EFFECT OF THE AGRICULTURAL SECTOR DEVELOPMENT STRATEGY ON AGRICULTURAL PRODUCTIVITY: A CASE OF TANA RIVER COUNTY IN KENYA

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DECLARATION

This project is my original work and has not been presented for a degree in any other university

…….. ……

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I confirm that the work in this project was done by the candidate under my supervision

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS AND ACRONYMS

ASDS	Agricultural Sector Development Strategy
ASDSP	Agriculture Sector Development Support Programme
EALA	East African Legislative Assembly
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
GoK	Government of Kenya
IFAD	International Fund for Agricultural Development
MDG	Millennial Development Goals
MoA	Ministry of Agriculture
NVA	New Vision for Agriculture
RBV	Resource Based View
SRA	Strategy for Revitalizing Agriculture
UN	United Nations
VRIO	Valuable, Rare, Inimitable, Organization

OPERATIONAL DEFINITION OF TERMS

Agribusiness: It is the production, processing (value addition) and distribution of agricultural products.

Agricultural credit: It is the amount of investment (monetary or farm inputs) made available for agricultural production from resources outside the farm sector.

Agricultural extension services: This is the application of scientific research and new knowledge to agricultural practices through farmer education. It is the function of providing need- and demand-based knowledge in agronomic techniques and skills to rural communities in a systematic, participatory manner, with the objective of improving their production, income, and (by implication) quality of life.

Agricultural productivity: It is the measure of agricultural output (farm produce and livestock) for a given amount of inputs.

Climate change response: These are adaptation and mitigation strategies adapted to curb the adverse effects of climate change.

Market access: The ability to have your products sell.

ABSTRACT

This study sought to find out how the Agricultural Sector Development Strategy (ASDS) has affected agricultural productivity in Kenya focusing on Tana River County. The specific objectives of the study are; To evaluate the effect of climatic change response on agricultural productivity; To examine the effect of agribusiness to agricultural productivity; To evaluate the effect of agricultural extension services on agricultural productivity; and To examine the effect of access to agricultural credit on agricultural productivity. The study will provide managers and policy makers in agriculture and possibly other sectors with an insight of the effects of the Agricultural Sector Development Strategy on Agricultural Productivity, general strategic planning in the public sector and any possible solutions. It will also guide the sector in Tana River County in unearthing whether there are special effects of the implementation of the Agricultural Sector Development Strategy in the county. Farmers in Tana River County and probably beyond will benefit from the study since they may identify gaps in the sector and help them bridge those gaps or demand action from the government. It will also be a useful reference for any researcher who intends to do a research related to this study, it will help them to develop new ideas or expand on the things that may not have been tackled in this research. The study reviewed the resource based view and the systems theories and showed how they are related to this research. This study employed descriptive survey design since it is an efficient method of collecting data as it involves studying large and small population. It targeted the sixty eight (68) technical staff members in the Agriculture Sector in Tana River County as its population. A census was used since the population was small. The study utilised questionnaires with both open and close ended questions for collection of data where the drop and later pick method was used to administer the same. To enhance validity, a pilot study was done through administering questionnaires randomly to seven (7) selected respondents in Tana River sub-county which is 10% of the total respondents. It was further enhanced by making necessary adjustments to the questionnaire based on the pilot study results. This study tested reliability of the instruments using Cronbach's alpha where a value 0.7 and above was considered acceptable. Quantitative and qualitative data was analysed by descriptive and inferential statistics, and presented through tables and charts. A multiple regression model was used to determine the influence that the independent variables have on the dependent variable, thus $Y = -0.063 + 0.164X_1 + 0.157X_2 + 0.285X_3 + 0.233X_4$. The study concluded that climate change response, agribusiness, agricultural extension services and access to agricultural credit positively and significantly influence agricultural productivity. Based on the research findings the study recommends that Tana River County should implement agricultural extension services by ensuring there is enough staff in the county who are regularly capacity built so as to improve the agricultural productivity of the county.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Wiley (2010) defines a strategy as the pattern of purposes, policies, programs, actions, decisions or resource allocations that define what an organization is, what it does and why it does it. Strategy is also a term that refers to a complex web of thoughts, ideas, insights, experiences, goals, expertise, memories, perceptions, and expectations that provides general guidance for specific actions in pursuit of particular ends. Strategic planning on the other hand is to a business what a map is to a road rally driver. It is a tool that defines the routes that when taken will lead to the most likely probability of getting from where the business is to where the owners or stakeholders want it to go (Dix & Matthews, 2002).

Strategic planning approaches developed in the private sector can help public sector organizations deal with the recent dramatic changes in their environments. For example, "strategic planning is a disciplined effort to produce fundamental decisions shaping the nature and direction of governmental activities within constitutional bounds" It can help governments become more effective (Hughes, 2012).

Policy makers and development practitioners who are responsible for developing investment strategies to promote economic growth find many challenges in the changing face of agriculture in the twenty-first century. In addition to its productive role of providing food, clothing, fuel, and housing for a growing world population, agriculture assumes other roles, the importance of which has more recently been recognized. In addition to its essential role in food security, agricultural development is now seen as a vital and high-impact source of poverty reduction. It is also seen as a source of

environmental problems and a contributor to global warming, water scarcity and pollution, and land degradation (World Bank, FAO & UN, 2010).

Agricultural development is one of the most powerful tools to end extreme poverty, boost shared prosperity and feed 9 billion people by year 2050. Growth in the agriculture sector is about two to four times more effective in raising incomes among the poorest compared to other sectors. This is important for 78% percent of the world's poor who live in rural areas and depend largely on farming to make a living. Agriculture is also crucial to economic growth: it accounts for one-third of gross-domestic product (GDP) and three-quarters of employment in Sub-Saharan Africa. But agriculture-driven growth and poverty reduction, as well as global food security are at risk: Agriculture is more vulnerable to climate change than any other sector. A warming climate could cut crop yields by more than 25%. Agriculture and land use change are also responsible for between 19–29% of global greenhouse gas emissions (World Bank, 2015).

Given the importance of food security in East Africa, especially in the light of climate change, the third meeting, third session of the Second East African Legislative Assembly (EALA) sitting at the Chambers of the Parliament of Uganda in Kampala 17th February, 2010 adopted a common strategy for food security in the region. It noted that the region as a whole had substantial unutilized potential for agriculture and that even the resources that are put into use are underutilised because of low productivity of labour, land and water (EALA, 2010).

1.1.1 The Agricultural Sector Development Strategy

The Agricultural Sector is the backbone of Kenya's economy and the means of livelihood for most of the rural population. Sustained agricultural growth is critical to uplifting the

living standards of the people as well as generating rapid economic growth. However, in spite of the importance of the agricultural sector, farming in Kenya has for many years been predominantly small scale, rain-fed and poorly mechanized. In addition, institutional support and infrastructure have been inadequate. To address these challenges, the Government launched the Strategy for Revitalizing Agriculture (SRA) in 2004 which has been largely successful. As a result, the sector surpassed the growth target which had been set of 3.1 per cent to reach a high of 6.1 per cent in 2007. The new Agricultural Sector Development Strategy (ASDS) is intended to build further on the gains made by the SRA. It is intended to provide a guide for public and private sectors' efforts in overcoming the outstanding challenges facing the agricultural sector in Kenya. Besides ensuring food and nutritional security for all Kenyans, the strategy aims at generating higher incomes as well as employment, especially in the rural areas. Moreover, it is expected to position the agricultural sector as a key driver in achieving the 10 per cent annual economic growth rate envisaged under the economic pillar of Vision 2030 (Government of Kenya [GoK], 2010).

The Agricultural Sector Development Strategy (ASDS) is the overall national policy document for the sector ministries and all stakeholders in Kenya. The document outlines the characteristics, challenges, opportunities, vision, mission, strategic thrusts and the various interventions that the ministries will undertake to propel the agricultural sector to the future. "In composing this strategy, we have defined the problems in the agricultural sector, explored the possible causes of the problems and proposed possible solutions. Recognizing that we cannot solve all problems, we have selected the best solutions and shall implement them in a phased manner. As a revision of the Strategy for Revitalizing Agriculture (SRA), the ASDS has incorporated not only the successes but also the lessons learned from the SRA to provide the framework for stimulating, guiding and directing progressive agricultural growth and development in the next 10 years. The document

proposes realistic policies and institutional changes that we believe are necessary in contemporary Kenya for creating a vibrant and productive agricultural sector" (GoK, 2010).

Climate fluctuations have a bearing on the way the environment and natural resources are managed. The effect has been unpredictable weather that in turn has affected agricultural activities. Local communities will be encouraged to document knowledge and practices that provided early warning systems and helped mitigate some of these changes within their environments for adoption and customization. The national climate change response strategy has come up with modalities of addressing climate change. These include recommendations on relevant policies, institutional framework, awareness creation and resource mobilization. The key objectives of this strategy will be to: identify priorities for climate adaptation and mitigation; develop comprehensive national education and awareness creation programmes; establish specific sectoral or cross-sectional adaptation measures for vulnerable groups, communities and regions; conduct periodic climate change threat and risk assessments at national and local levels; develop a national capacity building framework in strategic climate change areas; identify specific research and development needs to address climate change, and opportunities for technology development, absorption and diffusion; strengthen governance of climate change, that is, policy, legislation and institutional frameworks; strengthen national disaster risk reduction capacity in order to minimize the effects of climate change-related disasters; establish and sustain an effective implementation framework; and ensure monitoring and evaluation of the implementation of the action plan (GoK, 2010).

Market access is vital to agricultural development. Related to this is the need to address issues along the entire value chain to enhance agricultural productivity. Major agricultural exports include industrial crops such as tea, coffee and pyrethrum, and horticultural

produce dominated by fruits, vegetables and flowers. These products have been exported in their raw form with little or no value added, resulting in their reduced competitiveness in the global market. The agriculture subsector will emphasize collecting, collating and disseminating information on domestic and international markets. The information will be disseminated to producers, exporters and service providers. The subsector will also work closely with relevant stakeholders to ensure that agricultural products meet international quality and safety standards. It will collaborate with other relevant sectors and subsectors to promote economic cooperation and regional integration as a strategy for expanding local markets. These strategies are aimed at shifting the sector from subsistence agriculture to farming as a business (GoK, 2010).

Kenya relies on a few marketed agricultural products: tea, coffee, sisal and horticulture. Expanded and diversified regional and global market access for the country's agricultural products will largely depend on the competitiveness of the agricultural sector. This calls for improved productivity and an increased agricultural production base. The country's agricultural resource base will be increased and improved through developing diversified, demand-driven crop varieties; intensively applying appropriate technologies; and expanding use of irrigation systems in agricultural production. To achieve this research–extension links will be strengthened to ensure demand-driven research and effective application of research technologies on the farm. In addition, the private sector will be encouraged and supported to invest in agricultural production at all levels of the supply chain from farming, research and extension to processing and marketing. Strengthening extension services and creating strong links between research and extension are two of the subsector's overriding objectives. Effective adoption of technology packages will require a participatory approach to extension (GoK, 2010).

To increase agricultural productivity and improve farming as a business, farmers need access to inputs and credit. Appropriate credit packages suitable for small-scale producers will be made available to enable producers access key inputs such as fertilizer, agrochemicals and seed. Farmers need capital investment for irrigation infrastructure, value-addition technologies and general farm development, and to comply with food safety regulations. The subsector will employ the following interventions: Develop appropriate credit packages suitable for small-scale producers, Improve access to key inputs and Implement the flagship fertilizer cost-reduction investment project (GoK, 2010).

1.1.2 Agricultural Productivity

FAO (2011), reported that volatile prices and possible future supply scarcity of fossil fuels and the heavy reliance of the food industry on these non-renewable energy resources, raises concerns about the availability and affordability of food as well as on the economic viability of some food-related businesses in the years to come. In their study; Energy-smart food for people and climate, they noted that, if fossil fuel prices continue to rise and carbon charges are added to cover the externality costs of greenhouse gas emissions released during their combustion, the costs of tractor and boat fuel, agri-chemicals and fertilizers, food processing and transportation will all increase. This situation could cast doubt on the premise that, since farm land and fishing stocks are limited, future increases in food production will come mainly from crop yield increases, particularly through the application of higher external energy inputs in less intensive systems. They concluded that further intensification in primary agricultural production, together with any land expansion and intensification in activities beyond-farm gate, should ideally be gradually disconnected from additional fossil fuel demands if the world is to move towards a low-carbon, less fossil fuel dependent, food sector.

Improving agricultural productivity has been the world's primary safeguard against a recurring Malthusian crisis--where the needs of a growing population outstrip the ability of man and resources to supply food. Over the past 50 years, global gross agricultural output has more than tripled in volume, and productivity growth in agriculture has enabled food to become more abundant and cheaper (Fuglie & Wang, 2012).

Odhiambo and Nyangiti (2003) studied the concern rising about the performance of the agricultural sector in Kenya given that it is the backbone of the country's economy. The issue of particular concern was the declining productivity that has been associated with increasing poverty, food shortages and poor rural livelihoods. In their discussion paper "Measuring and Analysing Agricultural Productivity in Kenya: a Review of Approaches" they noted that there is a positive and significant statistical relationships between fertilizer use and productivity. Besides, there are numerous farm-demonstrations mainly by physical scientists that have shown the impact of fertilizer use on farm yields. The policy implication of these results is clear: increase fertilizer use to enhance productivity. Studies in Kenya have however shown that the use of fertilizer is still very low especially among smallholder farmers. They also found that there is a positive correlation between household agricultural commercialization and productivity.

In their discussion, Odhiambo and Nyangiti (2003), also noted that a number of empirical studies in Kenya had considered extension services as an important determinant of agricultural productivity. The main finding of the studies was that extension services have a discernible impact on productivity. The impact, according to the studies, was at the highest top end of the distribution of yields residuals, "suggesting that productivity gains from agricultural extension may be enhancing unobserved productive attributes of farmers such as managerial abilities" Although the importance of extension services in enhancing agricultural productivity are widely acknowledged, the extension system in Kenya has

virtually collapsed. The major conclusion of the study is that although there have been attempts to analyse agricultural productivity in Kenya, the approaches, the data used, as well as the scope have largely been inadequate. This has hampered policy formulation for the development of agricultural productivity.

1.1.3 Agriculture Sector in Tana River County

Tana River is one of the largest counties in the coast region with an estimated area of 38,582Km^2 and a population of 240,811 persons while the average poverty index is estimated at 71% (Ministry of Agriculture [MoA], 2015).

With 76.9 % of the population living in absolute poverty and with a population growth rate of 2.8, the county is faced with the challenge of increasing food production to cater for the increasing population and alleviate poverty. About 82.2 % of the County's population is dependent on agriculture and livestock. Farmers in the county mainly rely on rain fed and flood recession farming systems with only a few practicing irrigated farming. The County has supported farmers with farm inputs like seeds, subsidized fertilizers and mechanized land preparation activities to boost production. In order address some of the farming challenges the county plans to engage Kenya Agricultural Research Institute (KARI) to research on issues that affect farmers from soil health, crop pests and diseases to post harvest losses. The County has three major irrigation schemes namely Hola and Bura managed by the National Irrigation Board (NIB) and Tana Delta Irrigation Project managed by the Tana and Athi Rivers Development Authority (TARDA). These schemes utilize pump-fed and furrow irrigation and are engaged in maize and rice production (GoK, 2015).

Approximately 95% of pastoralists' households derive their income from the livestock subsector. The pastoralists depend on indigenous Boran beef cattle, Black Head Persian sheep and Galla goats, as well as single-humped Camels. The Tanaland Boran breed of beef cattle is trypano-tolerant and can withstand harsh climatic conditions experienced in the County. Efforts are in progress to improve the livestock marketing channels and also initiate a modern abattoir for value addition of beef, and for hides and skins tannery (GoK, 2015).

Growth in the agricultural sector decelerated in 2013 to 2.9 per cent from a revised growth of 4.2 per cent in 2012 partly due to inadequate rainfall received in some grain growing regions (GoK, 2014), this is in contrast with the ASDS where the overall goal of the agricultural sector is to achieve an average growth rate of 7 per cent per year. As reported by ASDSP (2014), the main problem facing the agricultural sector in Tana river include; low agricultural production leading food shortage, crops destruction by wildlife, livestock attacks by wild animals and encroachment of forests by human beings leading to environmental destruction. Table 1.1 below gives some productivity data from Tana River County.

Table 1.1 Crop, Horticulture and Animal Production in Tana River County

Produce / Year	2012	2013	2014
Maize (Bags)	134,981	164,270	156,248
Green grams (Bags)	16,322	22,286	16,372
Cowpeas (Bags)	18,404	22,964	11,186
Rice (Bags)	75,188	42,749	24,935
Bananas (Tons)	13,057	15,226	15,986
Mango (Tons)	18,540	22,054	23,204
Beef Cattle (No.)	460,562	528,469	557,190
Local Poultry (No.)	110,200	124,076	141,912
Local Goats (No.)	474,200	573,462	653,350
Sheep (No.)	217,500	251,734	276,650
Camels (No.)	59,927	59,661	61,832

Source: MoA Annual Reports, Horticulture Validation Reports and Livestock Department Annual reports

1.2 Statement of the Problem

Developing strategies is really a way to focus your efforts and figure out how you're going to get things done. By doing so, you can take advantage of resources and emerging opportunities, respond effectively to resistance and barriers and ensure a more efficient use of time, energy, and resources (Nagy & Fawcett, 2014). The ASDS vision is a food-secure and prosperous nation whereas its mission is innovative, commercially oriented and modern agriculture. To deliver the vision of the agricultural sector, institutional reforms and better coordination will be critical (GoK, 2010).

Agriculture plays a major role in Tana River County as it contributes to the livelihood of the communities through agro- pastoralism. Food security in the county is enhanced through agriculture by preferred foodstuff being available in the county and also by

enhancing access as a result of income earned through employment as alternative source of livelihood hence increasing the nutritional status of the population in the county. The main problem facing the agricultural sector in Tana river include; Low agricultural production leading to food shortage, crops destruction by wildlife, livestock attacks by wild animals and encroachment of forests by human beings leading to environmental destruction (ASDSP, 2014).

Child fund International (2015) reports that farmers in Kenya are still facing many challenges; from difficult environmental conditions to administrative land ownership hurdles, subsistence farming in Kenya can be hard for families living in poverty.

In another study, Kibet (2011) found out that there is limited access to extension services in most parts of the country with the National extension staff: farmer ratio standing at 1:1,500. This situation has hindered most farmers from keeping pace with changing technological advances.

Kosgey (2013) noted that accessibility to agricultural credit by farmers has been dwindling over time. The Ministry of Agriculture does not have a clear policy to deal with the problem hence leaving the task to credit institutions to provide finances to farmers at their own prerogative. Indeed the trend for the last nine years in agricultural credit dispersed to the grain farmers has been declining in the County. In 2004 to 2012 accessibility to agricultural credit dropped from 57.17 percent to 18.74 percent indicating that there is a problem since the number of applicants has been increasing over the same period whereas unsuccessful applicants have been increasing.

Kamwendwa (2013) also noted that politicians have converted the ministry of agriculture into a political toy of sorts. The end result has been incessant food shortages, fertiliser supply challenges and unmitigated losses triggered by avoidable circumstances, hence the

Vision 2030 initiative that agriculture is supposed to contribute 10 per cent of Kenya's GDP does not seem tenable at the current rate.

These studies paint a gloomy picture on the agriculture sector in Kenya with eminent food shortages in the future due to low production. It is with this picture in mind that this study sought to look into the effects of the key interventions by the Agricultural Sector Development Strategy (ASDS) on agricultural productivity in Kenya.

1.3 Objectives of the Study

1.3.1 General Objective

The general objective of the study was to establish the effect of the Agricultural Sector Development Strategy on agricultural productivity in Tana River County.

1.3.2 Specific Objectives

The specific objectives of the study include;

(i) To evaluate the effect of climatic change response on agricultural productivity in Tana River County;

(ii) To examine the effect of agribusiness on agricultural productivity in Tana River County;

(iii) To evaluate the effect of agricultural extension services on agricultural productivity in Tana River County; and

(iv) To examine the effect of access to agricultural credit on agricultural productivity in Tana River County.

1.4 Research Questions

The study was guided by the following research questions;

(i) What is the effect of climatic change response on agricultural productivity in Tana River County?

(ii) How has agribusiness affected agricultural productivity in Tana River County?

(iii) How has agricultural extension services affected agricultural productivity in Tana River County?

(iv) What is the effect of access to agricultural credit on agricultural productivity Tana River County?

1.5 Significance of the Study

The general purpose of the study was to evaluate the effect of the Agricultural Sector Development Strategy on agricultural productivity and whether it is achieving its intended purpose. The study may also provide managers and policy makers in agriculture and possibly other sectors with an insight of the effects of the implementation of the Agricultural Sector Development Strategy and general strategic planning in the public sector. It may also guide the sector in Tana River County in unearthing whether there are special effects arising from the implementation of the Agricultural Sector Development Strategy in the county. Farmers in Tana River County and probably beyond may benefit from the study since it identified gaps in the sector and may help them bridge those gaps or demand action from the government. The study also will be a useful reference for any researcher who intends to do a research related to this study, it will help them to develop new ideas or expand on the things that have not been tackled in this research.

1.6 Limitations of the Study

The study was constrained by several factors. A major challenge was the available resources within which to complete the study, particularly given the study scope and quality of work expected by the university. The study however sourced enough resources from workmates and friends before commencing the research. The funds were used to meet the research budget. Most of the respondents believed that the study was fully funded by the university and they therefore expected to be paid for giving their responses. This challenge was however overcome by explaining to the respondents that the study was self-sponsored which they easily understood

Timely response, response rate, and quality of responses, were also additional challenges given the depth and nature of information required, that might have resulted to compromised data quality and usefulness. The drop and later pick method of collecting the data helped in increasing the response rate and timeliness.

It is important, however, to state that there is confidence that these limitations did not impair the study results as extra caution was taken to avert and minimize, as far as possible, the potential effects of these limitations.

1.7 Scope of the Study

This study addressed the concept of the Agricultural Sector Development Strategy on agricultural productivity. It was conducted in Tana River County targeting the technical staff in the agriculture sector as its respondents.

1.8 Organization of the Study

The study is organized into five chapters. Chapter one provides details on the background of the study, statement of the problem, purpose of the study, objectives of the study, research questions, limitations, scope and organization of the study.

Chapter Two offers a review of the relevant literature on the effect of the Agricultural Sector Development Strategy on Agricultural Productivity, both theoretical and empirical reviews, research gap and the conceptual framework.

Chapter Three covers research methodology that is applied to source data. In this section the researcher identified the procedures and techniques which were used in the collection, processing and analysis of data. Specifically the following subsections are included; research design, target population, data collection instruments, data collection procedures, pilot testing and finally data analysis.

Chapter Four covered data analysis, presentation, discussion and interpretation of the study findings. This was followed by chapter five which contain summary of the findings, discussions, conclusions and recommendations. References and appendices are at the end of the report.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviewed both the theoretical and empirical frameworks related to implementation of strategic plans. The chapter developed the conceptual framework and reviewed the independent variables in relation to the dependent variable.

2.2 Theoretical Review

A theory is defined as a set of interrelated concepts, definitions, and propositions that present a systematic view of phenomena by specifying relations among variables with the purpose of explaining or predicting the Phenomena (Kerlinger & Lee, 2000). The study reviewed the resource -based view and the systems theories.

2.2.1 Resource Based View Theory

The resource based view theory was developed in 1984 by Birger Wernerfelt. In theory and practice of strategic management a number of different concepts of corporate competitiveness have been formulated. In the 1980's strategic research generated a new approach explaining economic results of businesses operating in a competitive environment through the resources owned by them. In western literature this approach is referred to as the Resource-Based View of the Firm (RBV), whereas in Polish literature as a resource approach or strategy. RBV is based on the assumption that in business the key success factor is the access to strategic resources and skills and their effective use. An enterprise owning the resources relevant to its economic activity and adopted strategy has

more chance to succeed than an enterprise whose resources are not compatible with its activity (Wronka & Maćkowska, 2011).

Public organizations working as open systems operate in conjunction with the environment. Interaction between the organization and its environment occurs while it is assumed that the impact of the environment on organizations is much greater than vice versa. The theory and practice of management clearly indicate the need for a proper diagnosis of the environment as an essential element of building an organization's strategy, although the very concept of the environment and its components can be handled differently. Diagnosing the environment is a prerequisite for the successful building of the organizational strategy. The environment of public organizations tends to be turbulent, which results in their politicization and consequent inability to predict upcoming changes on one hand, and – on the other hand - their complexity stemming from the existence of a large number of stakeholders within public organizations, whose expectations they are forced to fulfil, and which often are mutually exclusive. Literature in the field of management as one of the possible prescriptions for increasing environmental turbulence indicates the resource approach – Resource Based View - which assumes that the success of the organization lies within the organization itself, or to be exact – in its valuable, intangible and not perfectly imitable resources (VRIO condition) allowing it to achieve a sustainable competitive advantage Barney and Clark, (as cited in Szymaniec-Mlicka, 2014).

The growing importance of the public sector for socio-economic development of a country is reflected in the greater interest of researchers seeking answers about effective methods and tools for the management of public sector organizations. One of the important directions of research are issues of strategic management of the public organizations and searching for solutions improving their efficiency in that area, especially in an increasingly

dynamic environment. One of the proposed solutions is to use the resource-based view (RBV) which focuses on the interior structure of the organization, as well as its resources and capabilities that will better meet the emerging challenges (Szymaniec-Mlicka, 2014).

The agricultural sector is an organization by itself within the government structures which has enormous resources both tangible and intangible. This study looked into the resources within the agriculture sector to ascertain whether it has engaged them properly in the implementation of the ASDS and how this has affected productivity.

2.2.2 Systems Theory

The systems theory was developed by biologist Ludwig Von Bertalanffy in 1936. Hayajneh (2007) defines a system as a collection of independent but interrelated elements or components organized in a meaningful way to accomplish an overall goal. The function of any system is to convert or process materials, energy, and/or information (inputs) into a product or outcome for use within the system, or outside of the system (the environment) or both. This theory is based on the view that managers should focus on the role played by each part of an organization; rather than dealing separately with the parts (Hannagan, 2002). The systems theory maintains that an organization does not exist in a vacuum. It does not only depend on its environment but it is also part of a larger system such as the society or the economic system to which it belongs. The systems approach is concerned with both interpersonal and group behavioural aspects leading to a system of cooperation (Koontz, 2001).

The agriculture sector is a complex system consisting of the staff, various departments and numerous stakeholders. It is also a sub-system of a larger system called the government. The systems theory emphasizes unity and integrity of the organization and focuses on the

interaction between its component parts and the interactions with the environment. It suggests that organizations must be studied as a whole taking into consideration the interrelationships among its parts and its relationship with the external environment. As an open system, the agriculture sector responds to the external influences as it attempts to achieve its strategic objectives and this study sought to measure the interaction between the sector and its environment in the implementation of the ASDS and how agricultural productivity has been affected.

2.3 Empirical Review

The study identified four key independent variables namely; climate change response, agribusiness and market access, agricultural extension services and access to agricultural credit. This review endeavored to look into what other scholars and researchers have written on the same.

2.3.1 Climate Change Response and Agricultural Productivity

Nelson, et al (2009) reported that climate-change adaptation is increasingly on the agenda of researchers, policymakers, and program developers who are aware that climate change is real and threatens to undermine social and ecological sustainability. In agriculture, adaptation efforts focus on implementing measures that help build rural livelihoods that are more resilient to climate variability and disaster and an assessment of the costs of productivity-enhancing investments in agricultural research, rural roads, and irrigation infrastructure and efficiency that can help farmers adapt to climate change. In their report titled “Climate change, Impact on Agriculture and Costs of Adaptation” they assessed the costs of adaptation and identified agricultural productivity investments that reduce child

malnutrition with climate change to no-climate-change levels, holding all other macro changes constant, such as income and population growth. They concluded that agriculture and human well-being will be negatively affected by climate change. Crop yields will decline, production will be affected, crop and meat prices will increase, and consumption of cereals will fall, leading to reduced calorie intake and increased child malnutrition.

In a study "Global climate change and agricultural production", Bazzaz and Sombroek (1996) observed that climate change presents a challenge for researchers attempting to quantify its impact due to the global scale of likely impacts, the diversity of agriculture systems, and the decades' long time scale. Current climatic, soil and socio-economic conditions vary widely across the world. Each crop and crop variety has specific climatic tolerances and optima. They noted that it is not possible to model world agriculture in a way that captures the details of plant response in every location. The availability of data with the necessary geographic detail is currently the major limitation rather than computational capability or basic understanding of crop responses to climate. A specific problem has been how to take the detailed knowledge of plant response into aggregate assessments of regional assessments. In general, compromises are necessary in developing quantitative analyses at regional scales. They concluded that, global climate change, if it occurs, will definitely affect agriculture. Most mechanisms, and two-way interactions between agriculture and climate, are known, even if not always well understood.

Many studies project that Earth's climate will warm by 1.5 to 5.0°C during the next century. A substantial portion of this warming may occur even if global efforts are undertaken to reduce emissions of heat-trapping gases (Darwin, Tsigas, Lewandrowski & Raneses, 1995). In their report; "World Agriculture and Climate Change. Economic Adaptations", they argued that estimates of the economic and ecological effects of this warming and associated shifts in precipitation patterns are needed by policymakers to

determine how much to control emissions and how best to adapt to unavoidable climate changes. The agricultural consequences of these climate changes are twofold. First, climate change may affect crop and livestock productivity. Second, ensuing economic responses may alter the regional distribution and intensity of farming. This means that, for some regions, the long-term productivity and competitiveness of agriculture may be at risk, farm communities could be disrupted and conflicts over environmental impacts of agriculture on land and water resources could become increasingly contentious. Using the Future Agricultural Resources Model (FARM), they concluded that global warming and associated changes in precipitation patterns during the next century are not likely to imperil food production for the world as a whole. Although world production of non-grain crops would probably decline, production of grain and livestock would likely increase. The net result is that world production of processed foods would be maintained slightly above current levels.

Yohannes (2016), in the study titled "A Review on Relationship between Climate Change and Agriculture" concluded that with the right farming practice, agriculture could be the main solution for climate change by mitigation and adaptation response. Within the current and projected situation of climate change globally, only climate change mitigation is not enough so long term solution is important by combining climate change adaptation in agriculture sector. Such practices could be organic agriculture, manure management, agroforestry practice.

2.3.2 Agribusiness and Agricultural Productivity

In their study "Necessary and Sufficient Conditions for Agribusiness Success of Small-scale Farming Systems in Northern Vietnam", Ha, Bosch, and Nguyen (2015), conducted

their study in Haiphong (Vietnam) during 2013-2014 to analyse the requirements for the success of small-scale agribusinesses. Following two baseline studies on the current state of the local farming systems and market situations, various stakeholders were engaged in a number of workshops with support of a causal loop diagram (CLD) modelling tool to redefine the pre-requisites for agribusiness success and their interplays.

As a result, multi-stakeholder collaboration and government support via its policies and development programs were identified as the necessary conditions for success. They also observed that majority of the world's poor is smallholder farmers who are reliant on agricultural production. Securing market access for agricultural produce has been identified as one of the most important strategies towards rural development and poverty alleviation (Fischer & Qaim, 2012). They concluded that a multi-actor partnerships and government support through policies and development programs are highly necessary. However, it cannot guarantee the success of small-scale agribusinesses unless the sufficient conditions are met. That is, strengthening the capacity of local producer groups and investing in human and social capitals are required to address context-specific needs, and to facilitate collective actions and ownership of their livelihood development strategies towards a sustainable future.

Abatekassa and Peterson (2011) studied "Market Access for Local Food through the Conventional Food Supply Chain". Using a case study conducted in 2007 and 2008 in a six-county region of Southeast Michigan, they interviewed wholesalers and retailers in the food industry and overall, the findings indicate that market access for local food products are mainly based on existing relationships and linkages between the supply chain actors and the local food producers. In the literature, trust has been considered as one of the driving forces to improve seller-buyer relationships.

In their study "Linking agribusiness and small-scale farmers in developing countries: is there a new role for contract farming?" Kirsten and Sartorius (2002) examined a new role for contract farming in developing countries in the light of the industrialisation of agriculture and the globalisation of world markets. They noted that contracting allows farmers to overcome the barriers of entry into crop- and animal- specific sectors. Farmers usually enter into contract production in order to reduce cost and gain access to information, technology, marketing channels, managerial skills, technical expertise, access to plant and equipment and patented production procedures whereas for agribusiness, the benefits from a contract-farming venture revolve mainly around cost reduction, quality control and reduced uncertainty with regard to the supply of raw material. They however found out and concluded that there are problems normally associated with contract farming ventures, which lead to many failures and mistrust between agribusiness and smallholder families. These problems are: Poor enforcement of contracts; High transaction costs in dealing with many smallholders; Strict demands for consistency (no variation), quality, food safety, due diligence, etc.; Business attitudes and ethics referring to non-payment, delayed payments or even reduced payments; High rate of product rejection by agribusiness and traders; and Weak bargaining position of farmers vis-a`-vis a limited number of traders.

Reardon and Barrett (2000) noted that agro-industrialization prompts and responds to the changing organization of agri-food sectors in developing countries and in the institutions governing production and exchange. In their study, "Agro-industrialization, Globalization, and International Development: An Overview of Issues, Patterns, and Determinants" they suggested that given high per unit costs of contracting with smaller farmers, who also commonly have greater problems meeting stringent quality and safety requirements, contract farming in some settings favours more capital-intensive medium and large

farmers, lessening the income and employment impact of agro-industrialization for the poor.

These suggestions were also echoed by Key and Runsten, (1999). They concluded that the necessity of agro-industrialization is almost indisputable. Yet a plethora of questions remain as to how to get the right kind of agro-industrialization, the sort that stimulates employment, reduces poverty and real food prices, stimulates real wages, improves food safety, quality and consumer choice, and protects the natural environment. But too often the process of agro-industrialization leads to industrial concentration, exclusionary practices that crowd out undercapitalized indigenous firms and small farmers, substitution of imported equipment and managers for domestic workers and entrepreneurs, enrichment of local urban elites at the expense of the rural poor, and depletion or degradation of the host country's natural resources.

2.3.3 Agricultural Extension Services and Agricultural Productivity

In their study “Agricultural Extension in Kenya: Practice And Policy Lessons” Muyanga and Jayne (2006) assed the quality of extension service provision for food crops and livestock in Kenya, with a broad aim of understanding what exists, what works, and why. The study employed both qualitative and quantitative methods and used primary and secondary data gathered from government published Economic Surveys, statistical abstracts and public expenditure review reports. They noted that Kenya’s small farmers have traditionally benefited from two major types of extension systems, that is the government extension system and the commodity-based systems run by government parastatals, out grower companies and cooperatives. As a result of ineptness in the public extension system, a third type of extension service -- private agricultural extension system

has emerged. They concluded that private extension provision is generally skewed towards high potential regions and high value crops. Remote areas and poor producers, especially those growing low-value crops with little marketable surplus, are poorly served. Non-commercial providers are targeting them but their scope is limited since public resources for extension are very constrained.

Anderson and Feder (2004) studied a framework outlining farmers' demand for information, the public goods character of extension services, and the organizational and political attributes affecting the performance of extension systems. In their study "Agricultural Extension: Good Intentions and Hard Realities" this conceptual framework was used to analyse several extension modalities and their likely and actual effectiveness. They argued that investments in extension services have the potential to improve agricultural productivity and increase farmers' incomes, especially in developing economies, where more than 90 percent of the world's nearly 1 million extension personnel are located. They also noted that over the past four decades, extension operations have been one of the largest institutional development efforts the world has ever known. Hundreds of thousands of technicians have been trained, and hundreds of millions of farmers have had contact with extension services. As countries struggle with declining public budgets, a key question must wonder how effective these extension investments have been.

In their conclusion, Anderson and Feder found out that agricultural extension can play an important role in development. The public goods character of much extension work underpins the extensive public investment in extension services. But although public extension organizations are common in developing economies, they are often inadequately funded and their effectiveness is limited by many administrative and design deficiencies and challenges. Chief among these are the large scale and complexity of extension

operations, the important influence of the broader policy environment, weak links between extension and knowledge generation institutions, difficulties tracing extension impact, problems of accountability, weak political commitment and support, the frequent encumbrance of extension agents with public duties beyond those related to knowledge transfer, and severe difficulties of fiscal unsustainability.

In their discussion paper "Measuring and Analysing Agricultural Productivity in Kenya: a Review of Approaches", Odhiambo and Nyangiti (2003), noted that a number of empirical studies in Kenya had considered extension services as an important determinant of agricultural productivity. The main finding of the studies was that extension services have a discernible impact on productivity. The impact, according to the studies, was at the highest top end of the distribution of yields residuals, "suggesting that productivity gains from agricultural extension may be enhancing unobserved productive attributes of farmers such as managerial abilities"

Evenson, Robert, Mwabu and Germano (1998) studied effects of agricultural extension on crop yields in Kenya controlling for other determinants of yields, notably the schooling of farmers and agro-ecological characteristics of arable land. The data used was collected by the Government of Kenya in 1982 and 1990 and a quantile regression technique was used to investigate productivity effects of agricultural extension and other farm inputs over the entire conditional distribution of farm yield residuals. They concluded that productivity gains from agricultural extension are highest at the top end of the distribution of yield residuals, suggesting that agricultural extension may be enhancing unobserved productive attributes of farmers such as managerial abilities. They also noted that public investment that makes market centres broadly available to farmers would improve farm productivity because distance from market centres reduces farm yields at all quantiles. Another finding

is that increases in farm yields due to schooling generally rise with quantiles but these increments are not significant.

2.3.4 Access to Agricultural Credit and Agricultural Productivity

In a study "Agricultural Credit And Its Impact On Farm Productivity: A Case Study Of Kailali District" Bhatta (2014) explored the problems related to the procurement and use of agricultural credit by farmers in Kailali district, investigated the major determinants considered by banks and financial institutions while disbursing such credit and assess the impact of such credit on farmers technical efficiency and productivity. The study was based on a survey conducted with a sample of 100 farmers (50 agricultural credit users and 50 credit non-users) and 10 officials from banks and financial institutions working in the area of agricultural credit from Kailali District, Far-Western Nepal. He observed that farmers of the study area do not have an easy access to agricultural credit. They do not get as much credit as required to finance the inputs of agricultural production. Moreover, they have to bear a high interest rate while taking credit from micro credit banks and rural development bank.

Bhatta (2014) also noted that farmers have not benefited very much from the use of credit for the production of food crops and vegetables in the study area. This was due to the high interest rate charged on such credit and low rate of return from agricultural sector. On the other hand, banks and financial institutions were sceptic about the repayment of loan disbursed to agricultural sector. So, they demanded a lot of mortgage and annual income of farmers. Small farmers have, thus, little access to agricultural credit. He however concluded that agricultural credit had helped to enhance the agricultural productivity of the farmers in the study area. With such a credit facility, farmers had a better access to

improved seeds, fertilizer, pesticides and better irrigation facility. In the study area, all the farmers using the credit facility had achieved a higher technical efficiency level, (82 percent on the average) whereas the farmers not using the credit facility had a lower level of technical efficiency, (63 percent on the average).

In their study "Empirical Analysis of Agricultural Credit in Africa: Any Role for Institutional Factors?" Salami and Arawomo (2013) noted that access to credit facilities had been identified as the direct solution to increasing investment agriculture in Africa. Credit is a crucial factor in agricultural production and in many cases may be a limiting factor in small holder agriculture. The study was based on regional analysis of determinants of agricultural credit that involved ten Africa countries hence the panel data estimation was be used. They noted that despite the implementation of the various agricultural policies in Africa targeting to increase agricultural investment, what was discovered is the dwindling fortunes of the African countries in agricultural production. It was in the light of this that this study examined the extent of agricultural credit in African countries. The study equally analysed the factors responsible for the low level of agricultural credit in Africa, with a special consideration given to institutional factors. It concluded that the low and dwindling agricultural credit in Africa has continued to hamper the development of the sector in the continent. The factors responsible for the low level of agricultural credit in Africa were broadly categorized into: poor governance, government policies and institutional factors.

In his study "Determinants Of Smallholder Farmers Access To Formal Credit: The Case Of Metema Woreda, North Gondar, Ethiopia", Yehuala (2008) sought to ascertain factors that affected smallholder farmer's access to formal credit and also the status of women and different wealth groups' access to formal and informal credit sources in the study area. A two stage sampling method was employed to select three out of eighteen rural peasant

associations and 130 farm households. Structured interview schedule was developed pre-tested and used for collecting quantitative data for the study from the sampled farm households. Focus group discussion, group interview and field observations were held to generate qualitative data. The output from the study indicates that 56 (43.1%) of the sampled farm households were formal credit users, whereas the remaining 74 (56.9%) were non-users. It was also found out that credit access to female headed households was still limited and the difference between the wealth groups in accessing credit from the formal sources was also statistically significant.

Yehuala (2008) also found out that farmers acknowledged group lending that solves the problem of collateral requirement by lending institutions, controls misuse of borrowed funds and minimizes the risk of default and they also recognized the provision of saving services by Micro Finance Institution (MFI), while strongly criticizing the isolation of very poor farmers from the group formation. Moreover, the smaller loan size, earlier saving requirement which was not convenient to the farmers, and repayment period by the MFI were among the critical problems. Participation in extension package programs, experience in credit use from the formal sources, total cultivated land size, number of livestock in tropical livestock unit, collateral or group formation and membership of Farmers Multi-Purpose Service Cooperatives (FMSC) were highly important in influencing access to formal credit use as evidenced by the model output.

Fuglie and Wang (2012) report increased agricultural productivity on the global context whereas FAO (2011) paints a gloomy picture of future agricultural productivity. The 2014 economic survey highlights show a decline in agricultural productivity with the envisaged 7 per cent growth in the ASDS far from being attained. Tana River County is no different as shown in table 2.1 above, where crop production is not stable in growth unlike

horticulture and livestock. The data also lacks the movement in the produce either through marketing or local consumption and therefore it is difficult to know with certainty the real level of production.

Although there is marginal increase in horticulture and livestock production, there is no data linking the increase to the interventions of the ASDS and this study endeavoured to find out the reality on the ground.

2.4 Summary of Literature and Research Gap

Nelson, et al (2009) studied climate change, impact on agriculture and costs of adaptation and found out that agriculture and human well-being will be negatively affected by climate change. On their part, Darwin, Tsigas, Lewandrowski and Raneses (1995) concluded that global warming and associated changes in precipitation patterns during the next century are not likely to imperil food production for the world as a whole.

Ha, Bosch, and Nguyen (2015) found out that multi-actor partnerships and government support are highly necessary for agribusiness and success of small-scale farming. In their study Muyanga and Jayne, (2006) found out that in Kenya, private extension target high potential regions while non-commercial providers target low potential areas but their scope is limited since public resources for extension are very constrained. On the other hand, Bhatta (2014) reported that agricultural credit had helped to enhance the agricultural productivity. Odhiambo and Nyangiti (2003) noted that extension services have a discernible impact on productivity though in Kenya the service have virtually collapsed.

From the above literature, the various variables in this study have been addressed to a greater extent but there exists a gap on how they affect agricultural productivity and the real situation in Kenya, hence this study aims to bridge this gap. The literature also indicate

the necessity of resources and synergy between implementing agencies thus justifying both the resource based view and the systems theories in relation to this study

2.5 Conceptual Framework

A conceptual framework is defined as a network or a "plane" of linked concepts. Conceptual framework analysis offers a procedure of theorization for building conceptual frameworks based on grounded theory method (Jabareen, 2009). When clearly articulated, a conceptual framework has potential usefulness as a tool to scaffold research and, therefore, to assist a study to make meaning of subsequent findings.

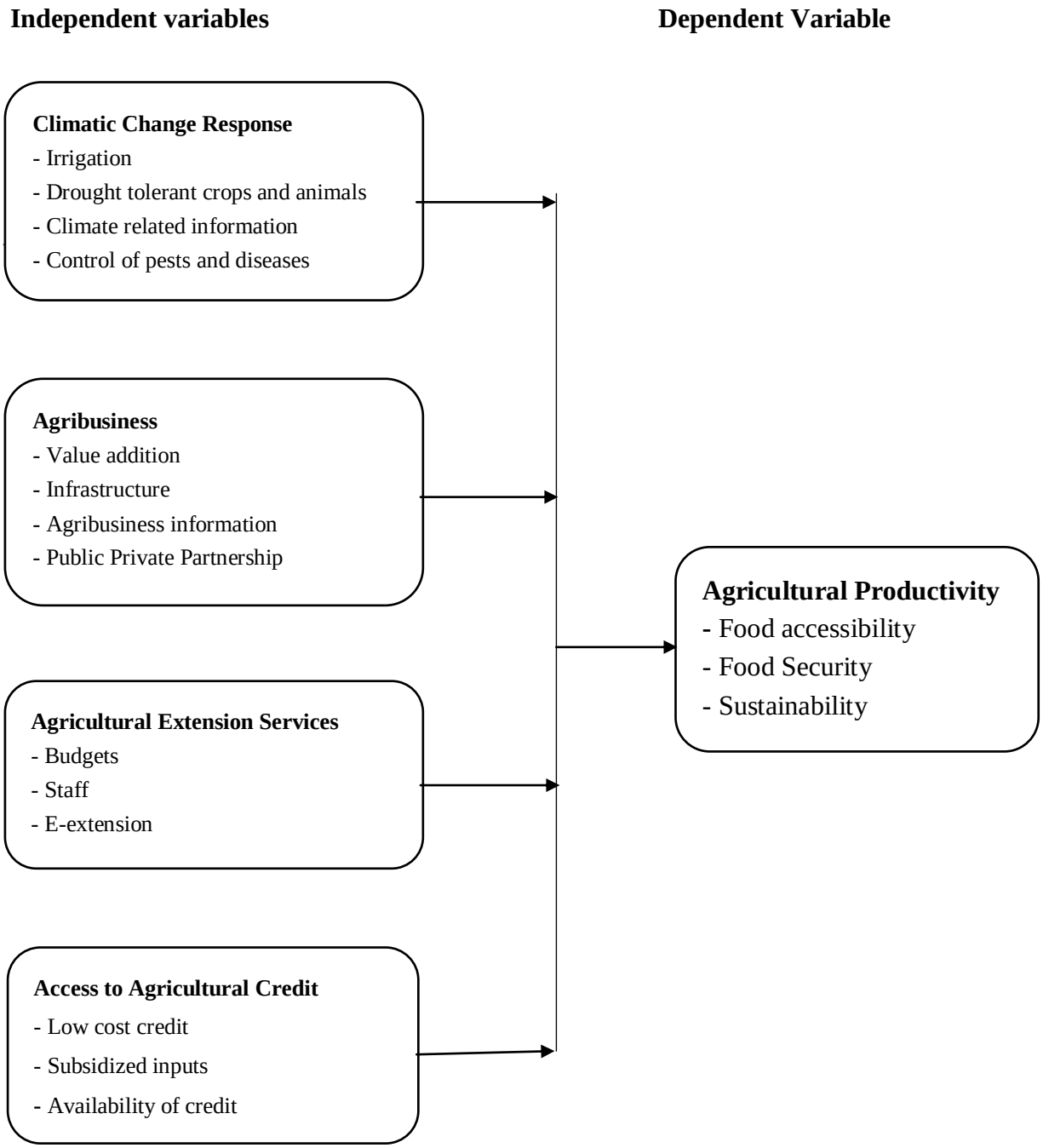

Figure 2.1: Conceptual Framework Source: (Author, 2017)

2.5.1 Climatic Change Response

In response to the challenges and opportunities posed by climate change, Kenya has developed this National Climate Change Response Strategy. The vision of the Strategy is for a prosperous and climate change resilient Kenya. The mission is to strengthen and

focus nationwide actions towards climate change adaptation and Green House Gases emission mitigation. This will be achieved by ensuring commitment and engagement of all stakeholders while taking into account the vulnerable nature of Kenya's natural resources and society (GoK, 2010).

2.5.2 Agribusiness

Agribusiness, often defined as the whole range of business activities that are performed from farm to fork, but also including the processing of raw materials for the production of many non-food items, such as textiles, paper and biofuel. Agribusiness covers the supply of agricultural inputs, the production and processing of agricultural products, and their distribution to the consumer (United Nations Industrial Development Organization [UNIDO], 2011).

2.5.3 Agricultural Extension Services

Agricultural Extension Service aims to educate the people of farming community in order to improve their quality of life through dissemination of knowledge, technologies, techniques, methods, ideas and useful information through extension system. It assists farm people, through educational process, in improving farm production methods and techniques, increasing production efficiency and income, improving their levels of living and lifting the social and educational standard of rural life. Agricultural extension services, which encompass public and private sectors, NGOs, research and academic institutions and also the farmers, are the main forces in the processes of technology transfer. The information usually flows from researchers to extension agents and from extension agents

to farmers in one direction, and from farmers to extension agents and then to the researchers, in the other direction. (Uddin, 2008).

2.5.4 Access to Agricultural Credit

Agricultural Credit is the amount of investment funds made available for agricultural production from resources outside the farm sector. It is also defined as a type of financing used to provide funding for agricultural producers. This may be in the form of letters of credit, loans or banker's acceptance documents. This is generally used to provide investment from outside resources to the farming sector. The funds may be used according to the farmer's planting, harvesting and marketing cycles for purchasing farm machinery, payment of labour wages, or for acquiring more land for agricultural purpose, development of irrigation facilities, etc (Mbaskool.com, n.d.)

2.5.5 Agricultural Productivity

Agricultural productivity may be defined as the "ratio of index of local agricultural output to the index of total input used in farm production". It is, therefore, a measure of efficiency with which inputs are utilized in production, if other things being equal (Dharmasiri, 2009).

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter sets out the research design, target population and how the sample size is developed. It also explained the data collection instruments, procedures and how collected data was analysed and presented.

3.2 Research Design

This study employed descriptive survey design. This survey is preferred since it is an efficient method of collecting data. It involves studying large and small population to discover distribution of sociological and psychological variable (Kerlinger & Lee, 2000). Kothari (2003) define a survey research as systematic gathering of information from a sample of respondents for the purpose of understanding and/or predicting some aspects of the behaviour of the population of interest. According to Creswell (2002), descriptive survey designs are used in preliminary and exploratory studies, to allow gathering of information, summarize, present data, and interpret it for the purpose of clarity. The study collected respondents' opinions and their perception about the effect of the ASDS on agricultural productivity.

3.3 Target Population

This study targeted technical staff in the agriculture sector in Tana River County. The study used the census method. Census refers to the complete enumeration of a universe. A universe may be a place, group of people or a specific locality through which we collect

data (Farooq, 2013). This method was preferred because the target population was small hence the sample is equal to the population, that is sixty eight (68). This method has a higher degree of accuracy and it is free from bias. The department of Agriculture, Livestock, Veterinary Services and Fisheries gave the following figures as its current staff profile per sub-county;

Table 3.1: Target Population

Sub – County	Staff Population Size
Tana North	17
Tana River	30
Tana Delta	21
TOTAL	**68**

Source: Agriculture Sector Staff Profile (2017)

3.4 Data Collection Instruments

According to Ngechu (2004), there are many methods of data collection. The choice of a tool and instrument depends mainly on the attributes of the subjects, research topic, problem question, objectives, design, expected data and results (Kamau, 2010). The study used a questionnaire containing both open-ended and closed questions, as well as 5-point likert scales was used for collecting both qualitative and quantitative data.

3.4.1 Reliability of the Instruments

Reliability is a measure of the degree to which a research instrument yields consistent results or data after repeated trials, the more reliable an instrument is, the more consistent the measure (Mugenda & Mugenda, 2003). This study tested reliability of the instruments using Cronbach's alpha where a value of 0.7 and above was considered acceptable (George & Mallery, 2003).

3.4.2 Validity of the Instruments

Validity determines whether the research truly measures that which it is intended to measure or how truthful the research results are. Research instrument is valid if it measures what it is supposed to measure and when the data collected through it accurately represents the respondents' opinion. To enhance validity, a pilot study was done through administering questionnaires randomly to seven (7) selected respondents in Tana River sub-county which is 10% of the total respondents as recommended by Mugenda and Mugenda (2003), the area has similar characteristic as the case under study. It was further enhanced by making necessary adjustments to the questionnaire based on the pilot study results.

3.5 Data Collection Procedures

The study used primary data obtained through questionnaires with a team of staff involved in implementation of the ASDS. The drop and later pick method was used to administer the questionnaires and was done personally since the respondents involved were not too many. A two day period was given for the respondents to give their data.

3.6 Data Analysis and Presentation

Before processing the responses, the completed questionnaires were edited for completeness and consistency. Qualitative data was coded into different words, concepts, themes, phrases and characters and converted into quantitative data (Terry College of Business, 2012). Both sets of data were analysed by descriptive and inferential statistics, and presented through tables and charts. This was attained through frequency distributions, means, percentages, and simple tabulations. A multiple regression model was used to determine the influence that the independent variables have on the dependent variable. The regression model being;

$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + e$

Where:

Y = Agricultural productivity

β_0 = constant term

$\beta_{1\text{-}4}$ = The coefficient of the independent variables $X_{1\text{-}4}$

X_1 = Climate change response

X_2 = Agribusiness and Market access

X_3 = Research, Extension and Training

X_4 = Access to Agricultural credit

e = the error term.

CHAPTER FOUR

RESEARCH FINDINGS

4.1 Introduction

This chapter comprised of data analysis, findings and interpretation. Results were presented in tables and diagrams. The analysed data was arranged under themes that reflected the research objectives.

4.2 Reliability

The Cronbach alpha was calculated in a bid to measure the reliability of the questionnaire. This was done by subjecting the administering questionnaires randomly to seven (7) selected respondents in Tana River sub-county in a pilot study which is 10% of the total respondents as recommended by Mugenda and Mugenda (2003). All the variables were reliable since their Cronbach alpha was above 0.7 which was used as a cut-off of reliability for the study. Table 4.1 shows the reliability results.

Table 4.1: Reliability

Variable	No of Items	Respondents	α=Alpha	Comment
Climate change response	5	7	0.723	Reliable
Agribusiness	5	7	0.835	Reliable
Agricultural Extension Services	4	7	0.729	Reliable
Access to Agricultural Credit	4	7	0.702	Reliable
Agricultural Productivity	4	7	0.752	Reliable

Source: Pilot Survey Data (2017)

4.3 Response Rate

The number of questionnaires that were administered to staff in the agriculture sector in Tana River County and the department of Agriculture, Livestock, Veterinary Services and Fisheries were 68. Out of 68 questionnaires 63 questionnaires were properly filled and returned as shown in table 4.2 below. According to Mugenda and Mugenda (2003) and also Kothari (2004) a response rate of above 50% is adequate for a descriptive study. Babbie (2004) also asserted that return rates of above 50% are acceptable to analyse and publish, 60% is good and 70% is very good.

Based on these assertions from renowned scholars, 92.6% response rate is very good for the study. Thus the response rate of 92.6% under this study was very good for study.

Table 4.2: Response Rate

Response	**Frequency**	**Percent**
Returned	63	92.6%
Unreturned	5	7.4%
Total	**68**	**100%**

Source: Author (2017)

4.4 Demographic Characteristics

This section consists of information that describes basic characteristics such as gender of the respondent, age of the respondent, level of education, year's public service and department that one belongs.

4.4.1 Gender of the Respondents

The respondents were asked to indicate their gender. Majority of the respondents were male who represented 96% of the sample while only 4% were female as indicated in table 4.3. This implies that the majority of the staff in the agriculture sector in Tana River County are male. Pearce and Robinson (2004) have singled out gender as one of the cultural issues that can affect strategy implementation.

Table 4.3: Gender of the Respondents

Gender	Frequency	Percent
Male	60	96%
Female	3	4%
Total	**63**	**100%**

Source: Survey Data (2017)

4.4.2 Level of Education

The respondents were asked to indicate their level of education. Majority of the respondents who were 48.5% indicated that their highest level of education to be diploma, whereas 19.1% indicated that they held a certificate. Twenty point six percent (20.6%) of the respondents indicated that their highest level of education is undergraduate, while only 11.8% of the respondents indicated that their highest level of education is postgraduate. This implies that the majority (19.1% + 48.5%) of the staff in the agriculture sector in Tana River County hold a certificate or diploma signifying their level of education. Although a diploma is a significant achievement, the highly dynamic agricultural sector requires more

advanced skills hence the results paint a discouraging picture on the technical effectiveness of the staff to implement the ASDS in the county. Table 4.4 gives the levels of education.

Table 4.4: Level of Education

Education	Frequency	Percent
Certificate	12	19.1%
Diploma	31	48.5%
Undergraduate	13	20.6%
Post Graduate	7	11.8%
Total	**63**	**100%**

Source: Survey Data (2017)

4.4.3 Duration in Public Service

The respondents were asked to indicate the number of years they have been in public service. Majority of the respondents who were 66.2% indicated that they have been in public service for over 15 years, 13.2% indicated that they have been in public service for 1–5 years, 13.2% indicated that they have been in public service for 6–10 years while only 7.4% indicated that they have been in public service for 11– 15 years as shown in table 4.5. Although this implies that majority of the staff in the agriculture sector in Tana River County have worked for many years and therefore had good knowledge and experience about the agriculture sector, it also points out the factor that the county is dealing with an aged workforce with very few staff to replace the aged once retired. An aged workforce may also imply less interest in work leading to low performance. Currently the future of the sector is not bright if a succession strategy is not developed.

Table 4.5: Duration in Public Service

Years	Frequency	Percent
1 - 5	8	13.2%
6 - 10	8	13.2%
11 - 15	5	7.4%
Above 15 Years	42	66.2%
Total	**63**	**100%**

Source: Survey Data (2017)

4.4.4 Department one Belongs

The respondents were asked to indicate the department that they belong. Majority of the respondents who were 64.7% of the respondents indicated that they belonged to agriculture department, 22.1% of the respondents indicated that they belonged to livestock production, 8.8% of the respondents indicated that they belonged to fisheries department. This implies that majority of the staff in the agriculture sector in Tana River County belonged to agriculture department. This shows that the Agriculture Department in Tana River County has been given a lot of weight based on the staff allocation, which essentially should translate to high productivity. The table 4.6 below shows the distribution of staff in the Agriculture Sector in Tana River County per Department.

Table 4.6: Department one Belongs

Department	Frequency	Percent
Agriculture	40	64.7%
Livestock Production	14	22.1%
Veterinary Services	6	8.8%
Fisheries	3	4.4%
Total	**63**	**100%**

Source: Survey Data (2017)

4.5 Descriptive Statistics

This section presents the descriptive results on climate change response, agribusiness and market access, agricultural extension services, access to agricultural credit and other information.

4.5.1 Climate Change Response

The first objective of the study was to evaluate the effect of climatic change response on agricultural productivity in Tana River County. The respondents were asked to respond to statements on climate change response. The responses were rated on a five likert scale as presented in Table 4.3. Majority of the respondents who were 44.1% (27.9%+16.2%) agreed with the statement that the government had increased greatly both National Expanded and Smallholder irrigation programs in the county and this has greatly increased agricultural productivity. The results also showed that majority of the respondents who were 54.4% also agreed with the statement that drought tolerant crops and animal breeds have been introduced in the county and has boosted productivity. In addition majority of

the respondents who were 47% also agreed with the statement that there is timely provision of climate related information and farmers are advised on time and productivity has increased due to this. Lastly majority of the respondents who were 44.1% also agreed with the statement that animal and crop pests and diseases are controlled in time using environment friendly pesticides. Agricultural productivity has been greatly enhanced by this measure.

On a five point scale, the average mean of the responses was 3.11 which mean that majority of the respondents were agreeing with most of the statements an indication that if climate changes are well responded to, it would enhance agricultural productivity. However the answers were varied as shown by a standard deviation of 1.21 in table 4.7 below indicating that the climate response strategies are not being addressed satisfactorily which could be the reason productivity in Tana River County is still at low levels.

Table 4.7: Climate Change Response

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Std. Dev
National Expanded and Smallholder irrigation programs	10.30%	32.40%	13.20%	27.90%	16.20%	3.07	1.29
Drought tolerant crops and animal breeds	8.80%	20.60%	16.20%	42.60%	11.80%	3.28	1.18
Timely provision of climate related information	13.20%	17.60%	22.10%	38.20%	8.80%	3.12	1.20
Animal and crop pests and diseases are controlled in time	7.40%	30.90%	17.60%	33.80%	10.30%	2.97	1.17
Total						**3.11**	**1.21**

Source: Survey Data (2017)

In addition the respondents were asked to rate the extent to which climate change response affects agricultural productivity in Tana River County in a scale of 1 - 10. Majority of the respondents at 70.7% rated climate change response affects agricultural productivity in Tana River County at scale 6 – 10 as indicated in figure 4.1.

These findings agree with that Bazzaz and Sombroek (1996) who observed that climate change presents a challenge for researchers attempting to quantify its impact due to the global scale of likely impacts, the diversity of agriculture systems, and the decades' long time scale. According to the study global climate change, if it occurs, will definitely affect agriculture. The findings were also consistent with those of Nelson, et al (2009) who found that agriculture and human well-being will be negatively affected by climate change. Crop yields will decline, production will be affected, crop and meat prices will increase, and consumption of cereals will fall, leading to reduced calorie intake and increased child malnutrition.

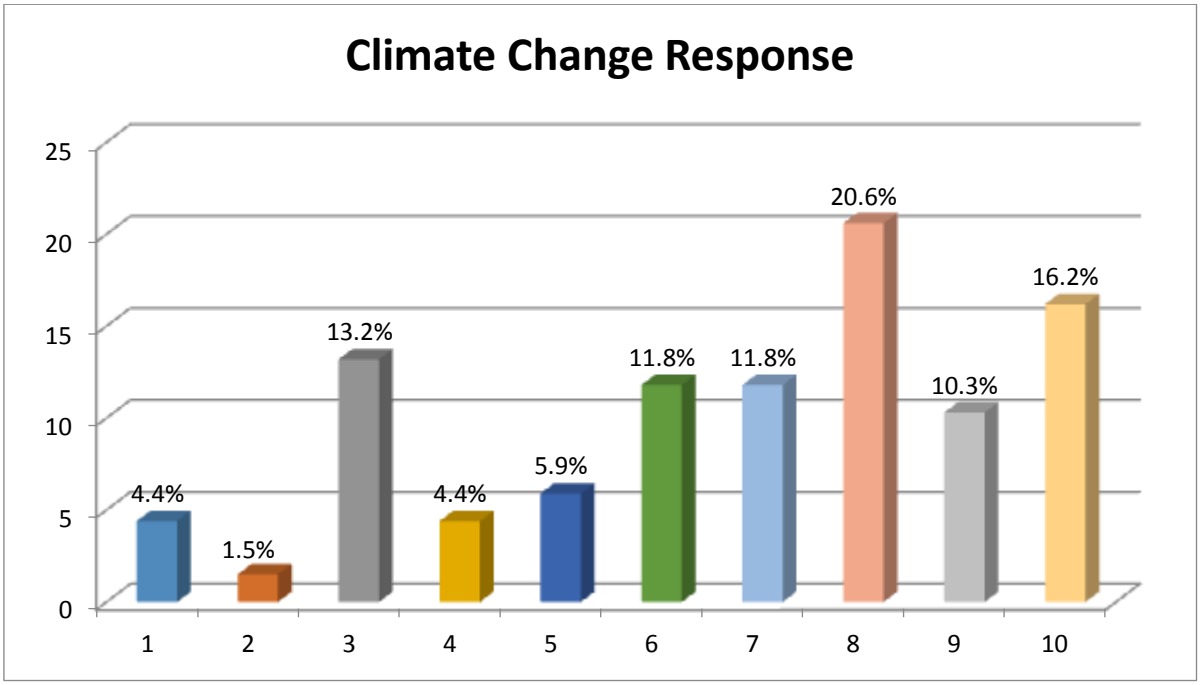

Figure 4.1: Rate of effect of Climate Change Response Source: Survey Data (2017)

4.5.2 Agribusiness

The second objective of the study was to examine the effect of agribusiness on agricultural productivity in Tana River County. The respondents were asked to respond to the statements on climate change response. Results in table 4.4 revealed that majority of the respondents who were 51.4% (38.2%+13.2%) agreed with the statement that micro processing plants have been introduced in the county to value add animal and crop products. This has encouraged productivity and increased farmers' incomes. The results also revealed that majority of the respondents who were 54.4% agreed with the statement that roads and other market related infrastructure have been improved thus enhancing market access. This has reduced post-harvest losses, increased incomes thus encouraging farmers to produce more. The results also revealed that majority of the respondents who were 75% agreed with the statement that information on modern methods of farming is readily available and farmers use such information to improve productivity. The results also showed that majority of the respondents who were 63.2% agreed with the statement that the government has partnered with many stakeholders including the private sector to enhance agribusiness.

On a five point scale, the average mean of the responses was 3.5 which mean that majority of the respondents were agreeing with most of the statements an indication that various strategies on agribusiness encourage agricultural productivity. However the answers were varied as shown by a standard deviation of 1.2 shown in table 4.8 indicating that the agribusiness strategies are not satisfactory in Tana River County.

Table 4.8: Agribusiness

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Std. Dev
Micro processing plants have increased farmers' incomes	10.30%	29.40%	8.80%	38.20%	13.20%	3.2	1.3
Roads and market related infrastructure have reduced post-harvest losses,	8.80%	22.10%	14.70%	38.20%	16.20%	3.3	1.2
Information on modern methods of farming is readily available	5.90%	7.40%	11.80%	48.50%	26.50%	3.8	1.1
Partnership with stakeholders to enhance agribusiness	4.40%	25.00%	7.40%	45.60%	17.60%	3.5	1.2
Total						**3.5**	**1.2**

Source: Survey Data (2017)

In addition the respondents were asked to rate the extent to which agribusiness and market access affects agricultural productivity in Tana River County in a scale of 1- 10. Majority of the respondents being 66.3% (scale 6 – 10) agreed that agribusiness affects agricultural productivity in Tana River County as indicated in figure 4.2.

These findings were consistent with that of Abatekassa and Peterson (2011) who found that market access for local food products are mainly based on existing relationships and linkages between the supply chain actors and the local food producers. This means, the more relationships and linkages, the higher the demand of agro-products which in turn enhances productivity.

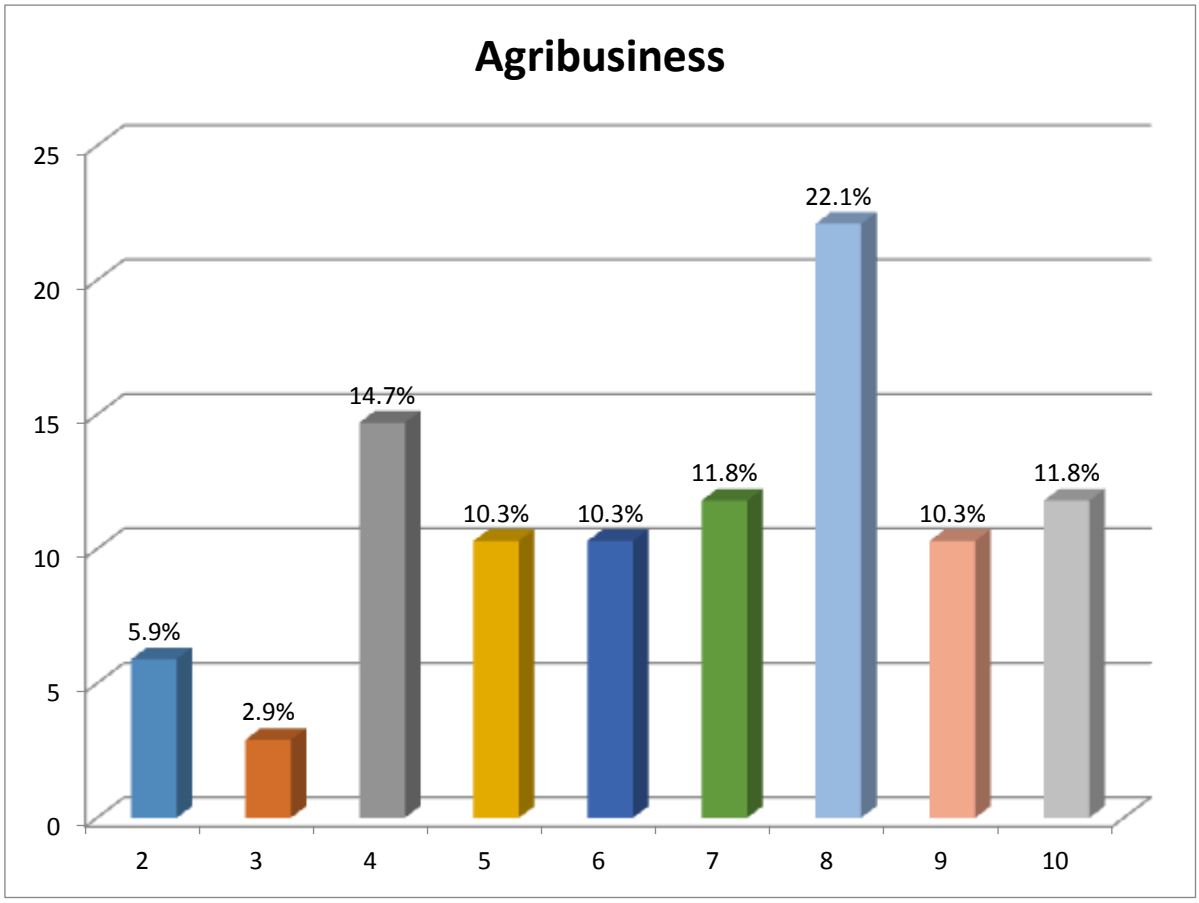

Figure 4.2: Rate of effect of Agribusiness Source: Survey Data (2017)

4.5.3 Agricultural Extension Services

The third objective was to evaluate the extent to which agricultural extension services have affected agricultural productivity in Tana River County. The results from table 4.5 revealed that majority of the respondents who were 60.4% (39.50% + 20.90%) agreed with the statement that the government sets enough budgets for extension services and trainings which in turn has enhanced agricultural productivity in Tana River County. The results also showed that majority of the respondents who were 66.3% agreed with the statement that there is enough extension staff in the county who are regularly capacity built and well facilitated for their work. This has improved productivity in the county. The results also revealed that majority of the respondents who were 67.5% agreed with the statement that

the government has embraced e-extension and provided the necessary equipment which has improved service delivery to farmers and in turn productivity has been enhanced.

On a five point scale, the average mean of the responses was 3.71 which implies that majority of the respondents were agreeing with most of the statements a confirmation that agricultural extension services can enhance productivity greatly; however the answers were varied as shown by a standard deviation of 1.2 in table 4.9 an indicator that the extension services in Tana River County are not attracting enough attention.

Table 4.9: Agricultural Extension Services

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Std. Dev
Enough budgets for extension services and trainings.	10.50%	19.80%	9.30%	39.50%	20.90%	3.41	1.31
Enough extension staff who are regularly capacity built and well facilitated for their work.	4.70%	25.60%	3.50%	32.60%	33.70%	3.65	1.31
E-extension and equipment which has improved service delivery to farmers.	5.80%	14.00%	12.80%	38.40%	29.10%	3.71	1.20
Total						**3.59**	**1.27**

Source: Survey Data (2017)

In addition the respondents were asked to rate the extent to which agricultural extension services affects agricultural productivity in Tana River County in a scale of 1- 10. Majority

of the respondents being 73.6% rated the extent to which agricultural extension services affects agricultural productivity in Tana River County at scale 6 - 10.

These findings were consistent with that of Anderson and Feder (2004) found that investments in extension services have the potential to improve agricultural productivity and increase farmers' incomes. Evenson, Robert, Mwabu and Germano (1998) who studied effects of agricultural extension on crop yields in Kenya found out that that productivity gains from agricultural extension.

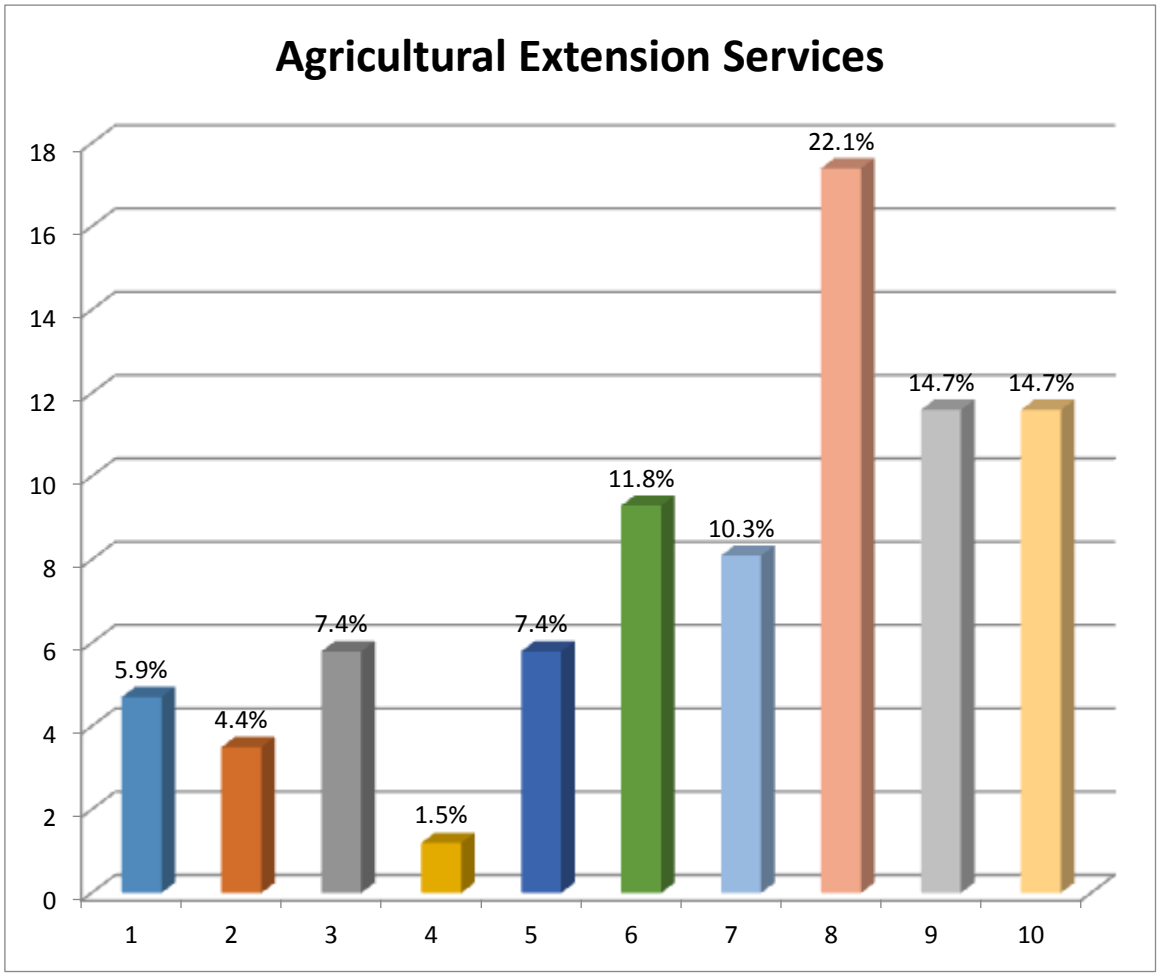

Figure 4.3: Rate of effect of Agricultural Extension Services Source: Survey Data (2017)

4.5.4 Access to Agricultural Credit

The fourth objective of the study was to examine the effect of access to agricultural credit on agricultural productivity in Tana River County. The results revealed that majority of the respondents who were 53.5% (38.4% + 15.10%) agreed with the statement that farmers have access to low cost credit to do capital investments in irrigation, value addition and other developments and this has greatly improved yields. The results also revealed that majority of the respondents who were 67.5% agreed with the statement that key farm inputs are easily available at low cost or subsidized prices and this has enabled farmers to increase productivity. The results also revealed that majority of the respondents who were 61.3% agreed with the statement that there are enough credit institutions in the county and farmers have a wide range of choice to access agricultural credit.

On a five point scale, the average mean of the responses was 3.48 which mean that majority of the respondents were agreeing with most of the statements. This means that if farmers have a steady access to low cost agricultural credit, there is a potential of increased productivity. However the answers were varied as shown by a standard deviation of 1.2 in table 4.10 which means that farmers in Tana River can access agricultural credit but not to the satisfactory levels that can enhance productivity to satisfactory levels.

Table 4.10: Access to Agricultural Credit

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Std. Dev
Farmers have access to low cost credit to do capital investments in irrigation, value addition and other developments and this has greatly improved yields	8.10%	23.30%	15.10%	38.40%	15.10%	3.29	1.21
Key farm inputs are easily available at low cost or subsidized prices and this has enabled farmers to increase productivity	3.50%	22.10%	7.00%	44.20%	23.30%	3.62	1.17
There are enough credit institutions in the county and farmers have a wide range of choice to access agricultural credit	5.80%	19.80%	12.80%	40.40%	20.90%	3.52	1.21
Total						**3.48**	**1.20**

Source: Survey Data (2017)

In addition the respondents were asked to rate the extent to which access to agricultural credit affects agricultural productivity in Tana River County in a scale of 1- 10. Majority of the respondents being 67.6% rated the extent to which access to agricultural credit affects agricultural productivity in Tana River County at scale 6 - 10.

This is supported by Bhatta (2014) who found that agricultural credit had helped to enhance the agricultural productivity of the farmers in the study area. The findings were also consistent with that of Salami and Arawomo (2013) who found that access to credit facilities had been identified as the direct solution to increasing investment agriculture in Africa.

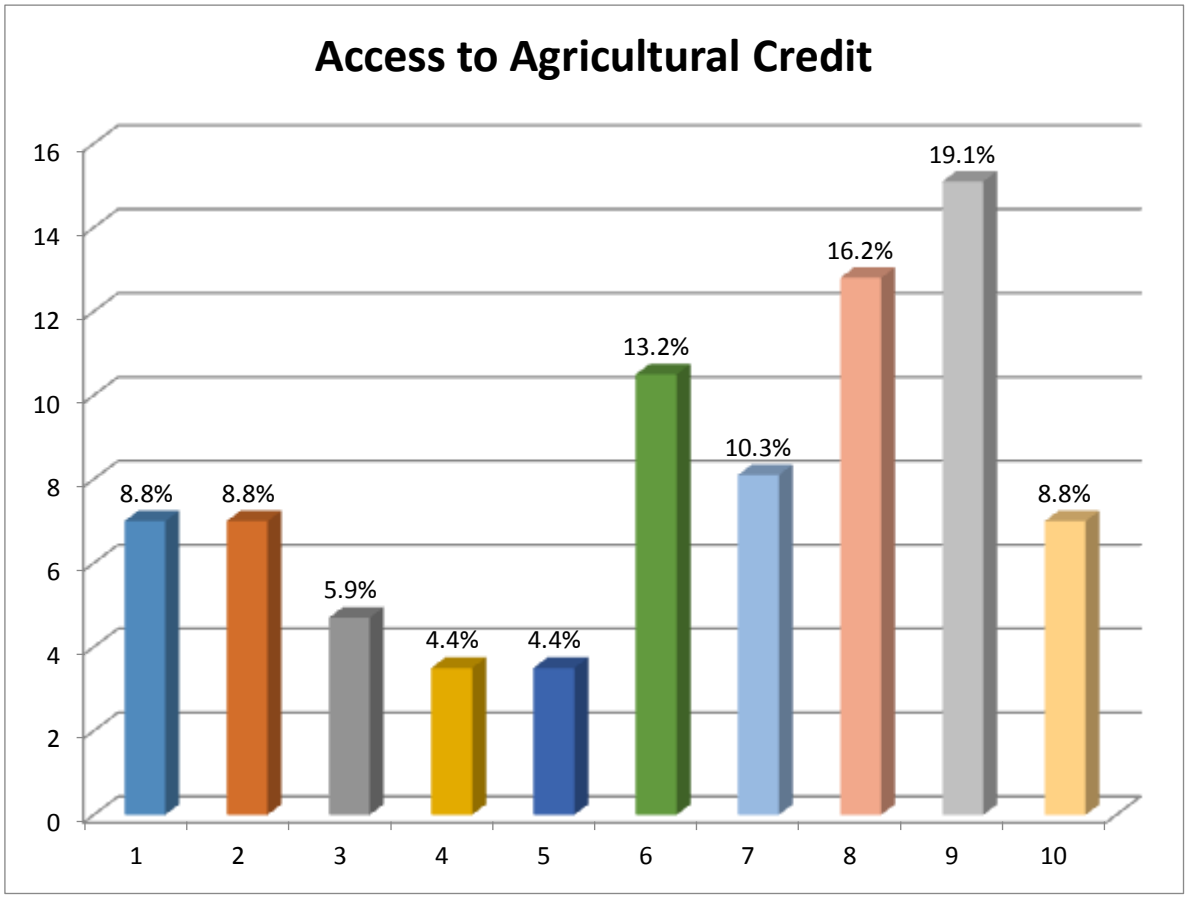

Figure 4.4: Rate of effect of Access to Agricultural Credit Source: Survey Data (2017)

4.5.5 Other Information

The respondents were further asked to indicate whether they think the agricultural sector has utilized the resources prudently to increase productivity. The results revealed that majority of the respondents who were 82% indicated that the agricultural sector has not utilized the resources prudently to increase productivity while only 18% indicated that the agricultural sector has utilized the resources prudently to increase productivity as shown in figure 4.5. This is an indicator on why agricultural productivity in Tana River County is still at low levels.

The respondents who said no were asked to state their reasons. Majority of the respondents indicated that misappropriation of funds and establishment of non-sustainable donor dependent programs were the main reasons to poor utilization the resources.

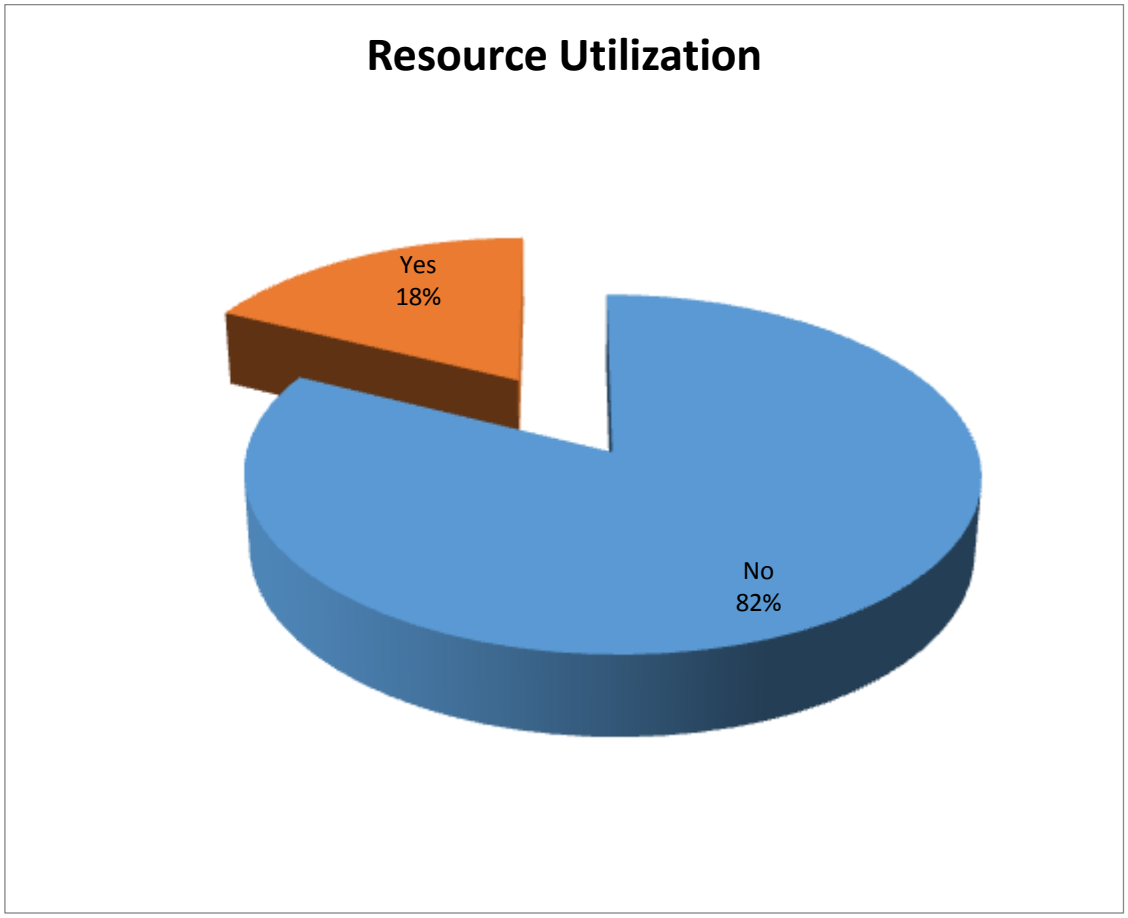

Figure 4.5: Utilization of Resources Source: Survey Data (2017)

In addition the respondents were asked to indicate whether their department refers to ASDS while planning its activities. Majority of the respondents (78%) said yes while only 22% said no as shown in figure 4.6. The respondents who said no were asked to indicate the document that is referred while planning. Majority indicated County Integrated Development Plan (CIDP).

This result shows that the Agricultural Sector Development Strategy (ASDS) is still the major policy document in the Agriculture Sector whose strategies can enhance productivity if well implemented.

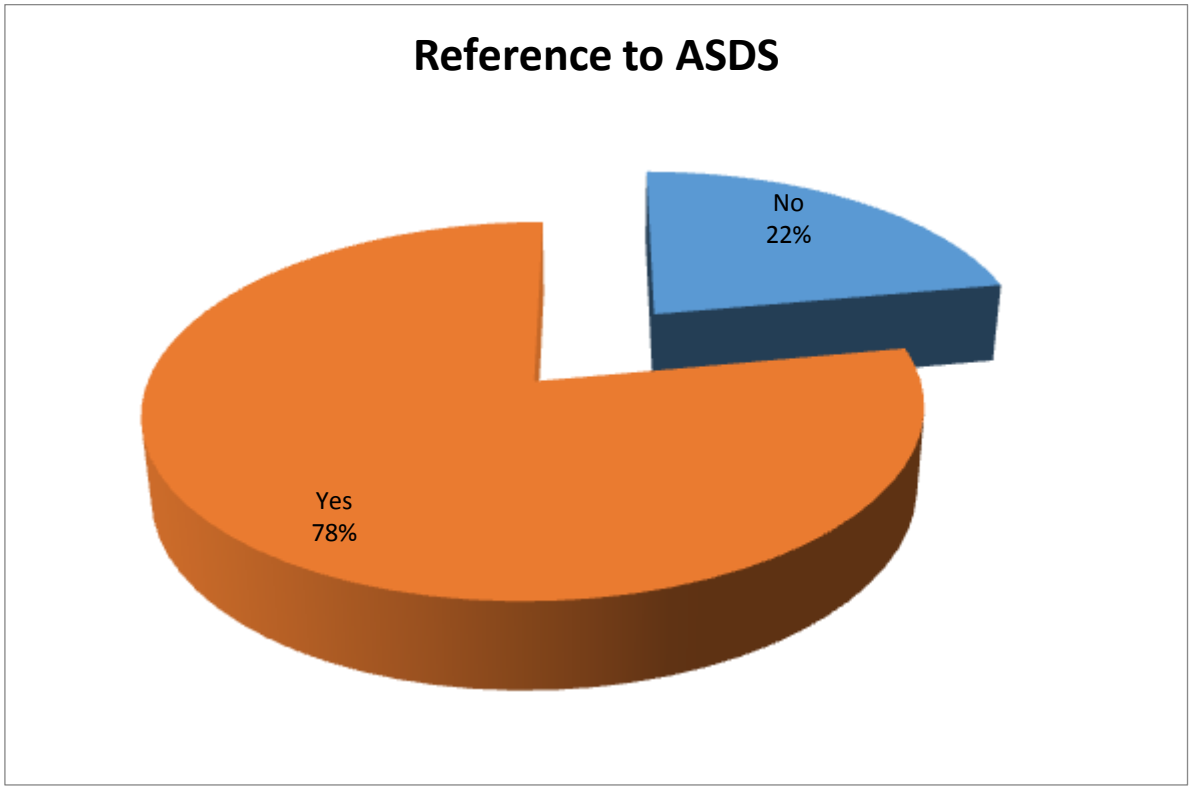

Figure 4.6: ASDS while planning its activities Source: Survey Data (2017)

In addition the respondents were asked to indicate whether their departments work in collaboration with other departments and stakeholders towards achievement of the ASDS. Majority of the respondents who were 94% indicated yes while only 6% indicated no as indicated in figure 4.7. The respondents who indicated no were asked to give their reasons. The respondents indicated that senior staff ignore field staff in planning and implementing of most programs.

The collaboration between various departments in the Agriculture Sector in Tana River County is strong enough to pursue the strategic thrusts in the ASDS if all other pillars in the strategy are well addressed.

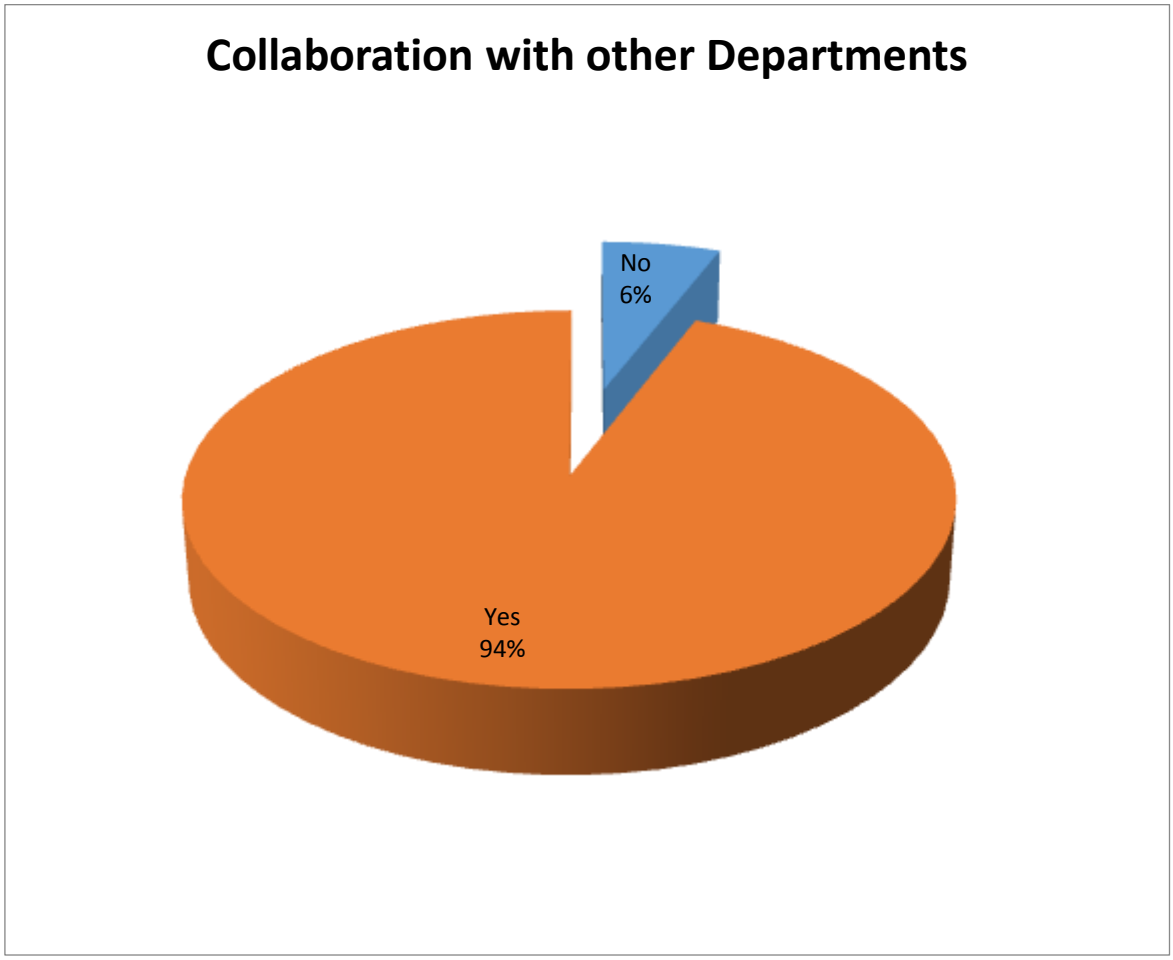

Figure 4.7: Collaboration with other Departments and Stakeholders Source: Survey Data (2017)

The respondents were further asked to indicate whether they have worked in another counties other that Tana River. Majority of the respondents who were 53% indicated that they had worked in another county other that Tana River while only 47% had not worked in another county other that Tana River. The respondents who indicated yes were asked

whether they think there are special factors affecting the implementation of the ASDS in Tana River County compared to other counties and also to give those factors. Some of the factors given are: land related issues, security issues, under development of county, unwillingness to enhance positive change among communities, low level of education of the locals, high poverty levels and vastness of the county.

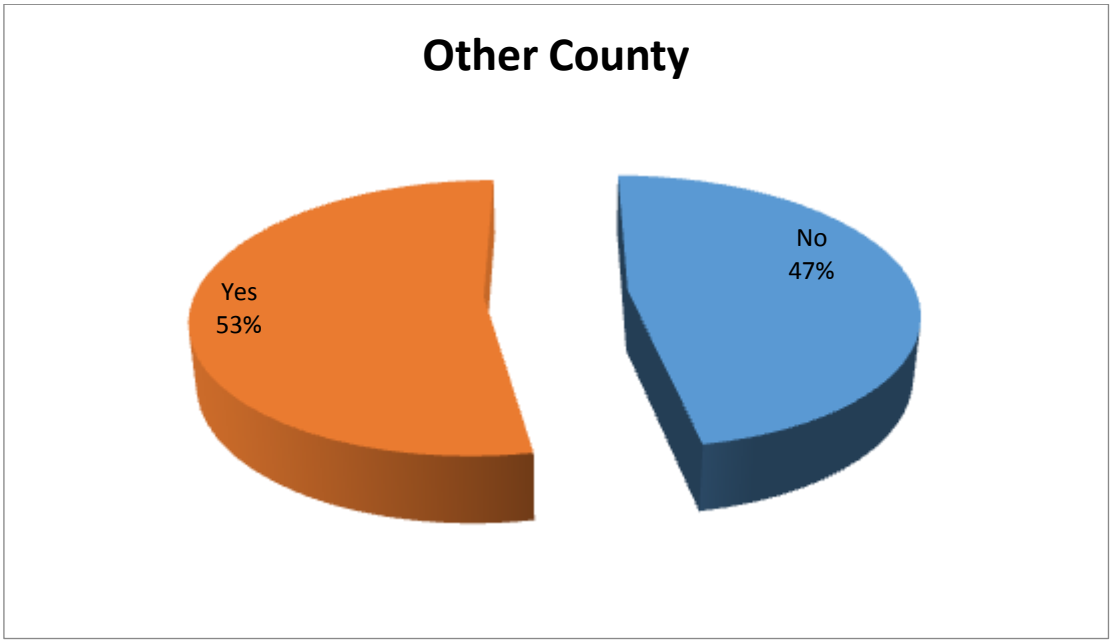

Figure 4.8: Working in another County Source: Survey Data (2017)

4.6 Inferential Statistics

Inferential analysis was conducted to generate correlation results, model of fitness, and analysis of the variance and regression coefficients.

4.6.1 Correlation Analysis

Table 4.7 below presents the results of the correlation analysis. The results revealed that climate change response and agricultural productivity are positively and significant related (r=0.585, p=0.000). The table further indicated that agribusiness and market access and

agricultural productivity are positively and significantly related (r=0.591, p=0.000). It was further established that agricultural extension services and agricultural productivity were positively and significantly related (r=0.583, p=0.000). Similarly, results showed that access to agricultural credit and agricultural productivity were positively and significantly related (r=0.623, p=0.000). This implies that an increase in any unit of the variables leads to an increase in agricultural productivity.

Table 4.11: Correlation Matrix

		Agricultural Productivity	Climate change Response	Agribusiness	Agricultural Extension Services	Accesss to Agricultural Credit
Agricultural Productivity	Pearson Correlation	1.000				
	Sig. (2-tailed)					
Climate change Response	Pearson Correlation	.585**	1.000			
	Sig. (2-tailed)	0.000				
Agribusiness	Pearson Correlation	.591**	.502**	1.000		
	Sig. (2-tailed)	0.000	0			
Agricultural Extension Services	Pearson Correlation	.583**	.425**	.328**	1.000	
	Sig. (2-tailed)	0.000	0	0.006		
Accesss to Agricultural Credit	Pearson Correlation	.623**	.457**	.563**	.403**	1.000
	Sig. (2-tailed)	0.000	0	0	0.001	

** Correlation is significant at the 0.01 level (2-tailed).

Source: Survey Data (2017)

4.6.2 Regression Analysis

The results presented in table 4.8 present the fitness of model used of the regression model in explaining the study phenomena. Climate change response, agribusiness and market access, agricultural extension services and access to agricultural credit were found to be satisfactory variables in agricultural productivity. This is supported by coefficient of determination also known as the R square of 60.9%. This means that climate change response, agribusiness and market access, agricultural extension services and access to agricultural credit explain 60.9% of the variations in the dependent variable which is agricultural productivity. This results further means that the model applied to link the relationship of the variables was satisfactory.

Table 4.12: Model Fitness

Indicator	Coefficient
R	0.781
R Square	0.609
Adjusted R Square	0.584
Std. Error of the Estimate	0.41012

Source: Survey Data (2017)

In statistics significance testing the p-value indicates the level of relation of the independent variable to the dependent variable. If the significance number found is less than the critical value also known as the probability value (p) which is statistically set at 0.05, then the conclusion would be that the model is significant in explaining the relationship; else the model would be regarded as non-significant.

Table 4.9 provides the results on the analysis of the variance (ANOVA). The results indicate that the overall model was statistically significant. Further, the results imply that the independent variables are good predictors of agricultural productivity. This was supported by an F statistic of 24.556 and the reported p value (0.000) which was less than the conventional probability of 0.05 significance level.

Table 4.13: Analysis of Variance

	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Regression	16.521	4	4.13	24.556	**0.000**
Residual	10.596	63	0.168		
Total	27.118	67			

Source: Survey Data (2017)

Regression of coefficients results in table 4.10 shows that climate change response and agricultural productivity are positively and significant related (r=0.164, p=0.031). The table further indicates that agribusiness and market access and agricultural productivity were positively and significant related (r=0.157, p=0.026). It was further established that agricultural extension services and agricultural productivity were positively and significantly related (r=0.285, p=0.001) while access to agricultural credit and agricultural productivity were also positively and significantly related (r=0.233, p=0.009)

Table 4.14: Regression of Coefficients

		B	Std. Error	t	Sig.
(Constant)		-0.063	0.203	-0.31	0.758
Climate change Response	X_1	0.164	0.075	2.204	**0.031**
Agribusiness and Market Access	X_2	0.157	0.069	2.281	**0.026**
Agricultural Extension Services	X_3	0.285	0.084	3.395	**0.001**
Access to Agricultural Credit	X_4	0.233	0.087	2.692	**0.009**

Source: Survey Data (2017)

Thus, the optimal model for the study is;

$Y = -0.063 + 0.164X_1 + 0.157X_2 + 0.285X_3 + 0.233X_4$

From the above model, it shows that if climate change response, agribusiness and market access, agricultural extension services and access to agricultural credit are set at zero or if zero effort is put in addressing them, then agricultural productivity will be affected negatively as shown by the constant -0.063. A positive unit change in climate change response will lead to increased agricultural productivity by 0.164 units whereas a unit change in agribusiness leads to increased agricultural productivity by 0.157 units. If agricultural extension services are positively changed by one unit, agricultural productivity will increase by 0.285 units whereas a unit change in access to agricultural credit will lead to increased agricultural productivity by 0.233 units.

The model also shows that agricultural extension services and access to agricultural credit have a higher impact on agricultural productivity.

These studies are in line with scholars' Nelson, et al, 2009 and Bazzaz and Sombroek, 1996 who noted that climate change significantly affects agricultural productivity. However, Darwin, Tsigas, Lewandrowski & Raneses, 1995 disagrees with these study findings by concluding that climate changes are unlikely to imperil food production for the world as a whole.

On agribusiness, the study findings agree with those of; Ha, Bosch, and Nguyen, 2015, Abatekassa and Peterson, 2011, Kirsten and Sartorius, 2002 and Reardon and Barrett, 2000 who noted that ago-industrialization (agribusiness) is almost a necessity implying that with the right linkages, agricultural productivity is guaranteed, whereas the converse is true hence a significant influence.

Muyanga and Jayne, 2006, Anderson and Feder, 2004 and Evenson, Robert, Mwabu and Germano, 1998 noted that a collaboration of both public and private extension services would greatly enhance productivity which support the findings of this study.

Bhatta, 2014, Salami and Arawomo, 2013 and Yehuala, 2008 agree with the study findings by concluding that an increase in access to agricultural credit leads to increased investment in agriculture thus influencing productivity significantly.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter addresses the summary of the findings, the conclusions and the recommendations. This is done in line with the objectives of the study.

5.2 Summary of Findings

This section provides a summary of the findings from the analysis. This is done in line with the objectives of the study.

5.2.1 Climate Change Response

The first objective of the study was to evaluate the extent to which climatic change response has affected agricultural productivity in Tana River County. The findings revealed that climate change response has a positive and significant effect on the agricultural productivity in Tana River County. This is also supported by the statements in the questionnaire which majority of the respondents agreed.

These findings agree with that Bazzaz and Sombroek (1996) who observed that climate change presents a challenge for researchers attempting to quantify its impact due to the global scale of likely impacts, the diversity of agriculture systems, and the decades' long time scale. According to the study global climate change, if it occurs, will definitely affect agriculture. The findings were also consistent with those of Nelson, et al (2009) who found that agriculture and human well-being will be negatively affected by climate change. Crop yields will decline, production will be affected, crop and meat prices will increase, and

consumption of cereals will fall, leading to reduced calorie intake and increased child malnutrition; which means the response to climate change will likely reverse this trend.

Darwin, Tsigas, Lewandrowski and Raneses, 1995 argued that estimates of the economic and ecological effects of this warming and associated shifts in precipitation patterns are needed by policymakers to determine how much to control emissions and how best to adapt to unavoidable climate changes. The agricultural consequences of these climate changes are twofold. First, climate change may affect crop and livestock productivity. Second, ensuing economic responses may alter the regional distribution and intensity of farming. This means that, for some regions, the long-term productivity and competitiveness of agriculture may be at risk, farm communities could be disrupted and conflicts over environmental impacts of agriculture on land and water resources could become increasingly contentious. The scholars agree with the findings of this study.

Yohannes (2016), also agrees with these findings by concluding that with the right farming practice, agriculture could be the main solution for climate change by mitigation and adaptation response.

5.2.2 Agribusiness

The second objective of the study was to examine the effect of agribusiness on agricultural productivity in Tana River County. The findings revealed that agribusiness and market access has a positive and significant effect on the agricultural productivity in Tana River County. This is also supported by the statements in the questionnaire which majority of the respondents agreed.

These findings were consistent with that of Abatekassa and Peterson (2011) who found that market access for local food products are mainly based on existing relationships and linkages between the supply chain actors and the local food producers.

Ha, Bosch, and Nguyen (2015) observed that, multi-stakeholder collaboration and government support via its policies and development programs are the necessary conditions for success in agribusiness. They also observed that majority of the world's poor is smallholder farmers who are reliant on agricultural production and securing market access for agricultural produce has been identified as one of the most important strategies towards rural development and poverty alleviation (Fischer & Qaim, 2012). Reardon and Barrett (2000) noted that agro-industrialization prompts and responds to the changing organization of agri-food sectors in developing countries and in the institutions governing production and exchange. Though these scholars address the importance of agribusiness, they fail to relate it with agricultural productivity.

5.2.3 Agricultural Extension Services

The third objective was to evaluate the extent to which agricultural extension services have affected agricultural productivity in Tana River County. The findings revealed that agricultural extension services have a positive and significant effect on the agricultural productivity in Tana River County. This is also supported by the statements in the questionnaire which majority of the respondents agreed.

These findings were consistent with that of Anderson and Feder (2004) who studied a framework and found that investments in extension services have the potential to improve agricultural productivity and increase farmers' incomes, especially in developing economies, where more than 90 percent of the world's nearly 1 million extension

personnel are located. Odhiambo and Nyangiti (2003) also agree with the study findings. They found out that extension services have a discernible impact on productivity. The impact, according to the studies, was at the highest top end of the distribution of yields residuals, "suggesting that productivity gains from agricultural extension may be enhancing unobserved productive attributes of farmers such as managerial abilities"

Evenson, Robert, Mwabu and Germano (1998) who studied effects of agricultural extension on crop yields in Kenya found out that that productivity gains from agricultural extension.

5.2.4 Access to Agricultural Credit

The fourth objective of the study was to examine the effect of access to agricultural credit on agricultural productivity in Tana River County. The findings revealed that access to agricultural credit have a positive and significant effect on the agricultural productivity in Tana River County. This is also supported by the statements in the questionnaire which majority of the respondents agreed.

This was supported by Bhatta (2014) who found that agricultural credit had helped to enhance the agricultural productivity of the farmers in the study area. The findings were also consistent with that of Salami and Arawomo (2013) who found that access to credit facilities had been identified as the direct solution to increasing investment agriculture in Africa.

Yehuala (2008) who noted that participation in extension package programs, experience in credit use from the formal sources, total cultivated land size, number of livestock in tropical livestock unit, collateral or group formation and membership of Farmers Multi-

Purpose Service Cooperatives (FMSC) were highly important in influencing access to formal credit use did not relate access to agricultural credit with agricultural productivity.

5.3 Conclusions

5.3.1 Climate Change Response

Based on the study findings the study concluded that climate change response has a positive and significant influence on agricultural productivity.

The study also concluded that global climate change, if it occurs, will definitely affect agriculture. Most mechanisms, and two-way interactions between agriculture and climate, are known, even if not always well understood.

5.3.2 Agribusiness

Based on the study findings the study concluded that agribusiness has a positive and significant influence on agricultural productivity. In addition the study concluded that market access for local food products are mainly based on existing relationships and linkages between the supply chain actors and the local food producers.

The study also concluded that multi-actor partnerships and government support through policies and development programs are highly necessary. However, it cannot guarantee the success of small scale agribusinesses unless the sufficient conditions are met.

5.3.3 Agricultural Extension Services

Based on the study findings the study concluded that agricultural extension services have a positive and significant influence on agricultural productivity. The study also concluded

that private extension provision is generally skewed towards high potential regions and high value crops. Remote areas and poor producers, especially those growing low-value crops with little marketable surplus, are poorly served. Non-commercial providers are targeting them but their scope is limited since public resources for extension are very constrained.

The study also concluded that agricultural productivity gains from agricultural extension are highest at the top end of the distribution of yield residuals, suggesting that agricultural extension may be enhancing unobserved productive attributes of farmers such as managerial abilities.

5.3.4 Access to Agricultural Credit

Based on the study findings the study concluded that access to agricultural credit have a positive and significant influence on agricultural productivity.

The study also concluded that agricultural credit had helped to enhance the agricultural productivity of the farmers in the Tana River County.

5.4 Recommendations

5.4.1 Climate Change Response

Based on the research findings the study recommends that urgent measures be undertaken to mitigate the impact of climate change on agricultural production. These measures include: research and development of agricultural technologies, investment in irrigation infrastructure and dissemination of information to farmers on climate change and possible

impacts. Other scholars have found out that climate change has a direct impact on agriculture and its mitigation may enhance agricultural productivity.

The study also recommends that the government should increase greatly both national expanded and small irrigation programs in Tana River County so as to boost the agricultural productivity of the county. Individual farmers engaging in irrigation farming can greatly improve food production. The government should therefore support the farmers with information on good farming practices including proper use of pesticides and steady supply of water.

5.4.2 Agribusiness

The study also recommended that micro processing plants should be introduced in Tana River County to value add animal and crop products. This will help to increase agricultural productivity in the county. Although most of the scholars in this field failed to relate agribusiness and agricultural productivity, their findings on the importance of doing agriculture as a business is a strong indicator that agribusiness is a great enhancer of agricultural productivity since it (agribusiness) relies on agricultural outputs.

In addition the study also recommended that the Tana River County government should partner with many stakeholders including the private sector to enhance agribusiness and market access which will translate to high productivity. This partnership may be in provision of current technologies, trainings, improving infrastructure among others. Farmer training colleges are also another emerging necessity in the agriculture sector which should be promoted.

5.4.3 Agricultural Extension Services

Based on the research findings the study recommends that Tana River County should implement agricultural extension services by ensuring there is enough staff in the county who are regularly capacity build so as to improve the agricultural productivity of the county. Provision of adequate resources to extension staff will enable them meet farmers regularly and provide adequate and timely agricultural information. A staff succession strategy is also crucial in ensuring that retiring staff are replaced in time

The study also recommends that Tana River County government should embrace agricultural extension services and provide necessary equipment which will help to increase the agricultural productivity of the county. These may include and not limited to vehicles and motor bikes to traverse the expansive county, computers to enable the staff access and process information and internet services to enable them research on agriculture related information.

5.4.4 Access to Agricultural Credit

Based on the research findings the study recommends that Tana River County government should ensure farmers have access to low cost credit so as to do capital investment in irrigation, value addition and other development which will help to increase the agricultural productivity in the county. The low cost agricultural credit may include government loans, subsidized farm inputs, off-setting current loans among others.

The study also recommends that Tana River County government should ensure that farmers can get low cost credit from available credit institutions in the county and attract more so that farmers have a wide range of choice to access agricultural credit.

5.5 Areas for Further Studies

The study sought to establish the effect of the Agricultural Sector Development Strategy on agricultural productivity in Tana River County. This called for analysis of Agricultural Productivity in only One County in Kenya thus area for further studies could consider other counties in Kenya and comparison be made with the findings of those of the current study.

Pearce and Robinson (2004) have singled out gender as one of the cultural issues that can affect strategy implementation. With the low number of female technical staff in the Agriculture Sector in Tana River County, this study also recommends a further study on the role of gender towards sustainable Agricultural Productivity and whether it (gender) affects agricultural productivity.

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APPENDICES

Appendix i: Introduction Letter

Victor N. Muindi

P.O Box, 109

Hola.

Dear Respondent:

RE: EFFECT OF THE AGRICULTURAL SECTOR DEVELOPMENT STRATEGY ON AGRICULTURAL PRODUCTIVITY. A CASE OF TANA RIVER COUNTY IN KENYA

I am a Master student at the School of Business of the Kenyatta University. As part of the degree requirements, the university expects me to undertake a research project and I have chosen to undertake a study with the above title.

I wish to inform that you have been selected as one of the respondents to assist in providing the essential data and information for this activity. I kindly request you to spare a few minutes and answer the attached questionnaire. The information obtained will be used for academic purposes only and will be treated with utmost confidentiality. You are not required write your name anywhere on the questionnaire.

I therefore request you to respond to all questions with utmost honesty.

Yours faithfully,

Victor Nguma Muindi

Reg. No. D53/OL/27172/2013

Appendix ii: Research Proposal Approval Letter

Appendix iii: Questionnaire

This questionnaire seeks to investigate the effect of the Agricultural Sector Development Strategy (ASDS) on agricultural productivity in Tana River County. This study is an academic study and the information obtained through this questionnaire will be treated confidentially and will not be used for any other purpose other than academic research.

Questionnaire No…….

SECTION A

General Information (Tick √ where applicable)

1. What is your gender?

   Male ( ) Female ( )

2. What is your level of education?

   Certificate ( ) Diploma ( ) Undergraduate ( ) Post graduate ( )

3. How many years have you been in the Public service?

   1 – 5 years ( ) 6 – 10 years ( ) 11 – 15 years ( ) Above 15 years ( )

4. Which Department do you belong?

Agriculture	( )	Veterinary Services	( )
Livestock Production	( )	Fisheries	( )

Any other (Specify)……

SECTION B

Climate Change Response

a) State to what extent you agree or disagree with the following climate change responses in relation to agricultural productivity. Please tick (√) the most appropriate option.

1- Strongly disagree 2- Disagree 3 - Neutral 4 – Agree 5 – Strongly agree

		1	**2**	**3**	**4**	**5**
1.	The government has increased greatly both National Expanded and Smallholder irrigation programs in the county and this has greatly increased agricultural productivity.					
2.	Drought tolerant crops and animal breeds have been introduced in the county and has boosted productivity					
3.	There is timely provision of climate related information and farmers are advised on time and productivity has increased due to this.					
4.	Animal and crop pests and diseases are controlled in time using environment friendly pesticides. Agricultural productivity has been greatly enhanced by this measure					

b)

In a scale of 1 to 10, with 1 being the lowest and 10 being the highest, rate the extent to which climate change response affects agricultural productivity in Tana River County									
1	2	3	4	5	6	7	8	9	10

SECTION C

Agribusiness

a) State to what extent you agree or disagree with the following. Please tick (√) the most appropriate option.

1- Strongly disagree 2- Disagree 3 - Neutral 4 – Agree 5 – Strongly agree

		1	**2**	**3**	**4**	**5**
1.	Micro processing plants have been introduced in the county to value add animal and crop products. This has encouraged productivity and increased farmers' incomes					
2.	Roads and other market related infrastructure have been improved thus enhancing market access. This has reduced post-harvest losses, increased incomes thus encouraging farmers to produce more.					
3.	Information on modern methods of farming is readily available and farmers use such information to improve productivity.					
4.	The government has partnered with many stakeholders including the private sector to enhance agribusiness and market access which has also translated to high productivity.					

b)

In a scale of 1 to 10, with 1 being the lowest and 10 being the highest, rate the extent to which agribusiness and market access affects agricultural productivity in Tana River County									
1	2	3	4	5	6	7	8	9	10

SECTION D

Agricultural Extension Services

a) State to what extent you agree or disagree with the following. Please tick (√) the most appropriate option.

1- Strongly disagree 2- Disagree 3 - Neutral 4 – Agree 5 – Strongly agree

		1	**2**	**3**	**4**	**5**
1.	The government sets enough budget for extension services and trainings which in turn has enhanced agricultural productivity in the county.					
2.	There is enough extension staff in the county who are regularly capacity built and well facilitated for their work. This has improved productivity in the county.					
3.	The government has embraced e-extension and provided the necessary equipment which has improved service delivery to farmers and in turn productivity has been enhanced.					

b)

In a scale of 1 to 10, with 1 being the lowest and 10 being the highest, rate the extent to which agricultural extension services affects agricultural productivity in Tana River County									
1	2	3	4	5	6	7	8	9	10

SECTION E

Access to Agricultural Credit

a) State to what extent you agree or disagree with the following. Please tick (√) the most appropriate option.

1- Strongly disagree 2- Disagree 3 – Neutral 4 – Agree 5 – Strongly agree

		1	**2**	**3**	**4**	**5**
1.	Farmers have access to low cost credit to do capital investments in irrigation, value addition and other developments and this has greatly improved yields.					
2.	Key farm inputs are easily available at low cost or subsidized prices and this has enabled farmers to increase productivity.					
3	There are enough credit institutions in the county and farmers have a wide range of choice to access agricultural credit.					

b)

In a scale of 1 to 10, with 1 being the lowest and 10 being the highest, rate the extent to which access to agricultural credit affects agricultural productivity in Tana River County									
1	2	3	4	5	6	7	8	9	10

SECTION F

Agricultural Productivity

a) State to what extent you agree or disagree with the following. Please tick (√) the most appropriate option.

1- Strongly disagree 2- Disagree 3 - Neutral 4 – Agree 5 – Strongly agree

		1	**2**	**3**	**4**	**5**
1.	Everyone in the county can access sufficient and quality food due to increased productivity.					
2.	The county is food secure and is at no risk of food shortage due to continued improvement in agricultural productivity.					
3.	Agricultural activities in the county are carried out in a sustainable way and there is minimum or no risk of degrading our environment.					

b) Any other factors affecting agricultural productivity in the county? If YES, list two of these factors …….

……..

SECTION G

Other Information

a) The agriculture sector is one of the sectors with huge resources and receives a huge allocation of the national budget. Do you think the sector has utilized these resources prudently to increase productivity?

Yes ( ) No ( )

If No, what do you think is the reason?.....

.....

.....

b) Does your department refer to the ASDS while planning its activities?

Yes ( ) No ( )

If No, which document (if any) is referred while planning activities?.....

.....

……..

c) Does your department work in collaboration with other departments and stakeholders towards achievement of the ASDS?

Yes ( ) No ( )

If No, what reason is there (if any)……...

……..

d) Have you worked in another county other than Tana River?

Yes ( ) No ( )

If Yes, do you think there are special factors affecting the implementation of the ASDS in Tana River County compared to other counties? If Yes, what are these factors

…….....……..……

……..……

……

THANK YOU.