AEAs want to deliver their services to them rather than soliciting their inputs for extension programme development. The *satisfactory* performance of public sector AEAs on this indicator might probably be as a result of the difficulties and complexities of forging partnership and coordination in the face of pluralistic advisory systems (Chowa, Gartforth & Cardey, 2013; Benson & Jafry, 2013) as required by the practice of decentralisation.

Table 4 - *AEAs' and farmers' perceptions about public sector AEAs' performance on stakeholder inclusion and participation in extension activities*

Stakeholder inclusion and participation in extension activities	Farmers (n= 334)		AEAs (N=59)	
	$\bar{x}$	SD	μ	σ
Agenda for agricultural extension meetings are provided to farmer groups before due dates.	3.60	0.92	3.80	0.77
Farmer group representatives in the operational area participate in the district's programme planning process.	3.58	0.88	3.78	0.83
The agent provides farmers the opportunity to voice our opinion about decisions that affect our livelihood.	3.55	0.98	3.89	0.74
The agent establishes contact with relevant agencies for farmers through meetings, seminars, workshops to gain stakeholder input into extension planning decisions.	3.45	0.91	3.42	0.90
The agent establishes a two-way communication process between service providers and farmers by means of direct contact, newsletters or joint group discussions.	3.43	0.98	3.62	0.81
The agent involves agricultural input distributors in the participation of extension processes.	3.37	0.87	3.44	0.66
Farmers take part in the operational areas' decision making process related to priority setting.	3.19	1.01	3.48	0.85
The agent allows farmers to prioritize their own extension needs according to how they we want them to be addressed.	3.17	0.97	3.21	0.84
The agent involves food processors in the participation of extension processes.	3.07	1.07	3.12	0.95
Farmers exercise control over community extension activities in my operational area.	3.02	.97	2.91	0.92
The agent provides farmers the opportunity to participate in the monitoring of extension activities adopted in farming communities..	2.99	1.07	3.07	0.76
The agent involves retailers in the participation of extension processes.	2.90	1.09	2.67	1.00
Overall Mean	3.27	0.62	3.38	0.42

Scale: 1= "Least agree", 2 = "Less agree", 3 ="Moderately agree", 4 = "Agree", 5 = "Strongly agree.
Source: Field Survey, Botchway (2019)

Public sector AEAs' performance on advisory services for food production, nutrition, family health and youth development in agriculture

The extension goal of many developing countries is to help small scale farm households and the rural poor to achieve food security, and, increase their income and access to health services. Accessible foods must meet the nutritional requirement of farm households in order to achieve nutritional security. It is believed that young farmers can play important role in ensuring food security if they are encouraged to get into agriculture.

Public sector AEAs' performance on advisory services for food production

From Table 5, AEAs and farmers *agreed* that public sector AEAs provide extension services on food production to farmers (μ=4.14, σ= 0.67) ($\bar{x}$ =3.97, SD=0.77), provide farmers the knowledge to produce diverse foods to increase food production (μ=4.12, σ= 0.59) ($\bar{x}$ =3.85, SD=0.81) and provide farmers the opportunity to work with input suppliers to increase their production (μ=3.68, σ= 0.75) ($\bar{x}$ =3.75, SD=0.85). The weighted mean from Table 5 reveal that public sector AEAs and farmers *agree* (μ=3.75, σ= 0.52) ($\bar{x}$ =3.69, SD=0.63) that public sector AEAs provide extension services to increase food production in the W/R under the decentralised system. The implication is that, public sector AEAs' performance for food production is *good* in the W/R under the decentralised system in Ghana. Under Ghana's decentralisation, according to FAO (2017), what makes the agricultural extension and advisory services particular is that it is focused on food production increase.

This may in a way, probably, explain why the major staple food crop production in Ghana have been on a gradual increase from 2013 to 2016 (MoFA, 2017, p.7). Both farmers ($\bar{X}$=3.42, SD=1.08) and their AEAs (μ=3.26, σ = 0.98) *moderately agreed* to the service provision for farmers to access

Table 5 - *AEAs' and farmers' perceptions about public sector AEAs' performance on advisory services for food production*

Advisory services for food production	AEAs (N= 59)		Farmers (n= 334)	
	μ	σ	$\bar{x}$	SD
The AEA provide extension services with regards to food production for his/ her farmers.	4.14	0.67	3.97	0.77
The agent provides knowledge that helps us to produce diverse foods for our household consumption.	4.12	0.59	3.85	0.81
The agent provides us the opportunity to work with agricultural input suppliers to increase food production.	3.68	0.75	3.75	0.85
The agent uses relevant advisory institutions to provide knowledge and information on food production processes for his / her farmers	3.68	0.75	3.71	0.80
The agent provides agricultural value chain development services to farmers to increase household incomes.	3.64	0.74	3.52	0.93
The agent provides information for accessing credit facilities to improve agricultural production.	3.26	0.98	3.42	1.08
Overall Mean	3.75	0.52	3.69	0.63

Scale: 1= "Least agree", 2 = "Less agree", 3="Moderately agree", 4= "Agree", 5 = "Strongly agree
Source: Field Survey, Botchway (2019)

credit facilities to improve food production. Public sector AEAs' performance on providing advisory services to help farmers to access credit facilities to improve food production was *satisfactory*.

The progress report of MoFA (2016, p.37) revealed that credit support to agriculture, forestry and fishing have significantly reduced from 6.50% to 3.84% between 2010 and 2015. According to the MoFA's annual progress report, access to rural credit for small-scale farmers is constrained by several factors such as default on subsidised loans, issues of land tenure, weather

risks, and a lack of technical knowledge on risk assessment and management with the most relevant being the lack of collateral. These empirical evidences probably back-up the public sector AEAs' and the farmers' reasons to the *satisfactory* performance scores on the advice for credit accessibility to farmers to improve food production.

Public sector AEAs' performance on advisory services for food nutrition

Similarly, both AEAs and farmers *agreed* that public sector AEAs provide advisory services aimed at improving farm household nutrition The *agreed* overall *mean* of AEAs' (μ=3.80, σ = 0.52) and farmers' ($\bar{x}$=3.60, SD=0.67) from Table 6 show that, perception about public sector AEAs' performance for providing advisory services to achieve the objective of nutritional security under the decentralised system in the W/R is *good*. Advisory services for making farmers cultivate varieties of plants and produce diverse foods to meet household daily nutritional requirement are all *good*. The total number of nutrition training beneficiaries to promote the consumption of micro-nutrient rich foods like eggs, leafy vegetables, vitamin A rich orange flesh sweet potatoes and moringa in the W/R in 2015 was 105 (MoFA, 2016).

According to Kuyper & Schneider (2016), AEAs support farmers to specialise by producing nutrient-dense foods demanded by the market (e.g. livestock, legumes, nuts and fruits) particularly in areas where market linkages are strong. AEAs efforts to improve the availability of diverse, nutrient-dense foods may represent a major contribution to improve nutrition, to prevent rural

people in low-income areas from consuming monotonous diets with inadequate nutrients diversity.

Table 6 -*AEAs' and farmers' perceptions about public sector AEAs' performance on advisory services for food nutrition*

Advisory services for food nutrition	AEAs (N=59)		Farmers (n=334)	
	μ	σ	$\bar{x}$	SD
The agent encourages us to produce diverse foods to meet our daily balance diet requirements.	4.06	0.69	3.89	0.75
The agent provides farmers the opportunities to cultivate plant varieties that meet the nutritional requirements of households.	4.15	0.72	3.83	0.78
The agent provides extension services with regards to nutrition for farmers.	3.93	0.55	3.65	0.81
The agent uses relevant advisory institutions to provide knowledge to farmers on how to achieve nutritional security.	3.56	0.77	3.42	0.84
My district AEAs provide agricultural development projects that deliver improved nutritional outcomes to farmers.	3.25	1.04	3.27	1.22
Overall Mean	3.80	0.52	3.60	0.67

Scale: 1="Least agree", 2="Less agree", 3="Moderately agree", 4="Agree", 5 ="Strongly agree

Source**:** Field Survey, Botchway (2019)

However, performance on the provision of local agricultural projects to improve the nutrition of farmers from both AEAs (μ= 3.25, σ =1.04) and farmers ($\bar{x}$=3.27, SD=1.22) perspective were *satisfactory*. The high variance and SD show how inconsistent the responses were over the item. The Directorate of Women in Agriculture Development (WIAD) is responsible to work in the area of nutrition, food safety and others (FAO, 2017). But because in the past, the MoFA promoted a unified extension approach, public sector AEAs work as generalist and support all agricultural extension and advisory services interventions, provided the activities are implemented in their districts regardless of the focus of the activities (FAO, 2017; McNamara, Dale, Keane & Ferguson, 2012). Probably, this is why performance for the provision of

local agricultural projects to improve the nutrition of farmers has been *satisfactory* as a result of some districts not providing such interventions.

Public sector AEAs' performance on advisory services for family health

Table 7 depicts that AEAs and farmers *agreed* that, the public sector AEAs perform their duties on advisory services for ensuring farm household health. The perceived performance *mean* scores obtained for items like the wearing of personal protective equipment (PPE) when applying chemicals and other inputs (μ= 4.33, σ = 0.66 and $\bar{x}$=4.17, SD= 0.77), keeping farm inputs away from the reach of children (μ=4.22, σ =0.67 and $\bar{x}$=4.16, SD= 0.74), and advisory services to follow instructions on the use of chemicals before harvesting (μ=4.27, σ = 0.61 and $\bar{x}$=4.07, SD= 0.79) have all been *good.* The others included the safe handling of equipment (μ=4.08, σ = 0.65 and $\bar{x}$=4.14, SD= 0.71), safe handling of animals products and chemicals before cooking and feeding (μ=4.29, σ = 0.62 and $\bar{x}$=4.03, SD= 0.81) and the advice to visit health facilities when casualties are experienced (μ=3.81, σ = 0.73 and $\bar{x}$=3.91, SD= 0.83).

Table 7 - *AEAs' and farmers' perceptions about public sector AEAs' performance on advisory services for family health*

Advisory services for family health	AEAs (N= 59)		Farmers (n=334)	
	μ	σ	$\bar{x}$	SD
The agent teaches farmers to wear personal protective clothing whenever applying chemicals.	4.33	0.66	4.17	0.77
The agent teaches farmers to keep farm inputs away from the reach of children at home and on their farms.	4.22	0.67	4.16	0.74
The AEA teaches farmers the safe handling of farm equipment to avoid injury.	4.08	0.65	4.14	0.71
The AEA teaches farmers to follow instructions for harvesting farm produce after applying chemicals.	4.27	0.61	4.07	0.79
The AEA teaches farmers the safe handling of animals' products and chemicals before cooking, eating and feeding children.	4.29	0.62	4.03	0.81
The agent advices farm households to visit health centres to access health services anytime they have casualties.	3.81	0.73	3.91	0.83
The agent advices farmers on personal and environmental hygiene issues to ensure good health.	3.98	0.63	3.89	0.80
The AEA provides extension services with regards to family health for farmers.	3.91	0.60	3.73	0.82
Overall Mean	4.10	0.51	4.00	0.63

Scale: 1="Least agree", 2="Less agree", 3="Moderately agree", 4="Agree", 5="Strongly Agree"
Source: Field Survey, Botchway (2019)

The overall perceived performance *mean* scores shown by Table 7 (μ=4.10, σ = 0.51 and $\bar{x}$=4.00, SD= 0.63) indicate that AEAs and their farmers *agree* that advisory services provided to improve household health are performed by the public sector AEAs in the six districts under the decentralised system in the W/R of Ghana. The study results of Okoffo, Mensah and Fosu-Mensah (2016) affirms that, majority of farmers (about 82%) in the Brong Ahafo Region where they conducted their study were aware of the negative effects of pesticides on their health and their immediate environments.

The overall *mean* scores of AEAs (μ=4.10) and farmers ($\bar{x}$=4.00) obtained with a variance of 0.51 and a SD of 0.63 (Table 7) showed that performance on advisory services to improve household health was perceived as *good* in the W/R under the decentralised system. The variance and the SD show the level of consistency of the views of both AEAs and farmers.

Public sector AEAs' performance on advisory services for youth development in agriculture

As depicted by the *overall mean* scores from Table 8, AEAs *agreed* (μ=3.63, σ=0.60) that they provide advisory services for youth development in agriculture in the W/R under the decentralised system in Ghana. Farmers

Table 8 - *AEAs' and farmer's perceptions about public sector AEAs' performance on advisory services for youth development in Agriculture*

Advisory services for youth development in Agriculture	AEAs (N= 59)		Farmers (n=334)	
	μ	σ	$\bar{X}$	SD
I provide extension services with regards to youth development in agriculture.	3.81	0.68	3.65	0.89
I facilitate my farmers' knowledge to keep their youth in agriculture to reduce the rural youth migration from farming areas to urban areas.	3.78	0.74	3.55	0.85
I develop extension programs that engage the youth in agricultural activities.	3.72	0.73	3.54	0.93
The agricultural extension activities I provide involve youth development initiatives that serve as a source of employment for rural youth.	3.72	0.87	3.61	0.85
I implement youth in agricultural development programmes in my operational area	3.64	0.81	3.51	0.95
I have rural youth producer groups who contribute to the production of agricultural products in my operational area.	3.13	1.02	3.12	1.07
Overall Mean	3.63	0.60	3.48	0.77

Scale: 1="Least agree", 2="Less agree", 3="Moderately agree", 4="Agree", 5="Strongly Agree"
Source: Field Survey, Botchway (2019)

moderately agreed ($\bar{X}$=3.48, SD=0.77) to public sector AEAs' performance on advisory services for youth development in the agriculture sector under the decentralised system in the W/R. AEAs' perception was *good* as farmers' perceptions also revealed a *satisfactory* performance. Irrespective of the *satisfactory* performance, Table 8 shows that, the *mean* scores for each item from the perspective of the farmers was above 3.50 except, having rural youth producer groups contributing to the production of agricultural products in their operational areas (μ=3.13, σ=1.02; $\bar{X}$=3.12, SD=1.07).

According to Ohene (2013), the objective of the MoFA is to help the youth generate appreciable income to meet their basic needs, ensure food security, improve living standards, and motivate them to stay in the rural areas through the Youth-in-Agriculture programme (YiAP). Public sector AEAs significantly have a role to contribute to the development of the youth in agriculture. Public sector AEAs in the W/R conducted 15 demonstrations with 2295 youth-in-agriculture beneficiaries of which 1230 were males with 1065 females in ten (10) districts to disseminate production technologies (GSS, 2013).

According to Ohene (2013), the constraints of the youth in Ghana to participate in agriculture are mostly related to land issues (about 78%), followed by low income derived and difficulty in accessing credit or loan for farming purposes. These probably may have accounted to the public sector AEAs' *satisfactory* performance in developing rural youth producer groups to contribute to agricultural production.

Public sector AEAs' performance on facilitation of knowledge to transfer technology for information sharing on production and marketing

Table 9 shows that farmers *agree* ($\bar{X}$=3.78, SD= 0.63) with AEAs (μ=3.94, σ = 0.58) that public sector AEAs use the teaching and learning processes to assist farmers to develop their practical skills. Farmers *agree* ($\bar{X}$=3.61, SD= 0.74) with AEAs (μ=3.91, σ=0.60) that public sector AEAs disseminate technologies that enhance information sharing on agricultural production. Farmers *agree* ($\bar{X}$=3.70, SD= 0.83) with AEAs (μ=3.82, σ=0.59) that public sector AEAs assist farmers to adopt information sharing technologies that best fit their conditions. However, the farmers *moderately agreed* ($\bar{X}$=3.47, SD= 0.86) to public sector AEAs' performance on disseminating technologies that enhance information sharing on the marketing of agricultural produce, although the public sector AEAs *agreed* (μ=3.74, σ=0.78) that they perform such roles.

Again, farmers ($\bar{X}$=3.57, SD= 0.63) and AEAs (μ=3.71, σ = 0.53) *agree* that public sector AEAs provide facilitation roles to transfer technologies for information sharing on production of agricultural produce. The implication is that AEAs' performance on facilitation to transfer technologies for information sharing on production and marketing of agricultural produce is *good* in the W/R under the decentralised system. Irrespective of the *good* performance, Table 9 shows that both public sector AEAs and farmers *moderately agree* to public sector AEAs' performance on knowledge facilitation to transfer technology for information sharing among

Table 9 - *AEAs' and farmers' perceptions about public sector AEAs' performance on facilitation of knowledge to transfer technology for information sharing on production and marketing*

Facilitation of knowledge to transfer technology	AEAs (N=59)		Farmers (n=334)	
	μ	σ	$\bar{X}$	SD
I use the teaching and learning processes to assist farmers to develop the technical knowledge and practical skills needed for their work.	3.94	0.58	3.78	0.63
I facilitate knowledge to disseminate technologies that enhance information sharing on agricultural production.	3.91	0.60	3.61	0.74
I assist farmers in making decisions about adopting information sharing technologies that best fit their conditions.	3.82	0.59	3.70	0.83
I facilitate knowledge to disseminate technologies that enhance information sharing on the marketing of agricultural produce.	3.74	0.78	3.47	0.86
The production costs of my farmers have gone down as a result of the knowledge I facilitate to transfer technologies for information sharing among farmers in the production processes.	3.50	0.82	3.47	0.87
The marketing costs of my farmers have gone down as a result of the knowledge I facilitate to transfer technologies for information sharing among farmers in the marketing processes.	3.32	0.78	3.40	0.88
Overall Mean	3.71	0.53	3.57	0.63

Scale: 1="Least agree", 2="Less agree", 3="Moderately agree", 4="Agree", 5="Strongly Agree"
Source: Field Survey, Botchway (2019)

farmers to reduce production cost (μ= 3.50, σ = 0.82; $\bar{X}$=3.47, SD= 0.87) and marketing cost (μ=3.32, σ = 0.78; $\bar{X}$=3.40, SD=0.88) to promote the production and marketing of agricultural produce. This implies a *satisfactory* performance.

According to the Development Gateway (2016), the Food and Agricultural Sector Development Policy (FASDEP) has mandated public sector AEAs to disseminate appropriate innovation systems platform technologies to farmers and increase support given to help farmers adopt them.

The public sector AEAs role is to facilitate farmers' knowledge to transfer such technologies for adoption. The DAES has made significant investment towards the use of such technologies in its advisory services provision. The directorate introduced tablet-based technologies for AEAs to disseminate but the initiative was limited. Public sector AEAs are calling for an expansion and institutionalisation of the initiative (Development Gateway, 2016).

The *satisfactory* performance of public sector AEAs as revealed by Table 9 on the items mentioned above (i.e., facilitation to disseminate technologies to reduce production cost and marketing cost) might also probably be as a result of, according to McNamara, Dale, Keane & Ferguson, (2012), the DAES is not having the capacity to manage such innovative technology platforms as a main feature to promote decentralisation and interactivity. Hence, such initiatives assist only few farmers to communicate with actors on the production and marketing chains to share information and work together in purchasing inputs and jointly marketing products in accessible markets to reduce their marketing and production cost.

However, the overall *agreed mean* values of AEAs' performance on facilitation of knowledge to transfer technology for information sharing on production and marketing from both AEAs (μ=3.71, σ = 0.53) and farmers ($\bar{x}$=3.57, SD = 0.63) perspective revealed *good* performance. According to MoFA, (2016), the W/R had a total of 38,087 E-agricultural registered farmers.

Public sector AEAs' performance on farmer group formation and development

Table 10 shows that both AEAs (μ=4.05, σ =0.72) and farmers ($\bar{X}$ =3.77, SD=0.78) *agree* that the AEAs use group methods to empower farmers in analysing their own problems and needs. Both AEAs (μ=3.89, σ =0.80) and farmers ($\bar{X}$=3.69, SD=0.87) *agree* that public sector AEAs

Table 10 - *AEAs' and farmers' perceptions about public sector AEAs' performance on farmer group formation and development*

Farmer group formation and development	AEAs N=59 μ	σ	Farmers n=334 $\bar{X}$	SD
I use farmer group approaches to improve farmers' capacity to analyse their own problems and needs.	4.05	0.72	3.77	0.78
Group members are allowed to determine strategies to implement their work plans to achieve set objectives. I facilitate the decision-making process.	3.91	0.78	3.67	0.85
Group goals and objectives are developed by group members under my facilitation.	3.89	0.80	3.69	0.87
I work with groups in all extension activities I conduct with farmers in my operational area.	3.78	0.92	3.59	0.88
My farmer group extension work plans are developed by group members under my facilitation.	3.75	0.83	3.72	0.90
I have formed and developed different categories of farmer groups in all my farming communities.	3.75	0.89	3.76	0.83
Overall mean	3.84	0.69	3.63	0.72

Scale: 1="Least agree", 2="Less agree", 3="Moderately agree", 4="Agree", 5="Strongly Agree"
Source: Field Survey, Botchway (2019)

provide farmers the opportunity to develop their own group goals and objectives under the facilitation of AEAs. They again *agreed* (μ= 3.91, σ =0.78; $\bar{X}$=3.67, SD= 0.85) that public sector AEAs allow group members to determine strategies to implement their work plans to achieve set objectives under their AEAs' facilitation. AEAs and farmers *agree* (μ=3.75, σ =0.89; $\bar{X}$=3.76, SD= 0.83) that public sector AEAs form and develop different categories of farmer groups in the farming communities where they operate.

The overall *mean* values of both AEAs and farmers (μ= 3.84, σ =0.69; $\bar{X}$=3.63, SD= 0.72) as depicted by Table10 show that public sector AEAs and farmers *agree* to the execution of the public sector AEAs roles on farmer group formation and development. The implication is that public sector AEAs' performance on farmer group formation and development is *good* in the W/R under the decentralised system. Farm households within each local community with common interests are willing to work together (Swanson and Rajahlati 2010).

As such public sector AEAs in the context of today's extension service delivery and decentralisation as revealed in Table 10, form and develop farmer producer groups and associations (involving groups in multiple communities) to work with. This promotes participatory planning and review processes to develop plans that will improve extension programmes for the upcoming year (Okorley, 2007). Table 11 shows a summary of the findings on public sector AEAs' performance from the AEAs' and farmers captured for the study in the six districts. The overall performance of the public sector AEAs on the four performance indicators used by the study was generally good from the perspectives of both AEAs and farmers in the W/R.

Table 11 - *Summary of public sector AEAs' overall performance in six districts of the W/R under the decentralised system*

Performance of public sector AEAs in the W/R under the decentralised system	AEAs N=59		Farmers n=334	
	μ	σ	$\bar{X}$	SD
i. Stakeholder inclusion and participation in agricultural extension activities.	3.38	0.42	3.27	0.62
ii. Advisory services for:				
-food production	3.75	0.52	3.69	0.63
-nutrition	3.80	0.52	3.60	0.67
-family health	4.10	0.51	4.00	0.63
-youth development in agriculture.	3.63	0.61	3.48	0.63
iii. Facilitation of knowledge to transfer technologies for information sharing on production and marketing.	3.71	0.53	3.57	0.63
iv. Farmer group formation and development	3.84	0.69	3.63	0.72
Overall mean	3.74	0.54	3.61	0.65

Scale: 1="Least agree", 2="Less agree", 3="Moderately agree", 4="Agree", 5="Strongly Agree"

Source: Field Survey, Botchway (2019)

Factors Affecting Public Sector Agricultural Extension Agents' Performance under the Decentralised Extension System in the W/R

This section presents and discusses the major findings on the factors affecting performance of the public sector AEAs in the W/R under the decentralised system in Ghana. Identified factors from literatures ((Ragasa, Ulimwengu, Randriamamonjy & Badibanga, 2016; Aboagye, 2015; Chowdhury, Odame, & Leeuwis, 2014; Benson & Jafry, 2013; Kwarteng & Boateng, 2012; Faure, Desjeux & Gasselin, 2012; Davis & Heemskerk, 2012; and Thach *et al.*, 2007; Okorley, 2007; Birner *et al.*, 2006) included enabling institutional environment and governance, partnership and linkages, individual capacity, organisational capacity, and advisory delivery methods.

According to literatures, these identified factors are critical elements that act together to influence the overall performance of public sector AEAs

and the entire extension system. The research also included the demographic background characteristics of the public sector AEAs as factors that influence their performance. The major findings from the responses of only the public sector AEAs on the effects of these factors on their performance are vividly presented and discussed below:

Effects of enabling institutional environment and governance on public sector AEAs' performance

Public sector AEAs *agreed* (μ=3.82, σ =0.88) to the provision of clearly defined measurable targets set for them by their DADUs to assess their performance each year as is revealed by Table 12. However, the AEAs *moderately agreed* (μ=3.31, σ=0.75) to the achievement of the annual performance targets set for them in the policy institutional environment in the W/R. It is established that decentralisation in Ghana has widened the roles of AEAs to include issues in rural areas that go beyond agriculture. Public sector extension agents do not just do extension but are often treated as all-purpose rural development agents (Christoplos, 2010). Probably, this may seem to be one of the reasons why public sector AEAs *moderately agreed* to the achievement of their performance targets set for them annually in the W/R.

Table 12 - *Public sector AEAs' perception about enabling institutional environment and governance as a factor affecting public sector AEAs' performance*

Enabling institutional environment and governance	μ (N=59)	σ
Management provides AEAs with clearly defined measurable targets that are used to assess performance.	3.82	0.88
Enabling institutional environment and governance improves my performance in farmer group formation and development.	3.81	0.78
I am aware of the DADU's mission around which we operate the decentralised extension service delivery.	3.75	0.70
I am aware of the decentralised extension policy and strategies of the DAES.	3.75	0.73
I am aware of my responsibilities in the MoFA's decentralised extension policy at the level of the DADU.	3.74	0.80
I am aware of the institutional structure and governance of the DADU upon which the decentralised extension is being delivered.	3.59	0.72
Enabling institutional environment and governance improves my performance in advisory services related to food production, nutrition, family health and youth development.	3.53	0.82
Enabling institutional environment and governance improves my performance in knowledge facilitation to transfer technology for information sharing on production and marketing.	3.51	0.77
I am aware of the levels of decentralization upon which the DAES operate decentralised extension delivery.	3.44	0.84
Enabling institutional environment and governance improves my performance in stakeholder inclusion and participation in extension activities.	3.38	0.81
I meet the performance targets set for me each year.	3.31	0.75
Decentralised extension delivery enhances the achievement of the performance targets set for me each year.	3.23	0.93
Overall Mean	3.57	0.57

Scale: 1= "Least agree", 2 = "Less agree", 3 = "Moderately agree", 4 = "Agree", 5 = "Strongly agree"

Source: Field Survey, Botchway (2019)

The second highest *mean* score from Table 13 (μ=3.81, σ =0.78) reveals that the AEAs *agreed* that enabling institutional environment and governance as a factor affecting public sector AEAs' performance promoted and aided their performance in terms of forming and developing farmer groups. AEAs *agreed* (μ=3.53, σ =0.82) that enabling institutional environment and governance affect their performance in terms advisory services related to food production, nutrition, family health and youth development as well as knowledge facilitation to transfer technology for information sharing on production and marketing (μ=3.51, σ =0.77).

Public sector AEAs *agreed* (μ= 3.75, σ =0.70) that, they were aware of the DADUs mission around which they operate the decentralised extension service, they were aware of their responsibilities (μ= 3.74, σ =0.80), and were aware of the institutional structure and governance of the DADU upon which the decentralised extension was being delivered (μ= 3.59, σ =0.72). In Ghana, according to Okorley (2007), there are well-developed local institutions (local government, executing agencies, community and, or farmer groups) in the communities for a variety of purposes. Clear legal guidelines provided by the central government as to how these institutions are to support agriculture remains an important factor to ensure that an enabling environment is being created to improve AEAs' performance. The overall *mean* value from Table 12 (μ=3.57, σ =0.57) implies that public sector AEAs *agree* that enabling institutional environment and governance have *high* influence on public sector AEAs' performance under the decentralised system in the W/R.

Effects of partnership and linkages on public sector AEAs' performance

AEAs, according to Table 13 *agreed* (μ=3.87, σ =0.70) that partnerships and linkages affect their performance in terms of farmer group

Table 13 - *Public sector AEAs' perception about partnership and linkages as a factor affecting public sector AEAs' performance*

Partnership and Linkages	μ (N=59)	σ
Partnership and linkages improve my performance in farmer group formation and development.	3.87	0.70
Partnership and linkages improve my performance in advisory services related to food production, nutrition, household health and youth development in agriculture.	3.66	0.63
Partnership and linkages improve my performance in knowledge facilitation to transfer technology for information sharing on production and marketing.	3.66	0.76
Partnership and linkages improve my performance in stakeholder inclusion and participation in extension activities.	3.64	0.64
Collaborating with the different directorates of the MoFA improves my performance in extension services delivery	3.63	0.83
I establish contacts with relevant extension support organizations to strengthen partnership and linkages.	3.56	0.68
Collaborating with actors is a strategy used to provide information to farmers for the marketing of their produce.	3.46	0.76
Establishing partnerships and linkages between actors in extension service provision is a strategy I use to facilitate interactions for my farmers and other relevant agencies.	3.43	0.77
My farmers partner different actors of extension in different localities with whom they share common interest with within the district for support services.	3.31	0.86
Overall Mean	3.56	0.61

Scale: 1= "Least agree", 2 = "Less agree", 3 = "Moderately agree", 4 = "Agree", 5 = "Strongly agree"
Source: Field Survey, Botchway (2019)

formation and development. AEAs *agreed* (μ=3.66, σ =0.63) that partnerships and linkages affect advisory services related to food production, nutrition,

family health and youth development in agriculture. They *agreed* that partnership and linkages affect the service delivery of facilitating to disseminate technologies for information sharing on production and marketing (μ=3.66, σ = 0.76) as well as stakeholder inclusion and participation in extension activities (μ=3.64, σ =0.64).

The AEAs *agreed* (μ=3.63, σ=0.83) that collaborating with the different directorates as a DADU at the district level have improved their performance. They *agreed* (μ=3.56, σ=0.68) that establishing contacts with relevant organisations help improve their performance in building farmers' capacity to produce and market for surplus. The overall *mean* score (μ=3.56, σ=0.61) shows that AEAs agree that partnership and linkages have *high* influence on public sector AEAs' performance in the W/R under the decentralised system The essence of partnership and linkages is to strengthen interaction among different actors and this is statistically linked to better performance (Ragasa *et. al*., 2016).

Effects of individual capacity on AEAs' performance

Agricultural extension agents are technically and vocationally trained to assist farmers with improved crop varieties, planting techniques, efficient input use, market conditions, and effective production management techniques. AEAs need to be knowledgeable in communication and facilitation, problem-solving and critical thinking skills, teamwork and human relations in order to effectively

Table 14 - *Public sector AEAs' perception about individual capacity as a factor affecting public sector AEAs' performance*

Individual capacity	μ (N=59)	σ
I assist farmers to use improved crop varieties and breeding stock to increase production.	4.15	0.61
I supervise farmers to apply effective production management techniques to improve their work.	4.15	0.51
I have the ability to assist farmers to effectively and efficiently use agricultural inputs to improve production.	4.15	0.58
I use my communication skills ability to improve my performance in knowledge facilitation and technology dissemination.	4.10	0.60
I have the competence to use problem-solving approaches to promote interactions among my farmers.	4.07	0.56
I use critical thinking skills to facilitate interactions in addressing issues of public concern among my farmers and colleague AEAs.	3.94	0.78
I have the ability to learn how to use new agricultural devices and technologies to improve my performance.	3.94	0.74
I use human relations skills to effectively facilitate interactions among my farmers and other stakeholders.	3.89	0.60
I have the capacity to involve stakeholders to participate in extension activities assigned to me.	3.76	0.83
Overall Mean	4.01	0.51

Scale: 1="Least agree", 2="Less agree", 3="Moderately agree", 4= "Agree", 5= "Strongly agree"
Source: Field Survey. Botchway (2019)

interact with farmers and other stakeholders. Table 14 reveals that AEAs *agreed* (μ=4.15, σ=0.61) that they assist farmers to use improved crop varieties and breeding stock to improve production.

AEAs *agreed* (μ=4.15, σ=0.51) that they supervise farmers to apply effective production management techniques to improve performance. The *mean* scores from Table 14 reveal that AEAs *agreed* to every item measuring individual capacity as a factor affecting public sector AEAs' performance under the decentralised system in the W/R. According to Thach *et al*., (2007) individual factors significantly contribute to performance of extension agents.

The overall *mean* score (μ=4.01, σ=0.51) shows that AEAs *agreed* that individual capacity have *high* effect on their performance in the W/R under the decentralised system.

Effects of organisational capacity on AEAs' performance

Organisational capacity includes effective organisational management system having the ability to run its operations and ensure that resources are well managed. Organisational capacity is very important for management and other staff to execute their roles well. Table 15 shows that public sector AEAs *agreed* to the use appraisal techniques to promote them base on their performance (μ=3.87, σ =0.78). They also *agreed* that supervisors effectively communicate to make their intensions clear to improve their performance (μ=3.86, σ =0.81).

Public sector AEAs *moderately agreed* to management's use of rewards and sanctions (μ=3.45, σ=0.80), provision of consistent staff training (μ=3.32, σ =1.07), staff motivation (μ=3.11, σ =0.87) and appropriate use of funds (μ=2.98, σ =0.94) to improve their performance as shown in Table 15. Ragasa *et al.,* (2016) affirmed that funds received, presence of a system of rewards and sanctions, and training received are statistically linked to better performance. United NationFood Securitys (2005) had established that due to poorly defined human resource development and management systems by organisations in developing countries, employed staff lack motivation.

Table 15 – *Public sector AEAs' perception about organisational capacity as a factor affecting public sector AEAs' performance*

Organisational capacity	μ (N=59)	σ
Management organizes timely meetings to seek staff inputs to improve service conditions and performance.	3.89	0.69
Appraisal techniques are used to promote AEAs based on their performance.	3.87	0.78
My supervisors effectively communicate with me to make their intentions clear about my performance.	3.86	0.81
There are appropriate reward and sanction systems for AEAs performance in my district.	3.45	0.80
Management provides consistent training programmes to improve AEAs job performance.	3.32	1.07
The DADU within which I work have good defined human resource development systems that provide job competency and motivation.	3.11	0.87
Management use funds appropriately to overcome shortages to help improve AEAs performance.	2.98	0.94
Our managerial staff strength to provide extension support relevant to the needs of our farmers is adequate.	2.41	1.00
Our technical staff strength is adequate to provide extension services that are relevant to the needs of our farmers.	2.25	1.19
There have been new intakes of AEAs in my district within the past four (4) years.	2.22	1.30
We are provided with adequate financial support to improve our performance.	2.02	0.94
We have plots to carry out field demonstrations to teach farmers.	1.97	1.08
There are available motorbikes to perform our operational duties effectively.	1.85	1.19
Overall Mean	3.00	0.51

Scale: 1= "Least agree", 2 = "Less agree", 3 = "Moderately agree", 4 = "Agree", 5 = "Strongly agree"

Source: Field Survey, Botchway (2019)

World Bank (2000a) has asserted that a major limitation to extension decentralisation in developing countries in general, specifically in Africa is lack of managerial ability at the local level. Public sector AEAs *less agreed* to the adequacy of managerial staff strength (μ=2.41, σ =1.00), technical staff strength (μ=2.25, σ =1.19) and the intake of new technical staff (μ=2.22, σ =1.30). According to Moore, Ferguson and Lolig (2015), public sector AEAs have reported that, to carry out activities stated in their work plans in the midst of the financial, managerial and technical staff constraints, they sacrifice their own salaries to pay for certain operational costs with the hope of being reimbursed when budgeted subventions are eventually received.

Aside that, AEAs use personal motorbikes for official duties to feasibly visit communities close to their offices to reduce transport cost (Moore *et al*. 2015). With respect to the issue of low staff numbers, the all hands-on-deck approach, according to Moore *et al*. has been adopted to address it. The deliberate group formation approach is also designed to address the issues of staff shortages. The overall *mean* (μ= 3.00, σ= 0.51) (Table 15) seem to show that, public sector AEAs view organisational capacity as a factor that has a *moderately high* effect on their performance in the W/R of Ghana.

This may probably be as a result of, according to Moore *et al*. (2015), public sector AEAs having alternative measures of doing away with some of the issues related to the capacity of their organisations. This and other items in Table 15 which reveal the strengths and the weaknesses of the DADUs' capacity probably explain why the public sector AEAs in the W/R *moderately*

agreed to organisational capacity as a factor that actually affects their performance under the decentralised system in the W/R of Ghana.

Effects of advisory delivery methods on public sector AEAs' performance

Advisory delivery methods are ways through which AEAs choose to deliver services and facilitate knowledge sharing. Table 16 shows that public sector AEAs *agreed* (μ=4.16, σ=0.59) to the use of a combination of delivery

Table 16 - *Public sector AEAs' perception about advisory delivery methods as a factor affecting AEAs' performance*

Advisory delivery methods	μ (N=59)	σ
Using a combination of delivery methods (individual, group and mass media) rather than concentrating on one, is the most effective delivery approach to extension.	4.16	0.59
I use available information centres in communities to share agricultural knowledge with farmers and other actors in agriculture.	3.64	0.61
The use of the radio in delivering timely information on issues of public concern is on the increase in my operational area.	3.49	1.00
The use of ICTs compliment other delivery methods	3.45	1.01
I always encourage the use of ICTs to facilitate interaction among farmers and fellow AEAs.	3.40	0.98
I have always used ICTs (phones, radio. television, internet, projectors, laptops etc.) in extension service provision.	3.40	0.89
My farmers appreciate the use of ICTs in receiving timely response from AEAs within and outside the district.	3.37	1.03
The use of ICTs has rendered the other extension delivery methods inactive.	2.33	1.02
Overall Mean	3.43	0.55

Scale: 1= "Least agree", 2 = "Less agree", 3 = "Moderately agree", 4 = "Agree", 5 = "Strongly agree"

Source: Field Survey, Botchway (2019)

methods as the most effective approach to extension. A summary of related literature by Ragasa & Sengupta (2012) have concluded that the mix or combination of delivery methods rather than concentrating on one is the most effective.

Again, public sector AEAs *agreed* (μ=3.64, σ=0.61) that the use of information centres in communities to share knowledge with farmers and other actors in agriculture have effect on their delivery approach to extension. Public sector AEAs *moderately agreed* (μ=3.40, σ =0.97) to the use of information and communication technologies (ICTs) as major delivery methods to agriculture extension as is revealed in Table 16. The overall *mean* of 3.43 with a *sigma* of 0.55 shows that public sector AEAs *moderately agreed* to advisory delivery methods as a factor that affected their performance under the decentralised system in the W/R of Ghana. The implication is that advisory delivery methods have a *moderately high* influence on the public sector AEAs' performance. This has been in support to Ragasa *et al.'s* (2016) assertion that advisory delivery methods do not have much effect in explaining performance of extension.

AEAs Perceived Problems of Decentralised Agricultural Extension Service Delivery and Performance

Table 17 shows that AEAs *agreed* (μ=3.78, σ =1.07) that they do not have the required human resource to fully operate in the districts. A sigma of 1.07 shows how inconsistent the responses were over this item which probably could mean that some districts have the required human resource than others to fully operate. Irrespective of the inconsistency of the responses, it is well

established by the MoFA, (2017) that the ministry has only 47.6% of its staff at post and has a staff deficit of 1,842 unfilled vacancies.

From Table 17, AEAs *agreed* (μ=3.68) that their conditions of service are generally poor and as such, this adversely affects their performance although the high value of the *sigma* of 1.19 shows some sort of inconsistency

Table 17 - *AEAs' perceived problems of decentralised agricultural extension service delivery*

Perceived problems of decentralised extension delivery	μ (N=59)	σ
I do not have the required logistics (boots, uniform, motorbikes, field note books, rain coats, information and communication technologies etc.) to facilitate performance improvement in my extension operations.	4.01	1.09
We do not have the required human resource to fully operate in the district.	3.78	1.07
My service conditions are generally poor when compared to other civil servants. This adversely affects my performance.	3.68	1.14
Staff training to deal with new challenges extension face in terms of insect-pest invasions, serious disease outbreaks, severe climatic conditions and intensive campaigns to increase awareness of infestations control has been inadequate.	3.58	1.19
Due to inadequate funds and poor infrastructure, I cannot implement all my annual activity schedules planned with clientele.	3.57	1.11
Needs assessment has always been a challenge to determine my farmers' wants and how they may be addressed.	3.51	1.11
Management does not provide adequate feedback relevant to the extension activities I perform for my farmers.	2.94	1.00
Management of the DADU does not provide me the opportunity to take part in the decision-making process.	2.55	1.25
Overall Mean	3.47	.71

Scale: 1="Least agree", 2="Less agree", 3="Moderately agree", 4= "Agree", 5="Strongly agree
Source=Field Survey, Botchway (2019)

in their responses to the item. Probably, this may be as a result of the different categories of public sector AEAs captured during the survey with different levels of education and rank and, or position, because the annual progress report (MoFA 2017) confirms that the Ministry has 7% sub-professional agriculturists and 34% other technical staff which according to McNamara, Dale, Keane, & Ferguson, (2012), some have not been able to advance in their careers and are categorised as not very dynamic and active.

AEAs deal directly with farmers and need frequent training to enhance their skills to enable them adequately address their changing needs. Table 17 shows that public sector AEAs *agreed* (μ=3.58, σ=1.19) that their training to deal with new challenges extension face is inadequate. A *sigma* of 1.19 indicates some level of inconsistency in the responses for the item but empirically, Aboagye (2015) has reported that under the decentralised extension system, public sector AEAs share the view that the frequency of training programmes has been reduced causing them to rely on previously acquired knowledge and skills, which is not suitable for the changing agricultural needs in the new policy environment.

Public sector AEAs *agreed* (μ=3.68, σ=1.14) that their service conditions are generally poor. Aboagye (2015) has reported that public sector AEAs interviewed in his study in the Sunyani municipality in the Brong Ahafo Region lamented that incentives such as staff promotions, provision of requisite logistics for their work and opportunities for career developments have been adversely affected since 2012 and these actually affect staff

motivation. Public sector AEAs *agreed* (μ=4.01, σ=1.09) that they do not have the required logistics needed to enhance their performance.

Aboagye (2015) has reported that public sector AEAs revealed that previously, the central government's MoFA freely provided protective clothing such as wellington boots and staff uniforms, and subsidised prices for motorbikes to ensure that public sector AEAs were able to purchase them and frequently visit their operational areas but currently these had not been forthcoming. The overall *mean* (μ=3.47, σ=0.71) shows that AEAs *moderately agreed* to the items considered by the study as perceived problems of decentralised extension service delivery that can lead to poor AEAs' performance in the W/R of Ghana.

Comparing Districts Extension Units AEAs' Performance under the Decentralised System in the W/R

Performance studies related to public sector extension service delivery in the context of decentralisation in Ghana conducted in single municipal and district assemblies have been producing mixed results. Okorley (2007) reported on a successful decentralised DADU and the interrelated organisational and political factors which have contributed to the success. Aboagye (2015) argued that the reported factors as was affirmed by Okorley limited farmers' access to agricultural extension services and that, public sector AEAs satisfied farmers in one locality with available extension services than others in different localities in the same municipality. Aboagye concluded that extension performance across different locations may not be the same under the decentralised system in Ghana.

Based on Aboagye's (2015) conclusion, the study compared the six districts DADUs AEAs' perceived performance to determine whether statistically, significant differences exist in their performance across the extension units used by the study. A one-way analysis of variance (ANOVA) was computed to compare districts extension units AEAs' performance on (i) stakeholder inclusion and participation in extension activities, (ii) advisory services for food production, nutrition, family health and youth development in agriculture, (iii) facilitation of knowledge to transfer technologies for information sharing on production and marketing, and (iv) farmer group formation and development to test the hypothesis one.

Comparing districts extension units AEAs' performance on stakeholder inclusion and participation in extension activities

Table 18 revealed that there is no statistically significant (sig**.** 0.740) difference among the six districts' extension units' AEAs' performance on stakeholder inclusion and participation in extension activities at a significance level of 0.05. The F-ratio which used the variances of the public sector AEAs' performance *means* of the six districts to test the statistical significant difference between and within districts AEAs' perceived performance on stakeholder inclusion and participation in extension activities at a predetermined significance level of 0.05 rejected the existence of any statistically significant differences at 0.547.

Even though there were no significant differences in the performance of the AEAs on stakeholder inclusion and participation in extension activities, the *mean* value for Bibiani-Anhwiaso-Bekwai (μ=3.50, σ=0.46) district with

13 AEAs seems that, the district involves stakeholders to participate in agricultural extension activities than the remaining 5 districts in the study area. Amenfi West (N=9) (μ=3.42, σ=0.42), Wassa East (N=15) (μ=3.41, σ=0.44), Amenfi East (N=10) (μ=3.30, σ=0.48), Mpohor (N=5) (μ=3.28, σ=0.27) and Amenfi Central

Table 18 – *One-way ANOVA comparing six districts units AEAs' performance on stakeholder inclusion and participation in extension activities*

District	N (59)	μ	σ	F	Sig
Bibiani Anhwiaso Bekwai	13	3.50	0.46	0.547	0.740
Mporhor	5	3.28	0.27		
Amenfi West	9	3.42	0.42		
Amenfi Central	7	3.23	0.33		
Wassa East	15	3.41	0.44		
Amenfi East	10	3.30	0.48		

Scale: 1="Least agree", 2="Less agree", 3="Moderately agree", 4= "Agree", 5= "Strongly agree $p< 0.05$ Levene Statistics (0.623, Sig=0.683)

Source: Field Survey, Botchway (2019)

(N=7) (μ=3.23, σ=0.33) had *moderately agreed mean* values which indicate that they moderately involve stakeholders to participate in extension activities.

Although the differences in the number of AEAs among the six districts could have biased the perceived performance results, the Levene's statistic of 0.623 shows no statistically significant difference (sig. 0.683) among the districts' AEAs in terms of their differences in number. The implication is that public sector AEAs in the six districts approximately has

equal variance on their performance on stakeholder inclusion and participation in extension activities. However, some of the districts included stakeholders to participate in extension activities than others in the W/R under the decentralised system as have been revealed by Table 18.

Comparing districts extension units AEAs' performance on Advisory services for food production, nutrition, family health and youth development in agriculture

Table 19 depicts that the public sector AEAs in all the districts *agreed* that performance was *good* in terms of advisory services for food production, nutrition, family health and youth development in agriculture in the W/R. Bibiani-Anhwiaso-Bekwai (μ=3.98, σ=0.49) had the highest performance *mean* score followed by Amenfi Central (μ=3.97, σ=0.46), Amenfi East (μ=3.96, σ=0.27), Amenfi West (μ=3.87, σ=0.45), Mporhor (μ=3.67, σ=0.07) and Wassa East (μ=3.51, σ=0.49). The F- ratio of 2.350 shows no statistical significance as it tested the variance between districts units AEAs'

Table 19 – *One-way ANOVA comparing six districts units AEAs' performance on advisory services for food production, nutrition, family health and youth development in agriculture*

District	N (59)	μ	σ	F	Sig
BibianiAnhwiasoBekwai	13	3.98	0.49	2.350	0.053
Mporhor	5	3.67	0.07		
Amenfi West	9	3.87	0.45		
Amenfi Central	7	3.97	0.46		
Wassa East	15	3.51	0.49		
Amenfi East	10	3.96	0.27		

Scale: 1="Least agree", 2="Less agree", 3="Moderately agree", 4= "Agree", 5="Strongly agree"
p< 0.05 Levene Statistics (1.737, Sig=0.142)
Source: Field Survey, Botchway (2019)

performance on advisory services for food production, nutrition, family health and youth development in agriculture.

The significance of 0.053 indicated that there was no statistical significant difference among the performances of the six districts units' AEAs. The Levene's statistic of 1.737 shows homogeneity of variance among the AEAs in the six districts irrespective of the differences in their number at a significance of 0.142. The implication is that equal variances are assumed among the different number of public sector AEAs in the six districts.

Comparing districts extension units AEAs' performance on knowledge facilitation to transfer technologies for information sharing on production and marketing

Districts extension units AEAs' performance shown by Table 20 reveals that public sector AEAs in the six districts except Wassa East *agreed* that, knowledge facilitation to transfer technologies for information sharing on production and marketing under the decentralised system in the W/R was *good*. Bibiani-Anhwiaso-Bekwai had the highest perceived performance *mean* (μ=3.91, σ=0.50) whilst Wassa East had the least perceived performance *mean* (μ=3.45, σ=0.51). Amenfi East had the second highest perceived performance *mean* (μ=3.78, σ=0.44) followed by Amenfi Central (μ=3.77, σ=0.58), Amenfi West (μ=3.72, σ=0.53) and Mporhor (μ=3.67, σ=0.75).

The Levene's statistic (0.460, sig. 0.804) showed no statistically significant difference among the public sector AEAs in the six (6) districts

irrespective of the differences in their numbers in each DADU at 0.05 alpha level.

Table 20 – *One-way ANOVA comparing six districts units AEAs' performance on knowledge facilitation to transfer technology for information sharing on production and marketing*

District	N (59)	μ	σ	F	Sig.
BibianiAnhwiasoBekwai	13	3.91	0.50	1.091	0.376
Mporhor	5	3.67	0.75		
Amenfi West	9	3.72	0.53		
Amenfi Central	7	3.77	0.58		
Wassa East	15	3.45	0.51		
Amenfi East	10	3.78	0.44		

Scale: 1="Least agree", 2="Less agree", 3="Moderately agree", 4="Agree", 5= "Strongly agree. $p < 0.05$ Levene Statistics (0.460, Sig=0.804)

Source: Field Survey, Botchway (2019)

The implication is that equal variances are assumed among the public sector AEAs in the six districts, hence, their performance under the decentralised system on advisory services for food production, nutrition, family health and youth development in agriculture in the W/R is equally *good*.

Comparing districts extension units AEAs' performance on farmer group formation and development

Districts extension units' public sector AEAs' performance shown by Table 21 revealed that AEAs in all the six districts *agreed* that farmer group formation and development in the W/R of Ghana under the decentralised system was *good*. Bibiani-Anhwiaso-Bekwai (μ=3.91, σ=1.02) seems to have formed and develop more farmer groups for use than the remaining five districts used for the study in the W/R. However, a sigma of 1.02 showed

some level of inconsistencies in the responses of the AEAs which does not help reveal the true picture on the

Table 21 – *One-way ANOVA comparing six districts extension units AEAs' performance on farmer group formation and development*

District	N (59)	μ	σ	F	Sig
BibianiAnhwiasoBekwai	13	3.91	1.02	0.169	0.973
Mporhor	5	3.60	0.55		
Amenfi West	9	3.90	0.48		
Amenfi Central	7	3.89	0.84		
Wassa East	14	3.80	0.64		
Amenfi East	10	3.83	0.45		

Scale: 1="Least agree", 2="Less agree", 3="Moderately agree", 4= "Agree", 5="Strongly agree. $p< 0.05$ Levene Statistics (0.552, Sig=0.736)

Source: Field Survey, Botchway (2019)

ground. Amenfi West had the second perceived performance *mean* (μ=3.90, σ=0.48) followed by Amenfi Central (μ=3.89, σ=0.84), Amenfi East (μ=3.83, σ=0.45), Wassa East (μ=3.80, σ=0.64) and Mporhor (μ=3.60, σ=0.55).

However, the F-ratio (F=0.169) rejected the existence of any statistically significant difference in districts AEAs' performance on farmer group formation and development. There is no statistically significant (sig.0.973) difference in the districts extension units AEAs' performance on the indicator in the six districts where the study was conducted in the W/R under the decentralised system at an alpha level of 0.05. Levene's statistic of 0.552 depicts homogeneity of variance among public sector AEAs of the

districts irrespective of the differences in their number with significance of 0.736 at an alpha level of 0.05.

Comparing extension units overall AEAs' performance among six districts in the W/R under the decentralised system

Table 22 shows that the overall performance of public sector AEAs for the six districts was all *good*. Bibiani-Anhwiaso-Bekwai (μ=3.89, σ=0.50) seems to have performed best, followed by Amenfi Central (μ=3.83, σ=0.45), Amenfi East (μ=3.82, σ=0.23), Amenfi West (μ=3.79, σ=0.44), Mporhor (μ=3.60, σ=0.20) as well as Wassa East (μ=3.51, σ=0.39).

Table 22 – *One-way ANOVA comparing AEAs overall performance among six districts in the W/R under the decentralised system*

District	N (59)	μ	σ	F	Sig.
Bibiani-Anhwiaso-Bekwai	13	3.89	0.50	1.585	0.180
Mporhor	5	3.60	0.20		
Amenfi West	9	3.79	0.44		
Amenfi Central	7	3.83	0.45		
Wassa East	15	3.51	0.39		
Amenfi East	10	3.82	0.23		

Scale: 1="Least agree", 2="Less agree", 3="Moderately agree", 4= "Agree", 5= "Strongly agree"

p< 0.05 Levene Statistic (0.805, Sig=0.552)

Source: Field Survey, Botchway (2019)

The F-ratio (1.585) as revealed by Table 22 indicated that there are no significant differences between districts extension units AEAs' overall performance.

As such, the significance of 0.180 implies that there is no statistically significant difference among district extension units AEAs' overall performance on the indicators used by the study to determine public sector AEAs' performance under the decentralised extension system in the W/R at an alpha level of 0.05. The Levene's statistic (0.805, sig. 0.552) implies that equal variances are assumed among public sector AEAs in the six districts and that, there is homogeneity amongst them irrespective of the differences in the number of AEAs within each district.

Based on the results of the ANOVA, the study failed to reject the null hypothesis (H_0) one which stated that there is no statistically significant difference in the performance of public sector AEAs across district extension units within the decentralised extension system at an alpha level of 0.05.

Relationship between Public Sector AEAs' Performance and Factors Affecting AEAs' Performance under the decentralised system in the W/R

Pearson product-moment correlation co-efficient (r), Spearman Rho (ρ) and Point Biserial (r_{pb}) correlations were used to explore the relationship between public sector AEAs' performance and factors affecting AEAs' performance under the decentralised system in the W/R to determine whether there are statistical significant associations among themselves. The factors included enabling institutional environment and governance, partnership and linkages, individual capacity, organizational capacity and advisory delivery methods. Demographic factors considered included age, position, work

experience, level of education and sex. The results of the analysis are presented in Table 23.

Table 23 - *Correlation Matrix of Overall AEAs' Performance and the Factors Related To Extension Service Delivery under the Decentralised System*

Variable	Y	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}
Y	-										
X_1	**0.559****	-									
X_2	**0.554****	0.580**	-								
X_3	**0.617****	0.641**	0.571**	-							
X_4	**0.360****	0.329*	0.118	0.023	-						
X_5	**0.346****	0.326*	-0.345**	0.411**	0.054**	-					
X_6	**0.085**	0.260*	-0.028	0.141	0.354**	0.229	-				
X_7	**-0.142#**	0.049	0.171	0.365**	-0.093	0.337**	-0.194	-			
X_8	**0.115**	0.317*	-0.058	0.227	0.404*	-0.259	0.897**	-0.033	-		
X_9	**0.021#**	-0.012	0.025	0.110	-0.160	-0.067	-0.006	-0.126	0.056	-	
X_{10}	**0.114+**	0.062	-0.010	-0.114	0.072	-0.036	-0.122	-0.077	-0.078	-0.065	-

Source: Field Survey,

Botchway (2019) *p< 0.05 (2-tailed) **p<0.01 (2-tailed) Spearman's Rho (ρ) Point Biserial (r_{pb})

Y= Perceived Overall AEAs Performance

X_1= Enabling Institutional Environment and Governance

X_2= Partnership and Linkages

X_3= Individual Capacity

X_4= Organizational Capacity

X_5= Advisory Delivery Methods

X_6= Age

X_7= Position (ρ)

X_8= Work Experience

X_9= Level of Education (ρ)

X_{10}= Sex (0=Male, 1=Female) (r_{pb})

Using the Davis' (1971) convention (Table 24), the correlation coefficients show that, the factors affecting public sector AEAs' performance

Table 24 - *Interpretations of the correlation matrix using the Davis Convention*

0.70 or higher	Very strong association
0.50-0,69	Substantial association
0.30-0.49	Moderate association
0.10-0.29	Low association
0.01-0.09	Negligible association

Source: Davis (1971)

have direct (positive) substantial and moderate significant associations with the overall public sector AEAs' performance under the decentralised system at an alpha level of 0.01 in the W/R. That is, direct, substantial, significant association between overall public sector AEAs' performance and enabling institutional environment and governance (r= 0.559). According to Ragasa *et al*. (2016), the key determinants of AEAs' performance in relation to enabling institutional environment and governance are the policy strategies and the performance targets set. Ragasa *et al*.'*s* findings revealed that the presence and enforcement of performance targets set are statistically associated to better performance.

There was a direct, substantial, significant association between overall public sector AEAs' performance and partnership and linkages (r= 0.554). Empirically, Ragasa *et al*. (2016) revealed that, the presence of interaction and linkages with other actors is statistically associated to better performance. Table 23 shows a direct, substantial and significant association between overall public sector AEAs' performance and individual capacity (r=0.617). The findings of Thach *et al*. (2007) revealed that the individual factors that

culminate to develop the capacity of the AEA have positive, strong, substantial and moderate significant relationship with performance.

Table 23 again, shows a direct, moderate and significant association between overall public sector AEAs' performance and organisational capacity (r= 0.360). The findings of Ragasa *et al.* (2016) revealed that external funds received, presence of a system of rewards and sanctions and training received are statistically associated with better performance. There was a direct, moderate, significant association between overall perceived AEAs' performance and advisory delivery methods (r= 0.346). Empirical study (Ragasa *et al*., 2016) has revealed that, none of the advisory delivery methods is statistically associated to extension agents' performance although the mixed delivery methods effectively work better than the single approaches.

Table 23 reveals that age and work experience showed direct insignificant low and negligible associations with overall public sector AEAs' performance under the decentralised system in the W/R. That is, direct, insignificant and negligible association between overall AEAs' performance and age (0.085); and direct, insignificant and low association between overall AEAs' performance and work experience (0.115). The dichotomous variable, sex, from Table 23, based on point biserial (Male=0, Female=1), had a positive, low (0.114) and insignificant relationship with public sector AEAs' performance which implied that female AEAs seem to perform better than their counterpart male AEAs under the decentralised system in the W/R irrespective of the variable being insignificant to performance.

Spearman's rho, a statistical test to explore the relationship between nominal or ordinal variables and a continuous dependent variable from Table 23 shows that respondents' position have indirect, low (-0.142) and insignificant association with public sector AEAs' performance under the decentralised system in the W/R. Table 23 again shows that respondents' level of education have a direct, negligible (0.021) and insignificant association with public sector AEAs' performance under the decentralised system in the W/R.

The implication is that, the demographic factors (age, position, work experience, level of education and sex) have no statistically significant effect on public sector AEAs' performance under the decentralised system in the W/R.

Predictors of Public Sector AEAs' Performance under the Decentralised System in the W/R of Ghana

The five factors that were revealed by the correlations to be having significant associations with public sector AEAs' performance were used to identify the predictor variable(s) that best explain public sector AEAs' performance under the decentralised system in the W/R. A stepwise multiple regression analysis was used. None of the correlation coefficients of the significant independent variables (Table 23) were higher than 0.80, hence, there is no possibility of the existence of any significant multicollinearity among variables (Cohen *et al.,* 2007; Gorard 2001:172).

Thus, there was no significant collinearity (linear associations) among the five independent variables found to be significant to public sector AEAs' performance under the decentralised system in the W/R that could bias the prediction. Again, Gupta, (2000) has established that significant collinearity exists between variables if R-squared is greater than 0.75 and only few t-values of the beta coefficients are significant. Table 25 shows the collinearity diagnostic test of the significant explanatory variables of the explained variable.

Table 25 - *Collinearity Diagnostic Test of the significant variables of public sector AEAs' performance*

Independent Variable	R^2	t-values of the Beta Coefficient	Sig.
Constant	-	5.129	0.000*
Individual capacity	0.355	5.550	0.000*
Organizational capacity	0.479	3.943	0.000*
Partnership and linkages	0.521	2.243	0.019*

N= 59 *p< 0.05

Source: Field Survey, Botchway (2019)

As indicated in Table 26, only three of the five significant independent variables used for the prediction accounted significantly to public sector AEAs' performance. The variables were *individual capacity*, *organisational capacity* and *partnership and linkages*. Together, the three predictor variables accounted for about 52% explanations of public sector AEAs' performance in the W/R under the decentralised system. Thus, the null hypothesis (H_0) two which stated that enabling institutional environment and governance, partnerships and linkages, individual capacity, organizational capacity, and advisory delivery methods do not significantly affect the performance of public sector AEAs is rejected.

Table 26 - *Stepwise Regression of factors affecting perceived AEAs' performance under the decentralised system.*

Predict-ors	Step of Entry	Beta (Standa-rdized)	R^2	Adjusted R^2	Adjusted R^2 Change	SEE	F Reg.	F Sig.
X_3	1	0.596	0.355	0.343	0.343	0.327	30.803	0.000*
X_4	2	0.378	0.497	0.479	0.136	0.291	15.550	0.000*
X_2	3	0.272	0.546	0.521	0.042	0.279	5.872	0.019*

N= 59 *p<0.05

Source: Field Survey, Botchway (2019)

X_3= Individual Capacity
X_4= Organisational Capacity
X_2= Partnership and Linkages
Regression Equation (from unstandardized beta)
$Y= 1.807 + 0.482\ X_3 + 0.299\ X_4 + 0.179\ X_2$
$Y=1.807$ if $\beta_3 = \beta_4 = \beta_2 = 0$

The adjusted R^2 change is the coefficient of determination which presents the amount of variance in the dependent variable accounted for by the independent variable in the regression model. The values of the Standard Error of Estimate (SEE) also relatively showed substantial accuracy of prediction in the regression model. The adjusted R^2 change (as depicted in Table 26) shows that the overall best predictor variable was individual capacity which accounted for 34.3% variance in public sector AEAs' performance under the decentralised system in the W/R of Ghana. Organisational capacity followed, accounting 13.6 % of the variance in public sector AEAs' performance. Partnership and linkages was the third predictor variable and its contribution in explaining the variance in public sector AEAs perceived performance was 4.2%.

Individual AEAs' capacity and performance

The factor revealed by Table 26 as the best predictor variable which accounted for the highest (34.3%) explanation in public sector AEAs' performance is individual capacity. Capacity in the context of the study is the competency or ability to make informed decisions, attract and manage resources to achieve certain goals. According to Thach *et al.* (2007) the success of agricultural extension work depends on the performance of agricultural extension agents (AEAs). It was argued that AEAs were the most important resource needed for agricultural development and thus, the AEAs are the most important elements upon which every agricultural extension process depends.

Hence, AEAs require adequate professional capabilities to deliver services as is expected of them. They require technical abilities to be 'up-to-date in their daily services provided to clientele. If agricultural policies provide conditions and structures that aim at equipping individual AEAs ability to successfully and sustainably perform tasks in crop production, animal husbandry, fish production, food processing, marketing and, or trading of agricultural products, Ghana's agricultural sector transformation will be promoted and enhance economic growth under decentralisation to eradicate poverty and hunger.

Organisational capacity and performance

Organisational capacity is the next best predictor variable which accounted for 13.6% variance in public sector AEAs' performance in the W/R under the decentralised system in Ghana. Organisations are open systems that

receive inputs and convert them through management processes (planning, organizing, staffing, leading and controlling) to produce outputs (Cole, 1996). The public sector extension organisation's ability to attract and manage resources to achieve extension goals affects public sector AEAs' performance. According to Leeuwis and van den Ban (2004), career development opportunities enhance promotion prospects, motivate staff to develop their skills and perform better.

Again, several studies show that enhanced technical and management capacity help improve the motivation, confidence and attitudes of extension staff (Tapa and Ojha, 2002; Saviroff and Lindarte, 2002; Pasteur, 2002; and Sharma *et al.*, 2001) to eventually influence performance. It is affirmed that when extension organisations train staff to improve their knowledge in communication and facilitation, networking, critical thinking, problem solving and human relations, the attitudinal change required for the decentralisation reform will be enhanced.

According to Anderson and Feder (2004), extension organisations inability to provide adequate funds for field operations has caused AEAs to scale down field activities that have adversely affected the availability of quality extension services. When extension organisations are in the position to provide enough funds, recruit adequate number of extension staff, provide staff with the required training in their areas of specialisation, provide appreciable amount of logistics, reinforce rewards and sanctions and provide leadership opportunities and supervisory roles, performance of public sector

AEAs will significantly improve. Ragasa *et al*. (2016) have asserted that organisational capacity is significant in explaining performance of AEAs.

Partnership and linkages, and performance

Partnership and linkages is the last significant factor that revealed itself as the predictor variable accounting 4.2% variance in explaining public sector AEAs' performance under the decentralised system in the W/R. The results from Table 26 have indicated that an integrated approach to collaborate among actors and sectors involved in agricultural development is required, particularly on issues related to food security and poverty eradication due to their complex nature. Forging partnerships to establish linkages have specific implications on the brokering role of AEAs (Davis and Heemskerk, 2012). Ragasa *et al.* (2016) has revealed that interactions among other extension agents, NGOs, agro-dealers, agribusinesses and local political authorities are particularly important in improving AEAs performance.

As such, Leeuwis and Aarts (2011) stressed on the importance of developing the skills of negotiation, network building, social learning and dealing with the dynamics of power and conflicts by AEAs and extension organisations. It is agreed that this will improve the interconnectivity between AEAs and other actors involved in improving the quality of lives of rural dwellers to achieve the objectives of food security and poverty eradication. The findings from Table 26 have revealed that when greater recognition is given to the importance of establishing partnership and linkages with other actors who are potential sources of technical support, services and information, performance of public sector AEAs will improve. Thus, policies

and investments to forge the development of partnerships and establish linkages between public sector AEAs and development organisations with others whose services are needed, are very critical in explaining extension agents' performance.

To sum up the discussions on the regression results, it is very important to note that, statistically, it has been revealed that individual capacity, organisational capacity and partnership and linkages were the best predictor variables of the public sector AEAs' *good* performance under the decentralised system in the W/R of Ghana. This may imply that, the DA need to be empowered through the district coordinating offices to plan, work and develop the predicted variables for utilisation when prioritising and sequencing interventions needed to improve extension service delivery to achieve an appreciable level of the long-term SDGs of poverty eradication and food security under the decentralised system in the W/R.

It should be noted that these variables are all embodied in one construct, 'capacity building'. As such, agricultural policy formulators, agricultural extension directors and managers as well as agricultural extension agents need to plan and work to determine how these factors can best be developed and be utilised in prioritising and sequencing activities to build the capacity of the public sector AEAs and their organisations to improve their performance under the decentralised system in the W/R.

The findings have re-emphasised the impact of the theoretical models used by the study on AEAs' performance. AEAs' performance in the

decentralised environment have been good towards the achievement of the SDGs number one and two as have been informed by the conceptual framework due to the high and moderate effects the identified elements of decentralisation have had on the performance indicators used by the study in the W/R. The positive, significant, substantial and moderate associations that existed between the identified elements of decentralisation and public sector AEAs' performance affirms the applications of the theoretical models that underpinned the study in the decentralised environment in the W/R.

The findings of the regression analysis have shown that, some of the 'choice variables' as the factors have been termed by the framework for analysing and designing agricultural extension which policy makers and extension managers can influence directly, act together to yield good public sector AEAs' performance. From the conceptual framework of the study, these may lead to intermediate performance outcomes such as increase in food production, increase in farmers' income, development of farmer-based organisations, acquisition of new knowledge in agricultural productions and farm management practices that may have effect on achieving our national objectives of poverty eradication and food security in the W/R.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

General Overview

This chapter presents the summary, conclusions and recommendations of the study. It also presents suggested areas of further studies.

Summary

It has been observed that a decentralised system creates proper incentives that serve as catalyst for economic growth. Many academics and researchers have advocated for decentralised systems from the 1980s in response to the revived global interest in governance and the need for human focused approaches to development. Agricultural extension has been a strategic mechanism used to confront issues of poverty eradication and food insecurity by governments and international organisations. Countries such as Columbia, Indonesia, Philippines, Poland and Tunisia practice decentralisation and claim that when agricultural extension is decentralised, there is fairly good balance in fiscal, administrative and political decentralisation and it significantly promotes participation.

The aim of the local government reform in Ghana was to establish efficient decentralised government machinery to provide strong support for participatory development. The 1992 Republican constitution of Ghana and the local government Act of 2016 (Act 936) have been enshrined with a strong political and legal framework for the practice of decentralisation. The DAES of the MoFA since 1997 have adopted a decentralised agricultural

extension services delivery approach to improve the effectiveness of extension services delivery under the decentralised system in Ghana.

The Local Governance Instrument 2009 (LI) 1961 has thus created offices of the MoFA in the district assemblies as Department of Agriculture (DA) to function through local government as the service provider. From 2012, further steps to decentralise the provision of extension services have been consolidated in Ghana and this has placed the responsibility of agricultural extension planning, management, resource-raising and, or allocation onto the District Agricultural Development Units (DADUs) and the local council.

It has been revealed that the whole extension process is dependent on AEAs. They are the most critical elements in all extension activities. The few authors in this area of study have identified factors that affect AEAs' job performance under the decentralised system. Ragasa *et al*. (2016) grouped the factors as enabling institutional environment and governance, partnership and linkages, organisational capacity and advisory delivery methods as Thach *et al.* (2007) included individual capacity. These were the factors used by the research to determine how they affect the performance of public sector AEAs under the decentralised system in the W/R. The performance indicators used by the study were stakeholder inclusion and participation in extension activities; advisory services for food production, nutrition, family health and youth development in agriculture; facilitation of knowledge to transfer technology for information sharing on production and marketing; and farmer group formation and development.

The statement of the problem was about the new and complex demands on public sector AEAs as a result of the general change from the 'top-down' to the 'bottom-up' approach adopted by the MoFA to promote public participation in extension services under the decentralised system. It considered the findings of Ragasa *et al*., (2016) and Okorley, (2007) as well as the contradictory findings of Aboagye, (2015) on the factors influencing extension performance under the decentralised system. It is claimed that Ghana's public sector extension delivery may either be worsened or improved due to the practice of decentralisation. As such, the study, based on the above findings, looked into public sector AEAs' performance to determine the factors that affected such performance in the W/R under the decentralised system.

The main objective of the study was to determine the level of performance of public sector AEAs and the factors that best explain, and, or affect such performance under the decentralised system in the W/R after decentralised extension delivery was consolidated in 2012.

The specific objectives of the study was to determine the performance of AEAs under the decentralised system in terms of stakeholder inclusion and participation in extension activities; agricultural advisory services for food production, nutrition, family health and youth development; facilitation of knowledge to transfer technology for information sharing on production and marketing; and farmer group formation and development. It was also to identify the factors that affect the performance of AEAs in terms of enabling institutional environment and governance, partnerships and

linkages, individual capacity, organisational capacity and advisory delivery methods.

The specific objectives again looked at AEAs' perception of problems associated with the decentralised agricultural extension service delivery in the W/R. It compared districts extension units AEAs' performance across locations under the decentralised system and explored the associations between public sector AEAs' performance and the factors affecting public sector AEAs' performance under the decentralised system in the W/R. This was to identify the predictors of the performance of public sector AEAs under the decentralised system in the W/R.

To allow for data collection from different groups of respondents at one point in time, a descriptive research design using a cross-sectional survey approach was employed. The study adopted quantitative methods to describe and present collected data in terms of summary frequencies and inferential statistics to report what have been found and make inferences and predictions based on the gathered data. The study area was the W/R where agriculture is the principal occupation which engages more than 50% of workers in all districts of the region except Jomoro (46.4%) and Shama-Ahanta East (45.8%). The region has been one of the largest producers of cocoa, rubber, coconut and oil-palm in the country.

The study population was all the AEAs who work in the DADUs and have been executing decentralised extension functions since 2012 in the W/R and farmers who received extension services from the DADUs AEAs in the W/R from 2012 till date. A multiple-stage sampling procedure was adopted. A census approach was used to include all the public sector AEAs (N=59) found

to be available in the six randomly selected districts of the region and a simple random sampling technique to select three farmer groups from each AEA based on the farmer group sample frame provided using the lottery approach. Finally, a stratified sampling technique was used to select farmer group representatives (n=334) of the randomly selected farmer groups to collect data for the study.

Self-administered questionnaires and structured interview schedules were used to determine public sector AEAs' performance and explored factors that affected such performance based on a six point Likert-type scale. Simple frequencies, percentages, measures of central tendency and dispersion, analysis of variance (ANOVA.), Pearson product-moment correlation coefficient (*r*), Spearman Rho, Point Biserial and ordinary least square (OLS) stepwise step of entry were the statistical tools used for the analysis of the collected data.

The summary of the major findings as they relate to the specific objectives of the study were that AEAs' performance on stakeholder inclusion and participation in agricultural extension activities in the W/R was *satisfactory*. Irrespective of the overall satisfactory result, performance on items like farmers participation in extension meetings, stakeholders' involvement and participation in districts' programme planning processes and farmers' opportunity to voice their opinion about decisions that affect their livelihood were *good*.

Public sector AEAs' performance on advisory services for food production increase, nutrition and farm household health was *good* in the W/R

under the decentralised system. For youth development in agriculture, public sector AEAs' performance was *satisfactory* from the farmers' perspective as AEAs perceived that their performance was *good*. Irrespective of the *satisfactory* results from the perspective of the farmers, with exception of a single item that had a mean of 3.48, each individual item had a mean value above 3.50 which provided evidences of *good* performance for the AEAs on the indicator in the W/R under the decentralised system.

The results for the overall public sector AEAs' performance on knowledge facilitation to transfer technology for information sharing on food production and marketing from the public sector AEAs and farmers was *good*. Public sector AEAs' performance on farmer group formation and development from both AEAs and farmers perspective was *good* under the decentralised system in the W/R.

The major findings on the factors affecting public sector AEAs' performance under the decentralised system was that enabling institutional environment and governance affects AEAs' performance in terms advisory services related to food production, nutrition, family health and youth development; knowledge facilitation to transfer technology for information sharing on production and marketing; as well as forming and developing farmer groups. Public sector AEAs agreed that enabling institutional environment and governance has a high effect on their performance under the decentralised system in the W/R.

Partnership and linkages also had a *high* effect on public sector AEAs' performance in terms of farmer group formation and development, advisory

services related to food production, nutrition, family health and youth development in agriculture, facilitating to disseminate technologies for information sharing on production and marketing as well as stakeholder inclusion and participation in extension activities in the W/R under the decentralised system. Individual capacity significantly contributed to public sector AEAs' performance under the decentralised system. The overall *mean* score obtained showed that individual capacity have *high* effect on public sector AEAs' performance in the W/R under the decentralised system.

Public sector AEAs *moderately agreed* to organisational capacity as a factor that affects their performance. The implication was that, organisational capacity has a *moderately high* effect on public sector AEAs' performance in the W/R under the decentralised system. It is reported by literature that public sector AEAs are able to overcome some of the issues related to the capacity of their organisations to help them improve upon their performance. This probably may be a reason why public sector AEAs *moderately agreed* to organisational capacity as a factor that affected their performance under the decentralised system in the W/R of Ghana.

Public sector AEAs *moderately agreed* to advisory delivery methods as a factor affecting their performance under the decentralised system in the W/R of Ghana. This probably may be in support to the findings that, advisory delivery methods do not have any significant effect on agricultural extension agents' performance. The conclusion was that the mix or combination of delivery methods rather than concentrating on one was the most effective method.

Public sector AEAs *moderately agreed* to the perceived problems related to the execution of their tasks under the decentralised system in the W/R of Ghana. Hence, it was deduced from the AEAs moderately agreed perception that, the identified problems were not seriously admitted to be constraints that actually could lead to poor extension service delivery that may result to low agricultural productivity in the W/R under the decentralised system, although, they are very important to be addressed, to help improve public sector AEAs' performance.

In comparing district extension units AEAs' performance under the decentralised system in the W/R, it was concluded that there was no statistically significant difference in the performance of public sector AEAs across district extension units within the decentralised extension system in the W/R. There was homogeneity amongst the AEAs of the six DADUs irrespective of the differences in their number within each district in the W/R. As such, the results of the ANOVA failed to reject the null hypothesis one at an alpha level of 0.05.

For the relationship between perceived public sector AEAs' performance and factors affecting AEAs' performance under the decentralised system in the W/R, the findings from the study showed that enabling institutional environment and governance, partnership and linkages and individual capacity had direct, substantial, significant associations with public sector AEAs' performance under the decentralised system at an alpha level of 0.01. Organisational capacity and advisory delivery methods had direct, moderate, significant associations with public sector AEAs' performance

under the decentralised system at an alpha level of 0.01. The demographic factors had no significant association with public sector AEAs' performance.

A multiple regression analysis using ordinary least squares stepwise step of entry revealed individual capacity (34.3%), organizational capacity (13.6%) and partnership and linkages (4.2%) as the predicted variables or factors which accounted about 52% variance in public sector AEAs' performance in the W/R under the decentralized system. Thus, the null hypothesis (H_0) two (2) which stated that, 'enabling institutional environment and governance, partnerships and linkages, individual capacity, organisational capacity, and advisory delivery methods do not significantly affect the performance of public sector AEAs was rejected at an alpha level of 0.05.

With such account, it was suggested that, through the MLGRD, agricultural policy planners, agricultural extension directors, managers and agricultural extension agents at the district level need to plan, work and develop these three best predicted variables when prioritising and sequencing interventions in efforts to improve public sector AEAs' performance under the decentralised system in the W/R.

Conclusions

Based on the specific objectives and the results of the study, the following conclusions were drawn:

In reference to the performance of public sector AEAs' in the W/R under the decentralised system, farmers and AEAs' *moderately agreed* to the performance of the public sector AEAs' roles of including stakeholders to participate in extension activities. This implied a *satisfactory* AEAs' performance on stakeholder inclusion and participation in extension activities. Performance on the advisory services for food production, nutrition, farm household health and youth development in agriculture was all *good* in the W/R under the decentralised system.

Public sector AEAs' performance on facilitation of knowledge to transfer technology for information sharing on production and marketing was *good* from the perspective of both public sector AEAs and farmers in the W/R under the decentralised system. The respondents *agreed* that public sector AEAs have been performing their duties on the indicator and called for expansion to institutionalise the tablet-technology initiative for information sharing.

Both AEAs and farmers *agreed* that public sector AEAs perform their roles on farmer group formation and development. Both public sector AEAs and farmers' agreement levels indicated that public sector AEAs' performance on forming and developing farmer groups in the W/R was *good* under the decentralised system.

The findings on the factors affecting public sector AEAs' performance showed that, public sector AEAs in the W/R *agreed* to enabling institutional environment and governance, partnership and linkages and individual capacity as factors that had *high* effects on their performance under the decentralised system in the W/R of Ghana. The public sector AEAs revealed that, the level at which organisational capacity and advisory delivery methods were affecting their performance were *moderately high*.

The findings on problems of public sector AEAs under the decentralised system in the W/R revealed the most pressing problem as inadequate logistics provision to facilitate performance improvement in their extension operations. However, the inconsistency in the responses might indicate that, some of the AEAs have access to some of the logistics than others. The AEAs *agreed* that, the next pressing problem was the inadequacy of their human resource capacity to fully operate in all operational areas in the districts. This was followed by the service conditions of AEAs, which they *agreed* to have adversely affecting their performance, although, the inconsistency in the responses probably show that, the service conditions seemed to be good for some of the AEAs than others.

Although public sector AEAs receive training to deal with the new challenges extension face in the decentralised policy environment, it was revealed that the training given to public sector AEAs was not adequate enough to deal with majority of such challenges. AEAs *agreed* that, the inadequate funds received coupled with the poor state of infrastructure in the districts are not aiding them to achieve their annual planned targets. In all, the AEAs *moderately agreed* to the problems considered by the study as

constraints that can lead to poor agricultural extension service delivery and low agricultural productivity under the decentralised system in the W/R.

After comparing the overall extension units' AEAs' performance among the six districts in the W/R, Bibiani-Anhwiaso-Bekwai seemed to have performed best, followed by Amenfi Central, Amenfi East, Amenfi West, Mporhor as well as Wassa East. The overall performance of each of the districts was *good*. It was revealed that, there was no statistically significant difference among the performance of the public sector AEAs. There was homogeneity among the public sector AEAs of the six DADUs irrespective of the differences in their number in each district of the W/R under the decentralised extension system. The hypothesis one was failed to be rejected.

After exploring the relationships between public sector AEAs' performance and the factors affecting public sector AEAs' performance under the decentralised system in the W/R, it was identified that, at an alpha level of 0.01, enabling institutional environment and governance, partnership and linkages and individual capacity had direct, substantial, significant associations with public sector AEAs' performance. Organizational capacity and advisory delivery methods had direct, moderate, significant associations with public sector AEAs' performance at an alpha level of 0.01 under the decentralised system in the W/R. This implied that, the five identified factors were having significant associations with public sector AEAs' performance in the W/R under the decentralised system. The demographic factors considered by the study (age, position, work experience, level of education and sex) were identified as not having significant associations with public sector AEAs' performance.

The study revealed that, the best predictor variables of public sector AEAs' overall *good* performance under the decentralised system in the W/R of Ghana were *individual capacity* (34.3%), *organisational capacity* (13.6%) and *partnership and linkages* (4.2%). Together, the three predictor variables accounted for a total of about 52% variance in public sector AEAs' overall *good* performance. Hence, hypothesis two was rejected. With such account, it was suggested that, through the MLGRD, agricultural policy planners, agricultural extension directors, managers and agricultural extension agents at the district level need to plan, work and develop these three best predicted variables when prioritising and sequencing interventions in efforts to improve public sector AEAs' performance under the decentralised system in the W/R.

Recommendations

Based on the conclusions of the study, the following recommendations were made:

1. The Regional Coordinating Councils (RCCs) and the District Assemblies (DAs), through national policy programmes, should provide training to the public sector AEAs to be abreast with coordinating mechanisms to allow them maximize efforts to collaborate with key actors and, or stakeholders of agriculture. Public sector AEAs have the capacity to provide accurate, up-to-date and free extension services in the decentralised policy environment.
2. The MLGRD and the MoFA, through the Regional Directorate of Agriculture (RDA) and the Department of Agriculture (DA), should provide AEAs the opportunity to plan their own competency requirements and decide how to achieve them within the decentralised framework. Attention should be paid to on-the-job training and continuing education programmes to help AEAs address their competency needs. In the context of decentralisation, public sector AEAs should be clear of their responsibilities and roles so that they can be aware of the competencies expected of them.
3. In the decentralised policy environment, the RDA and the DA should empower AEAs to learn new 'bottom-up' planning procedures, agricultural marketing and other enterprises that have economic potentials for small-scale farmers. The RDA and the DA, through the RCCs, should provide AEAs with broader technical expertise knowledge about extension communication, agricultural economics,

types of markets (domestic, regional and global) and home economics. This will help public sector AEAs to improve their capacity to provide appropriate advisory services to clientele.

4. The RCCs and the DAs, through the MLGRD should strengthen AEAs capacity to assist farmers to identify their own needs. This can be achieved by formally including farmers and representatives of other stakeholder agencies to meetings on specific issues affecting farmers. This will help the DA and its AEAs to develop need-based agricultural extension programmes for farmers.
5. To help correct AEAs perceptions of successfully achieving set performance targets, the DA should set clear, achievable and measurable targets that can be monitored and evaluated. The DA can achieve this, through annual consultative planning meetings with AEAs and other relevant actors involved in the agricultural development process.
6. It is suggested that, the DAs, through MLGRD, reinforces investments in forming, developing and supporting farmer groups to empower public sector AEAs in providing advisory services that are compactible to their groups' needs.
7. The RDA through the DA, should build AEAs capacity to transfer technologies that include market driven innovations to help farmer producer groups to increase their production in appropriate crops, livestock and, or other agro-enterprise suitable for locations with accessible markets to increase food accessibility and household income

of the rural poor. This will provide AEAs the opportunity to help farmers reduce their production and marketing costs.

8. Again, the MLGRD, through the RCCs, RDA, DAs and the DA, need to develop youth entrepreneurial and skills development modules related to agriculture, to engage public sector AEAs to establish youth 'producer-marketer' projects to introduce the youth into agricultural value chain development activities to generate income and increase food production for themselves in their communities. This will help solve the problems of rural-urban migration, eradicating poverty and achieving food security in the W/R. Information sharing technology initiatives can well be institutionalised in such projects levels to disseminate appropriate innovations systems platform technologies to support producers and marketers along the producing and marketing chains in the agriculture industry.

Suggested Areas for Further Studies

1. The research should be repeated in the study area after some time to show the trend of public sector AEAs' performance under the decentralised system. Such longitudinal studies will help provide insight into public sector AEAs' performance and the contributing factors of such performance.
2. It is suggested that a study is conducted to assess the impact of decentralised extension service delivery on the livelihood of small-scale farmers in the W/R.

3. The study should be conducted in other regions with ecological and economic diversity where agriculture is very prevalent such as the Ashanti, Eastern and the Brong Ahafo Regions of Ghana.
4. Again, it is suggested that a study is conducted to identify modalities used by the District Assemblies (DAs) through the DA to make decentralised extension delivery participatory as required by the practice of decentralisation.
5. It is also suggested that a study is conducted to evaluate the value addition and contribution of ICTs for agricultural extension service delivery under the decentralised system in the W/R.

REFERENCES

Aboagye, P.Y. (2015). *Promise and reality of decentralisation*. The Case of Farmers' Access to Agricultural Advisory Services in the Sunyani Municipality of Ghana. Lunds University. University Press.

Abou, B. (2015). *Extension and advisory services*: *Rural extension services for agricultural transformation.* Feeding Africa Background Technical Paper. 21-23 October. Abdou Diouf Conference Centre, Dakar, Senegal

Adams, I. (2014). *Perceived competencies of agricultural extension workers in extension services delivery in Northern Ghana, perspective from literature.* (Working Paper No. 15. *Vol. 4*. Developing Country Studies. Ghana. Retrieved from http//www.iiste.org

Aker, J.C. (2001). *"Dail A for agriculture": A review of information and communication technologies for agricultural extension in developing countries.* (Working Paper 269). Center for Global Development, Washington, DC.

Alonge, J. (2006). *Bringing stakeholders in agricultural extension reform agenda: A participatory SWOT analysis of the Trinidad national agriculture extension service.* Paper presented at the AIAEE 22nd Annual Conference. International Teamwork in Agricultural Extension and Education. Clear Water Beach, Florida, USA, 17 -19 May 2006.

Ananda, J. & Herath, G. (2003). The use of analytic hierarchy process to incorporate stakeholder preferences into regional forest planning. *Forest Policy and Economics*, *5*(1), 13-26

Anandajayesekeram, P., Pusker, R., Sindu, W. & Hoekstra, D. (2008*). Concepts and practices in agricultural extension in developing countries: A sourcebook*. IFPR (International Food Policy Research Institute), Washington, DC, USA, and ILRI (International Livestock Research Institute), Nairobi, Kenya. 275pp

Anderson, J.R. (2007). *Agricultural advisory services.* Background Paper for the World Development Report, 2008. Washington, DC: The World Bank.

Anderson, J. R., Feder, G. (2004). Agricultural extension: Good intentions and hard realities. *The World Bank Research Observer*, *19*(1), 41-60.

Andima, D.K., Makini, F.W., Okoko, E.N., Muyonga, C.K., Wanyama, J.M., Masinde, A. & Makworo, S. (2002). *Assessing the impact of the farmer participatory research approach in the development of soil management technologies in Southwest Kenya*. KARI, Kisii Regional Research Centre.

Annan, F. (2012). *The role of agricultural extension services in agricultural transformation for rural poverty reduction: A situational study in the Ashanti Region.* Unpublished Master's Thesis submitted to the School of Graduate Studies, Kwame Nkrumah University of Science and Technology. College of Architecture and Planning, Department of Planning. Kumasi, Ghana.

Antholt, C. & Zijp, W. (1995). *Participation in agricultural extension*. Environmental Department Dissemination Notes (24). World Bank, Washington, DC, USA.

Armitage, D., Berkes, F. & Doubleday. (2007): *Adaptive co-management: collaboration learning and multi-level governance*. UBC Press, Vancouver.

Armstrong, M. (2006). *A handbook of human resource management practice*. London. Kogan Page.

Asuming-Brempong, S.; Sarpong, D.B.; Asante, F. (2006). *Institutional bottlenecks of agricultural sector development: The case of research and extension provision in Ghana.* Accra: University of Ghana. Retrieved from http://www.inter-reseaux.org/IMG/pdf.

Awortwi, N. (2010). The past, present and future of decentralisation in Africa: A case study of local government development trajectories of Ghana and Uganda. *International Journal of Public Administration*. *33*(12-13) 620-634. African Governance Institute. The Hague, Netherland. Retrieved from http://www.researchgate.net/publication/232952677.

Barbbie, E. (1990). *Survey research methods* (2nd Ed.). Belmont, CA: Wadsworth.

Belay, K. & Abebaw, D. (2004). "Challenge facing agricultural extension agents: A case study of South-Western Ethiopia": African Development Bank Review. *African Development Bank*. *Vol. 16*(1) 139-168. Retrieved from http://ideas.repec.org/s/adb/adbadr.html

Benson, A. & Jafry. T. (2013). "The state of agricultural extension: An overview and new caveats for the future". *The Journal of Agricultural Education and Extension*. *9*(4): 381-393.

Bentz, R.P. (1997). Acquiring and managing financial resources. In B.E. Swanson, R.P. Bentz, & A.J. Sofranko, (Eds.). *Improving agricultural extension: A reference manual*, Chapter 16. Rome: Food and Agriculture Organization of the United Nations.

Berdegue, J.A & Escober, G. (2001). *Agricultural knowledge and information systems and poverty reduction.* Santiago, Cassilla 228-22.

Birkhaeuser, D., Evenson, R. E., Feder, G. (1991). The economic impact of agricultural extension: A review. *Economic Development and Cultural Change 39*(3) 607-650.

Birner, R., Davis, K., Pender, J., Nkonya, E., Anandajayasekeram, P., Ekboir, J., Mbabu, A., Speilman, D., Horna, D., Benin, S., Kisamba-Mugerwa, W. (2006). *From "Best practice" to "Best fit": A framework for designing and analysing pluralistic agricultural advisory services worldwide*. Development Strategy and Governance Division Discussion Paper No.37. International Food Policy Research Institute. Washington, DC.

Bosompem, M. (2006). *Cocoa farmers perceived impact on the cocoa high technology programme on their livelihoods in the Eastern Region.* Unpublished Master's Thesis submitted to the Department of Agricultural Economics and Extension, School of Agriculture, College of Agriculture and Natural Science, University of Cape Coast.

Boyd, B.L. (2004). Extension agents as administrators of volunteers: Competencies needed for the future. *Journal of Extension*. *42*(2). Retrieved from http://www.joe.org/joe/2004/a4.-shtml.

Boyd, B.L. (2003). "Identifying competencies for volunteer administrators for the coming Decade. A National Delphi Study". *Journal of Agricultural Education. 44*(4): 47-56.

Burgelman, R., Christensen, C. & Wheelwright, S. (2008). *Strategic management of technology and innovation*. (5th Ed). McGraw-Hill: Irwin.

Cerdán-Infantes, P., Maffioli, A., Ubfal, D. (2008). *The impact of agricultural extension services: The case of grape production in Argentina*. Washington, DC. Inter-American Development Bank.

Cheema, G.S., Rondinelli, D.A. (2007). *Decentralising governance: Emerging concepts and practices.* Washington, DC. Brookings Institution Press.

Chowa, C., Garforth, C. & Cardey, S. (2013). "Farmer experience of pluralistic agricultural extension, Malawi*". The Journal of Agricultural Education and Extension. 19*(2): 147-166.

Chowdhury, A. H., Odame, H.H. & Leeuwis, C. (2014). "Transforming the roles of public extension agency to strengthen innovation: Lessons of the national agricultural extension project in Bangladesh". *The Journal of Agricultural Education and Extension*. *20*(1):7-25.

Christoplos, I. (2010). *Mobilizing the potential of rural and agricultural extension.* The Global Forum for Rural Advisory Services. Rome. FAO.

Cohen, L., Manion, L. & Morrison, K. (2007). *Research methods in education* (6th Ed.) Great Britain. MPG Books Ltd. Bodmin.

Cole, G. A. (1996): Management: Theory and Practice. (5th Ed.). London. Ashford.

Crook, R.C. (2003). Decentralisation and poverty reduction in Africa: The politics of local-central relations. *Public Administration and Development*. *23*(1) 77-88.

Crook, R.C., Sverrisson, A.S. (2001). *Decentralisation and poverty-alleviation in developing countries: A comparative analysis or, is West Bengal unique?* (IDS Working Paper 130). Brighton, UK: Institute of Development Studies, University of Sussex.

CSIR-STEPRI, (2014). *Decentralisation of MoFA: Implications for sustainable agricultural productivity policy brief.* Proceedings of CSIR-Science and Technology Policy Research Institute and Ministry of Food and Agriculture Policy Symposium, October 2004, Accra, Ghana: CSIR-STEPRI.

Davis, J. A. (1971). *Elementary survey analysis.* Eaglewood Cliffs, NJ: Prentice-Hall.

Davis, J.C. (1997). *The relationship of community stakeholder participation to the effectiveness of U.S Agency for International Development-assisted non-governmental organisation agricultural and natural resources development projects*. College Park. University of Maryland.

Davis, K. (2008). "Extension in sub-Saharan Africa. Overview and assessment of past and current models, and future prospects". *Journal of International Agriculture and Extension*. *15*(3); 15-28

Davis, K. & Heemskerk, W. (2012). Module 3: Investments in extension and advisory services as part of agricultural innovation systems. In World Bank (2012). *Agricultural innovations systems: An investment sourcebook*. Washington DC: World Bank.

Deshler, D. (1997). Evaluating extension programmes. In B.E. Swanson, R.P. Bentz, & A.J. Sofranko, (Eds.). *Improving agricultural extension: A reference manual* (Chapter 11). Rome: Food and Agriculture Organization of the United Nations.

Development Gateway. (2016). Results data initiative: Findings from Ghana. Retrieved from http://www.developmentgateway.org.

Dhanakumars, V.G. (2001). Performance appraisal in rubber board extension delivery systems. *Journal of Agricultural Extension Management*. 2: 174-190

Dubrin, A.J. (2007) *Leadership: Research findings, practice and skills.* New York: Houghton Mifflin Company.

FAO (2017): *Integration of nutrition in agricultural extension services in Africa.* A Desk Review of Country Case Studies; Pre-Service and In-Service Training Materials. Accra. FAO. Retrieved from http://www.fao.org /publication

FAO (2014). *Analysis of public expenditure in support of the food and agriculture sector in Ghana, 2006-2012*; *A preliminary assessment.* Technical Notes Services, MAFA, by Ghins, L., Rome.

FAO (2006). "*Food security policy brief*" (2); 4. Rome, Italy.

FAO (2003b). *Agricultural extension, rural development and food security challenge*. Rome, Italy.

Faure, G.Y., Desjeaux, Y. & Gasselin. (2012). "New challenges in agriculture advisory services from a research perspective: A literature review, synthesis and research agenda". *Journal of Agriculture Education and Extension 18* (5): 461-492.

Feder, G., Murgai, R. & Quizon, J.B. (2004a). "Sending farmers back to school; The impact of farmer field schools in Indonesia". *Review of Agriculture Economics. 55*(2): 221-243.

Feder, G., Willet, A. & Zijp, W. (2001). Agricultural extension: Generic challenges and ingredients for solutions. In S. Wolf and D. Zilberman (Ed.). *Knowledge generation and technology change: Institutional innovations in agriculture* (pp.313-356). Boston: Mass Kluwer

Fraenkel, J.R. & Wallen, N. (2000). *How to design and evaluate research in education.* New York: McGraw- Hill Companies.

Garforth, C. (2004). Demand-led approaches. In W. Rivera and G. Alex (Ed.). *Demand driven approaches in agricultural extension: Case studies of international initiatives* (pp. 3-6), Washington, DC: The World Bank.

Ghana Statistical Service. (2013). 2010 *Population and housing census. Regional analytical report. W/R.* Accra, Ghana. GSS.

Gorard, S. (2001). Quantitative methods in educational research: The role of numbers made easy. London: Continuum.

Guatam, M. (2000). *Agricultural Extension: The Kenya experience. An impact evaluation.* World Bank Operations Evaluation Department. World Bank, Washington, DC. USA. VJ Books Inc.

Gupta, V. (2000). Regression Explained. Georgetown, Washington, D.C: VJ Books Inc.

IFAD (2012), *Youth in agriculture: Special session of the farmer's forum global meeting*, 18th February, 2012. IFAD, Rome.

Ifenkwe, G. (2012). Agent related factors affecting the performance of agricultural extension staff in Abia State, Nigeria. *Journal of Agricultural Science. 3*: 43-48.

IMF (2003). *Ghana poverty reduction strategy paper* (No. 03/56). Washington, DC: International Monetary Fund.

Khalil, A.H., Ismail, M., Suandi, T. & Silong, A.D. (2008). Influence of leadership competencies in extension workers' performance in Yemen. Department of Professional Development and Continuing Education, Faculty of Educational Studies, University Putra. Malaysia. *Journal of International Society Review*. *4*: 368-387.

Kroma, M.M. (2003). *Reshaping extension education curricula for 21st century agricultural development in sub-Saharan Africa*. In Association for International Agricultural and Extension Education. Proceedings: AIAEE, Annual Conference Raleigh, North California. Retrievedfromhttps://www.aiaee.org/attachments/article/1204/kroma353.pdf.

Kwarteng, J.A & Boateng, S.A. (2012). Mid-career extension graduates' perceptions of the impact of a demand-driven, extension curriculum in Ghana. *Australian Journal of Adult Learning*. *52*(2), 257-276.

Kuyper, E. & Schnieder, L. (2016): *Conceptualizing the contribution of agricultural services to nutrition*. Feed the Future Discussion Paper. California, USA.

Lai, K.C., Cistulli, V. (2005). *Decentralised development in agriculture: An overview.* Rome. Food and Agriculture Organization.

Lakai, D.K., Jayaratne, S.U., Moore, G.E. & Kistler, M. J. (2012). "Barriers and effective educational strategies to develop extension agents' professional competencies." *Journal of Extension. 50*(4). Retrieved from http://www. joe.org/joe/2012august/rb1.php

Larson, A.M., Ribot, J.C. (2004). Democratic decentralization through a natural resource lens: An introduction. *Economic Journal of Development Research*, *16*(1).

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

Leeuwis, C. & Van den Ban, A.W. (2004). *Communication for rural innovation: Rethinking agricultural extension* (3rd Ed.). Oxford, United Kingdom. Blackwell Publishing.

Liles, R.T. & Mustian, R.D. (2004). Core competencies: A system approach for training and organizational development in extension. *Journal of Agricultural Education.10*: 77-82.

Linder, J.R. (2001). Competency assessment and human resource management performance of county extension chairs in Ohio. *Journal of Agriculture Education*. *42*(4):21-31.

Linder, J.R. & Dooley, K.E. (2002). Agricultural education competencies and progress towards a Doctoral degree. *Journal of Agricultural Education*. *43*(1) 57-68.

Madukwe, M.C. (2006). *Delivery of agricultural extension services to farmers in developing countries*. Nsukka, University of Nigeria.

Maddy, D.J., Niemann, K., Lindquist, J. & Bateman, K. (2012). *Core Competencies for the cooperative extension system.* Oregon State University extension service. Retrieved from https://www.msu. extension. org/ core_competencies.pdf

Manor, J. (1999). *The political economy of democratic decentralisation*. Washington, DC: The World Bank.

Mbega, W.L. (2015). *Factors affecting the job performance of agricultural extension workers in Handeni district, Tanzania*. Unpublished Master's Dissertation submitted to Sokoine University of Agriculture, Morogoro, Tanzania.

McNamara, P., Dale,J., Keane, J. & Ferguson,O. (2012). *Strengthening pluralistic agricultural extension in Ghana.* Modernizing extension and advisory services project (MEAS). Illinois, USA. USAID

Meizen- Dick, R., Quisumbing, A., Behrman, J., Biermayr-Jenzano, P., Wilde, V., Noordelooos, M., Ragasa, C. & Beintema (2012). *Engendering agricultural research development and extension*. IFPRI Research, Monograph, Washington, DC: IFPRI

MLGRD. (2003). *National decentralization action plan: Towards a sector-wide approach for decentralisation implementation in Ghana* (2003-2005). Decentralization Secretariat. Accra, Ghana.

MoFA. (2017). *Agriculture sector progress report*, Monitoring and Evaluation Directorate, *MoFA*, Accra. Ghana. Retrieved from http://www.mofa. gov.gh.

MoFA. (2016). *Agriculture sector progress report*, Monitoring and Evaluation Directorate, MoFA, Accra. Ghana. Retrieved from http://www.mofa.gov. gh.

Moore, A., Ferguson, O. & Lolig, V. (2015). *Assessment of extension and advisory services in Ghana's Feed the Future Zone of Influence*. MEAS, Ghana Intervention Assessment. Urbana-Champaign. Illinois, USA: USAID

Ohene, V.F. (2013). *Determinants of farmers' participation in the Youth-in-Agriculture programme in the Eastern Region of Ghana*. Unpublished Master's Thesis submitted to the University of Ghana, Department of Agricultural Economics and Agribusiness. Legon, Ghana.

Okoffo, E.D., Mensah, M. & Fosu-Mensah, B.Y. (2016). Pesticides exposure and the use of personal protective equipment by cocoa farmers in Ghana. *Journal of Environmental Systems Research 5*:17. Retrieved from https://www.researchgate.net/publication/301662114

Okorley, E.L. (2007). *An operational framework for improved decentralised agricultural extension: A Ghanaian case study*. Unpublished doctoral thesis, Massey University. New Zealand.

Okwoche, V.A. & Asogwa, B.C. (2012). Analysis of determinants of job performance of agriculture extension worker as a leader to farmers in Nigeria. *Journal of British Economics, Finance and Management Sciences. 5*:48-125.

Olsen, L., Bhattacharya, J. & Scharf, A. (2006). *Cultural competency. What it is and why it matters.* Lucile Packard Foundation for Children's Health, California.

Oxford Business Group. (2017). *Agriculture report.* Retrieved from https://oxfordbusiness.group.com/Ghana-2017

Oyinlade, O. (2006). A method of assessing leadership effectiveness. *Performance Improvement Quarterly*. *19*(1) 25-40.

Paisley, C. (2013). *Engaging youth in agriculture: Investing in our future.* Global Agriculture Development Initiative. Retrieved from http://globalfoodforthoughtpad.com/global-fot-thought/2013/02/commentary-engaging-youth-in-agriculture-investing-in –ourfuture, html.

Pallant, J. (2001). *SPSS survival manual*. Maidenhead: Open University Press and McGraw-Hill Education.

Pandolfelli, L., Meizen-Dick, R. & Dohrns, S. (2008). "Introduction. Gender and collective action: Motivations, effectiveness and impact". *Journal of International Development. 20*(1):1-11.

Parker, A. (1995). *Decentralisation: The way forward for rural development*? (Policy Research Working Paper No. 1475). Washington, DC: The World Bank.

Pasteur, K. (2002a). *Changing organizations for agricultural extension in Bangladesh: Strategies for change (Lessons for change in policies and organizations No. 3)*. Brighton: Institute of Development Studies.

Pellini, A. (2000). *Development, decentralization and education: Main issues and open questions*. Retrieved from http://www.uta.fi/-arnaldopellini/ papers/ questions.pdf

Place, F., Swallow, B.M., Wangila, J. & Barret, C.B. (2002). Lessons for natural resource management technology adoption and research. In C.B. Barret, F. Place & A.A. Aboud (Eds.). *Natural resource management in African agriculture: Understanding and improving current practices*. Commonwealth Agricultural Bureau International. London, United Kingdom.

Qamar, M.K. (2005). *Modernizing natural agricultural extension system:* A practical guide for policy-makers in developing countries, Rome. FAO.

Qamar, M.K. (2003). *Agricultural extension in Asia and the Pacific: Time to revisit and reform*. Resource Paper at the International Seminar on Enhancement of Extension Systems in Agriculture. Asian Productivity Organization, Tokyo, Japan and Faisalabad. 15th-20th December, Pakistan.

Quisumbing, A. & Kumar, N. (2011). "Does social capital build women's assets? The long-term impact of group-based and individual dissemination of agricultural technologies in Bangladesh". *Journal of Development Effectiveness* (Special Issue: Evaluating Long-Term of Anti-Poverty Interventions in Bangladesh). *3* (2) 220-242.

Ragasa, C., Ulimwengu, J., Randriamamonjy, J. & Badibanga, 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. Retrieved from http://dx.doi.org/10.1080/ 138922.

Ragasa, C. & Sengupta, D. (2012). *"Gender and institutional dimensions. Agricultural technology adoption: A review and synthesis of 35 case studies".* Paper presented to International Association of Agricultural Economics (IAAE) Conference, 18th-24th August, Foz do Iguaçu, Brazil.

Rezaie, A.A., Alambeigi, A. & Rezvanfer, A. (2008). Analysis of the job performance of the agricultural extension expert of Yazd Province, Iran. *Journal of Agriculture and Biological Science. 4*: 78-85.

Riggo, R.E. & Taylor, S.J. (2000). Personality and communication skills as predictors of hospital nurse performance. *Journal of Business Psychology 15*:3512-359.

Rivera, W.M. (2007). Agricultural extension into the next decade. *European Journal of Agricultural Education and Extension*, *4*(1), pp. 29-3.

Rivera, W. & Alex, G. (2004a). (eds.) *Decentralised systems: Case studies of international initiatives*. Washington, D.C: The World Bank.

Rivera, W.M. & Qamar, M.K. (2003). *Agriculture extension. Rural development and the food security challenge*. Rome. FAO.

Rivera, W.M. & Sulaiman, V.R. (2009). "Extension: Object of reform, engine of innovation". *Outlook of Agriculture*. *38*(3): 267-273.

Rogers, E.M. (2003): *Diffusion of innovations.* (5th Ed). New York: Free Press.

Sallam, M. & Akram, B. (2005). *Agriculture extension situation in Dhama province. Dhama rural development project*. Ministry of Agriculture and Irrigation, Yamen.

Sanga, C., Tumbo, S. & Mlozi, M. (2013). "System design and ICT adoption in agricultural extension services delivery in Tanzania, Chapter 15". In *Technology development and platform enhancements for successful global e-government design*. 282-306. Hershey, PA: ICT Global.

Sanga, C., Mlozi, M.R.S., Tumbo, S., Mussa, M. & Haug, R. (2013). On search for strategies to increase the coverage of agricultural extension services: Web based farmers' advisory information system of Sokoine University of Agriculture and MAFC, Dar es Sallam, MATI Uyole and Norwegian University of Life. *Journal of International Computing and ICT Research*. *7*(1): 42-55.

Sanginga, P. C., Lilja, N. & Tumwine, J. (2001). *Assessing the quality of participation in farmers' research groups in the highlands of Kabale, Uganda*. PRGA, CGIAR, Future Harvest, Working Document / PRGA 19.

Sarker, M.A. & Ittohara, Y. (2009). Farmers' perception about the extension services and extension workers: The case of organic agricultural extension programme by PROSHIKA. *American Journal of Agriculture and Biological Sciences*, *4* (4): 332-337.

Saviroff, M., Lindarte, E. (2002) *Reforming national extension: The recent experience of Venezuela. Extension case study*. Washington, DC: The World Bank.

Sharma, R., Swanson, B., Sadamate, V. (2001). Field-testing new methodologies for planning and implementing extension programs: A comparison of innovative extension projects in India and the United States. In *Association for international agricultural and extension education. proceedings*: 17th AIAEE Annual Conference, Baton Rouge, Louisiana.

Smith, L.D. (1997). *Decentralisation and rural development: The role of public and private sector in the provision of agriculture support services*. Paper prepared for the FAO/IFAD/World Bank technical consultation on decentralisation, December 16-18, Rome, Italy: FAO.

Smits, R. (2002). "Innovation studies in the 21st century: Questions from user perspective". *Technological Forecasting and Social Change. 69* (9): 861-883.

Sperenza, C.I., Kiteme, B. & Opondo, M. (2009). *Adopting public agricultural extension services to climate change: Insight from Kenya*. Bonn, Germany. German Development Institute.

Stringfellow, R., Coulter, J., Lucey, T., McKone, C. & Hussain, A. (1997). *Improving the access of smallholders to agricultural services in sub-Saharan Africa. Farmer cooperation and the role of the donor community. Natural resource perspectives*. London, UK: Overseas Development Institute.

Swanson, B.E. (2006). The changing role of agricultural extension in a global economy. *Journal of International Agriculture and Extension Education.* 13(3) Fall 06. Urbana-Champaign, Illinois. USA. AIAEE.

Swanson, B.E., Samy, M.M. (2004) Introduction to decentralisation of agricultural extension systems: Key elements for success. In W. Rivera, and G. Alex, (Eds.), *Decentralised systems: Case studies of international initiatives, pp. 1-5.* Washington, DC. World Bank,

Swanson, B.E. & Rajalahti, R. (2010). *Strengthening agricultural extension and advisory systems. Procedures for assessing, transforming and evaluating extension systems*. Agricultural and Rural Development Discussion Paper 45. Washington, DC: The World Bank.

Swanson, R.A. (1999). The foundations of performance improvement and implications for practice. In R. Torraco (Ed.). *The theory and practice of performance improvement.* San Francisco. Berrett-Koehler, pp. 1-25

Tapa, T. Ojha, G. (2002) *Projectisation in the context of extension reform in Nepal. Extension case study*. Washington, DC: The World Bank.

Terry, B.D. & Isreal, G.D. (2004). Agent performance and customer satisfaction. *Journal of Extension*, December, 2004. *42*(6). Retrieved from http:// www.joe.org/joe/2004december/94.shtml.

Thach, L.N., Ismail, M., Uli, J. & Idris, K. (2007). *Individual factors as predictors of extension agents' performance in Mekong Delta,* Vietnam.

The Texas University System. (2005). *Performance appraisal system. Extension agents: 2005 performance summary*. Texas Cooperative Extension. Retrieved from http://countyprograms.tamu.edu/cpoadmin /Agent PAS Evaluation Document.pdf

Tossou, R.C. & Zinnah, M.M. (2005). Toward the search for better institutional arrangement for agriculture extension in a decentralised context. The case of the Republic of Benin. *Journal of International Agricultural Extension and Education*, *12* (3), 43-52.

United Nations. (2005). *Policy dialogue*: *Decentralisation for poverty reduction*. Retrievedfromhttp://www.unescap.org/pdd/CPR/CPR2005/ English/CPR(L2E).PDF

Waddington, H.; Snilstveit, B.; White, H.; Anderson, J. (2010). *The impact of agricultural extension services*. Synthetic Reviews-SR009 Protocol. London: International Initiative for Impact Evaluation. Retrieved from http://www.3ieimpact.org/media/.pdf.

WHO (2016). "Health Topics: Hygiene" www.who.int/topics/hygiene/en (Retrieved 2/12/17.20:41:25 GMT)

World Bank. (2012). *ICT in agricultural sourcebook*, Washington DC: World Bank.

World Bank (2004). *Supporting participation in development policy operations. Good practice note 5*. Washington, DC: The World Bank.

World Bank. (2003). *Extension and rural development*. Retrieved from http://www.worldbank.org/akis/extensionwork

World Bank. (2000a). *Decentralising agricultural extension: Lessons and good practice.* Retrieved from http://siteresources.worldbank.org/INTARD/825 826.../Decentralisation.pdf

Work, R. (2002). *Overview of decentralisation worldwide: A stepping stone to improved governance and human development.* Proceedings: 2nd International Conference on Decentralisation, Federalism: The Future of Decentralising States? July 25-27, Manila, Philippines. New York: United Nations Development Programme.

APPENDIX A

STRUCTURED INTERVIEW SCHEDULE FOR RESPONDENTS

UNIVERSITY OF CAPE COAST

SCHOOL OF AGRICULTURE

DEPARTMENT OF AGRICULTURAL ECONOMICS AND EXTENSION

STRUCTURED INTERVIEW SCHEDULE FOR RESPONDENTS

Dear Respondent,

I am a final year MPhil student (Agricultural Extension) conducting a survey as part of my research thesis on the topic: ***"Factors affecting public sector agricultural extension agents' performance under the decentralised system in the W/R of Ghana".***

You are kindly requested to listen or read through the items and respond to them as frankly and objectively as possible. Your responses will be treated confidentially and be used solely for academic purpose. Do not write your name on the questionnaire since this is not a test and you will not be identified with the results. Thank you for taking time to help with this research.

SECTION A

Background information of Respondent

Instructions: Please tick (√) the box where applicable.

1. What is your sex?

a) Male []

b) Female []

2. Age at last birthday:……..

3. Type of Respondent: a) Farmer Representative [ ] b) Group Member [ ]

4. District:…….

5. Years as a Representative and, or Group

Member:……

7. Level of Education: None [ ], JHS/Middle school [ ], SHS [ ],Tertiary [ ].

SECTION B

The performance of AEAs under the decentralised system.

Below is a list of statements about your perception on the performance of your duties under the decentralised system. Indicate whether you do not agree (NA=0), least agree (LsA=1), less agree (LA=2), moderately agree (MA=3), agree (A=4), or strongly agree (SA=5) to the statements by ticking (√) in the corresponding box.

Stakeholder inclusion and participation in extension activities**.**

NO	STATEMENT	NA	LsA	LA	MA	A	SA
		0	1	2	3	4	5
1.	Farmers take part in the operational areas' decision making process related to priority setting.						
2.	The agent provides farmers the opportunity to voice out their opinion about decisions that affect our livelihood.						
3.	Farmer group representatives in the operational area participate in the district's programme planning process.						
	The agent allows farmers to prioritize their own extension needs according to how they want them to be addressed.						
5.	The agent establishes a two-way						

	communication process between service providers and farmers by means of direct contact, newsletters or joint group discussions.						
6.	The agent provides farmers the opportunity to participate in the monitoring of extension activities adopted in their communities.						
7.	The agent establishes contact with relevant agencies for farmers through meetings, seminars, workshops to gain stakeholder input into extension planning decisions.						
8.	The agent involves food processors in the participation of extension processes.						
9.	The agent involves agricultural input distributors in the participation of extension processes.						
10.	The agent involves retailers in the participation of extension processes.						
11.	Farmers exercise control over community extension activities in the operational area.						
12.	Agenda for agricultural extension meetings are provided to farmer groups before due dates.						

Advisory services for food production, nutrition, family health and youth development

No.	Statement	NA	LsA	LA	MA	A	SA
		0	1	2	3	4	5
1.	The AEA provides extension services with regards to food production for farmers.						
2.	The agent uses relevant advisory institutions to provide knowledge and information on food production processes for farmers.						
3.	The agent provides farmers the opportunity to work with agricultural input suppliers to increase food production.						
4.	The agent provides information for accessing credit facilities to improve agricultural production.						
5.	The agent provides agricultural value chain development services to farmers to increase household incomes.						
6.	The agent provides knowledge that help farmers to produce diverse foods for household consumption.						
7.	The agent provides extension services with regards to nutrition for farmers.						
8.	The agent provides farmers the opportunities to cultivate plant varieties that meet the nutritional requirements of households.						
9.	The agent encourages farmers to produce diverse foods to meet their daily balance diet requirements.						

10.	The agent uses relevant advisory institutions to provide information to farmers on how to achieve nutritional security.						
11.	AEAs provide agricultural development projects that deliver improved nutritional outcomes to farmers.						
12.	The AEA provides extension services with regards to family health for farmers.						
13.	The AEA teaches farmers the safe handling of animals' products and chemicals before cooking, eating and feeding children.						
14.	The AEA teaches farmers to follow instructions for harvesting farm produce after applying chemicals.						
15.	The agent teaches farmers to wear personal protective clothing whenever applying chemicals.						
16.	The AEA teaches farmers the safe handling of farm equipment to avoid injury.						
17.	The agent teaches farmers to keep farm inputs away from the reach of children at home and on their farms.						
18.	The agent advices farmers on personal and environmental hygiene issues to ensure good health.						
19.	The agent advices farm households to visit health centres to access health services anytime they have casualties.						
20.	The AEA provides extension services with regards to youth development in						

	agriculture.						
21.	The AEA implements youth in agricultural extension programmes in the operational area.						
22.	The AEA develops extension programs that engage the youth in agricultural activities.						
23.	The AEA has rural youth producer groups who contribute to the production of agricultural products in the operational area.						
24.	The agent facilitates farmers' knowledge to keep their youth in agriculture to reduce the rural youth migration from farming areas to urban areas.						
25.	The agricultural extension activities the agent provides involve youth development initiatives that serve as a source of employment for the rural youth.						

Facilitation of knowledge to transfer technology for information sharing on production and marketing.

No.	Statement	NA	LsA	LA	MA	A	SA
		0	1	2	3	4	5
1.	The agent uses the teaching and learning processes to assist farmers develop the technical knowledge and skills needed for our work.						
2.	The agent facilitates knowledge to disseminate technologies that enhance information sharing on agricultural production.						
3.	The AEA facilitates knowledge to disseminate technologies that enhance information sharing on the marketing of agricultural produce.						
4.	Farmers' production costs have gone down as a result of the knowledge the AEA facilitates to transfer technologies for information sharing among actors in the production processes.						
5.	Farmers marketing costs have gone down as a result of the knowledge the AEA facilitates to transfer technologies for information sharing among actors in the marketing processes.						
6.	The AEA assists farmers in making decisions about adopting information sharing technologies that best fit their conditions.						

Farmer group formation and development.

No.		NA	LsA	LA	MA	A	SA
		0	1	2	3	4	5
1.	The agent uses farmer group approaches to improve farmers capacity to analyse their own problems and needs.						
2.	The agent has formed and developed different categories of farmer groups in farming communities.						
3.	The agent works with groups in all extension activities he or she conducts with farmers in the operational area.						
4.	Group goals and objectives are developed by group members under the agent's facilitation.						
5.	Farmer group extension work plans are developed by group members under the AEA's facilitation.						
6.	The agent allows group members to determine strategies to implement their work plans to achieve set objectives. He only facilitates the decision-making process.						

APPENDIX B

QUESTIONNAIRE FOR RESPONDENTS

UNIVERSITY OF CAPE COAST

SCHOOL OF AGRICULTURE

DEPARTMENT OF AGRICULTURAL ECONOMICS AND EXTENSION

QUESTIONNAIRE FOR RESPONDENTS

Dear Respondent,

I am a final year MPhil student (Agricultural Extension) conducting a survey as part of my research thesis on the topic: ***"Factors affecting public sector agricultural extension agents' performance under the decentralised system in the W/R of Ghana''.***

You are kindly requested to read through the items and respond to them as frankly and objectively as possible. Your responses will be treated confidentially and be used solely for academic purpose. Do not write your name on the questionnaire since this is not a test and you will not be identified with the results. Thank you for taking time to help with this research.

SECTION A

Background information of Respondent

Instructions: Please tick (√) the box where applicable.

1. What is your sex?

c) Male [ ]

d) Female [ ]

2. Age at last birthday:……..

3. Position…….

4. District:…….

5. Years of Work Experience:……

6. Level of Education: General Certificate [ ], Diploma [ ], First Degree [ ], Second Degree [ ]

SECTION B

The performance of AEAs under the decentralised system

Below is a list of statements about your perception on the performance of your duties under the decentralised system. Indicate whether you do not agree (NA=0), least agree (LsA=1), less agree (LA=2), moderately agree (MA=3), agree (A=4) or strongly agree (SA=5) to the statements by ticking (√) in the corresponding box.

Stakeholder inclusion and participation in extension activities.

No.	Statement	NA	LsA	LA	MA	A	SA
		0	1	2	3	4	5
1.	Farmers take part in the operational areas' decision making process related to priority setting.						
2.	I provide farmers the opportunity to voice their opinion about decisions that affect their livelihood.						
3.	Farmer group representatives in my operational area participate in the district's extension programme planning process.						
4.	I allow my farmers to prioritize their own extension needs according to how they want them to be addressed.						
5.	I establish a two-way communication process						

	between service providers and farmers by means of direct contact, newsletters and joint group discussions.						
6.	My farmers always participate in the monitoring of extension activities adopted in the farming communities.						
7.	I establish contact with relevant agencies for farmers through meetings, seminars, workshops to gain stakeholder input into extension planning decisions.						
8.	I involve food processors in the participation of extension processes.						
9.	I involve agricultural input distributors in the participation of extension processes.						
10.	I involve retailers in the participation of extension processes.						
11.	Farmers exercise control over community extension activities in the operational area.						
12.	Agenda for agricultural extension meetings are provided to farmer groups before due dates.						

Advisory Services for food production, nutrition, family health and youth development.

No.	Statement	NA	LsA	LA	MA	A	SA
		0	1	2	3	4	5
1.	I provide extension services with regards to food production for my farmers.						
2.	I use relevant advisory institutions to provide knowledge on food production processes for farmers.						
3.	I provide farmers the opportunity to work with agricultural input suppliers to increase food production.						
4.	I provide information for accessing credit facilities to improve agricultural production.						
5.	I provide agricultural value chain development services to farmers in my operational area to increase household incomes.						
6.	I provide knowledge that help farmers to produce diverse foods for household consumption.						
7.	I provide extension services with regards to nutrition for my farmers.						
8.	My farmers are provided the opportunities to cultivate plant varieties that meet the nutritional requirements of households.						
9.	I encourage my farmers to produce diverse foods to meet their daily balance diet requirements.						
10.	I use relevant advisory institutions to provide information to farmers on how						

	to achieve nutritional security.						
11.	My district provides agricultural development projects that deliver improved nutritional outcomes to farmers.						
12.	I provide extension services with regards to family health for my farmers.						
13.	I teach my farmers the safe handling of animals' products and chemicals before cooking, eating and feeding children.						
14.	My farmers are taught to follow instructions for harvesting farm produce after applying chemicals.						
15.	Farmers are taught to wear personal protective clothing whenever applying chemicals.						
16.	I teach my farmers the safe handling of farm equipment to avoid injury.						
17.	My farmers are taught to keep farm inputs away from the reach of children at home and on their farms.						
18.	I teach my farmers personal and environmental hygiene issues to ensure good health.						
19.	Farm households are advised to visit health centres to access health services anytime they have casualties.						
20.	I provide extension services with regards to youth development in agriculture.						
21.	I implement youth in agricultural extension programmes in my						

	operational area.						
22.	I develop extension programs that engage the youth in agricultural activities.						
23.	I have rural youth producer groups who contribute to the production of agricultural products in my operational area.						
24.	I facilitate my farmers' knowledge to keep their youth in agriculture to reduce the rural youth migration from farming areas to urban areas.						
25.	The agricultural extension activities I provide involve youth development initiatives that serve as a source of employment for rural youth.						

Facilitation of knowledge to transfer technology for information sharing on production and marketing

No.	Statement	NA	LsA	LA	MA	A	SA
		0	1	2	3	4	5
1.	I use the teaching and learning processes to assist farmers to develop the technical knowledge and practical skills needed for their work.						
2.	I facilitate knowledge to disseminate technologies that enhance information sharing on agricultural production.						
3.	I facilitate knowledge to disseminate technologies that enhance information sharing on the marketing of agricultural produce.						
4.	The production costs of my farmers have gone down as a result of the knowledge I facilitate to transfer technologies for information sharing among actors in the production processes.						
5.	The marketing costs of my farmers have gone down as a result of the knowledge I facilitate to transfer technologies for information sharing among actors in the marketing processes.						
6.	I assist farmers in making decisions about adopting information sharing technologies that best fit their conditions.						

Farmer group formation and development

No.	Statement	NA	LsA	LA	MA	A	SA
		0	1	2	3	4	5
1.	I use farmer group approaches to improve farmers' capacity to analyse their own problems and needs.						
2.	I have formed and developed different categories of farmer groups in all my farming communities.						
3.	I work with groups in all extension activities I conduct with farmers in my operational area.						
4.	Group goals and objectives are developed by group members under my facilitation.						
5.	My farmer group extension work plans are developed by group members under my facilitation.						
6.	Group members are allowed to determine strategies to implement their work plans to achieve set objectives. I facilitate the decision-making process.						

SECTION C

Factors that affect the performance of AEAs under the decentralize system.

Below is a list of statements about the factors that affect your performance as an AEA under the decentralise system. Indicate whether you do not agree (NA=0), least agree (LsA=1), less agree (LA=2), moderately agree (MA=3), agree (A=4) or strongly agree (SA=5) to the statements by ticking (√) in the corresponding box.

Enabling institutional environment and governance

Awareness of the presence of policy plans and strategies for extension delivery							
No.	Statement	NA	LsA	LA	MA	A	SA
		0	1	2	3	4	5
1.	I am aware of the decentralised extension policy and strategies of the DAES.						
2.	I am aware of the levels of decentralisation upon which the DAES operate Decentralised extension delivery.						
Awareness of the mission, objectives and responsibilities set for the DADU's AEAs under the decentralised extension delivery system.							
3.	I am aware of my responsibilities in the MoFA's decentralised extension policy at the level of the DADU.						
4.	I am aware of the institutional structure and governance of the DADU upon which the decentralised extension is being delivered.						
5.	I am aware of the DADU's mission around which we operate the						

	decentralised extension service delivery.						
Presence of set performance targets for AEAs							
6.	Management provides AEAs with clearly defined measurable targets that are used to assess performance.						
7.	I meet the performance targets set for me each year.						
8.	Decentralised extension delivery enhances the achievement of the performance targets set for me each year.						
Enabling institutional environment and governance as a factor of decentralised extension delivery promote and aid the performance of my duties in terms of:							
9.	stakeholder inclusion and participation in extension activities.						
12.	advisory services related to food production , nutrition, family health and youth development						
13.	knowledge facilitation to transfer technology for information sharing on production and marketing.						
14.	farmer group formation and development.						

Partnership and linkages

No.	Statement	NA	LsA	LA	MA	A	SA
		0	1	2	3	4	5
1.	I establish contacts with relevant extension support organisations to strengthen partnership and linkages.						
2.	My farmers partner different actors of extension in different localities with whom they share common interest with within the district for support services.						
3.	Establishing partnerships and linkages between actors in extension service provision is a strategy I use to facilitate interactions for my farmers and other relevant agencies.						
4.	Collaborating with actors is a strategy used to provide information for the marketing of agricultural produce.						
5.	Collaborating with different the directorates of the MoFA improves my performance in extension services delivery						
Developing and establishing partnership and linkages have been an operational approach use to improve my performance in terms of :							
6.	stakeholder inclusion and participation in extension activities.						
7.	advisory services related to food production, nutrition, household health and youth development in agriculture.						
8.	knowledge facilitation to transfer						

	technology for information sharing on production and marketing.						
9.	farmer group formation and development.						

Individual capacity

No.	Statement	NA	LsA	LA	MA	A	SA
		0	1	2	3	4	5
1.	I have the ability to assist farmers to use improved crop varieties and breeding stock to increase production.						
2.	I have the ability to assist farmers to effectively and efficiently use agricultural inputs to improve production.						
3.	I supervise my farmers to apply effective production management techniques to improve their work.						
4.	I use my communication skills ability to improve my performance in knowledge facilitation and technology dissemination.						
5.	I have the competence to use problem-solving approaches to promote interactions among my farmers.						

6.	I use critical thinking skills to facilitate interactions in addressing issues of public concern among my farmers and colleague AEAs.						
7.	I have the capacity to involve stakeholders to participate in extension activities assigned to me.						
8.	I use human relations skills to effectively facilitate interactions among my farmers and other stakeholders.						
9.	I have the ability to learn how to use new agricultural devices and technologies to improve my performance.						

Organisational capacity

No.	Statement	NA	LsA	LA	MA	A	SA
		0	1	2	3	4	5
1.	The DADU within which I work have good defined human resource development systems that provide job competency and motivation.						
2.	Management provides consistent training programmes to improve AEAs job performance.						
3.	There have been new intakes of AEAs in my district within the past four (4) years.						

4.	Our technical staff strength is adequate to provide extension services that are relevant to the needs of our farmers.						
5.	Our managerial staff strength to provide extension support relevant to the needs of our farmers is adequate.						
6.	There are available motorbikes to perform our operational duties effectively.						
7.	We have plots to carry out field demonstrations to teach farmers.						
8.	We are provided with adequate financial support to improve our performance.						
9.	Management use funds appropriately to overcome shortages to help improve AEAs performance.						
10.	Appraisal techniques are used to promote AEAs based on their performance.						
11.	There are appropriate reward and sanction systems for AEAs performance in my district.						
12.	My supervisors effectively communicate with me to make their intentions clear about my performance.						
13.	Management organizes timely meetings to seek staff inputs to improve service conditions and performance.						

Advisory Delivery Methods

No.	Statement	NA	LsA	LA	MA	A	SA
1.	Using a combination of delivery methods (individual, group and mass media) rather than concentrating on one, is the most effective delivery approach to extension.						
2.	I have always used ICTs (phones, radio. Television, internet, projectors, laptops etc.) in extension service provision.						
3.	I use available information centres in communities to share agricultural knowledge with farmers and other actors in agriculture.						
4.	I encourage the use of ICTs to facilitate interaction among farmers and fellow AEAs.						
5.	My farmers appreciate the use of ICTs in receiving timely response from AEAs within and outside the district.						
6.	The use of ICTs compliment other delivery methods						
7.	The use of ICTs has rendered the other extension delivery methods inactive.						
8.	The use of the radio in delivering timely information on issues of public concern is on the increase in my operational area.						

SECTION D

AEAs perceived problems associated with decentralised agricultural extension service delivery.

Below is a list of statements about your perceived problems associated with Decentralised agricultural extension delivery. Indicate whether you do not agree (NA=0), least agree (LsA=1), less agree (LA=2), moderately agree (MA=3), agree (A=4) or strongly agree (SA=5) to the statements by ticking (/) in the corresponding box.

No.	Statement	NA	LsA	LA	MA	A	SA
		0	1	2	3	4	5
1.	Management do not provide adequate feedback relevant to the extension activities I perform for my farmers.						
2.	We do not have the required human resource to fully operate in the district.						
3.	My service conditions are generally poor when compared to other civil servants. This adversely affects my performance.						
4.	Staff training to deal with new challenges extension face in terms of insect-pest invasions, serious disease outbreaks, severe climatic conditions and intensive campaigns to increase awareness of infestations control has been inadequate.						
5.	I do not have the required logistics (boots, uniform, motorbikes, field note books, rain coats, information and communication technologies etc.) to facilitate performance						

	improvement in my extension operations.						
6.	Due to inadequate funds and poor infrastructure, I cannot implement all my annual activity schedules planned with clientele.						
7.	Management of the DADU does not provide me the opportunity to take part in the decision-making process.						
8.	Needs assessment has always been a challenge to determine my farmers' wants and how they may be addressed.						