

**AGRICULTURAL EXPORTS, SELECTED MACROECONOMIC
VARIABLES AND ECONOMIC GROWTH NEXUS IN KENYA**

BY

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DECLARATION

Declaration by Candidate

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DEDICATION

I dedicate this work to My beloved Wife Everline Kiplagat and to my beloved Father David Bartilol for their encouragement and support. Above them all, I dedicate this work to the almighty GOD.

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I would like to acknowledge all those who participated in the preparation of this study document. First, I would like to appreciate my supervisors Dr. Vincent Ng'eno and Dr. Alfred Serem for guiding me on the choice of my topic, giving me guidance on how to organize my content and also the general development of the document. Also, my sincere gratitude goes to my family and friends who in one way or the other gave me moral as well as material support during the preparation of this document.

ABSTRACT

Kenya is the most developed of the original three countries of the East African Community. Kenya to align to long term development agenda to vision 2030 and to attain the goal of big four agenda development priority which includes food security, manufacturing, universal health care and affordable housing as the key fundamental sectors targeted to spur economic growth, Kenya needs to do more on agricultural production to enhance exports since most people are engaged in the agricultural sector. The most worrying problem is the danger caused by the rising costs of production in relation to the fluctuating prices received by exporters causing fluctuation in the volume of exports. Based on that, this study analyzed the relationship between Agricultural Exports and Economic Growth in Kenya. The specific objectives being to determine the relationship between Agricultural Exports and economic growth in Kenya, to determine the effects of physical capital formation on economic growth in Kenya, to investigate the effects of Human Capital on economic growth in Kenya, to determine the effect of inflation rates on economic growth in Kenya and to determine the relationship between exchange rates and economic growth in Kenya. The study made use of time series data for the period between 1964 and 2018 majorly sourced from World Bank data base. The study was guided by the endogenous growth theory and made use of longitudinal research design. Analysis was done following endogenous growth model in line with the time series property tests employing the Auto Regressive Distributed Lags (ARDL) methodologies. Unit root results indicated that at first difference all the variables were stationary. The findings of the study showed that Agricultural Exports($\beta=0.1372$, p-value $0.014<0.05$), Gross physical capital formation ($\beta=0.7649$, p-value $0.000<0.05$), Inflation ($\beta=0.0048$, p-value $0.004<0.05$) and Exchange rates $\beta=0.0033$, p-value $0.001<0.05$) are significant in relation to Gross Domestic Product (GDP) growth in Kenya (Economic growth) in the long run whereas; Agricultural Exports($\beta=0.0956$, p-value $0.023<0.05$), Gross capital formation($\beta=-0.1442$, p-value $0.013<0.05$), Inflation($\beta=-0.0017$, P-value $0.000<0.05$) and Exchange rates($\beta=-0.0023$, p-value $0.040<0.05$), were significant in relation to GDP growth in the short run. Human capital was found to be insignificant both in the short run and in the long run. The Error Correction Term (ECT) value was negative (ECT=-0.6964) and significant (p-value $0.000<0.05$) showing a 69.64 percent speed of adjustment to the equilibrium in one year. This study thus concludes that in the long run Agricultural Exports, Physical capital formation, Inflation and Exchange rates are statistically significant in explaining economic growth in the long run and thus recommends that Kenyan policy makers should enact laws and policies that ensures a stable economy through putting checks on Agricultural Exports, Physical capital formation, Inflation and Exchange rates.

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ABBREVIATIONS AND ACRONYMS

ADF:	Augmented Dickey-Fuller Tests
ARDL:	Autoregressive Distributed lag
CBK:	Central Bank of Kenya
EAC:	East African Community
ECM:	Error Correction Model
FAO:	Food and Agricultural Organization
GDP:	Gross Domestic Product
GoK:	Government of Kenya
HCA:	Human Capital Accumulation
IMF:	International Monetary Fund
KIPPRA:	Kenya Institute for Public Policy Research and Analysis
KNBS:	Kenya National Bureau of Statistics
LM:	Lagrange Multiplier
MDG:	Millennium Development Goals
NPEP:	National Poverty Eradication Plan
PP:	Philips-Perron
PRSP:	Poverty Reduction Strategy Paper
SAP:	Structural Adjustment Program
SDG:	Sustainable Development Goals
VAR:	Vector Autoregressive Model
VECM:	Vector Error Correction Model

OPERATIONAL DEFINITION OF TERMS

Agricultural export: Agricultural export means shipping any agricultural commodity or product whether raw or processed out of the port of a country or selling of agricultural goods produced in the home country to other markets.

Economic growth: The increase in volume and value of goods and services produced by a given economy over time. Economic growth was proxied by growth or increase/decrease in gross domestic product.

Exchange Rates: An exchange rate (also known as foreign exchange rate) between two currencies is the rate at which one currency will be exchanged for another. It is regarded as the value of one country's currency in terms of another currency (Kennen, 2000).

Export of Goods and Services: An export of a country is a function of international trade comprising of the sum of all goods and services produced that are shipped to another country for future sale or trade.

Human Capital: Human capital index, based on years of schooling and returns to education

Inflation: Defined as a generalized increase in the level of price sustained over a long period in an economy (Lipsey1995) as cited in Abogan *et al.*, (2014). It is a rise in the general level of prices of goods and services in an economy over a period of time.

Physical Capital: Physical capital consists of the sum of all manmade goods that assist in the production process in Kenya.

CHAPTER ONE

INTRODUCTION

1.1 Background Information

Macroeconomic variables have since time in memorial been factored as important determinants of economic growth. Previous studies have shown that macroeconomic variables play a very crucial role in determining the growth of the economy and thus considered significant (world bank, 2014). International organizations such as World trade organization (WTO), International Monetary Fund (IMF) and World Bank (WB) are constantly advising, especially developing countries, to speed up the process of trade liberalization to achieve high economic growth. The ultimate goal of many countries and economies has always been achieving high economic growth since this has been shown to be the only route of improving the standards of life of their people to levels that are desirable (Umulkheir & Muganda, 2017).

To maintain its liberal nature, Kenya has always strived to promote a free market model with a few state-owned infrastructures and thus expanding its economic growth by an estimated 4.9 per cent in 2017 which has since been shown to be less when compared to a revised growth of 5.9 percent in 2016 although improving compared to other years (KNBS, 2018).

According to Kenya's vision 2030, Kenya aspires to transform from a lower middle-income economy to an upper middle-income economy. This can only be attained if the requisite infrastructure and policies are in place to provide fundamentals of ensuring the country is in a position to take off. According to a study by KIPPRA, the outstanding sources aiding the growth in Gross Domestic Product in Kenya are agriculture, Forestry, fishing, Manufacturing, Transport & storage, information & communication, construction, real estate and financial services (KIPPRA, 2017). Many economic

scholars have actually perceived Kenya as the hub of Eastern Africa's financial, communication and transportation.

Agriculture, fishing & forestry have however been shown as the main sectors in the Kenyan economy. This is based on a study conducted by FAO (2013) where it is noted that the sector accounts for about 24 percent of Kenya's gross Domestic Product. Further, an estimated 75 percent of the Kenyan urban and rural population depends on the sector either directly or indirectly (FAO, 2013). The study also noted that, Agriculture is the largest provider of foreign exchange through export earnings of agricultural products.

Following all through from independence cutting across both the fixed exchange rates and the floating exchange rate regimes, Kenya's main cash crops according to Karingi (2002) have been tea, coffee, flowers, fruits, pyrethrum, tobacco, sugar, cotton, sisal, and wattle. Of all these, Tea, coffee and horticultural products account for approximately 55 percent of the total exports (Karingi, 2002). This has been the case since independence where agriculture has always been the leading sector accounting for over 40 percent of GDP through the years. Its performance in the recent year has been declining enormously amounting to 24 percent of GDP in 2004 (Statistical Abstract, 2004). It has been noted that good agricultural performance in the country translates into measurable improvements in the quality of life (Ochanda, 2010). Researchers have noted that despite the downfall in the recent past agriculture has been playing a vital role in the economy (Moses, 2008; Rutto, 2014).

1.2 Agricultural Export Products

Kenya's economy depends majorly on agriculture. It accounts to 25 % of the annual GDP and 70% to workforce. The key leading agricultural exports are tea, coffee, cut

flowers, and vegetables. Kenya is the world's leading exporter of black tea and cut flowers. Tea was first introduced in Kenya in 1903 by an Indian colonial settler called G.W.CAINE watts, (1999) as cited by (Gesimba *et al.*, 2005). Since then the tea sector has grown gradually and currently tea is the leading export crop in Kenya and on that note Kenya is ranked top in the export of black tea in the world competing with India and Sri Lanka (Muthamia, 2015).

Tea research foundation asserts that, with regards to production Kenya is ranked third after China and India (Rutto, 2014). On that note, Watts, (1999) attributed the success of the tea sector to three main reasons including: government policy to integrate smallholder farmers in tea production (small scale farmers account for over 60% of tea produced in Kenya), secondly is the establishment of tea estates under the British tea companies and finally the formation of tea research foundation of Kenya which has assisted in the selection of high yielding varieties of tea and the selective application of improved agronomic practices. Kenya is therefore a net exporter of tea hence a source of foreign exchange. Being an export crop it is subject to macroeconomic variables which have been the concern of many economists (Bryant, 2006).

Tea is sold in US dollars through automated auctioning in Mombasa auction whose membership consists of brokers, buyers, producers, warehouse men and packers (TBK, 2012). This is normally sold in a semi-processed form normally low valued. The Mombasa auction is run by the East African Tea Trade Auction (EATTA) which is ranked second in the world after Colombo auction. Over 84% of the exported tea passes through the Mombasa auction (EATTA 2012). Major trading partners of Kenyan tea include Pakistan, Egypt and United Kingdom commanding over 66% of all tea exports from Kenya (TBK, 2012). Pakistan commands a larger share importing 23.69%, United

Kingdom follows commanding 22.19%, Egypt commands 20.78% followed by other importers of Kenyan tea sharing the remaining 33.35%. this is as shown below.

Table 1.1: Major Trading Partners of Kenyan Tea

Country	Market share (%)
United Kingdom	22.19
Pakistan	23.69
Egypt	20.78
Others	33.35

Source: TBK, 2012

Before and post liberalization, Kenyan tea exports has experience some upward fluctuating trend. This assessed has affected the profitability of tea earnings.

Further, Coffee was introduced in Kenya by French missionaries in 1893. Both the Arabica and Robusta varieties of coffee were introduced in Kenya, but Arabica takes almost 100% of the total production of coffee in Kenya. Since its introduction until just before independence no Kenyan was allowed to neither own nor manage any coffee farm (Akiyama, 1987). It was until after independence that Kenyans were allowed to do so. This was a bid to prevent competition from the locals (Barnes, 1979). Since its introduction coffee has played a greater role in the Country's agricultural sector being the first major agricultural export in the country (Thuku, 2013) . 60% of its production in Kenya is done by small scale farmers grouped in co-operatives whereas 40% is done by large scale farmers majorly at estate levels (Nyangito, 2005).

The national area under coffee is estimated at 170,000 hectares. Coffee is grown between altitude 1,400 and 2100 meters above sea level. The main production regions

in Kenya include Northern part of Nairobi, High plateau surrounding Mount Kenya, in the Aberdare zone, West areas of Kisii, Nyanza, Bungoma, Kakamega, Rift Valley areas of Nakuru, Trans Nzoia and Taita Hills near Mt. Kilimanjaro (Monique Bagal *et al*, 2013). Coffee is a key industry of the Kenyan economy, as it is the fourth largest earner after tourism, tea and horticulture. It is further estimated that out of the 70% of Kenya's workforce engaged in agriculture, 30% are employed in the coffee industry (Monique Bagal *et al*, 2013).

1.3 Problem Statement

Todani and Munyama (2005) states that Bilateral trade between two countries depends upon, among other things macroeconomic variables, exchange rates and the relative price level of the two partners (Muthamia, 2015). There is no country that can develop to required standards in a situation of autarky; there is need for nations to trade with each other so as to enjoy a comparative advantage in its production activities (Dr. Noula *et al*, 2013). This is the case with Kenya where most people are engaged in the agricultural sector. The most worrying problem is the danger caused by the rising costs of production in relation to the fluctuating prices received by exporters causing fluctuation in the volume of exports. This applies most forcibly to the estate sector where labor account for some two thirds of ex-factory production costs.

This unequal relationship between cost and prices of major Kenyan exports is caused by the overwhelming changes in the world prices of these commodities in relation to specific inflation rates in our country as well as other macroeconomic variables. Furthermore, Kenya's exports as share of GDP have remained constant since 2005 (at around 23-24 percent) while imports have ballooned from 32 percent in 2005, to 40 percent of GDP in 2012 (World Bank, 2013). Theoretically, the livelihoods of export oriented cash crops producers on less developed countries are more vulnerable to

market forces when they commercialize all their farm production and rely entirely in the market for food (Kiplimo et al., 2015).

Farmers who engage in export crops have been hypothesized to face dual market structures; a competitive output market structure and an oligopolistic input market structure (Tweeten, 1980). The output market is actually controlled by the forces of demand and supply hence subject to macroeconomic variables such as exchange rates, inflation, foreign income, among other variables. On the other hand, the input market is normally controlled by some few suppliers who fix prices as per the conditions of the economy hence able to deal with changing macroeconomic effects easily. This is true for the Kenyan exporters who produce mainly for exports market using imported inputs. This immensely affects economic growth of the country and therefore it would be of great essence to study the trend of Agricultural exports, physical capital formation, human capital, inflation and exchange rate in relation to economic growth.

1.4 Objectives

Objectives of the study have been categorized into two. The general and specific objectives.

1.4.1 General Objective

The general objective of this study was to determine the relationship between Agricultural Exports, selected macroeconomic variables and Economic Growth in Kenya.

1.4.2 Specific Objectives

The specific objectives of the study were.

- i. To determine the effect of Agricultural Exports on economic growth in Kenya.
- ii. To determine the effects of physical capital formation on economic growth in Kenya.
- iii. To investigate the effects of Human Capital on economic growth in Kenya.
- iv. To determine the effect of inflation rates on economic growth in Kenya.
- v. To determine the relationship between exchange rates and economic growth in Kenya.

1.5 Hypotheses

The study tested the following hypotheses.

H₀₁: Agricultural Exports have no significant effect on Economic growth in Kenya.

H₀₂: Physical capital have no significant effect on Economic growth in Kenya.

H₀₃: Human Capital have no significant effect on Economic growth in Kenya.

H₀₄: Inflation rates have no significant effect on Economic growth in Kenya.

H₀₅: There is no significant relationship between exchange rate and Economic growth in Kenya.

1.6 Justification of the Study

Since the period after liberalization Kenyan government has been involved in putting in place policies leading to a shift and increase of Agricultural export oriented economic activities. It is therefore of great importance to conduct such research which in the long run will see that Agricultural exports are increased in Kenya hence increase in foreign exchange and improved balance of payment theoretically leading to economic development. It should also be noted that no country has developed without transforming its primary products for exports. The study will also see the increase in

the number of grey literature available in this topic hence improved knowledge regarding exportation of commodities and their effects to the economy in totality. The study will also be important to those persons who would wish to research on the same topic or field of study.

In a nutshell, the study will assist to fill problematic gaps associated with agricultural problems linked to the agricultural sector as a whole as well as the Agricultural export commodities. The recommendations that will be put in place at the end of the analysis will be used by other analyst to provide solutions associated with other bilateral trade problems in the agricultural sector.

CHAPTER TWO

LITERATURE REVIEW

2.1 Overview

This chapter entails a review of existing published and grey literature on the relationship between Agricultural Exports and Economic Growth. It therefore gives a detailed literature review of the existing works, both theoretical and empirical, as well as the summary of literature review. It also presents the theoretical framework that defines the study, as well as the conceptual framework.

2.2 Theoretical Literature

The study on the drivers of economic growth might be considered an old age study pertaining to developed nations but to developing nations like Kenya the topic is considered as current since most of these nations consider agriculture as the backbone to their economies (Bbaale & Mutenyo, 2011). On that regard there is scattered literature to this topic in Africa as compared to other parts of the world. Theoretical literature on this field of study dates back to the period of Adam Smith, 1776 when he came up with the absolute advantage theory. Other theories include comparative advantage theory, export-led growth theory among other important theories.

2.2.1 Absolute Advantage Theory

Using labour as the only input Adam Smith (1776) formulated absolute advantage theory which measures a country's ability to produce a greater quantity of a good using the same amount of resources than the competitor. It states that a country will export those commodities it can produce at a lower cost in terms of labour and other inputs when compared with other countries. Adams ideas on the division of labour establish the ground for his theory of absolute advantage. According to him, the division of labour is the only strategy that will ensure a greater labour productivity. As an outcome

of higher and enhanced division of labour, a lot of products can be produced using the same amount of labour. Also, the quantity and the quality of products will be improved due to labour specialization or rather the division of labour. This implies that there is an increase in output, technological advancement is accelerated and the skills of the workers together with their production are improved. As an outcome, economic growth is stimulated and the wealth of the nation is increased. Schumacher (2012) seconded this theory and concluded that a more specialized labour force causes more growth.

The theorist continues to argue that if one country establishes trade links with another country, it will cause an extension of labour specialization since the cross-border market is larger than the home market. International trade is therefore beneficial to a country since an improvement in specialization of labour causes an increase of the negotiable value of the yearly produce of the land together with the labour of the nation. According to Schumacher (2012), international trade means there is extension of labour specialization which cause a rise in the level of production via technical and structural inventions. Therefore, more products can be produced overall using the same amount of labour. This promotes economic growth because wealth is stimulated and industry is enhanced.

The benefits from international market are strengthened by an increase in competition that domestic producers are faced with. This is advantageous because international trade reduces the possibility of domestic monopolies. According to Adam Smith, unrestricted competition, even though not in the concern of the producers, is constantly advantageous to the public.

The weakness with this theory of international trade is that it is possible for a country to have no absolute advantage.

2.2.2 Comparative Advantage Theory

As proposed by David Ricardo, this theory explains the way in which differences between nations gives rise to trade and advantages from it. In his explanations, the thinker considered labour as the only factor of production and the differences in the countries is due to labour productivity in a number of different industries in each nation. The theory states that a country will export that product in which it has a comparative advantage in the production of labour. According to Ricardo, trade expands or enlarges a nations consumption possibility. The distribution of trade benefits relies or depends on the relative prices of the commodities that nations produce.

With the weaknesses of absolute advantage theory David Ricardo (1817) came with an advanced theory on international trade called comparative advantage theory. This theory emphasizes on the ability of a country to specialize efficiently in the production of a good produce. Ricardo considered opportunity cost instead of financial cost. This theory eliminates the weakness of absolute advantage by allowing those countries that don't have absolute advantage to specialize in the production of those goods or sectors that they are least bad, development policy review, (2009) as cited in (Riaz Bushra and Bergman Mats, 2010). When formulating this theory, Ricardo was against trade tariffs and barriers.

Julio (2005) studied developing countries using comparative advantage theory and came to a conclusion that specialization is the way to go with regard to international trade. This therefore shows us that when studying sections on international trade comparative advantage theory is still valid and should not be ignored since it has been shown that it plays a very important role in economic growth.

2.2.3 Factor Proportion Theory

This theory was formulated to improve on the theory of comparative advantage. It was pioneered by Heckscher and Ohlin (1933) and it's an economic theory that states that countries should export what they can easily and abundantly produce. The theory assumes that technological advancement between the countries trading with each other is the same, meaning that given the same amount of inputs, the same amount of outputs should be produced. The theory actually emphasizes how countries can benefit from international trade by exporting what they have in abundance. Important assumptions of this theory are constant returns to scale in both sectors, factors are completely mobile between sectors within a country, all factors are inelastically supplied, there are no imperfections in any market so factors are paid the value of their marginal products and finally, consumers preferences are identical and homogenic in both countries.

2.2.4 Solow-Swan Neoclassical Growth Theory

This is an advancement by neoclassical economists after Heckscher-Ohlin theory and normally this framework is adopted in the analysis of economic growth (Awokuse *et al*, 2009). The theory is an improved version of production function and therefore, assumes a constant-return-to-scale aggregate production function stated as:

$$Y_t = K_t L_t B_t \dots\dots\dots 2.1$$

Where Y, K, L, and B represent real GDP per capita, real gross capital, labor, and the Hicks-neutral productivity term respectively. This theory normally frames forward and backward linkages between the rural productive sector and the modern consumption sector showing their convergence in the long-run (the steady state condition).

2.2.5 Staple Theory for Primary-Led-Export Growth

The staple theory focuses on the export of staples and builds on them as long as they remain competitive in the macroeconomic perspective. In some instances strengthening the existing specialization may be more sensible than attempting to diversify the economic base (Boame, 1998). This theory is actually an expansion of the aspect of comparative advantage formulated by Heckscher-Ohlin-Samuelson. The staple approach to the study of economic history is primarily a Canadian innovation, the leading innovator being Harold Innis in his pioneering historical studies, notably of the cod fisheries and the fur trade (Grant and Watkins, 1993).

The theory emphasizes on the crucial role of primary exports in the economic growth process. It emphasizes the linkages of the staple export(s) with the rest of the economy. It also stresses its benefits as improved utilization of existing resources, expanded factor endowments and linkage effects. It assumes that the export sector is the main sector, driving the rest of the economy forward in a given economy (Boame, 1998).

The basic assumption of the staple theory is that staple exports are the leading sector of the economy. That is, the export sector acts as a key propulsive sector, propelling the rest of the economy forward. The central concept of the staple theory, thus, is the impact of export activity on domestic economy and society.

The likely growth path of a staple economy follows that growth is initiated by an increase in demand for a staple export. It actually stipulates that when the export sector grows so should the domestic sector. This will lead to increasing demand for factors of production such as labour and capital. Domestic slack, if it exists at all, will be quickly absorbed, and the continuation of growth will depend on the ability to import scarce factors.

2.3 Empirical Literature

2.3.1 Agricultural Exports and Economic Growth

While studying the relationship between economic growth and exports using simple correlation coefficient, Kormendi and Mequire (1985), found that growth in exports is positively related with the growth in the economy. Ukpolo (1994) using regression technique also studied the relationship between exports and economic growth and found that there exists a positive relationship between the two. Block and Timmer (1994), analyzed conceptual issues on the relationship between agriculture and economic growth and found that the economic growth multiplier associated with agriculture was almost three times that one associated with non-agricultural sector. This therefore, shows that there is a positive relationship between agricultural products and economic growth.

Ojo *et al.*, (2014) studied the association amongst exports of agricultural products and the growth of gross domestic product in Nigeria. The study used the time series data that were gathered from the year 1980 to 2012. The study employed HWA (1988) model in the analysis. The study employed the conventional time series test of Philip-Perron to check for stationarity. To check for the presence of both short and long run relationship, the study conducted the cointegration test and the vector error correction model. The outcomes of the analysis found out that exports of agricultural outputs, net capital flows and the outside world prices of Nigerians main agricultural products are long run determinants of economic growth in Nigeria. The study therefore recommended that the government should put more emphasis on improving exportation of agricultural commodities in order to grow the economy

Dilawar *et al.*, (2012) evaluated the relationship that exist between exports, imports and economic growth in Pakistan. The study used a set of time series data that was collected

since the year 1972 to 2009. In an attempt to check for long run correlation between exports, imports and economic growth, the study used the Granger causality and cointegration test. The study used the vector error correction model to test the hypotheses. The study found that all the variables under the investigation were positively and statistically significant in economic growth. In addition, the study discovered that economic growth influences both exports and imports. The conclusion is that for economy to grow steadily, exports and imports promotion is a prerequisite.

Afzal *et al.*, (2019) examined the influence of merchandize and service trade on economic growth of Pakistan. The major issue of concern was that the service trade sector was growing faster necessitating the research of this kind in order to assess its impact on the economy. The study used the time series data that were collected from 2001 to 2016 in the analysis. The study results showed that merchandize trade has a positive and statistically significant influence on economic growth. Model 2 of the analysis found the results of the service trade to be having negative impacts on the economic growth in Pakistan. The study recommends that service trade should be looked at keenly in order to avoid serious bad impacts that is causing in the economy.

Kumar (2011) did a study to check if remittances, exports together with financial development matter for economic growth. The study used the yearly time series data for the analysis. The study used the bound test model to test for the short and long run effects of all study variables on income per capita. The outcomes showed that exports are significant in both the short and the long run, whereas remittances affect the economy positively only in the long run but in the short run it has a negative impact. The financial development showed that it has no significant long run effect which is opposite of many empirical findings. The study recommended that efforts should be put to enhance exports and remittances markets in order to have a long term and sustainable

economic growth. Also, the decision makers should develop new strategies to make financial sector very integrated thus growth

Bakari and Mabrouki (2017) investigated the influence of exports and imports on economic growth in Panama. The study used secondary data that was collected from 1980 to 2015. To answer the objectives, the study used Johansen co integration technique, vector error correction model together with the Granger causality test. As per the study results, exports and imports were found not to have any significant relationship with economic growth in Panama. Additionally, the granger causality test results confirmed that there is a bidirectional causality running from imports to economic growth and from exports to GDP growth. The study recommended that the government of Panama should formulate policies that promote export and imports in order to accelerate economic growth.

Were *et al.*, (2002) studied Export Performance of Kenya disaggregating total exports of goods and services into three categories: traditional agricultural exports (tea and coffee), non-traditional exports and other exports of goods and services. For each section a model was specified along the standard trade model that incorporates real exchange rate and real foreign income. The explanatory variables of the study provided mixed results some proofing to be positive and some negative. However, the study acknowledged that exports have been expanding beyond the normal traditional markets.

Abou-Stait (2005) studied the Export-led Paradigm for Egypt using historical data for the period between 1977 and 2003. The paper employed a variety of analytical tools including causality, co-integration, unit root tests, vector auto regression and impulse response function approach. The study came to a conclusion that exports granger cause economic growth and hence positively related. Dawson (2005) studied the contribution

of agricultural exports to economic growth in less developed countries. The researcher used two theoretical models in his analysis, the first model based on agricultural production function, including both agricultural and non-agricultural exports as inputs and the second model was a dual economy model also on agricultural and non-agricultural sectors each sub divided into exports and non-export sectors. Fixed and Random effects were estimated in each model using a panel data of sixty-two less developed countries for the period 1974-1995. The study provided evidence from less developed countries that supported theory of export led growth. The results of the study highlighted the role of agricultural exports in economic growth. The study suggested that the export promotion policies should be balanced.

Kwa and Bassoume (2007) examined the linkage between Agricultural Exports and sustainable development. The study was based on case study involving agricultural exports. The results of the study suggested that agricultural exports performance is more elastic to change in domestic factors. Mohan and Nandwa (2007), tested export led growth in Kenya using ADRL Bounds Test Approach found that there exists a long-term relationship between GDP growth and exports, and it is unidirectional, running from exports to GDP growth. Bbaale & Mutenyo (2011) conducted a panel analysis on Export Composition and Economic Growth in 35 Sub-Saharan Africa countries and found that it is the growth in agricultural exports that is associated with growth in per capita income and not growth in manufactured exports. This means that agricultural exports are positively and significantly related with economic growth.

Examining the effect of export growth on economic growth in Iran using Feder model and econometrics conventional methods Mehdi (2012) found that each section of export growth has a positive effect on the growth of value added in the same section. But the

effect of export growth on the value added in industry and mining sector is more than other sectors.

On the same sense, Noula *et al.*, (2013) studied the impacts of agricultural exports on economic growth of Cameroon majoring on cocoa, coffee and bananas. The study employed an extended generalized Cobb Douglas production function model, using food and agricultural organization data and World Bank Data from 1975 to 2009. The findings of the study showed that the agricultural exports have mixed effect on economic growth in Cameroon-coffee and bananas had a positive and significant relationship with economic growth whereas cocoa had a negative and insignificant relationship with economic growth.

Gbaiye *et al.*, (2013) studied the relationship between agricultural exports and economic growth of Nigeria using the following neoclassical model:

$$\log RGDP = \beta_0 + \beta_1 \log GFCF + \beta_2 \log LAB + \beta_3 \log AGEX + \beta_4 \log FDI + \mu_1 \dots \dots \dots 2.3$$

Where:

RGDP is Real Gross Domestic Product, GFCF is Gross Fixed Capital Formation, LAB is Labour Force, AGEX is Agricultural Exports, FDI is Foreign Direct Investments, β_0 is constant term, β_1 to β_4 are elasticity coefficients and μ is stochastic disturbance term

The study covered the period between 1980 and 2010 following on the principles of Export- Led Growth Hypothesis and the Neo-classical Growth Model. The study found that a long run relationship exists between agricultural exports and economic growth and that the relationship was elastic.

2.3.2 Physical Capital Formation and Economic Growth

Capital accumulation or formation refers to the process of amassing or stocking of assets of value, the increase in wealth or the creation of further wealth. Examining the Impact of Capital Formation on the Growth of Nigerian Economy, (Ugwuegbe S. U & Uruakpa P. C, 2013) found that capital formation has positive and significant impact on economic growth in Nigeria for the period under review, while both inflation rate and interest rate have an insignificant negative impact on economic growth in Nigeria for the period under review. The study, however, did not take into account the common structural breaks like volatile oil prices and the effects of political regimes that might intervene between economic growth and capital formation. On the same note, Shuaib, I. M & Dania Evelyn Ndidi, (2015) studied capital formation impact on the economic development of Nigeria covering the period between 1960-2013. The paper applied Harrod –Domar model to Nigerian economic development model.

From the empirical findings, it was discovered that there was a significant relationship between capital formation and/or economic development in Nigeria under the period of study. The results were in line with other studies though it did not consider structural breaks that might have been occasioned by other variables like government size and world oil prices that might not be ignored when studying economic growth in relationship to other variables.

Ocharo *et al.*, (2014) Examined private capital inflows, remittances and economic growth in Kenya. The study investigated the causality between foreign direct investment, portfolio investment and cross-border interbank borrowing and economic growth; analyzed the effect of foreign direct investment, portfolio investment and cross-border interbank borrowing on economic growth; and examined the effect of remittances on economic growth in Kenya. It used Granger Causality to investigate the

causality between foreign direct investment, portfolio investment and cross-border interbank borrowing and economic growth. The ordinary least square was estimated to determine the effect of foreign direct investment, portfolio investment and cross-border interbank borrowing; and remittances on economic growth.

The study found that there was a unidirectional causality from foreign direct investment to economic growth and from economic growth to cross-border interbank borrowing. Regression results showed that the coefficient of foreign direct investment as a ratio of gross domestic product was positive and statistically significant, and the coefficients of portfolio investment as a ratio of gross domestic product and cross-border interbank borrowing as a ratio of domestic product were positive and statistically insignificant. Similarly, the coefficient of remittances as a ratio of gross domestic product was positive and significant.

Moki, (2017) studied effects of human capital accumulation on economic growth in Kenya; a cointegration approach. The study made use of the four variables human capital accumulation (HCA) factors, Specific Level Primary HCA, Specific Level Secondary HCA, Specific Level Tertiary HCA and Government Expenditure on Education all affect economic growth. The results indicated that there was a significant effect of Specific Level Primary HCA, Specific Level secondary HCA, Specific Level tertiary HCA and government expenditure on education on GDP growth rate. The study however concentrated more on capital formation relating to education and thus working on a small sector of the economy.

2.3.3 Human Capital and Economic Growth

Kazmi *et al.*, (2017) studied the Impact of Human capital on Economic Growth: Evidence from Pakistan. The study rotated around many social indicators such as school

enrolments, life expectancy, health, knowledge, and skills are collectively known as human capital. The results of Johansen co-integration show, that human capital and economic growth are co integrated, as there was a long run relationship between them. The study however, had some loopholes since it considered the average weighted education level as a proxy for the human capital instead of directly considering the human capital as an indicator on itself from the available datasets.

Teixeira & Queiros (2016) Analyzed Economic growth, human capital and structural change: A dynamic panel data analysis. The study analyzed both the supply side and demand side to assess the direct and indirect effects of human capital on economic growth, including in the latter the interaction of human capital with the industrial specialization of countries. The assessment found that human capital and the countries' productive specialization dynamics are crucial factors for economic growth. Moreover, the interaction between human capital and structural change in high knowledge-intensive industries impacts significantly on economic growth. However, the sign of this effect depends on the type of country and the period of analysis. Specifically, over a longer time span (1960–2011) and for more highly developed (OECD) countries, the impact of the interaction between human capital and structural change is positive.

Bucci (2003) investigated whether there is a long-run relationship between population (size and growth) and per-capita income focusing on human and physical capital as reproducible inputs. The study found out that population growth exerts a negative effect on economic growth. However, when individuals choose endogenously how much to save, population growth can also have a neutral influence on economic growth. The study also extended its analysis to the case where physical and human capital can interact with each other in the production of new human capital. When the two types of capital are substitutes for each other in the education sector, the effect of population

growth on per-capita income growth is always negative. Instead, if human and physical capital is complementary for each other, the impact of population change on real per-capita income growth becomes ambiguous. The intuition is the following. For given per-capita physical capital stock, an increase of population causes the aggregate physical capital to rise.

Oloo *et al.*, (2015) studied Human Capital Development and Economic Growth in Kenya. The study employed the Ordinary Least Square multiple regression analytical to examine the relationship between capital expenditures on education and healthcare, and economic growth. The results showed that there was a significant and positive relationship between health expenditures and economic growth, while reporting a significant but negative relationship between education expenditures and economic growth. The study, however, did not consider structural breaks which might have affected the general data set interactions and thus having some impacts on the interlinks and relationships between the variables under investigation

Fashina *et al.*, (2018) conducted a study on the relationship between foreign aid, Human capital and Economic growth in Nigeria. In the analysis, the study employed two methods or approaches of analysis. Engle-Granger model was engaged in testing the validity of medicine model and the Vector Error Correction model was employed to evaluate the impact of aid and shocks of human capital on growth. The results the second model of the study showed that Nigeria is delicate to human capital through education whereas reaction from shocks of aid is a challenge in the long run. The study concluded that if the government pumps a lot of money in education sector plus aids flowing in from foreign nations will see the economy growing faster in a steady way.

Ogundari *et al.*, (2018) did a study on the contribution of human capital to economic growth in the sub-Saharan Africa. The data for the study was panel and it was collected from 35 countries for a period of 28 years. The study used the dynamic model based on the system generalized methods of moments. The balanced panel data was fit into the stata software for analysis. The findings of the study discovered that the two variables that were used to measure human capital had positive influence on economic growth.

Jaiyeoba *et al.*, (2015) conducted a study on investing on human capital and economic growth in Nigeria. The study employed the yearly time series data gathered from 1982 to 2011. The major focus of the study was to conduct an empirical research on the association between investing in education, health and economic growth in Nigeria. The techniques that the study employed during the analysis are trend analysis, Johansen co integration and finally the Ordinary Least Squares. From the analysis, the study indicated that there is presence of a long run connection between government expenditure on education, health, and economic growth. The other findings of the study were that health and education expenditures, admission rate of secondary and tertiary level together with the gross fixed capital influences the economic growth positively. The study therefore recommended that the country should pump a lot of resources to both health and education sectors in order to spur the economic growth and untie the majority of the citizens from the trap of poverty.

Iqbal *et al.*, (1998) investigated the effect of major macroeconomic determinants of economic growth in Pakistan. The study utilized time series yearly data spanning from 1959 to 1997. The study used the multiple regression to differentiate the effects of major macroeconomic factors on economic growth. The study findings found education to be a vital tool in speeding up economic growth. Also, an increase in the stock of physical capital is a prerequisite for the economy to grow. However, both budget deficit and

external debt affect the growth of the economy negatively. The study recommends that the country should formulate informed policies that are geared towards long term and sustainable economic growth.

2.3.4 Inflation and Economic Growth

Ayyoub *et al.*, (2011) conducted a study of whether inflation affects the growth of the economy in Pakistan. The study also sought to understand whether inflation positively or negatively affects the economy in a similar manner, or the behavior is different under each level. Yearly time series data collected from 1972 to 2010 was used for the analysis of the study. The study adopted the Ordinary Least Squares technique in the analysis and the results found was that inflation negatively affects the economic growth in Pakistan. The study therefore suggested that the state bank of Pakistan together with the policy makers should stabilize inflation by restricting it to be below seven percent.

Mubarik and Riazuddin (2005) did a study estimating the threshold level of inflation in Karachi Pakistan. The annual time series data collected from 1972 to 2000 was used during the analysis. To understand the causality among inflation and GDP growth, Granger causality test was carried out. This was done before model estimation. The results found that inflation causes economic growth and not the vice versa. The results from model estimation suggested that 9% threshold level of inflation is good for the economy to grow but higher than this is dangerous because the economy will deteriorate.

Hussain and Malik (2011) evaluated the relationship between inflation and economic growth in Pakistan. The study used the yearly time series data gathered from (1960 to 2006). The study found a positive association between inflation and economic growth.

The granger causality test found that inflation granger causes economic growth and vice versa.

Chimobi (2010) sought to find whether or not there is a link between inflation and economic growth in Nigeria. The study employed the cointegration approach and granger causality and time series data from 1970 to 2005 in the analysis. Time series stationarity test of Augmented Dickey Fuller and the Philip Perron were conducted to avoid reporting spurious regression results. The study found the data to be stationary at first difference and was suitable for analysis. The co integration test results discovered that co integration between inflation and economic growth does not exist in Nigeria during the period of study. The results from Vector Autoregressive Model found that inflation causes economic growth.

Mallik and Chowdhury (2001) investigated the relationship among inflation and the growth of gross domestic product in the four countries of the South Asia. This comparative study utilized panel data sourced from the International Monetary Fund and Error Correction Model in the analysis. The study found that there is a positive long run connection between gross domestic product and inflation in all countries under investigation.

Tariq and Muhammad (2005) examined short run and long run relationships among four macroeconomic variables in Pakistan namely M2, call money rate as a measure of interest rate, CPI for prices and real Gross Domestic Product at factor cost as a measure of output. They established that growth in money caused real Gross Domestic Product growth but did not cause inflation. Thus, an attempt to control inflation through monetary contraction may lead to contraction of real economic activity rather than inflation. Moreover, in this study interest rate turned out to be independent of Money,

Prices and Output. Ansari (1996), noted that monetarists used a “St. Louis” style equation to argue against the effectiveness of fiscal policy based on its inflationary and crowding-out effects in the case of India

Ndambiri *et al.*, (2012) analyzed the determinants of economic growth in sub-Saharan Africa, a panel data approach covering 19 sub-Saharan Countries. The study utilized an augmented growth model by Solow borrowing from Seetanah (2011). The study results indicate that physical capital formation, a vibrant export sector and human capital formation significantly contribute to the economic growth among sub-Saharan countries. However, government expenditure, nominal discount rate and foreign aid significantly lead to negative economic growth. The study however ignored some potential determinants like inflation, exchange rates among others that might have some influence on economic growth. It also did not take into consideration specific country structural shocks that are perceived to influence growth of the economy.

Nyenyia *et al.*, (2017) examined the Relationship between Inflation and Economic Growth in East African Community Countries. The study presented panel data for 5 countries in the community and applied Robust Least Square estimation technique with fixed effects. The study was anchored on Solow growth model and employed correlation research design. Co-integration results revealed that there exists a long run relationship between inflation and economic growth in EAC countries while result for causality analysis showed that there exists a uni-directional causal relationship from economic growth to inflation although the effect would be effective after 2 years. The study also found that inflation negatively and significantly affect economic growth, however, when the structural breaks in EAC were considered, the negative effect inflation reduces and becomes statistically insignificant to economic growth.

Kasidi and Mwakanemela (2013) examined the impact of inflation on economic growth in Tanzania. The study adopted time series data for the period between 1990 and 2011. Correlation coefficient and co-integration technique established the relationship between inflation and GDP and Coefficient of elasticity were applied to measure the degree of responsiveness of change in GDP to changes in general price levels. The results revealed that inflation has a negative impact on economic growth. The study also revealed that there was no co integration between inflation and economic growth during the period of study. The study also found no long-run relationship between inflation and economic growth in Tanzania.

2.3.5 Exchange Rate and Economic Growth

Barguelli *et al.*, (2018) conducted a study on the effect of an oscillating exchange rate on the growth of gross national product of 45 countries both the developing and emerging ones. The study used the data gathered from 1985 to 2015. The study employed the General Autoregressive Conditional Heteroskedasticity to measure volatility and used the Generalized Method of Moments model. The study discovered a negative effect of a volatile exchange rate on economic growth.

Srithilat and Thavisay (2017) evaluated the influence of policies of the money market on the growth of the economy in Lao PDR. The study used yearly time series data for a period of 27 years. The study conducted the conventional unit root, Johansen co integration test and the Error correction test to check for stationary of the variables under the investigation and also to analyze the link amid the variables. Among all the variables under the investigation, exchange rate was the only one which was found to positively associated with the GDP per capita.

Collins *et al.*, (2016) did a study on the effects of exchange rate and foreign direct investment on the growth of Nigeria's economy. The objective of the study was to highlight the impact of FDI and exchange rate that were critical in the growth of economy but had been ignored. The study found that foreign direct investment and exchange rate are significant determinants of economic growth in Nigeria

Agbugba *et al.*, (2018) conducted a study on the impact of exchange rate on economic growth of 18 countries in the sub-Saharan Africa. The study used panel data collected from 1981 to 2015. The Hausman test results confirm that random effect model was appropriate. The study found that there is a long-run, exchange rate positively and significantly impacts the process of economic growth on the sub-Saharan Africa.

Korkmaz (2013) studied the effect of Exchange rate on economic growth. The study adopted a panel approach (2002-2008) cutting across randomly selected 9 European countries. Results from the study showed that there was some level of causality between exchange rate and economic growth for the selected countries.

On the same note, Chen (2012) studied the role of real exchange rate on economic growth evidenced from Chinese provisional data. The data was collected from 28 Chinese provinces covering the period between 1992-2008. The data thus took the form of dynamic data estimation. From the study, it was depicted that there was a positive significant relationship between real exchange rate and economic growth in the selected provinces.

2.4 Theoretical Framework

The linkage between Agricultural Exports and economic growth has occupied a key position in the development of literature. The main focus has been on how components (input and output market variables) of Agricultural Exports affect economic growth in

Kenya. This necessitated the use of endogenous growth theory in this study. Endogenous growth theory emerged not so long dating back to the work of Barro (1990) as cited in Abogan *et al.*, (2014) who made use of this theory to find linkage between public revenue/public spending and economic growth in Nigeria. It states that the growth rate of output (GDP) is principally determined by the following factors: the rate of growth of gross labour and/or the rate of growth of its quality, multiplied by the labour income share; the rate of growth of gross capital input and/or the rate of growth of its quality, multiplied by the capital income share; and change in technology or total factor productivity (Akinlo A. E. & Odusola A. F, 2003). The national accounts form the basis of the economies to be analyzed and it is used in conjunction with Change in technology. This approach has got a wide application in econometric analysis (Levine and Zervos, 1996). This is given as:

$$g=f(L,K,T).....2.4$$

Where: g = growth of GDP; L = labour; K = capital formation / investment; and T = technology Going by the above, the model to be estimated in this study will take the above form the variables being economic growth, agricultural exports, physical capital formation, human capital, inflation rates and exchange rates.

2.5 Conceptual Framework

The relationship between agricultural exports, physical capital formation, human capital, inflation rate, exchange rate and economic growth as other studies have depicted has been a concern of many economists especially after the fall in the prices of world primary commodities in the 1980's. This initiated this study having in mind the listed variables in the study. The study, therefore, focused on the following as shown in the conceptual framework. The dependent variable in this case is economic growth proxied by Gross Domestic Product (GDP). The explanatory variables of interest

comprise of agricultural exports physical capital formation, human capital, Inflation and Exchange rate. These variables have been chosen due to their perceived contribution to the Kenyan economy.

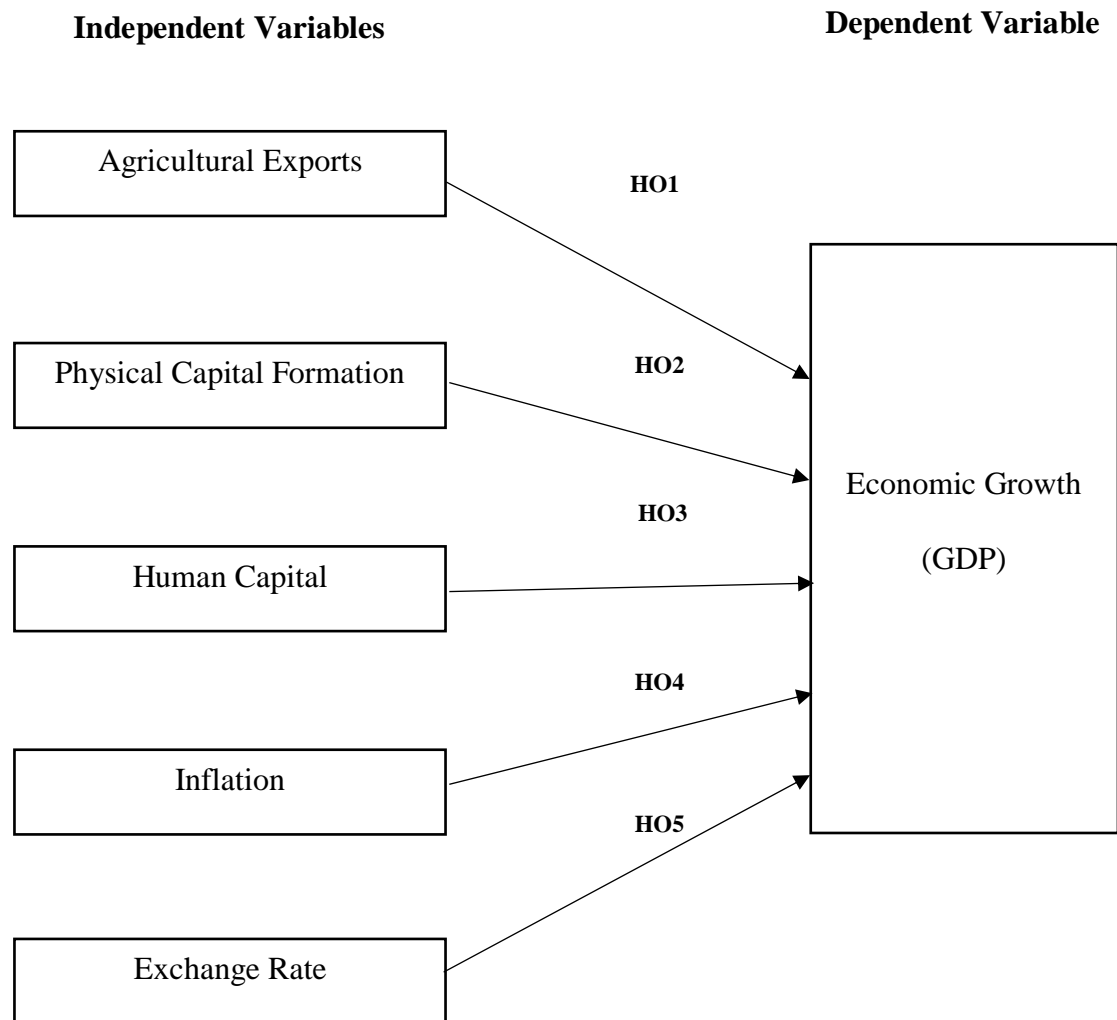


Figure 2.1: Conceptual Framework

Source: Author's Conceptualization, 2020

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Overview

This chapter presents the research design, description of the study area, data types and sources as well as the data analysis procedures that were followed to achieve the outcome of the study.

3.2 Study Area

The study covered the entire Kenyan economy. Kenyan economy just like other Eastern African countries depend on export of agricultural products mostly tea, horticultural products, coffee and tourism (Kinya, 2015). Kenya has a total area of 582646Km² and out of this 2.3% is occupied by water surface. The better part of this being covered by Lake Victoria (an area of 3,755km²) hereby listed as an inland water surface. Other inland water surfaces are located along the stretch extending along the floor of Rift Valley between lake Natron and the Northern end of lake Turkana (GoK, 2009). Kenya as a country has a population of approximately 47 million people most of them engaging in agricultural production as their core economic activity (KNBS, 2018). The major economic activity therefore, in Kenya is agriculture ranging from crop production to animal production. Other major economic activities include mining and tourism in the service sector.

3.3 Research Design

Research design is the plan and the procedure for research that span decisions from broad assumptions to detailed methods of data collection and analysis. The study made use of longitudinal research design taking the form of time series. This was because the data under study were used as they were without any manipulation.

3.4 Data Types and Sources

The data collected were time series data on Economic Growth, Agricultural Exports, Physical Capital Formation, Human Capital, Inflation & Exchange rate. The study therefore, made use of secondary data from the World Bank database and Food and Agriculture Organization of the United Nations Database (FAOSTAT). These institutions according to many scholars are categorized as one of the major custodians of authentic data that when generalized or processed can yield quality reports good for economists, policy makers and researchers.

3.5 Data Analysis

STATA software was used to carry out statistical analysis which involved both descriptive and inferential analysis: Data was analyzed and presented in form of descriptive and inferential statistics. Time series as defined is a set of observations ordered in time and therefore it was of essence to perform the descriptive statistics. This was basically done to check on the nature of the data and the behavior of the data: whether they are normally distributed or not. Therefore, the mean, variance and standard deviation of all the variables were well defined in the study. These were basically done to provide simple summaries and measures about the data. Inferential statistics entails model estimated to test the hypotheses.

3.6 Model Specification

3.6.1 Endogenous Growth Model

The model used in the study was based on the theoretical Formulation of the endogenous growth models though the concepts were derived from the neoclassical growth models since their specifications are more or less the same. The neoclassical growth model was based on the concept of an aggregate production function of the whole economy. Output of the economy was measured by economic growth (Gross

Domestic Product) which is a function of physical capital and labour. The aggregate long run model was specified as:

$$\text{Economic growth} = A, F(K, L) \dots\dots\dots 3.1$$

where A is a technology coefficient measuring total factor productivity for each year, t whereas K and L are physical capital and labour respectively. The percentage change in output of the economy is equal to the percentage change in technology (or total factor productivity), the share of weighted percentage change in capital inputs and the share weighted percentage change in labour.

An augmented production function including GDP (Dependent variable), Agricultural exports, gross physical capital formation, Human Capital, exchange rates and inflation is econometrically expressed as:

$$(GDP) = f(AGEXP, PCF, HCI, INFL, EXR) \dots\dots\dots 3.2$$

The function can be expressed as:

$$GDP = \beta_0 + \beta_1 AGEXP + \beta_2 PCF + \beta_3 HCI + \beta_4 INFL + \beta_5 EXR + \varepsilon \dots\dots\dots 3.3$$

The equation can be expressed in time series terms as:

$$GDP_t = \beta_0 + \beta_1 AGEXP_t + \beta_2 PCF_t + \beta_3 HCI_t + \beta_4 INFL_t + \beta_5 EXR_t + \varepsilon_t \dots\dots\dots 3.4$$

Agricultural exports, physical capital formation and GDP in Equation 3.4 was then expressed in logarithms so that coefficients can be interpreted in elasticities for the natural logs. Equation then becomes:

$$\text{Log} GDP_t = \beta_0 + \beta_1 \text{log} AGEXP_t + \beta_2 \text{log} PCF_t + \beta_3 HCI_t + \beta_4 INFL_t + \beta_5 EXR_t + \varepsilon_t \dots\dots 3.5$$

3.7 Time Series Properties

Time series properties were then applied on the data generated as below:

3.7.1 Unit Roots Test

The unit roots test is important because it checks if a data series is stationary or non-stationary. Modeling in time series requires that the data be stationary to avoid the problem of spurious regression. This is subject to the fact that the data normally used in macroeconomics tend to exhibit trends of volatility normally resulting in non-stationarity (Noula *et al.*, 2013). Therefore, to determine the order of integration of the variables the study employed Augmented Dickey-Fuller (ADF) and Phillips-Perron (1988) unit-root tests. This ensured validity of the test statistics (t, f statistics and R^2) by testing the properties of the concerned variables in this study.

3.7.2 Augmented Dickey-Fuller Tests

The ADF test tests the null hypothesis that a time series Y_t is integrated of order I (1) against the alternative that it is integrated of order I (0). The ADF test is based on estimating the following test regression for each series;

$$\Delta Y_t = \beta_0 + \beta_1 t + \delta Y_{t-1} + \sum_{i=1}^p \alpha_i \Delta Y_{t-1} + \varepsilon_t \dots \dots \dots 3.6$$

Where: Δ is the first difference operator, β_0 is the intercept term, $\beta_1 t$ is the coefficient on time trend, Y_{t-1} are lagged levels of the series and p is the lag which is normally determined prior to conducting cointegration analysis using several information criteria including Akaike Information Criterion (AIC), Schwarz Information Criterion (SIC), Hannan-Quinn Information Criterion (HQIC) and Final Prediction Error (FPE). The lag was determined to ensure stability of the model used by ensuring that none of the roots lies outside. The error term in this case was assumed to be homoskedastic. The specification of the deterministic terms depends on the assumed behavior of y_t under

the alternative hypothesis of trend stationarity. The rule of thumb is that if the ADF test statistic value is greater than the critical value in absolute terms at the level of significance, reject H_0 and accept H_1 . This means that there is no unit root and the data is stationary.

3.7.3 Phillips-Perron (P-P) Tests

Phillips and Perron (1988) developed a number of unit root tests that have become popular in the analysis of time series. The Phillips-Perron (PP) unit root tests differ from the ADF tests mainly in how they deal with serial correlation and heteroskedasticity in the errors. In particular, where the ADF tests use a parametric auto-regression to approximate the structure of the errors in the test regression, the PP tests ignore any serial correlation in the test regression. The test regression for the PP tests is:

$$\Delta y_t = \beta_0 D_t + \Pi y_{t-1} + \mu_t \dots \dots \dots 3.7$$

Where: μ_t is I (0) and may be heteroskedastic. The PP tests correct for any serial correlation and heteroskedasticity in the errors μ_t of the test regression by directly modifying the test statistics.

3.8 Bound Test for Co-integration

Co-integration tests are conducted in case of non-stationary series to find whether there exist long run relationships. The study applied the ARDL bound test for cointegration method as coined by Pesaran *et al.*, (2001) to obtain the number of co-integrating equations. This is the best method when we are not sure about the unit root properties of the data. The method is superior over the conventional Johansen's test for cointegration because it is more statistically significant for small samples unlike Johansen's test which requires a large sample to yield validity. Co-integration is

meant to find if there is existence of long-run equilibrium (stationary) relationship among the variables under study. The study therefore tested co integration using the bound test approach. The hypothesis in this case was ‘there is no co integration among the variable’. The decision rule was to reject the null hypothesis of no co integration if the F-statistics is higher than the upper bound critical value.

3.9 Autoregressive Distributed Lag (ARDL)

Final analysis to reconcile the short-run dynamics and the long-run dynamics of the variables under study involved the use of the autoregressive distributed lag model (ARDL). ARDL is a proposed approach by Pesaran and Shin (1999) and further expounded by Pesaran *et al.*, (2001). The approach is superior to the Engle and Granger (1987) and Johansen and Juselius (1990) approaches due to the fact that both the long run and the short estimations can be estimated simultaneously. This process was done in two stages as per the requirements of the model based on the data generated by the production function modelling. First, the model required that the optimal lags is selected and thereafter the unit root is tested to ascertain that the dependent variable is $I(1)$. This process is then followed by running the long run ARDL modelling followed by the error correction estimation. After this process, an ARDL bound test for cointegration is conducted to ascertain whether there is a long run relationship among the variables. If there is a long run relationship, then the error correction estimation results will be interpreted. Failure of the long run relationship means that the ARDL model at levels was to be interpreted. This study followed this process and found that the variables had long run relationship and thus the error correction estimations were interpreted.

The ARDL error correction model was specified as follows:

$$\Delta \log GDP_t = \beta_0 + \beta_1 \log AGEXP_{t-1} + \beta_2 \log PCF_{t-1} + \beta_3 HCI_{t-1} + \beta_4 INFL_{t-1} + \beta_5 EXR_{t-1} + \beta_6 \Delta \log AGEXP_{t-1} + \beta_7 \Delta \log PCF_{t-1} + \beta_8 \Delta HCI_{t-1} + \beta_9 \Delta INFL_{t-1} + \beta_{10} \Delta EXR_{t-1} + \varepsilon_t \dots 3.8$$

Where: Δ denotes the first difference operator i.e. $\Delta \ln G_t = \ln G_t - \ln G_{t-1}$, β_0 to β_{12} are the dynamic adjustment coefficients, $\ln G_{t-1}$ is the lag of residual, ε_t is the white noise residual

3.10 Diagnostic Tests

3.10.1 Normality Time Series Tests

Before the final time series procedures are done, the data was subjected to normality test basically to support the descriptive statistics and allow for the final analysis. These normality tests included Sample Skewness and Kurtosis test. Skewness is a summary of the shape of the data in terms of the symmetry. This is commonly shown by the shape of a histogram. It can also be defined as the third central theorem divided by the cube of the standard deviation. if skewness = 0, the distribution is symmetric around the mean. If skewness is greater than zero, the distribution has positive skew, or is skewed to the right. If skewness is less than zero, the distribution has negative skew, or is skewed to the left. An alternative description of skewness is given by the relative positions of the mean and mode. Mean greater than mode is positive skew; mean less than mode is negative skew (Panofsky and Brier, 1968).

Kurtosis is a measure of whether the data are heavy-tailed or light-tailed relative to a normal distribution. That is, data with high kurtosis tend to have heavy tails or outliers. Data sets with low kurtosis tend to have light tails or lack of outliers. A uniform distribution would be the extreme case. Just as skewness, the histogram is an effective technique of showing kurtosis.

3.10.2 Autocorrelation or Serial Correlation

Autocorrelation refers to the existence of systematic correlation between one observation of the error term and the other. When this happens, it causes violation of one of the classical econometric assumptions. It actually causes difficulty in getting accurate standard errors of coefficient estimates. This therefore called for this study to tests autocorrelation using Breusch-Godfrey serial correlation test which is deemed to be more accurate (Noula *et al.*, 2013). The decision rule was to accept H_0 if the probabilities of the F-statistic and the observed R^2 of the intermediary equation are greater than the level of significance chosen.

3.10.3 Heteroskedasticity Test

Heteroskedasticity is a case where the error term has no constant variance. For accurate analysis and to ensure that no classical assumption is violated heteroskedasticity test was conducted in this study. This was done to ensure the residuals are dispersed throughout the range of the dependent variable. The study therefore tested heteroskedasticity using the Breusch-Pagan-Godfrey test.

3.11 Hypotheses Testing

Hypothesis testing in this study followed from the objectives and hypotheses stated zeroing from the relationship between Agricultural Exports and Economic growth in kenya. The hypotheses in this case therefore, involved testing hypotheses that Agricultural Exports, Physical capital formation, Inflation & Exchange rate have no effects on economic growth. The decision rule in this case was to fail to reject null hypothesis if the calculated is greater than tabulated value and otherwise also holds.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 Overview

The section presents the results in two ways, the descriptive and inferential statistics. The unit root tests were carried out before making the inference using two conventional tests; Augmented Dickey-Fuller test, and Phillip-Perron unit root tests; to test for stationarity. ARDL bound cointegration test was also estimated. ARDL Error Correction model was employed to estimate the parameters of the study after the set of time series tests.

4.2 Descriptive Statistics

Table 4.1: General Description of Variables

	GDP	AGEXP	PCF	HCI	INFL	EXR
Mean	1.65e+10	2.09e+09	3.30e+09	1.727252	9.302327	41.3822
Median	8.18e+09	1.27e+09	1.79e+09	1.716945	8.675935	25.21135
Maximum	7.88e+10	6.13e+09	1.48e+10	2.305269	41.9888	103.411
Minimum	9.98e+08	2.22e+08	1.30e+08	1.232148	-9.21916	7.00119
Std. Dev.	1.97e+10	1.88e+09	3.97e+09	0.3400855	7.717437	33.88674
Skewness	1.688888	1.08342	1.686797	0.1165982	1.372779	0.3241649
Kurtosis	4.800186	2.784322	4.589545	2.032327	7.878999	1.460546
Observations	54	54	54	54	54	54

Source: Author, 2020

Before estimating the model, the study sought to understand the overall nature of the data used in terms of the measures of central tendency that is the mean, median, minimum, maximum, and the standard deviation. If there is presence of the outliers, it is easily noticed and removed at this stage. The Gross Domestic Product (GDP),

Physical Capital Formation (PCF) and Agricultural Exports (AGEXP) were measured in million US dollars. Human Capital (HCI) was measured in Human capital index, based on years of schooling and returns to education. Inflation (INFL) in percentages while Exchange rate (EXR) was measured in Kenya Shilling against US dollar. From the results presented in table 1, it shows that, the Kenyan GDP has been on an average of 16.5 billion US dollars with a minimum of 998 million and maximum of 78.8 billion US dollars over the period under study.

The standard deviation for GDP is 19.7 billion meaning the entire GDP has been growing closely around the mean. Physical capital formation indicated an average of 3.3 billion with a minimum of 130 million and a maximum of 14.8 billion over the period under study. The standard deviation for physical capital as tabulated is 3.97 billion meaning it has been growing not so far from the mean. On the other hand, exports of Agricultural goods and services indicated a mean of 2.09 billion US dollars with a maximum of 6.13 billion US dollars value and a minimum of 222 million US dollars over the period of the study. The standard deviation for exports of Agricultural goods and services was 1.88 billion US dollars which was very close to the mean meaning most of the values were close to the mean over the period under study. Human capital index based on years of schooling and returns to education showed a mean of 1.73 with the 50th percentile being 1.72.

The maximum Human Capital index was 2.31 and a minimum of 1.23 over the period under study. The standard deviation over the period was 0.34. Inflation over the period under study indicated a mean of 9.30 percent whereas the median was 8.68 percent. The maximum rate of inflation over the period of the study was found to be 41.99 percent with a minimum of -9.22 percent recorded. The standard deviation in this case was 7.72 percent. On the side of exchange rates, results indicated that the mean exchange rate

over the period of the study was 41.38 whereas the median was 25.21. The maximum exchange rate was found to be 103.41 and the minimum being 7.00. The standard deviation for exchange rate over the period of the study was 33.89 which was no so far from the mean.

4.3 Correlation Analysis

Correlation coefficients can be determined in different ways either by Spearman correlation coefficient, Kendall rank coefficient, Pearson correlation or Point-Biserial coefficients. This study used Pearson correlation coefficient (ρ). The values range from $-1 \leq \rho \leq 1$. The value closer to -1 indicates weak negative correlation, values close to zero implies weak correlation while values close to 1 implies strong positive correlation.

Table 4.2: Correlation Analysis

	LnGDP	Lnpcf	lagexp	hc	Exr	Infl
Lgdp	1.0000					
Lpcf	0.9896* (0.0000)	1.0000				
Lagexp	0.9866* (0.0000)	0.9725* (0.0000)	1.0000			
Hci	0.9666* (0.0000)	0.9339* (0.0000)	0.9582* (0.0000)	1.0000		
Exr	0.8773* (0.0000)	0.8235* (0.0000)	0.8746* (0.0000)	0.9602* (0.0000)	1.0000	
Infl	0.1561 (0.2595)	0.1676 (0.2257)	0.2034 (0.1402)	0.1352 (0.3297)	0.0436 (0.7545)	1.0000

Source: Author, 2020

The results in table 4.2 present pair wise correlation coefficients of Pearson's (ρ) in form of diagonal matrix. Results indicate that all the independent variables except inflation had a significant association with gross domestic product (GDP). Physical

capital formation agricultural exports, human capital, and exchange rates exhibited a strong positive correlation with the dependent variable (GDP); $\rho = 0.9896, 0.9866, 0.9666$ and 0.8773 respectively. This strong correlation of the variables in question gives us an economic understanding of GDP in relation to these factors (the independent variables). It aids in locating the critical important variables on which GDP of a country depend on. This correlation results, further reveals the connection by which disturbance of GDP are spread and stabilized to be effective. However, unlike other variables, inflation indicated a weak insignificant positive correlation with GDP.

4.4 Unit Root Tests

Green (2012) stated that unit root is a property usually tested in time series studies. A series is said to be stationary if there is no unit root. Estimating regression models with nonstationary time series data leads to interpretation that has no meaningful information about the general population being investigated and this would lead to misleading results. To remove this unit root property, Series are differenced of any order until they attain the stationarity property. There are several tests for unit root, but this study used two conventional tests; Augmented Dickey Fuller test proposed by Dickey & Fuller (1979) and Phillips-Perron test proposed by Phillips & Perron (1988).

4.4.1 Augmented Dickey Fuller Unit Root Test

The first unit root test used was ADF test. Its null hypothesis being; the series is not stationary against alternative hypothesis that the series is stationary. The results presented in table 4.3 indicates all the variables except inflation and human capital had unit roots at levels. Inflation and human capital were stationary, or we can say that they were integrated of order zero denoted as $I(0)$.

Table 4.3: Augmented Dicker Fuller Test at Levels and at First Difference

At Levels						
Variables	Z(t)	Prob>t	Critical values			Conclusion
			1%	5%	10%	
Lgdp	-1.452	0.8450	-4.143	-3.497	-3.178	Presence of unit root
Lpcf	-2.291	0.4388	-4.143	-3.497	-3.178	Presence of unit root
Lagexp	-2.060	0.5686	-4.143	-3.497	-3.178	Presence of unit root
Hci	-5.191	0.0000	-4.143	-3.497	-3.178	No unit root($I(0)$)
Exr	-2.056	0.5708	-4.143	-3.497	-3.178	Presence of unit root
Infl	-5.448	0.0000	-4.143	-3.497	-3.178	No unit root($I(0)$)
At Difference						
Variables	Z(t)	Prob>t	Critical values			Conclusion
			1%	5%	10%	
Lgdp	-5.099	0.0001	-4.146	-3.498	-3.179	$I(1)$
Lpcf	-7.152	0.0000	-4.146	-3.498	-3.179	$I(1)$
Lagexp	-7.867	0.0000	-4.146	-3.498	-3.179	$I(1)$
Hci	-10.713	0.0000	-4.146	-3.498	-3.179	$I(1)$
Exr	-6.672	0.0000	-4.146	-3.498	-3.179	$I(1)$
Infl	-11.570	0.0000	-4.146	-3.498	-3.179	$I(1)$

* $I(1)$, indicates that the variables are integrated after first difference. The reference critical value is 5 percent. Mackinnon p-values for Z(t) were used.

Source: Author, 2020

The order at which a variable is said to be stationary is the number of differencing a variable takes to attain its stationarity. According to Green (2012), differencing an already stationary variable makes it more stationary though you will lose degrees of freedom. It is also seen that all the variables became stationary upon first difference. The critical reference value for this study was 5%. The Mackinnon Z(t) values less than

critical values of 5% confirms the presence of stationarity and the values greater than this critical value confirms presence of unit root.

4.4.2 Phillips Perron Unit Root Test

Gujarati (2004) vividly illustrated the use of more than one test will enhance consistency and efficient in confirmation that variable is stationary or not. Phillips-Perron test was thus used to confirm the previous results by ADF test. Like ADF test, Philips Perron test uses Mackinnon $Z(t)$ statistics in relation to critical values of 1%, 5% and 10% levels of significance. Phillips-Perron test indicated that all the variables were stationary after the first difference with the exception of inflation and human capital which were stationary at levels presented in table 4.4.

Table 4.4: Phillips-Perron Unit Root Test

At Levels						
Variables	Z(t)	Prob>t	Critical values			Conclusion
			1%	5%	10%	
Lgdp	-1.850	0.6801	-4.143	-3.497	-3.178	Presence of unit root
Lpcf	-2.327	0.4189	-4.143	-3.497	-3.178	Presence of unit root
Lagexp	-2.183	0.4992	-4.143	-3.497	-3.178	Presence of unit root
Hci	-5.170	0.0000	-4.143	-3.497	-3.178	No unit root($I(0)$)
Exr	-2.097	0.5479	-4.143	-3.497	-3.178	Presence of unit root
Infl	-5.519	0.0000	-4.143	-3.497	-3.178	No unit root($I(0)$)
At Difference						
Variables	Z(t)	Prob>t	Critical values			Conclusion
			1%	5%	10%	
Lgdp	-5.110	0.0001	-4.146	-3.498	-3.179	$I(1)$
Lpcf	-7.152	0.0000	-4.146	-3.498	-3.179	$I(1)$
Lagexp	-7.836	0.0000	-4.146	-3.498	-3.179	$I(1)$
Hci	-6.959	0.0000	-4.146	-3.498	-3.179	$I(1)$
Exr	-6.659	0.0000	-4.146	-3.498	-3.179	$I(1)$
Infl	-13.372	0.0000	-4.146	-3.498	-3.179	$I(1)$

* $I(1)$, indicates that the variables are integrated after first difference. The reference critical value is 5 percent. Mackinnon p-values for Z(t) were used.

Source: Author, 2020

4.5 Lag Length Selection Criteria

There are several criteria in which lags can be selected for a model with integrated variables. Tsay (1984) and Paulsen (1984), Nielsen (2001) showed that several methods can be used to select lag length to be used in estimating cointegrating equations. ARDL modelling advises on the application of either Akaike information criterion and Schwarz information criterion. According to Hatemi -J (2001) if these two

criteria choose different lag orders, then the author suggested using the likelihood ratio (LR) test to choose between these two lags. Following this in table 4.5; the maximum optimal lag to be used is lag of 4(as indicated by LR *). Lutkepohl (1993) argued that overfitting that is selecting a higher order lag increases the mean square variance of residuals.

Table 4.5: Lag-Length Selection Criteria

Lag	LL	LR	DF	P	FPE	AIC	HQIC	SBIC
0	-173.94				.000054	7.1976	7.28497	7.42704
1	203.526	754.93	36	0.000	6.4e-11	-6.46102	-5.84941	-4.85493*
2	266.88	126.71	36	0.000	2.3e-11*	-7.55519	-6.41934*	-4.57244
3	302.357	70.955	36	0.000	2.7e-11	-7.5343	-5.87421	-3.17489
4	347.093	89.47*	36	0.000	2.7e-11	-7.8837*	-5.69937	-2.14763

Source: Authors' Compilation, 2020

4.6 Bound Test for Co integration

Table 4.6: Pesaran/Shin/Smith Bound Test for Co integration

	10% sig. Level	5% sig. Level	1% sig Level
Lower Bound I (0)	2.26**	2.62**	3.41**
Upper Bound I (1)	3.35**	3.79**	4.68**
F-Statistics =	Number of regressors =	Ec1 Lag order =	
10.195	5	(4,2,0,0,4,4)	

Note: ** means that we reject the null hypothesis at 5 percent levels

Table 4.6 presents results of co integration to ascertain whether there is a long run relationship among the variables or not. The test employed Pesaran/Shin/Smith Bound Test for Co integration as presented by Pesaran *et al* (2001). Theoretically, to realize this, the F-statistic results of the bound test are compared with the calculated critical

values. The decision rule was to reject the null hypothesis of no co integration if the F-statistics is higher than the upper bound critical value. The otherwise also holds. Results from the analysis indicated that on a standard 5% level of significance the F-statistic from the bound test was 10.195 whereas the upper bound and lower bound critical values were 3.79 and 2.62 respectively. The decision rule in this case is therefore to reject the null hypothesis of no co integration; meaning there is a long run relationship among the variables under study. The study therefore needed to reconcile the long run and the short run relationship among the variables using the ARDL error correction model procedures.

4.7 ARDL Estimation Results

Table 4.7 presents results of error correction ARDL with lag order of (4,2,0,0,4,4) to reconcile the long run and the short run relationship as per the results of the bound test co integration in table 4.6. The error correction results in table 4.7 showed a negative error correction term (-0.6964) which was significant (p-value = 0.000). Theoretically, the error correction term must fall between 0 and -1 but in some special cases it can go below -1 but should not be positive. The magnitude of error correction term (-0.6964) coefficient represents the speed of adjustment with which the variables converge over time. The error correction term coefficient shows how quickly variables converge in the long run based on their significance. The speed of adjustment to equilibrium in this case in absolute terms is therefore 69.64%.

Table 4.7: Short-Run, Long-Run, and ECM Coefficients of the ARDL estimation

D.lgdp	Coef.	Std. Err.	T	P> t	[95% Conf. Interval]		
Long Run Relationship							
lagexpL1	.1372306	.0524995	2.61	0.014**	.0300123	.2444489	
lpcf L1	.7649417	.0553556	13.82	0.000***	.6518904	.877993	
hc L1	-.0657789	.1291548	-0.51	0.614	-.3295481	.1979903	
Infl L1	.0047874	.0015377	3.11	0.004***	.001647	.0079277	
exr L1	.0032801	.0009294	3.53	0.001***	.001382	.0051782	
Short Run Relationship with lags							
D.lgdp	Coef.	Std. Err.	T	P> t	[95% Conf. Interval]		
ECTt-1	lngdp L1.	-.6964432	.1049157	-6.64	0.000***	-.9107096	-.4821767
Lagexp							
D1.		.0955733	.039943	2.39	0.023**	.0139989	.1771477
Lpcf							
D1.		.2309212	.0450706	5.12	0.000***	.1388747	.3229676
LD		-.1441548	.0543321	-2.65	0.013 **	-.2551158	-.0331938
Infl							
D1.		-.0003838	.0004379	-0.88	0.388	-.0012781	.0005105
LD		-.0025264	.0007338	-3.44	0.002***	-.004025	-.0010277
L2D		-.0022395	.000554	-4.04	0.000***	-.0033708	-.0011082
L3D		-.0017081	.0004303	-3.97	0.000***	-.002587	-.0008292
Hc							
D1.		-.0458112	.0878641	-0.52	0.606	-.2252536	.1336311
LnEXR							
D1.		-.0043575	.0007529	-5.79	0.000***	-.0058952	-.0028198
LD		-.0018545	.0011629	-1.59	0.121	-.0042294	.0005204
L2D		-.0005215	.001045	-0.50	0.621	-.0026558	.0016127
L3D		-.0022765	.0010628	-2.14	0.040 **	-.004447	-.000106
_cons		1.121744	.2494893	4.50	0.000***	.612219	1.631269
Observations	50	Root MSE = 0.0151					
R-squared	0.9410						
Adj R-squared	0.9037	Log likelihood= 151.46823					

Note: standard errors are in parentheses. *, **, and *** indicate estimates are statistically significant at 10, 5, and 1 percent levels respectively.

Authors: Compilation, 2020

4.7.1 Test of Hypotheses

The hypothesis that there is no significant relationship between Agricultural Exports and Economic Growth in Kenya was rejected by the study both in the long run and in

the short run basing on the optimal selected lags at 5% level of significance. Agricultural exports recorded a positive significant (p-value $0.014 < 0.05$) coefficient of 0.1372 in the long run and a positive significant (p-value $0.023 < 0.05$) coefficient of 0.0956 in the short run at 5% level of significance. This result implies that a one percent increase in the amount of Agricultural exports from Kenya leads to an increase in economic growth by 0.1372 in the long run and 0.0956 in the short run. The results are in line with (Dilawar et al.,2012) where it is always expected that exports play a significant role in accelerating the growth process because the higher income gained from exports is able to boost trading activities and the surplus is pumped to other sectors of the economy thus resulting to growth. The small impact however can be associated with high fluctuations in the prices of exports and the related externalities that have effects on the exports.

This can also be associated with the trend of exporting more of traditional commodities like tea, coffee and horticulture with some exports having dropped tremendously like the exports of pyrethrum which was one of the major exports 1970, s and early 1980's. The place of trade and majorly exports of goods and services in any developing nation is clear and undisputed. Additionally, trading in the service sector for example the transport, insurance, licensing, recreation and cultural service sectors are also a plus and a critical input to the prosperity of any nation especially in Kenya. The results from this study are in support with the theories of international trade within the period under study both in the long run and in the short run. These theories argue that exports of goods and services is a vital determinant in growing the economy. The protagonists of these theories also argue that exportations lead to transfer of technologies, reduction on domestic market dependency and widening the market base. Exports also leads to

foreign income earning which is translated to high national income thus improved and better living standards.

The hypothesis that there is no significant relationship between physical capital formation and economic growth was rejected both in the long run and in the short run. Physical capital formation recorded significant relationship with economic growth in the long run with a positive coefficient of 0.7649 (p -value $0.000 < 0.05$) but in the short run at the optimal lag, results indicate a negative significant relationship ($\beta = -0.1442$ P-value $0.013 < 0.05$) between physical capital formation and economic growth. The outcome of the long run results indicates that a one percent increase in physical capital formation would lead to a decrease in the GDP growth by a rate of 0.7649. The positive influence of capital formation (that comes after sometime) on economic growth is expected to increase capital formation in form of real investment in tangible means of production, such as acquisitions, research and development leading to increased productivity, creation of more savings, mobilization of savings and finally increased investment and which adds to economic growth in an economy. Further, increasing capital formation leads to an increase in per capita income of a country which in turn leads to increased purchasing power of the population and consequently this increases demand for goods and services.

This finding concurs with the Harrod-Domar model which states that the more the government accumulate capital using a certain level of technology and following on the multiplier effect the economy is expected to grow. Further, this result resonates with the findings of Kedir, (2017), Uneze (2013), Ewubare and Ogbuagu (2015), Shuaib & Ndid (2015) and Lach (2010) who found a significant relationship between GDP growth and physical capital formation. However, the findings were inconsistent with

the findings of Nweke *et al.*, (2017) who concluded that gross capital formation and economic growth has no relationship in Nigeria.

The hypothesis that there is no significant relationship between inflation and economic growth was rejected both in the long run and in the short run. Inflation posited a positive and significant (P-value $0.004 < 0.05$) Coefficients of 0.0048 in the long run and a negative significant (P-Value $0.000 < 0.05$) coefficient of -0.0017 in the short run. The results are consistent with economic theory whereby the expectation is that there is a significant relationship between inflation and economic growth. Results in the long run indicated that a 1% increase in inflation causes an approximately 0.48 % increase in economic growth and 0.17% decrease in the short run. There has been a mixed reaction on the effect of inflation on economic growth. While some researchers showed that there is a negative relationship some showed a positive relationship while some have showed no effect. These long run findings contradict earlier studies by (Munir and Mansur 2009); Khan, M. (2014); Kasidi and Mwakanemela (2013) who found a negative and significant relationship between inflation and economic growth.

Increased inflation causes nominal interest rates to increase and this consequently led to low savings and low capital formation. According to results by Seleteng *et al.*, (2013) a high level of economic growth and low level of inflation is desirable for an economy which also varies from one economy to another and its level of economic growth. Ndoricimpa, (2017) argued that high rates of inflation are detrimental for low-income economies as compared to high income economies. Increase in inflation also increases the cost of borrowing by investors.

Exchange rate registered a positive and statistically significant (P-Value $0.001 < 0.05$) relationship with 0.0033 in the long run and a negatively statistically significant (P-

Value $0.04 > 0.05$) relationship with economic growth in the short run with a coefficient of -0.0023 . Long run results indicate that a 1% increase in exchange rate causes an increase in economic growth by 0.33%. The hypothesis that there is no significant relationship between exchange rate and economic growth in Kenya was therefore, rejected by the study in the long run. The study interprets this result as being associated with the devaluation of Kenyan shilling which motivate many traders in the country to export products and fetch high foreign currency. This high foreign earnings from international trade are used to boost various economic activities thus economic growth. Results resonate with the study by Odhiambo et al., (2014) who concluded that East African Countries should devalue their currencies in order to earn more foreign income. In their study, the researchers suggested that appreciating local currencies gives rise to awkwardness in the export sector thus hampering economic growth due to loss of returns.

The hypothesis that there is no significant relationship between Human Capital and Economic Growth in Kenya was accepted both in the long run and in the short run; P-values 0.614 and 0.606 respectively. The empirical results showed that the human capital had negative and insignificant coefficient of -0.0658 in the long run at the standard 5% level of significance (p -value $0.614 > 0.05$) and a negative insignificant coefficient of -0.0458 in the short run at the standard 5% level of significance (P -value $0.606 > 0.05$). Educated population are likely to increase employability of the citizens beyond the borders hence attracting increased remittances which in turn increases economic growth. Human capital acts as a productive factor hence, the number of years in schooling such as post-secondary allows individuals to adjust to changing job opportunities and hence will increase productivity in a country that will directly lead to increased economic growth. However, most at times this is affected by the quality of

education offered and the rate of employment in the country; like the case of Kenya. The findings contradict the previous studies of Ali & Memon (2018), Wilson (2004), and Diebolt & Hippe (2019) both in the long run and in the short run. The findings also contradict with the findings of Sharma (2019) in the long run who found a significant negative relationship between the human capital and economic growth in China and this negative relationship is explained by the fact China has attained level of economic growth and further spending on education sector will not contribute to economic growth hence negative relationship.

4.8 Diagnostic Checks

It is prudent in any economic or statistical estimation to test the ordinary least squares assumptions (OLS) before making some inference about the relationship between the dependent variable and the independent variable/s. In view of this the study tested; normality, autocorrelation and finally the heteroskedasticity.

4.8.1 Normality Test Using Histogram

To visualize on the nature of the distribution of the residuals, the study made use of a histogram and a bell curve in figure 4.1. Based on the shape of the bell curve the study results indicated that there was little deviation from the mean. This therefore concludes that the predicted residuals were normally distributed.

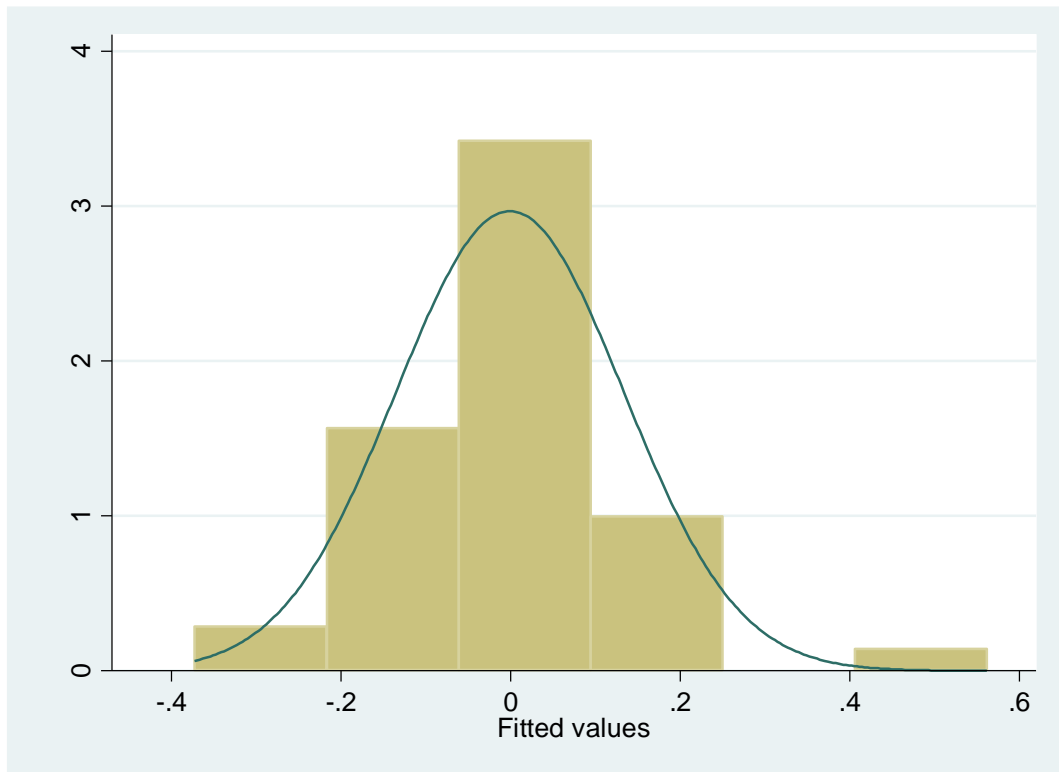


Figure 4.1: Normal Distribution Histogram

Source: Author, 2020

4.8.2 Lagrange Multiplier Test for Autocorrelation

In order to identify whether there was presence of successive correlations between one observation of the error term and the another, the study used Lagrange Multiplier test. This test uses chi-square tests statistic. Its null hypothesis is that there is no autocorrelation. When the probability is greater than 0.05, then the null hypothesis is accepted and otherwise also holds. From the results presented in the table 4.8, the Probability at lags 1 2, and 3 are 0.6432; 0.5091 & 0.0735 respectively which are all greater than 0.05. This indicates that there was no autocorrelation between the predictor variables.

Table 4. 8: Lagrange-Multiplier Test

Lags(p)	Chi2	Df	Prob
1	0.215	1	0.6432
2	1.350	2	0.5091
3	6.951	3	0.0735

Source: Author, 2020

4.8.3 Heteroscedasticity

The assumption of constant variance (Homoscedasticity) or the homogeneity of variance in ordinary least square is frequently discussed in parametric analysis. The study used Breusch-Pagan/ Cook-Weisberg test. The test tests the null hypothesis of ‘Constant Variance’. Since the prob > chi2 was 0.1373 in table 4.9, which is greater than 0.05 percent significance level, it was concluded that the residuals are homoscedastic.

Table 4.9: Breusch-Pagan/ Cook-Weisberg Test for Heteroscedasticity

Chi2	2.21
Prob > Chi2	0.1373

H0: Constant Variance
Source: Author, 2020

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Overview

This chapter presents the summary of study findings and draws conclusions from the findings based on the study objectives. The Chapter also presents the recommendations made from the findings. The last part of this chapter presents suggestions for further research.

5.2 Summary of Findings

The specific objectives of the study were; to find the relationship between Agricultural Exports and economic growth in Kenya, to determine the effects of physical capital formation on economic growth in Kenya, to investigate the effects of Human Capital on Economic Growth in Kenya, to determine the significant effect of Inflation on Economic Growth in Kenya and to determine the significant effect of Exchange rates on Economic Growth in Kenya. Descriptive statistics were computed out to check on the general nature of the data and to check on the possibility of outliers.

Conventional unit root tests such as ADF and PP were carried out to check for unit root among the variables and it was found out that Economic Growth, Physical Capital formation, Agricultural Exports, and Exchange rate exhibited unit root at level whereas Inflation and Human Capital were stationary. At first difference all the variables were stationary. Bound test for cointegration by Pesaran *et al* (2001) was further carried out to find out for cointegration and the results showed that the variables were cointegrated hence the need to conduct an error correction ARDL modelling. From the empirical results, it is indicated all explanatory variables; Physical Capital formation, Inflation,

Exchange rates and Agricultural Exports were significant in explaining GDP growth in Kenya (Economic growth) in the long run.

5.3 Conclusions of the Study

The aim of the study was to find the relationship between agricultural exports and economic growth in Kenya. In this case agricultural exports were an aggregate value for all agricultural commodities that are exported from Kenya. The hypothesis stated that there is no significant relationship between Agricultural exports and economic growth in Kenya. The study rejected this hypothesis both in the long run and in the short run. The coefficient for Agricultural exports was found to be positive both in the long run and in the short run-in relation to economic growth and this implied that increased exportations of goods and services in Kenya increases growth in the economy and accelerates the processes of economic growth both in the long run and in the short run.

The study also had other variables which could not be avoided in international trade and based on the model used in the study. The study sought to determine the effects of physical capital formation on economic growth in Kenya; to investigate the effects of Human Capital on economic growth in Kenya; to determine the effect of inflation rates on economic growth in Kenya and to determine the relationship between exchange rates and economic growth in Kenya.

The study found that physical capital formation significantly affects economic growth both in the long run and in the short run. The ARDL error correction results found that Capital formation is positively related with economic growth in the long run which implies that an increase in capital formation leads to an increase in economic growth. In the short run, results indicated a negative significant relationship between physical

capital formation and economic growth. Therefore, in the short run given an increase in physical capital formation; economic growth reduces by the size of the parameter. This could be due to the fact that in the short run there is the aspect of investment and the payback period cannot be realized in the short run.

The study also found that inflation had a significant impact on economic growth. In the long run the ARDL error correction results indicated that inflation had a positive and significant relationship with economic growth in Kenya. This therefore means that an increase in inflation will see an increase in economic growth to the equivalent percentage of the parameters. This could be attributed to many issues one of them being more exports during inflation which earns more returns from the exports. Short run results indicated that there was a negative and significant relationship between inflation and economic growth. An increase in inflation will therefore see a decrease in economic growth and the otherwise also holds.

The study had also hypothesized that exchange rate does not significantly influence economic growth. Results showed that exchange rate registered a positive and statistically significant relationship with economic growth in the long run and a negatively statistically significant relationship with economic growth in the short run. This therefore means that an increase in exchange rate by a certain rate will result in an increase in economic growth in the long run and a decrease in the short run. This shows a clear relationship of earnings received during periods of devaluation of the Kenyan shilling in relation to international market currencies and also returns during periods of increase in the value of the shilling.

The study also sought to investigate the relationship between human capital and economic growth. In this case the data used was the human capital index based on years

of schooling and returns to education. ARDL results indicated that human capital measured this way had no significant relationship with economic growth both in the long run and in the short run.

5.4 Recommendations of the Study

The study determined to find the relationship between agricultural exports, selected macroeconomic variables and economic growth in Kenya. Results indicate that agricultural exports have a significant relationship with economic and as such agricultural exports is one of the main contributors of economic growth in Kenya. The study therefore recommends promotion of Agri processing which will ultimately realize an increase in the value of agricultural exports and thus increase in economic growth in Kenya. There is also need for the government of Kenya to fully exploit the regional markets through the available structured blocks like East Africa Community (EAC) and Common Market for east and southern Africa (COMESA).

This will see an increase in the scope of markets of agricultural produce and thus increase in the volume of exports as compared to overdependency on specific international markets. The government should also consider building the capacity of Kenyan farmers engaging in agricultural exports basically in sanitary, phytosanitary, zoo sanitary and also international standards in a bid to improve their knowhow in international agricultural trade. There is also need for the government of Kenya to invest more in research and development. This will encourage more trade in improved agricultural produce and thus increase in their values leading to increased earnings from agricultural exports.

The study also determined the effects of physical capital formation on economic growth in Kenya. From the results, it was depicted that in the long run physical capital

formation is a significant determinant of economic growth in Kenya. This therefore, calls for Kenya to invest more on physical capital formation if the vision 2030 is to be achieved. This can be done by boosting more resources and skills to the big four agenda which supports manufacturing, housing, food security and universal health care infrastructures. Investing in these infrastructures will see economic growth in the long run.

From the results of the study, it was confirmed that Inflation rates and exchange rates are very important macroeconomic variables and might have a serious implication on economic growth and the distribution of income. Therefore, the study recommends that policy makers should continue formulating policies that ensures balanced state of the economy ensuring a stable exchange rate and inflation rate that won't affect the economy negatively; which will give rise to higher economic growth that is sustainable. Economically, a higher exchange rate reduces or lowers imports and promotes exports.

5.5 Suggestions for Further Research

Further studies should be done on the relationship between Agricultural Exports and economic growth. For a complete picture to come out clearly, the researchers should use the disaggregated data because the disaggregated data shows clearly the nature of Agricultural Exports in Kenya. Disaggregated in this case means running data for the specific agricultural commodities instead of the aggregated figures.

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