

EFFECTS OF INTEREST RATES ON AGRICULTURAL OUTPUT IN KENYA

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Declaration and Approval

Declaration

This research project is my original work and has not been submitted anywhere else to the best of my knowledge.

Cinderella Lombard Sign..... Date.....

Approval

This project has been presented for assessment with my approval as her supervisor.

Ms. Gladys Nemayian Sign Date.....

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Dedication

To my spouse **Joseph Maina** for his constant encouragement throughout my course.

Acknowledgment

Without question, the break through made in the writing of this work is by God's grace and favor.

In a special way, I am very grateful to Ms. Gladys Nemayian my supervisor, for her unending support and guidance.

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Abstract

This research work examines the influence of interest rates on Agricultural output in Kenya using Macroeconomic variables; interest rates, and agricultural output. The objective of the study is to explore the extent to which commercial bank interest rates have influenced agricultural output in the country. The specific objectives are; to assess the impact of interest rate on agricultural output in Kenya; to analyze the effect of inflation rates on agricultural output; to analyze the effect of budget allocated on agricultural output and to assess the effects of taxes on agricultural output in Kenya. The strategy adopted for the study was multiple regressions and the F-test; these were used to test the significance of the entire regression plane, and the R^2 , to test the joint influence of the independent variables on the dependent variable. The finding was that: firstly, interest rates, budget allocated on agricultural output, tax and inflation rates contributed to agricultural output. Secondly interest rates in Kenya are relatively high. Based on the findings above, the following suggestions were made:

1. There is need for financial institutions to increase the amount of loans given to farmers at a lower interest rate. In light of the discoveries and conclusions of the review, policies ought to be put in place to assist the banks relax their level of lending interest rates to farmers. The recommendation is based on the findings that higher interest rates lead to lower agricultural productivity.
2. Policies ought to be implemented to guarantee that the tax rates on agricultural inputs should be relatively lower to reduce the cost of agricultural inputs for the realized output to be more.
3. Also, policies concerning increase in government budget allocation on agriculture ought to be set up in order to increase the agricultural output.

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Abbreviations and Acronyms

GNP:	Gross National Product
KNBS:	Kenya National Bureau of Statistics
KAPP:	Kenya Agricultural Productivity Project
ASPS:	Agricultural Sector Program Support
SACCOs:	Savings and Credit Co-operative Societies
SSA:	Sub-Saharan Africa
SPSS:	Statistical Packages for Social Scientists

CHAPTER ONE

1.0 Introduction

Agriculture is the technological know-how or practice of farming that entails cultivation of the soil for the growing of crops and rearing of animals for food production and other products. These contribute to rural employment, foreign and rural incomes have such terrific significance that any extensive primarily based improvement in rural residing standards will almost truly require good sized productivity growth in agriculture. The growth in Agriculture increases growth in other sectors of the economy. Currently, agricultural productivity growth in SSA falls behind that of other regions in the world, and is well below that required to achieve food security and poverty goals (World Bank, 2007). The Kenya Vision 2030 has also indicated the growth in agricultural sector as a major problem (Republic of Kenya 2007). Over the past five years, the Kenya government has strived to revamp productivity in agricultural through government and donor supported programs such as KAPP, ASPS.

Agriculture is the art and science of tilling soil, growing crops, and keeping livestock for local and commercial purposes. Agriculture is a source of food, employment, and other valuable products and thus, forms an essential part of the Kenyan economy. As the backbone of the economy, Agriculture contributes 33% of our GDP and hires more than 40% of its total populace (Musona, 2021). Most agricultural produce such as tea, fruits, fresh flowers, and coffee encompasses the most significant portion of Kenya's exports. It has been ranked the leading world's exporter of cut flowers and black tea. In addition, Kenya has been undertaking reforms that will spur agricultural growth since 2013, and it is evident in its current performance.

1.1 Background of Study

Agribusiness refers to any business related to the commercial production of farm and farming-related products. Agricultural business involves raising, preparing, and marketing crops, livestock, timber, nursery stock, and other products related to agriculture. Cultivation of wheat, cotton, and flowers for export earns the country a lot of income and tax, utilized in constructing roads, amenities and improving the economy (German et al., 2020). The sector has grown over time and is gaining popularity in most parts of Kenya, where farmers are educated on the importance of commercial farming. Generally, agriculture is one of those rare businesses where farmers buy everything in retail and sell the resultant products wholesale.

Although the concept of agriculture as a business may differ from most claims, Kenyans should invest more in agriculture as seen, it encompasses the backbone of our economy. It is neither a social sector nor a development activity (Musona, 2021). It is an economic activity that should be treated as a business to attract more investors, create wealth and improve the lives of many Kenyans living in abject poverty. The private sector should be encouraged to join the agricultural business as the government alone cannot mitigate all agricultural issues.

According to statistics in Kenya, GDP in agriculture has been fluctuating over the years with the lowest value recorded is 23.2% in 2006 and the highest being 34.2% in 1983. In 1980 agriculture represented for 33% of Kenya's overall GDP. In 1990, Agricultural contributed 30% of the GDP; and in 2000 it increased to 32%. In 2011 Agriculture contributed 23% GDP which is an overall fall. Generally, GDP in agriculture has been decreasing since 1990 and there's need to improve agricultural output.

Furthermore, interest rates general trend is; between 1981-1987 rates have been decreasing with an average of 14.45%, 1988-1996 rates have been increasing with an average of 24.38%, 1997-2004 rates have been decreasing with an average of 21.46% and between 2005 to 2010 rates have been decreasing with an average of 14.01%. Generally, interest rates have been increasing from 1981-1996 and has been decreasing from 1997 to 2010. In Kenya, low agricultural productivity is explained by significantly high interest rates compared to other successful countries in agriculture. For instance, Egypt's interest rate averaged to 8.75% from 1991 to date.

Interest rates among other factors such as; collateral, selective credit control and ignorance have made credit not readily available for most farmers. This made it possible for most of the farmers in Kenya to come up short of the necessary capital for investment in large scale agriculture. As a remedy, farmers have opted to seeking financial assistance from microfinance institutions such as Sacco's. Interest rates have significantly impacted the agricultural enterprise by affecting the fee of borrowing cash, funding decisions and values of farmland. Interest is the amount paid by borrower to a lender (bank/financial institution), in exchange for the use of lenders money for a certain period of time. Changes in interest rates directly affect output of agricultural sector by influencing borrowing, spending and investing. Kenya committed itself in 2003 through Maputo declaration to spending 10% of its national budget on agriculture.

Agriculture generates about 30% of the GDP and has rapidly increased the value of agricultural imports. The sector provides employment opportunities to many Kenyans and encompasses a more significant proportion of Kenyan exports. The principal exports include tea, vegetable, cut flowers, and coffee. Kenya's high rainfall zone encompasses about 10 percent of arable land, producing more than 70 percent of agricultural produce (Nyoro, 2019). Farmers in

semi-arid regions produce about 20 percent, while arid zones produce about 10 percent of agricultural output. Although productivity remains relatively low in most zones due to underdeveloped infrastructure and poor incentives, agricultural reforms implemented in 2013 will increase food production by 2030.

Maize is a staple and commercial food for most Kenyan regions, and its consumption continues to rise despite calls by the ministry of health and the government of Kenya for diet diversification. Wheat is also cultivated in specific parts, and its demand has been fueled by a considerable increase in home and commercial baking. Also, leading supermarket chains such as Naivas have opened baking units which increase the demand for wheat (Birch, 2018). Kenya also produces sugar and tea in small quantities due to limitations from the high cost of production, low market levels, and rampant corruption. Other agricultural products in Kenya include dairy products, horticulture, pineapples, and rice.

Agriculture generates foreign currency via the export of tea, coffee, flowers, and other agronomic goods. It also generates employment via farming, research activities, and hence raising citizens' standards of living (Recha, 2019). The buying power of individuals is enhanced through income generation activities such as farming, hence creating a market for industrial commodities. Also, agriculture provides a market for industrial commodities such as fertilizers, equipment, and machinery for various farming processes. Research programmers also employ individuals to research the improvement of farming activities and logistic personnel to transport farm products.

In conclusion, agriculture generates about 30% of the GDP and has rapidly increased the value of agricultural imports. The sector provides employment opportunities to many Kenyans

and encompasses a more significant proportion of Kenyan exports. The industry should be conserved as it plays crucial roles in the economy, helps reduce poverty and increases food security by 80%. Factors affecting agriculture such as poor infrastructure should be looked into to ensure the agricultural vision 2030 is attained in both rural and urban farming. Generally, agriculture is an economic activity that should be treated as a business to attract more investors, create wealth and improve the lives of many Kenyans living in abject poverty.

1.2 Statement of the Problem

Over the years, Kenya has been characterized by low agricultural productivity and this is due to factors such as interest rates, inflation rates, government budget on agriculture and tax. In spite of high endowment of productive land, agricultural productivity is still low in Kenya due to relatively high interest rates which have been increasing from 1981 to 2010 and thus GDP in agriculture has been decreasing over the same time period.

Not until recently has government seriously endeavored to mobilize potential savings for rural farmers. Business financial institutions themselves give little interest to endorse advances or loans to farmers for fear of default wherein credit score is reached from other sources. The level of interest rates has been relatively high, these reported exorbitant loan costs that stark realities to peasant farmers. Farming is believed to be the generator of employment directly and indirectly while guaranteeing food security for Kenyans. In Kenya, the creation and improvement of the productivity of the agriculture sector is one of the vital drivers to realization of the development goal.

The Kenyan economy is influenced highly by agriculture, taking 40% of the entire workforce while 25% accounts for the annual workforce. Major agricultural exports in the country include coffee, tea, vegetables, and cut flowers, and it is the leading producer of cut flowers and black tea worldwide. However, productivity is relatively low in Kenya, and all regions account for poor incentives (Kogo, Kumar, & Koech, (2020). The country started agricultural reforms in 2013 to spur the sector's growth. Despite efforts to improve agricultural farming in Kenya over the years, slight improvement has been seen. Lack of access to credit is the biggest challenge to agricultural farming in Kenya.

Small farmers in Kenya are highly affected by the increasing environmental variability. The population in third world countries comprises two-third of people who live in rural areas. Most of these people are disadvantaged due to their poor living conditions, lack of food, and a changing climate. Individuals who lack access to enough credit face higher risks, including drought and farming (Kogo, Kumar, & Koech, (2020). However, although small farmers are not categorized as people who stand a chance to access loans, now they can get these loans from banks to fund their agricultural activities once they are evaluated. In addition to low chances of loan access, these farmers are affected by high-interest rates too. Majority of the farmers tend to consider interest rates while accessing loans to fund their farming. Small farmholders however, are mostly pulled back and discouraged to take these loans due to the high interest rates. Some of the programs that aim to solve financing challenges include Feed the Future East Africa. It works by boosting productivity and is profitable to small farmers. It also provides financial tools and business planning frameworks. In addition, it teaches how to engage with investors and make sound business decisions.

Organizations like the Food and Agriculture Organization promote reasonable farming practices locally; hence, small farmers can increase their income and throughput despite the weather variability. Credit risk remains the biggest challenge to Kenyan farmers to date. Banks say that many farmers borrow money without repaying, which forces them to stop giving them loans; moreover, the number of farmers applying for loans has increased over the years, while people willing to offer such loans are dwindling. It is for this reason that banks ask for collateral, which may be in form of pay slip, properties and guarantors, before issuing loans.

Agricultural farming in Kenya is behind due to the lack of credits farmers can use to advance farming techniques and get better yields. Farmers work in uncondusive environments and weak incentives, which affect output (Maloba, & Alhassan, (2019). Despite measures by the government to improve the sector, little has changed as farmers do not have the resources to improve operations. Furthermore, they rely on weak techniques that do not meet expected standards. Thus, the only remedy to better output is facilitating agricultural farming by giving farmers credits. Also, training farmers on how to access and use such credits will go a long way in improving performance. Also, educating farmers on different agricultural techniques will motivate them to apply these techniques and hence boost yields and make farming more accessible.

Additionally, efforts to improve smart agriculture for small farmers will boost output and increase survival rates for most people in Kenya who settle in rural areas. Making credits accessible to farmers will also increase farmers' incomes, improve nutrition, and boost food security. However, this will be a success through the involvement of the government and other

financial institutions that are in a position to offer credits to farmers to finance their agricultural activities.

The study aims at conducting an empirical analysis to see whether lending interest rates, inflation rates, and tax and government budget allocated on agriculture affects agricultural output in the country.

1.3 Research Objectives

1.3.1 General Objective

The broad review of the study is to assess the impact of interest rates on agricultural yield in Kenya.

1.3.2 Specific Objectives

However, the objectives in specific are;

- a) To determine the effect of lending interest rates on agricultural output in Kenya.
- b) To determine the impact of inflation on agricultural output in Kenya.
- c) To determine the effect of government budget on agricultural output in Kenya.
- d) To determine the effect of tax on agricultural output.

1.4 Research Hypotheses

Following from the above stated objective, the following theories were tested in this study.

- a) Lending interest rates have no significant impact on agricultural output.
- b) Inflation rate has no effect on agricultural output in Kenya.
- c) Budget allocated on agriculture has no significant effect on agricultural output

d) Tax has no effect on agricultural output in Kenya

1.5 Importance of the Study

This research is important to farmers, banks, government policy makers and investors in the agricultural region. Banks gained more by charging interest rate on credit given to the farmers. The lower the loan fees charged by banks, the more people borrowed credit and hence the returns to the bank increase.

The policy makers of the government discover this review helpful as a contribution to their approach process. To achieve vision 2030, Kenya will be required to commercialize the agricultural sector as a food production entity in addition to creation of employment. To come up with accurately made arrangements, this review provides valid and most recent findings concerning effect of interest rates on agricultural output in Kenya. These findings were used in designing of policies to trigger performance of the agricultural sector. The policies designed targeted and were beneficial to the investors in the farming sectors.

Farmers benefited from this study in the sense that when interest rates are low, they increased productivity and hence they got more income which led to an increase in their welfare.

1.6 Scope of the Study

The review examines the effects of interest rates on agricultural yield in Kenya over the period 1981 to 2010.

1.7 Limitation of the Study

The review used unadulterated auxiliary information from a few sources which may be instilled for certain mistakes and in so doing, may influence the discoveries from purely econometric methodology utilized.

CHAPTER TWO

2.0 Literature Review

2.1 Introduction

This segment gives a written audit of the review. It will discuss the importance of agriculture, and the challenges facing agriculture at the global level, continental level, as well as in Kenya. The chapter will also discuss three theories; loan pricing theory, signaling theory and Keynesian theory of investment. It also discusses empirical studies on effect of credit on agricultural output.

2.2 Importance of Agriculture

Agriculture is a general term that explains the concept of crop growing and animal rearing to provide food and other necessities. For past years, agriculture has mostly been known for food crop production, but recently, agriculture is also associated with poultry, beekeeping, dairy, fruit growing, forestry, and mushroom growing. (Lamm, 2021). Agriculture plays a vital role in producing economic resources, thus acting as a backbone of a given country's economy. Apart from providing food, agriculture has other benefits, including;

Means of income

Agriculture act as the primary source of living for lots of people. Many people depend directly on agriculture as their source of livelihood, approximately 85%. Following the lack of other developments and activities, especially in the developing countries, many people end up venturing into agricultural activities leading to a high percentage.

Source of revenue

For most developing countries, agriculture is the primary means of national income. Although agriculture does not play a significant role in the already developed countries, it is a part of its economic booster.

Source of saving

Most people who have ventured into the agriculture sectors for decades are rich from the savings brought up by selling agricultural products. The agriculture development increases savings.

Research shows that 45% of rich people worldwide are farmers that own big farms and ranches.

Benefit Transport

Agriculture has boosted the transportation section given that bulk agriculture products are moved from different farms to manufacturing areas and factories by the use of roads and railways. In addition to that, the transport sector ought to be developed due to the transportation of agricultural goods since agriculture lifts the nation's economic system.

Provision of food materials for human and animals'

The agricultural section supplies foodstuff for humans from crops and through domestic animals. It also supplies fodder for domestic animals. For instance, some domestic animals like cows supply people with high vitamins, thus boosting good health, and they also provide manure required for crop growing.

Benefit International Trade

Countries that depend on agriculture have tobacco, rice, coffee, spices, and sugar as their main exports. If there is smooth development practice of agriculture, imports are reduced while export increases considerably. This helps to reduce the country's unfavorable balance of payments as well as save foreign exchange. This amount may be well used to import other essential inputs, machinery, raw material, and other infrastructure that is helpful for the support of the country's economic development.

Marketable Surplus

Individuals engaged in mining; manufacturing contribute to the growth of marketable surplus. They rely on food production to meet the marketable surplus. As the agricultural sector develops, there is an expansion of marketable surplus because of the production increase, which can be exported to other countries.

Provision Raw Material

Many processing industries, such as fruits and rice husking and vegetables, get their raw materials from the agricultural sector.

Foreign Exchange Resources

Agricultural products continue to be an essential source of earning a country foreign exchange because the nation's export trade depends mainly on the agricultural sector.

Employment Opportunities

The agricultural sector provides more employment opportunities to the labor force required during the construction of irrigation schemes, drainage systems, and other such activities in the agricultural sector; this helps reduce the unemployment rates in developing countries with fast-growing populations.

Economic Development

The standard of living and economic development is improved Since agriculture employs many people, this offers a progressive outlook and increases the motivation needed hence creating a good atmosphere for economic development needed in a country, so it is in the proper position to say that economic development relies on agricultural growth rate.

Food Security

Most countries rely on agricultural products as their primary source of income. A stable agricultural sector ensures a nation of food security. (Barrett, 2021). The main requirement of any country is food security because security prevents malnourishment that has traditionally been believed to be one of the major problems faced by developing countries.

2.3 Challenges facing Agriculture Globally

Changing Weather Patterns

The quality of crops harvested diminishes as each new global warming pattern takes its toll. This reduces the number of agricultural products harvested. Agriculture is affected by global warming when marked changes to weather patterns play havoc with the length of growing seasons. Global warming trends give rise to more extended periods of higher temperatures in areas with formerly

short growing seasons. In other areas of global agricultural communities, longer than regular periods of drought or shorter periods of precipitation can alter specific crop growth. Or damage crops. This reduces the number of agricultural products harvested.

Biodiversity loss

Less biodiversity means that plants and animals are more vulnerable to pests and diseases. Compounded by our reliance on fewer and fewer species to feed ourselves, the increasing loss of biodiversity for food and agriculture puts food security and nutrition at risk,” Globally, biodiversity for food and agriculture is in decline. This is a severe risk to global food security and makes agriculture less resilient to climate change, pests, and diseases. We need more sustainable food production systems to preserve better and sustainably use biodiversity. New challenges like the digitalization of genetic information must be keenly addressed. The loss of biodiversity is steadily accelerating around the world, and ecosystem services are declining. It is thought that due to human-induced environmental changes and based on current trends, one million animal and plant species are threatened with extinction. The rate of loss of biodiversity is shocking and concerns the entire human race. Humans are dependent on biodiversity and ecosystem services that it provides to meet their basic food needs. However, while crop and livestock agriculture, forestry, and aquaculture are made up of and rely on a complex web of living organisms, they have become one of the significant causes of biodiversity loss.

2.4 Challenges facing agriculture in Africa

Lack of enough water

Scarcity of water can cause significant threats to the smallholder farming society of SSA by adversely affecting yields. Water is a critical driver of agricultural production. The availability of

quality water directly influences agricultural activities such as crop and livestock production, fishing, and agro-processing. By the year 2050, it is predicted that about 66% of the world population will be vulnerable to water shortages. Such shortages will strongly impact food production because agriculture uses many freshwaters, and SSA will be among the most affected areas.

Change of climate

Climate change can also affect agricultural productivity indirectly by elevating the reproduction rate and movement patterns of pests. Moreover, a rise in temperature or drought affects the resistance of crops to disease. Climate changes have adverse effects on agricultural productivity through a wide range of meteorological and hydrological processes, including increases in the atmospheric temperature affecting the rate of precipitation and evaporation. This results in water scarcity, lack of predictability of weather events such as the "seasonal" rains that require smallholders to plant cultivation, and by causing the greater frequency of extreme weather events that can cause great soil and crop losses.

Post-harvest loss

In Africa, the post-harvest loss could reach up to 40% of the crop. In monetary terms, post-harvest loss of grain crops alone in Africa is estimated to cost US\$3billion per year, suggesting the need for quick intervention to curb this problem to find critical pathways for increasing the volume of available food.

An unacceptably high number of people go hungry daily, and post-harvest losses due to spoilage and infestation contribute significantly to food insecurity. Post-harvest loss in

developing countries is more significant than in developed countries due to inadequate pre-and post-harvest management.

2.5 Challenges facing Agriculture in Kenya

Climate change

The changing and unpredictable raining seasons have dramatically affected the farmers' ability to plan their farming activities. The farmers have felt the effects of climate change mainly due to dependence on rain-fed agriculture. Areas that received adequate rainfall now receive insufficient rainfall, reducing the land that can support agricultural activities. This brings the need for more exploitation of irrigation farming, especially in ASALs. It is estimated that intensified irrigation can increase agricultural productivity fourfold, and, depending on the crops, incomes can be multiplied.

Extension services

There is a need for the recruitment of more extension staff and the involvement of NGOs to increase access to extension services to farmers. The agricultural sector extension service plays a crucial role in disseminating knowledge, technologies, and agricultural information and linking farmers with other actors in the economy. (Birch, 2018). 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.

The extension service is one of the critical change agents required in transforming subsistence farming to modern and commercial agriculture to promote household food security, improve income and reduce poverty.

Old technology

The use of modern science and technology in agricultural production is still limited even though Kenya has a well-developed agricultural research system. Preliminary research–extension–farmer linkages to facilitate demand-driven research and increased use of improved technologies continue to constrain efforts to increase agricultural productivity as farmers use ineffective and outdated technologies. This brings the need for extension services that can link the farmers and research.

Pest and Diseases

Most farmers undergo losses incurred by pests and diseases because the farmers lack the basic knowledge on how to control the diseases and pests. Poor storage facilities also significantly affect the yields. (Djatkika, 2021). Crops in poorly made storage facilities often than ever rot, leading to post-harvest losses. Extension services are detrimental in helping reduce the pre- and post-harvest losses caused by the above.

Use of inputs

Farm yields are reduced because farmers lack the knowledge and information on the appropriate time to apply farm inputs and the correct type of farm input. The cost of such inputs as fertilizers, pesticides, vaccines, and drugs are expensive and unaffordable to most small-scale farmers, and most end up not using them. This affects the agricultural yield a farmer gets.

Damage of soil nutrients

The ever-rising population density has contributed to the uneconomical sub-division of land to small units. Furthermore, continuous land cultivation has led to soil nutrient depletion, reduced agricultural yields, and environmental degradation. The farmers in question need information on the correct farming practices to help restore soil nutrients and boost agricultural yields, all done by simple advisory and extension services.

Poor infrastructure

Farmers undergo huge losses when transporting perishable goods due to poor rural roads leading to spoilage during transportation. Moreover, some poor infrastructure causes the transportation cost of agricultural goods to be high. The challenges facing Kenyan agricultural farmers are unending. However, they can be solved by effective advisory services according to the farmers, especially the small-scale farmers. The government should also solve some of these problems, like organizing seminars and training research to help farmers. The government should also improve infrastructure to help reduce losses incurred by the agricultural sector.

One of the primary difficulties impacting agriculture in Kenya is the lack of rural roads linking farmer facilities and commercialization points around the nation. The challenge has an impact on the loss of perishable items and significantly raises production costs (Njeru, 2017). If production costs are higher, they are reflected in the ultimate price of a product that is in good form when it reaches commercialization, therefore negatively hurting the production cycle on both ends. The sector's success is influenced at all levels, from manufacturing to marketing, both locally and globally. For exporters, this entails a lack of long-term raw material availability

owing to unmanaged supply, with gluts and shortages alternating, and lack of competitiveness due to high transportation costs, which are reflected in high pricing. Meager infrastructure has therefore also led to the country's lack of market integration.

A thin base of agronomic goods, particularly ship-in of agricultural products, leads to high revenue sensitivity to global market changes. Weak vertical integration characterizes the industry, exacerbated by a lack of financial institutions and supportive amenities for agricultural exports. Only a few supplies such as coffee, tea, dairy, maize, wheat, cattle, and agriculture provide a living for more than 85% of the people, with coffee and tea accounting for 45% of the sector's wage rates. The inadequate basis for agricultural exports is closely therefore related to this.

Lack of comprehensive land use policy in place also affects agriculture. The aspect has resulted in difficulty in accessing enough land for use over time (Njeru, 2017). Because the government lacks a well-defined land policy, issues such as land use, management, tenure adjustments, and ecological protection are not sufficiently handled by existing institutions. Land is a valuable resource for agriculture, and a lack of access to terrestrial land ownership is one of the primary causes of poverty in Kenya. Due to the scarcity of agricultural land, land use policy is, therefore, a crucial concern. The livestock sector with little development and exploitation is also amongst the challenges in the agricultural sector, whereby despite the cattle sectors long-underappreciated potential, it remains primarily underutilized (Birch, 2018). Kenya's cattle sector accounts for 10 percent of the country's GDP and about 42 percent of overall agricultural production. It provides meat, milk, dairy products, and other beef produce for home use, accounting for about 30% of total advertised agricultural production. Along with producing raw resources for agro-based enterprises, the industry generates foreign cash through exporting live

animals, animal skin, dairy yields, and processed pig goods. It, therefore, hires half of the overall farming workforce.

A variety of reasons, however, are limiting the growth of the livestock market. Droughts that cause immense livestock losses and hence livelihood losses for pastoralists constitute a significant issue. Deficiency of stable markets has significantly destabilized efforts to realize the sector's full latent growth (Gashu, Demment & Stoecker, 2019). Insufficient financing for the agricultural industry and related operations affects agriculture and its activities. A lack of funding hampers agriculture's inability to increase production and participate in value-added activities. Access to financial services has limited the range of activities, the technology employed, and the size of processes that a farmer may use on his farm, particularly for small-scale agriculturalists and women. Since independence, the amount of agricultural finance accessible to farmers has tended to decrease. Even though several organizations have been active in agricultural funding over time, real venture in the field has been negligible (Gashu, Demment & Stoecker, 2019). As a result, access to affordable financial credit is critical for improving agricultural productivity and incomes, particularly for smallholders and the large percentage of whom live in rural areas. The concept will allow them to purchase modern farming expertise as an essential input in achieving a progressive and efficiency goal.

2.6 Solutions offered by Government to Agriculture in Kenya

Agricultural sector plays a vital role in Kenya's economy, and it is the critical source of income for the mass of Kenyans residing in rural areas. Sustained agricultural expansion is essential for raising people's living standards while also generating rapid economic growth (Kogo, Kumar & Koech, 2020). Despite the implication of the agronomic sector, farming in the nation has been primarily small-scale, rain-fed, and inadequately mechanized for many years.

Furthermore, institutional funding and infrastructure are lacking to farmers, and the government, therefore, solves the problem farmers' face by implementing various policies.

With increased access to micro-finances, farmers can acquire fertilizers and machinery. Micro-financing institutions have also led to improved production through channeling funds to research and innovation among the youth. Generally, access to finance with low-interest rates has been initiated to ensure maximum profits for the farmers and more tax for government expenditure (Kogo, Kumar & Koech, 2020). The concept was implemented in 2018 through a bill presented to the government to reduce interest rates, which have been a stumbling block in agriculture. Another bill presented in the government is the need for better local infrastructure, attained through President Kenyatta's infrastructure initiatives. About 10,000km of rural and urban roads have been constructed since the initiation of the bill.

The government works to address the underlying causes of hunger and poverty. Its goal is to improve the competitiveness and variety of agricultural market systems and livelihoods to improve food security and earnings. Dairy, livestock, horticulture, and essential foods are the four key value chains targeted by government efforts. It connects farmers to markets and contemporary farming methods, improves agricultural input availability and reliability, widens access to funding, and advocates private sector solutions (Ali, 2017). Through sustainable land-use practices and environmental conservation, the government guarantees the dynamic balance of agricultural land. It achieves the initiative, which will design and construct irrigation schemes, soil, and water conservation programs, recover dry land and conserve forests and riverbanks in land-use development.

The Kenyan population is currently estimated at 47 million and is projected to be about 95 million in 2050. As a fundamental aspect of the economy, Agriculture is a vital instrument in eradicating poverty, stable food security, and sustainable development. The government has highlighted significant agricultural challenges and strives to improve the sector via government and NGO-based programs. One of the critical challenges is weather variability which limits sustainable food production (Loboguerrero et al., 2019). Food insecurity should be dealt with to eliminate the agricultural productivity gap. Agronomic amplification and increasing crop yield per acre should be a priority in a quest to curb food shortages and the destruction of natural resources.

The majority of Kenyans find it hard to invest in agriculture and opt for white-collar jobs. The factor that makes many lands go to waste and the result is a gradual decline in the agronomic sector. In a quest to curb the challenge, the government incorporates measures such as obtaining cheap labor that can be utilized for maximum production. Also, poor transport and communication have been among the critical challenges of agriculture (Loboguerrero et al., 2019). Through its able agricultural leadership, the government aims to incorporate expertise that will enhance the transportation of farm produce to industries. Communication is also an important aspect that should be improved to avoid delays in transporting perishable goods for local consumption and export. Generally, the government should take a significant role in supporting agriculture, a source of food, foreign currency, and economic value to the nation.

2.7 Theoretical Literature Review

2.7.1 The Loan Pricing Theory

Banks can't generally set exorbitant loan fees for example attempt to procure most extreme interest pay. They ought to consider the issue of unfriendly determination and moral danger since it is truly challenging to figure the borrower type toward the beginning of a financial relationship Stiglitz and Weiss (1981).

In the event that banks set high interest fees, they may induce detrimental problems due to the fact that high risk borrowers are willing to accept those high fees. When these borrowers receive the loan, they may develop negative behavior due to the fact they may be likely to tackle high risk projects Chodechali (2004). This theory relates to the study because interest rates determine the amount borrowed by farmers. If the bank sets their interest rates high many farmers will be discouraged to borrow hence output will decline.

2.7.2 Signaling Theory

The signaling contention states that good farmers should provide more collateral/security so that they could signal to the financial institution that they're much less volatile type borrowers after which they are charged low interest rates. Borrowers who give less collateral/security for their financing demonstrate higher levels of risk. Firms offering high collateral therefore, will be charged low interest fees while those who offer low collateral will be charged higher interest fees Chodechali (2004).

This theory relates to the study in that farmers should be encouraged to give large collateral so that they can be given large amount of loans at a lower interest rate hence increasing agricultural output in Kenya.

2.7.3 Structural Inflation Theory

The structuralism holds the view that inflation is essential with development. As indicated by this view, as the economy develops, rigidities rise which prompts underlying inflation. As the demand for agricultural goods goes up, their domestic supply being inelastic, the prices of agricultural goods rise. The yield of these goods does not increase when prices rise because their production is in elastic due to defective policies of land tenure and other rigidities (Ihingan 1997). This theory is significant to the study because it examines inflation as a factor leading to low output as inflation is caused by persistent increase in prices.

2.8 Empirical Literature Review

Bank credits are essential to agricultural output and are well established in many countries. According to Sohail et al (1991:38) on the connection between bank credits and agricultural yield in Pakistan, they found out that a factual huge relationship existed between bank credit and the agricultural output.

In addition, Yaron et al (1997:203) also contended that coordinated programs were associated with the adoption of contemporary innovations such as green-houses in Morocco and tube wells in North West Bangladesh and these innovations were related with increase in agricultural yield.

Also, May (1970:08) stated that countries that emphasized the agricultural sector wound up with quicker modern development than those that focused on industries alone. Therefore, agriculture may be the fastest road to industrialization.

Johnson (1975) studied Japanese industrial development and reported that without the earlier expansion in agricultural efficiency, the financing of Japanese industrial development would not have been feasible. Therefore, the inventory of savings from agriculture was the critical factor in Japan's rapid economic growth and it is frequently perceived as the main motivation behind the success of offering herself the necessary investment funds in the early stages of industrial development (Binswanger, 1989).

Adegeye and Ditto (1985) depicted Agriculture as the method involved with acquiring power over the utilization of cash, labor and products in the present in return for a guarantee to reimburse sometime not too far off. The crucial rate of interest and credit in agricultural production and development can also be upraised from the perceptive of the amount of issues exuding from its absence. Currently in Kenya, arrangements of farming credit are not sufficient however proficient utilization of such credit has turned into a significant factor to build usefulness.

Furthermore, Otieno (2010) stated that to reorganize financing to the agricultural sector it is important that factors that affect lending to this sector in Kenya are found to be utilized as sources of info when coming up with financial policy.

Poulton et al. (1998) reported in his study that; small holder cash-crop production in liberalized cotton and cashew markets in Ghana, Pakistan, and Tanzania. They researched the problems

facing farmers in financing seasonal crop yields and the policies created by private brokers to deliver seasonal credit score. It emerged from the study that farmers' restricted access to capital is a critical issue on crop production

Higgins (1980:37) argues that the only means to a cumulative improvement in agricultural productivity is a public policy designed to move to large-scale agricultural and encouraging a rapid rate of industrialization. Elsewhere, he recognized that such a policy requires heavy investment in both the industrial and agriculture sectors. heavy investments in both sectors require that interest rates should be lower keeping all other factors constant so as to encourage most people to borrow money from financial organizations

2.9 Conceptual Framework

GDP in agriculture = f (interest rates, inflation rate and taxes).

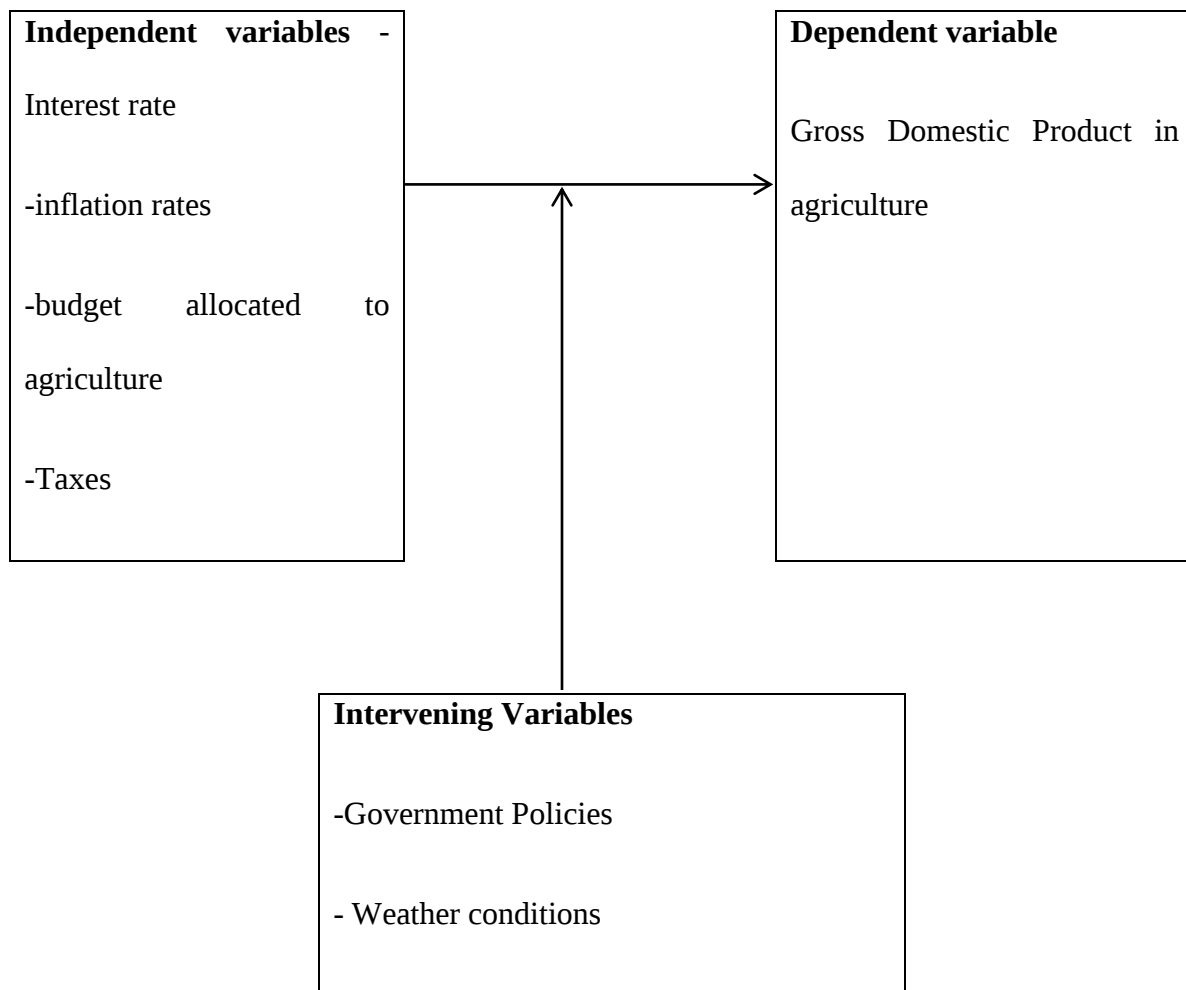


Figure 1: Conceptual Framework

Source: Cinderella Lombard (2020)

CHAPTER THREE

3.0 Research Methodology

3.1 Introduction

This segment covered the general methodology used to complete the review. The presentation involves research design, target population, sampling design, test size, information assortment instruments and how evaluation of statistics was done.

3.2 Research Design

The study aimed at explaining a causal relationship between interest rates, budget allocated on agriculture, tax and inflation rate on agricultural output in Kenya. The study adopted a historical design since it involved time series information for the period 1981-2010.

3.3 Sample Size

A 30year period between 1981 and 2010 was chosen on which the research is based. The time frame of between 1981 and 2010 was representative enough in analyzing the connection that is present between the variables. The period between 1981 and 2010 comprised of sample data that had gone through a few stages like, attempted coup of 1982, financial recessions and recoveries, and post-election violence in 2007.

3.4 Data Collection Instruments

Data for the research is from reliable authorities such as legitimate government publications and other government authorities like the Central Bank of Kenya and Kenya National Bureau of statistics. Annual data for lending interest rates, tax, Government budget allocated to agriculture and for inflation from 1981 – 2010 was gathered essentially from the Central Bank of Kenya.

3.4.1 Validity and Reliability

Data obtained from Kenya's Government publications is considered authentic and is therefore reliable for making conclusions. Such data is also credible and free from error.

3.5 Data Analysis.

The information was analyzed using descriptive and inferential analysis. The secondary data was collected using retrieval method and was compiled, sorted and analyzed using a computerized data analysis package SPSS. The economic criteria was used to analyze which of the factors influenced agricultural output. Hypothesis testing gave the significance of estimates of the independent variable.

The regression formula below was used to dictate the relationship. Agricultural yield/output is the reliant variable while the independent variables are; lending interest rates, inflation rate, tax and budget allocation on agriculture.

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

Where:

Y = GDP in agriculture

X₁ = interest rates

X₂ = inflation rate

X₃ = tax

X₄ = budget allocated on agriculture

β₀ = Intercept Term

$\beta_1, \beta_2, \beta_3, \beta_4$ = Sensitivity of agricultural output to the independent variables

ε = the error term

The *t* –*statistic* at 95% confidence level was used to measure the importance of the constants of regression $\beta_0, \beta_1, \beta_2, \beta_3$ and β_4 . The importance of the whole regression was tested using the *F* –*test* at 95% confidence level. The strength of the level to which the three independent variables X_1, X_2, X_3, X_4 explain the variation in agricultural output was evaluated using the coefficient of determination R^2 .

CHAPTER FOUR

4.0 Analysis Interpretation and Discussion of Results

4.1 Introduction

This segment covers the general results of the study, data analysis interpretations and arguments of the topic under study. The chapter presents findings on; lending interest rates, government budget allocation on agriculture, tax as a percentage of GDP on agriculture and inflation on agricultural output in Kenya.

4.2 Descriptive Analysis

4.2.1 Economic Criteria

$$Y = 16.666 - 0.204X_1 - 0.021X_2 - 0.499X_3 + 0.245X_3$$

16.666 – autonomous output. This is agricultural output that does not depend on; interest rates, tax, inflation and budget allocation on agriculture.

-0.204 - Sensitivity of agriculture output on lending interest rates(X_1). A unit increase in interest rate leads to 0.204 decrease in agricultural output. Hence, an inverse relationship.

-0.021- Sensitivity of agriculture output on inflation(X_2). A unit increase in inflation rate leads to 0.021 decrease in agricultural output. Hence, an inverse relationship.

-0.499- Sensitivity of agriculture output on tax(X_3). A unit increase in tax rate leads to 0.499 decrease in agricultural output. Hence, an inverse relationship.

0.245- Sensitivity of agriculture output on government budget allocation on agriculture(X_4). A unit increase in budget allocation to agriculture leads to 0.245 increase in agricultural output. Hence, a direct relationship.

4.3 Inferential Survey

Table 1: Regression Calculation

Model	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
1 (Constant)	16.666	7.820		.043
LENDING INTEREST RATES	-.204	.090	.476	.032
INFLATION RATES	-.021	.061	-.066	.072
TAX AS % OF GDP AGRICULTURE BUDGET	-.499	.412	.227	.038
ALLOCATION ON AGRICULTURE	.245	.225	.221	.027

Source: SPSS

- i. The p-value 0.032 is less than 0.05 level of significance, we reject the hypothesis that lending interest rates has no effect on agricultural output. This therefore advocates for lower interest rates in order to maximize agricultural output.

- ii. The p-value 0.072 is greater than 0.05 level of significance, we therefore accept the hypothesis that inflation has no effect on agricultural output.
- iii. The p-value 0.038 is less than the significant level of 0.05, hence we reject the hypothesis that tax has no effect on agricultural output. It is therefore advisable to reduce tax on agricultural inputs in order to increase output.
- iv. The p-value 0.027 is less than the full-size stage of 0.05. Therefore, we reject the hypothesis that budget allocation on agriculture has no effect on agricultural output. This therefore advocates for an increase in budget allocation on agriculture in order to increase output.

Table 2: R² table

Model	R Square	Std. Error of the Estimate
1	.756	0.0722

Source: SPSS

- 75.6% of the fluctuations in agricultural output is explained by the model. And 24.4% is explained by other factors no longer captured in the model.

CHAPTER 5

5.0 Summary with Conclusions and Recommendations

5.1 Introduction

This section sums up as well as states the conclusion gathered from the analysis of information.

The findings have been summarized alongside the target of the review and proposals are given.

5.2 Summary of Findings

The overall target of the study was to decide the impact and effects of the interest rates on agricultural output. The hypothesis of the study was to establish whether interest rates have an effect on agriculture output.

The study found out that interest rates, tax and government allocation on agriculture have an effect on GDP of agriculture. Where, interest rates and tax have negative effect while government expenditure has positive effect. Inflation however was found not to have any effect.

5.3 Conclusion

From the findings of this research, interest rates affect agricultural output that is, when interest rates are high, farmers tend not to borrow loans and therefore agricultural productivity is low. Productivity on agriculture is dependent on government budget allocation to the agricultural sector since a high amount of allocation to agriculture leads to higher productivity. It is also concluded that the country's tax on agricultural inputs has an inverse relationship on agricultural output in Kenya.

5.4 Recommendations

Based on the survey results and conclusions of the study, policies ought to be set up to help banks relax their level of lending interest rates to farmers. This recommendation is primarily based on the findings that higher interest rates lead to lower agricultural productivity

A plan of action needs to be put in place to ensure that the tax rates on agricultural inputs should be relatively lower to reduce the cost of agricultural inputs for the realized output to be more.

Also, policies concerning increase in government budget allocation on agriculture should be devised so as to increase growth in agricultural output.

5.5 Areas of Future Research

There is need for applied research targeted on agriculture since it is the backbone of our economy. This assessment can also be done in more than one country to get better the findings and provide more room for generalizability. This is due to the fact that the findings of this study are focused on the Kenyan financial institution and farmers. A review of a substantial population will be more informing and will give more generalizable outcomes.

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Appendices

Research Data

YEAR	GDP ON AGRICULTURE	LENDING INTEREST RATES	INFLATION RATE	TAX RATE	BUDGET ALLOCATION TO AGRICULTURE
1981	32.50	12.42	11.60	16.02	6.90
1982	33.40	14.50	20.67	17.32	8.10
1983	34.20	15.83	11.39	17.92	5.80
1984	34.00	14.42	10.28	15.63	8.50
1985	32.60	14.00	13.00	16.05	8.50
1986	33.00	14.00	2.53	17.95	10.70
1987	31.50	14.00	8.64	17.95	6.10
1988	29.90	15.00	12.26	18.54	12.90
1989	30.20	17.25	13.79	16.59	4.80
1990	29.50	18.75	17.78	17.65	2.80
1991	28.10	19.00	20.08	17.62	.40
1992	28.70	21.07	27.33	18.41	4.80
1993	31.50	29.99	45.98	14.97	5.10
1994	33.30	36.24	28.81	14.94	4.10

1995	31.30	28.80	1.55	20.49	4.20
1996	30.70	33.79	8.86	15.85	5.50
1997	30.90	30.25	11.36	16.06	3.20
1998	31.20	29.49	6.72	15.15	3.40
1999	32.40	22.38	5.74	16.15	2.50
2000	32.40	22.34	9.98	16.83	3.10
2001	31.30	19.67	5.74	17.83	4.20
2002	29.10	18.45	1.96	17.29	4.10
2003	29.00	16.57	9.82	15.77	3.90
2004	28.00	12.53	11.62	16.57	4.60
2005	27.20	12.88	10.31	18.67	4.60
2006	23.20	13.64	14.45	15.14	5.70
2007	23.30	13.34	9.75	15.16	6.50
2008	24.90	14.02	26.24	15.96	7.80
2009	26.10	14.80	9.23	15.55	8.70
2010	27.80	14.37	3.96	15.93	9.20

Source: KNBS website (2013), CBK website (2013), World Bank Database (2013)