THE AGRICULTURAL OUTPUT-ECONOMIC GROWTH NEXUS IN SOMALIA

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DECLARATION

I declare that this is my original work and has not been presented to any other university for the award of any degree.

Signature……  Date 31/OCT/2022

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This research project has been submitted for examination with my approval as university supervisors.

Signature  ……Date 2022-10-31…….

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

DEDICATION

I dedicate this work to my parents, my brothers and sister and to my classmates for their unending support during this project writing.

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I wish also to acknowledge with sincere gratitude my supervisor for the invaluable guidance he offered' during various stages for this project writing. His patience for the various suggestions and availability made it possible for the completion of this project.

To parents, for the ample time and support during this research and to all my friends' and colleagues who helped me in diverse ways, and encouraged me to complete this work I say thank you and God bless you.

LIST OF ABBREVIATIONS AND ACRONYMS

AR: Autoregressive

ARDL: Autoregressive Distributed Lag

COVID-19: Coronavirus Disease

EAC: East African Community

EU: European Union

GCF: Gross Capital Formation

GDI: Gross Domestic Income

GDP: Gross Domestic Product

IFS: International Financial Statistics

ILO: International Labour Organization

SAM: Social Accounting Matrix

SATG: Somali Agriculture Technical Group

TFG: Transitional Federal Government

UK: United Kingdom

UN: United Nations

US$: United States Dollars

VECM: Vector Error Correction Model

ABSTRACT

The Government of the Federal Republic of Somalia has identified agriculture as among the sectors to drive economic growth. This implicitly assumed a causal link from agricultural output to economic growth. However, in contrast to this assumption, causality could run from economic growth to agriculture or there maybe bi-directional causality. The study objective was examining the causal relationship between levels of agricultural output and gross domestic product in Somalia. The study used aggregate data for the period 1989 to 2020 and apply Ordinary Least Square test. Economic growth is an important goal for Somali's economy for poverty reduction. Descriptive statistics (means, standard deviation, minimums, maximums, Skewness and Kurtosis) was utilised for describing the data. Inferential statistics entailed time series models to be estimated after undertaking tests to reveal the appropriate model to determining the effect of agricultural output on economic growth. The study established that levels of agricultural output and gross domestic product has been increasing over the last 32 years between 1989 and 2020. This could be attributed to efforts by the transitional federal government (TFG) (2004-2012) and federal government (2012 to date) to revolutionize the economy of the country by investing in major sectors like Agriculture. The study also revealed that there is bidirectional causality between the levels of agricultural output and gross domestic product. The study found that 89.7% of the changes in gross domestic product in Somalia could be attributed to changes in levels of agriculture output and vice versa. The study concluded that there exists a bidirectional causality be'tween levels of agricultural output and gross domestic product in Somalia. This is an indication that levels of agricultural output and gross domestic product affect each other directly. The stu'dy recommended that the federal govern'ment of Somalia should come with strategies to promote agriculture in the country. These policies should address the provision of agricultural input subsidies to encourage more people to practice agriculture. The study also recommends that the federal government of Somalia should address the country's challenges currently facing the agricultural sector. The study also recommends that the government should allocate more funds for agricultural research.

CHAPTER ONE

INTRODUCTION

1.1 Background Information

Economic growth is measured as the percent rate of increase in real GDP. The percentage rate of increase in real GDP is the benchmark for calculating economic growth. Simon Kuznets first proposed the concept of gross domestic product (GDP) in 1934 for a report that he was preparing for the United States Congress although he cautioned against using GDP as a proxy for welfare (Reyes & Useche, 2019). Following the Britain Woods conference in 1944, gross domestic product (GDP) was made the primary indicator used to measure the economy of the country. The Gross Domestic Product (GDP) per capita income is not a measurement of personal income but rather an indicator of the level of living in a country (Leibler, 2019; Tacchella, Mazzilli & Pietronero, 2018). One of the major contributors to economic growth in many countries is agriculture. Agriculture is the backbone of growth in the economy, development, and the fight against poverty in countries that are still on the path of globalization. Agriculture has always been seen as both the driver of and the cure for prosperity and economic growth (Zhang, Pang, Chen, & Lu, 2019).

The history of agriculture records the domestication of plants and animals and the development dissemination of techniques for raising them productively (Iriarte, Elliott, Maezumi, Alves, Gonda, Robinson, & Handley, 2020). Agriculture started separately in several locations around the world, and it involved a wide variety of tax structures. More than eleven distinct places of the Old and New World were engaged as distinct centers of origin (Byerlee & Lynam, 2020). In most regions, particularly Europe, North America, and Australia, and more recently in Brazil, China, and India, humanity has as well grown skilled at increasing crop yields through the use of

inputs such as fertilizers and pesticides (Mundia, Secchi, Akamani & Wang, 2019). Despite this, agriculture continues to expand onto marginal and unstable lands in many of the world's poorer nations, which have low rates of overall productivity and populations that are expanding (Bilsborrow, & Geores, 2019). Agriculture remains the primary foundation of social-economic growth in the most developed nations of the economic world as a result of the strong dedication of the people in those nations; it has started industrialization as a result of its plentiful outputs. Additionally, it has played a substantial role in the expansion of the national economies of these countries (Qiao, Zheng, Jiang & Dong, 2019).

Globally, agriculture have played a key role in economic growth. Agriculture also plays a crucial role in the United Kingdom by supplying 61 percent of the raw materials for the wider United Kingdom agri-food industries where these industries contribute around 108 billion pounds to the Gross Value Added of the country's economy and more than 3.7 million jobs (Guth & Smędzik-Ambroży, 2020; Qiao, Zheng, Jiang, & Dong, 2019). In Canada, the agriculture and agri-food sector is responsible for more than six percent of Canada's gross domestic product and provides 13 percent of the countrys jobs. The agriculture industry in Canada continues to influence economic growth, which contributes to the country's solid economic performance (Barichello, 2020). In China, though growth in economy have not entirely been ascertained by agricultural output, studies shows that agriculture has been the most crucial sector enhancing the economy since 1949, even though its output share in GDP has sharply been decreasing over time (Smolińska, 2019). In Brazil, as a crucial economic sector, agriculture makes the main contribution to gross domestic product (GDP) and to the exports of the country; and it as well provides jobs and produces food and energy (VieiraFilho, 2014; de Moraes, Bacchi & Caldarelli, 2016).

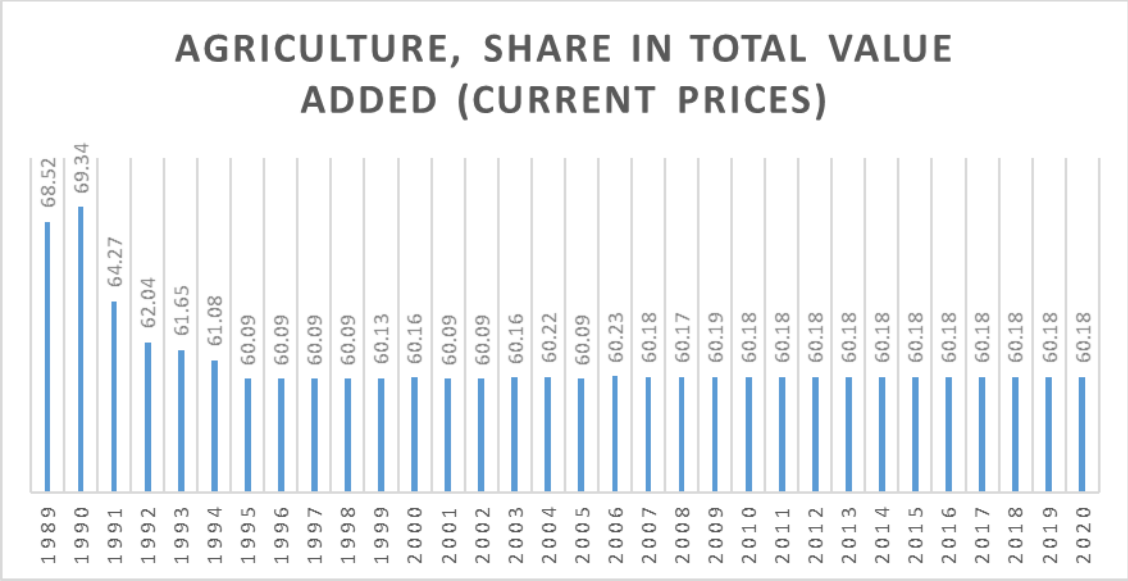
In Africa, agriculture has been a major contributor to economic growth. According to Woldemichael, Salami, Mukasa, Simpasa and Shimeles (2017), agriculture remains the most crucial economic sector in Sub-Saharan Africa, generating 40% of the region's GDP, 15% of exports, and anywhere from 60 to 80 percent of the labor force. However, the levels of productivity for most of its products are poor when compared to global standards, and the levels of importation of commodities are higher than they should be in several nations (Enahoro, Lannerstad, Pfeifer & Dominguez-Salas, 2018). A higher agricultural production is therefore a prerequisite for growth and development in the majority of African nations, and boosting yields is the key to improving incomes (and lowering poverty) in rural regions (Mehrara & Baghbanpour, 2016; Devaux, Torero, Donovan & Horton, 2018). As per Hawar (2019), agricultural and industrial producers may benefit, particularly if they are capable of diversifying their output into valued products that require a greater level of expertise. In the area of Eastern Africa economies like Kenya, agriculture contributes to around 33% of its GDP and also creates at least 40% of jobs in the country even though the agricultural sector has recently stagnated (Kerubo, 2021). In Tanzania, agriculture accounts for 26.7% of Tanzania's GDP and creates jobs for most of country’s population (Chongela, 2015).

According to UN data, the annual average growth rate in Somalia between 2004 and 2014 was -3.3 percent. As a result, Somalia's GDP per capita fell from US$ 241 in 2004 to US$ 131 in 2014. In 2014, the overall GDP was US$ 1374 million, with agriculture accounting for 60.2 percent of the GDP (Organization of Islamic Cooperation, 2016). On the other hand, the country’s economic growth was 1.4 percent in 2017 and later rose to 2.8 percent (2018), 2.9 percent (2019), and 3.2 percent in 2020 according to the World Bank (2021).

Agriculture is a key contributor to Somalia's economy in a number of ways. Foremost, the value of agricultural output in terms of GDP was measured at 64.5 percent on average between 1960 and 1990, and later 60 percent in 2017 (World Bank, 2018). Secondly, agriculture is a major source of export income. For example, agricultural exports accounted for about 93 percent of total exports in 2017, a factor that World Bank (2018) attributes to strong livestock exports. Thirdly, based on a report by ILO (2014), 45.8% of workers aged 15 and above are employed in the agricultural sector. Out of this group, 25.2 percent of workers are engaged in crop production, 9.4 percent take part in herding, 4.0 percent in herding, while the remaining 7.2 percent work in other activities related to agricultural sector.

Figure 1.1 shows the Agricultural share in total GDP in Somalia 1989-2020. It is evident that agricultural is backbone of economy in Somalia. The above figure shows that the increase in the share of agricultural output has been about 0.63.

Figure 1. 1: Agricultural share in total GDP in Somalia.



Agriculture and livestock ministries have existed since the colonial era, with specialized policies, administrative tasks, and resources. Following the fall of the state, the national Ministry of Agriculture and Livestock had well-developed administrative structures that were backed up by management and specialized technical skills (Hussein & Shirdon, 2020). The collapse of the central state, like that of other public institutions, obliterated the ministry's capability, as well as its assets and infrastructure (World Bank, 2018). For the federal and state ministries of agriculture and livestock, there is still a lack of integrated decision-making and policy-making, as well as unified functions, mandates, and objectives.

Somalia has for long had fragile government and so though there are policies geared toward agricultural production; however, the polices are not robust and have not been implemented to the latter (World Bank, 2018). The Ministry of Agriculture in Somalia has major capacity limits due to decades of political, social, and economic issues. As a result of the collapse of national government structures as a result of conflict, many institutions' capacity to carry out their missions was devastated, and as a result, Somalia performs badly on human and social metrics. The capacity to design strategy, policies, and regulatory instruments is crucial for building a conducive environment that supports investment possibilities and competitiveness in the productive sectors. This also allows numerous players and institutions to efficiently carry out their tasks.

In 2014, the Somali Agriculture Technical Group (SATG), in collaboration with Agriculture Ministry, evaluated all regulations and legislations introduced prior to the civil war, including phytosanitary requirements (Hussein, Law & Fraser, 2021). National and internal specialists were also involved in the process and tasked with analyzing previous policies and developing new regulations consistent with policies applicable throughout the East African region. Different

players in the agriculture sector were also involved in the process. Among the policies established as a result of this analysis include the Seed and Plant Variety Act, the Plant Protection Act, and other subsidiary laws, alongside guidelines for conducting phytosanitary inspection processes. However, these rules and regulations are yet to be implemented and are still on paper.

1.2 Statement of the Problem

Economic growth is an important goal for Somali's economy for poverty reduction. The economic growth target for the 2021 to 2024 period is 3.5% (Ministry of Planning, Investment and Economic Development, 2020). However, Somalia faced several shocks in 2019 and 2020 such as COVID-19 pandemic, floods, and drought as reported by the African Delopment bank (2021), Due to the COVID-19 measures such as implementation of travel restrictions and interruptions in supply and value chain systems, Somalia's real GDP decreased by 1.5 percent in 2020, in comparison to 2.9 percent in 2019 (African Development Bank, 2021).

The Somalia National Development Plan put the development of the agricultural sector at the heart of efforts to accelerate economic growth in Somalia. The emphasis on agriculture to drive economic growth implicitly assumes agriculture leads economic growth. However, the relationship between the two variables maybe more complex. The causal relationship may be from economic growth to agricultural output or there may be bidirectional causal link between agriculture and economic growth, or there may be no causal relationship.

1.3 Research question

Is there a causal link between levels of agricultural output and gross domestic product in Somalia, and, if so, what is the direction of causality?

1.4 Objectives of the study

1.4.1 General objective

To examine the link between levels of agricultural output and gross domestic product in Somalia.

1.4.2 Specific objectives

a) To test for causal link between agricultural output and gross domestic product in Somalia

b) To draw implications from the results

1.5 Justification of the study

Agriculture is a vital of the Somali economy and it is also a major source of the Somali economy. More proportion of Somali GDP emerges from the agricultural sector this shows the significant relationship between agriculture and the Somali economy. Income distribution, export, reduction in unemployment, and an increase in government revenue all of these factors have been affected by agricultural production.

The improvement of the agricultural sector in Somalia can lead to poverty reduction, an increase of employment, an increase of the manufacturing market, better living standard level and capability of going to school since this is the main sector for economic growth and government revenue. Human capital is expected go up after adjustment and enhancement the sector of the agriculture. The developments the sector of the agricultural can relief nation's problems such as immigration of youth, allocation of resources, and conflicts in society. The agricultural sector can attract foreign direct investment.

The Somali people those live in rural areas are more than 50% and gain their income from the agricultural sector. Public institutions s stress the advancement of the agricultural sector to

achieve improvement in the standard of living, reduction of inequalities, and sustainable development. But the Somalia government neglects the importance of agricultural production that would have strong and sustainable development. Drought, floods, famines, and miseries are the most obstacles that have been facing and defect the agricultural production. These remorse factors give birth to a weak national economy and a continuous fiscal deficit. To depict the most troubles in the agricultural sector can prompt a real solution to the economic problems.

The study also informs policy implications as it will help policy makers in coming up with appropriate policies to promote agriculture in Somalia. The established link between levels of agricultural output and gross domestic product in Somalia would a long a way in helping government in allocation of more funds for agricultural input subsidies as well as for agricultural research to promote come up with advanced methods of agricultural production.

The study contributes to knowledge body on link between levels of agricultural output and gross domestic product in Somalia. Hence, this study will be beneficial to scholars and researchers as a reference material for undertaking future studies on link between levels of agricultural output and gross domestic product in Somalia and other countries.

1.6 Organization of the study

The rest of the project is arranged as follows: Chapter two presents the theoretical review underpinning the study and a review of the empirical literature. Chapter three outlines the theoretical model, empirical model, data source, operationalization of variables and diagnostic tests. Chapter Four gives the analysis and the results of the study. Finally, Chapter five covers the summary of findings, deduced the conclusions along with policy suggestions and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter contains review of theory and empirical literature on agricultural output and economic growth. A summary of the literature review concludes the chapter.

2.2 Theoretical Literature

There are three arguments for a causal link between agricultural output and economic growth. The first one the agricultural output leads economic growth. Johnston, and Mellor(1961) pointed out that agriculture is linked to growth and development in five different ways including the provision of labor to industrial companies, provision of food for subsistence use, a market for industrial products, provision of local savings for industrial development, and facilitation of foreign exchange form exported agricultural products that is important in financing the importation of capital and immediate goods.

Secondly economic growth can lead agricultural output: According to Todaro (2009) the expansion of agriculture is the result of economic growth as an improvement of the various systems without a change in structure. Further, Todaro noted that institutions expand as the result of economic growth and facilitate agricultural sector to expand output. Solow (1957) suggested that economic growth is more output with unchanged technical and institutional systems. This implies that Solow relates the way of Todaro, since the expansion of various systems is expected to cause more output including agricultural products (Osabohien, Osabuohien & Urhie, 2018).

To Solow, the structure may change but the technical and institutional arrangement remains the same (Acs, Estrin, Mickiewicz, & Szerb, 2018).

Thirdly, agriculture may lead economic growth and economic growth drives agricultural growth (Tiffin and Irz, 2006). Food surplus, labor, agricultural products, capital, and foreign currency exchange are the ways those the agriculture leads the economic growth (Praburaj, Design & Nadu, 2018). As well as, investment and the development of sector of the industry are some ways that economic growth can promote the sector of the agriculture.

2.3 Empirical Literature

As indicated in the theoretical literature review, there are three augments possible relationships between agriculture and economic growth: agriculture-led growth, economic growth-led agricultural expansion, or feedback relationship.

2.3.1 Agriculture-Led Economic Growth

Various studies have established that agriculture have led to growth in economic growth. For instance, Awan and Alam (2015) examined how agricultural production related with Pakistan's economic growth in the years between 1972 and 2012. The researchers utilized the autoregressive distributed lags (ARDL) technique to determine the association between economic growth and agriculture. The results indicate that increase in agriculture value added significantly increased GDP per capita. Pakistan is an agricultural country, so agricultural productivity growth is vital the economic development in Pakistan. Increased in agricultural productivity not only fulfills domestic needs but it also creates surplus goods for exports and earn hard needed foreign exchange. The advancement in agriculture sector and the better use of land resources are essential for reducing food scarcity and poverty.

Bakari and El Weriemmi (2022) assessed the impact of agricultural investment on economic growth in France. The ARDL model was utilised to provide an estimate based on the annual data that was collected between the years 1978 and 2020. The empirical findings suggest that both in the long term and in the short run, investments in agricultural sector contribute positively to the country's overall economic expansion in France. These findings provide support for the proposition that financial investments in the agricultural sector are a significant determinat in the expansion of the economy in France and stimulate the necessity to create effective regulations that will further bolster the sector. France possesses substantial agricultural assets, which ought to enable it to make the most of the chances that are open to it, both on the domestic market and on global markets.

Constanza, Pereira and Silva (2022) did an analysis of the impact of agriculture on growth of Brazilian economy. The study was based on literature. The study conclusions and recommendations were extracted from the results of previous researches. According to the findings of the study, agriculture contributed favourably to the expansion of the Brazilian economy. Farming is the primary economic activity, particularly for countries that are still in the development stage. It has an important role in the generation of income as well as jobs and production of food. Brazil is the leading producer of a number of commodities, including coffee, cattle, ethanol, and soybeans. In the past 20 years, Brazil's agricultural value addition has increased, which can be attributed to the country's rising crop yields and animal populations. The agricultural production of Brazil, as well as the profession of farming, still has unrealized potential. The study concluded that agricultural pursuits are very important to the expansion of the economy. Agriculture development is among the most effective tools available to eradicate extreme poverty, increase shared prosperity, and provide food for the world's population. When

compared to growth in other industries, agriculture sector expansion is two to four times more successful in increasing incomes of the world's poorest people.

Pattanayak and Mallick (2017) assessed the agricultural production and economic growth in India based on an econometric analysis. The general study objective was to assess how agricultural production led to the Indian economic growth between 1991 and 2012. The logistic model was used and conducted using E-views-7. It has been discovered that the production of tea, cereals, and tobacco are positively contributing to the expansion of the GDP in India. On the other hand, the production of coffee and sugarcane appears to have a negative association with the expansion of the economy, albeit one that is not non - significant. Consequently, decreases in agricultural output have been matched by falls in the growth of the GDP. In order to motivate farmers to raise their yields, it is necessary to provide them with suitable training, as well as adequate facilities for storage.

Mohammed, Damba and Amikuzuno (2020) examined the agricultural output and economic growth nexus in Ghana. The study was obtained from International Monetary Fund's International Financial Statistics (IFS), the World Bank's World Development Indicators and the Ghana Statistical Service. The approximated outcomes from the Johansen Maximum Likelihood co-integration and the Vector Error Correction Model (VECM) backs the deductions of a long-run association amongst agricultural output and growth of Ghanian economy. This relationship is supported by the fact that agricultural output is positively correlated with economic growth. In particular, the results of the co-integration test indicate that agricultural output and economic growth are, over the course of time, determined to be moving in tandem with one another. The Granger causality test revealed that there is a one-way causal

linkage going from agricultural value-added to economic growth, but that there is no causal relationship in the opposite direction, from general economic growth to agriculture.

Karimou (2018) conducted a study on the impact of agricultural output on growth of economy growth in Benin. The time series data used was between 1961 and 2014. The analysis of the data was done using Vector Error Correction Model (VECM). The study findings revealed that there exist long-run association amongst agricultural output and GDP growth. The error correction model shows that 21.6% of the divergence between long-run and short-run GDP is adjusted within a year. The proportion of agricultural output to disruptions in GDP is approximately 6% during the first ten years of the era, while it is less than 2% for the first three years of the period.

Runganga and Mhaka (2021) studied how agricultural productivity influences Zimbabwe's economic growth using data from 1970-2018. The study utilised autoregressive Distributed Lag (ARDL) method of estimation for data between 1970 and 2018. The study established that economic growth is affected favorably by inflation, government spending, and gross fixed capital creation both in the short-run and in the long-run. The research established that agricultural output positively impacted the growth of the economy in the short-run but in the long-run, there was no impact on the growth of the economy. Hence, the sector of agriculture play a crucial role in development of the economy but when the economy is already developed, agriculture plays a negligible role.

Mubita (2019) utilized time series data ranging from 1981 and 2016 for assessing how agricultural production is linked to Namibian growth of economy. The analysis of the data was conducted utilizing Autoregressive Distributed Lag (ARDL) model. The properties of time series data were analyzed through Augmented Dickey Fuller and Philip Peron unit root tests. The long-run association was examined by use of bound test to co-integration. So as to examine

the nature of the causal association the Toda-Yamamoto Granger causality test was conducted. The Toda- Yamamoto Granger causality test findings showed existence of a uni-directional causality from agricultural productivity to growth of economy. The study established no causal association from growth of economy to agricultural output. The study found that the 1 percent change in agriculture value added led to growth of economy by 0.975 percent. The study recommended that sectoral linkages be reinforced, and the government must focus on policy initiatives that would enhance the performance of the agricultural sector. These policies could include investing in the sector, which would lead to an increase in productivity and trying to address other limitations that affect the sector.

In addition, Odero (2017) did an analysis of the causal relationship between agricultural value addition and Namibian growth of economy. The study was founded on yearly data between 1980 and 2015, utilizing the techniques of unit root, cointegration and pairwise Granger causality. The results of the Granger causality test revealed a uni-directional causal association from agricultural value added to growth of economy and not vice versa. The study recommended that Namibia should continue advocating for values addition to enhance economic growth.

Oyakhilomen and Zibah (2014) examined the link between agricultural productivity and Nigerian economic growth in Nigeria. Time series data were used in the study and the data analysis was done utilising unit root tests and the bounds (ARDL) testing approach to cointegration. The study established that agricultural production significantly affected the growth of Nigerian economy. Despite the expansion of the economy of Nigeria, levels of poverty are on the rise; as a result, the country has to transition away from an economy that is dominated by the oil industry and toward one that is more diverse, with agriculture serving as the primary industry.

In conclusion, the study established that there is a positive relationship between the agricultural productivity and growth of Nigerian economy both in the long and short-run.

Matthew and Mordecai (2016) looked at the impact of agricultural output on economic development in Nigeria (1986-2014). The study used the Augmented Dickey-Fuller Unit Root test and the Vector Autoregressive model. The multivariate VAR model results showed that majority of variables' lags are not substantial. The study established that agriculture play a crucial role in development of Nigerian economy. The findings of the variance decomposition study, the largest contribution to shocks in economic development, other than those caused by feedback shocks, was obtained from shocks to the agricultural sector.

Sertoglu, Ugural and Bekun (2017) looked at the contribution of agricultural sector on economic growth of Nigeria. This study empirically examined the agricultural sector impact on the Nigerian growth of economy by use of time series data between 1981 and 2013. The study established that real gross domestic product and agricultural output a long run equilibrium association. The results obtained from Vector error correction model revealed that the adjusted speed of the variables towards their long run equilibrium path was low, though agricultural output positively impacted the growth of the economy. The study recommended that the government and policy makers need to start diversifying as well as enhancing the allocation of funds for sector of agriculture.

Moreover, Oyetade (2021) assessed the impact of agricultural output on growth of Nigerian economy through application of numerical prediction and econometric analysis. For predicting the dataset between 2020 and 2025, the block method which is a numerical method was developed for every variable utilising the logistic growth model. This is an indication that yearly data between 1981 and 2025 was used. The ARDL bound test approach was used for examining

the relationship between country's agricultural output and growth of the economy. The study found that there exists long-run and short-run association between the variables. The pairwise granger causality tests showed that there is one-way causality moving from agriculture to growth in the economy. This is an indication that agricultural output results into growth in the economy but growth in the economy does not result into agricultural output. The findings approves the positive relationship amongst the agricultural output and growth in the economy and this is beneficial for improving the country's economic outlook.

Pfunzo (2017) looked at the agriculture's contribution to economic growth and development in rural Limpopo Province, South Africa. The study utilised the Limpopo Social Accounting Matrix (SAM) for 2006 developed by Conningarth Economists as a database for developing a multiplier model. Since the Limpopo SAM was unbalanced, manipulation of data was conducted through application of manual balancing to the data existing in Excel. The findings from the SAM multiplier analysis showed that R1 million directed to the sector of agriculture results into a significant change in output (R1.67 million) and value-addition (R764 000). The sub-sectors of agriculture that have contributed to greater amount of output include sub-tropical fruits and forestry. The study concluded that in spite of more people from the villages practicing agriculture as a livelihood source, the sector of agriculture actually contributes less to growth of the economic growth than non-agricultural sectors in Limpopo.

Mohammed and Osman (2021) examined the impact of agricultural projects on economic growth in Egypt. The study was based on literature where deductions were made from the previous studies. The study established that agricultural output is a key contributor to economic growth of Egypt. The outputs of agriculture provide the industries with the raw resources that they need. In addition to that, research has shown that the industry provides jobs for more than

57 percent of the country's overall population. It has been determined that agriculture is crucial to the economy as it directly contributes 37% of the Gross Domestic Product (GDP) and indirectly contributes another 41% of the GDP through links with other sectors. In addition to this, it has been shown that agriculture is a market for industrial commodities like the machinery, equipment, and fertilizers that are utilized in the process of farming. The study recommended that government must take measures to make sure that there is a reliable supply of water for irrigation drawn from the Nile River.

Mohamed (2010) assessed the role of agriculture in economy of Sudan. The study established the only feasible economic sector is agriculture, with declination of industry as a result of over taxations, expensive prices of inputs, deflation of the currency of Sudan and augments the levels of exchange rates for foreign currency. The poor performance of Sudan's agriculture sector is the primary factor that contributes to the country's precarious food supply situation. It is important for planners and policymakers to take into account the fact that approximately one-third of Sudanese work in agriculture. As a result, the best way to alleviate the food shortage in rural areas and throughout the country as a whole is to create the agriculture industry, especially the traditional sector, which is responsible for the production of more than sixty percent of cereals. The interventions of the government might come in the form of packages, such as extension and research programs in agriculture and livestock, organizational and managerial changes, checking account reforms, marketplace accessibility reforms, and government investment reforms.

Tigist (2015) examined the impact of agricultural exports on economic growth in Ethiopia based on output of coffee, oil seed and pulses. The analysis was done using co-integration model, Error correction model and Granger causality model. The outcomes of the study indicated that exports of coffee and oilseeds had a positive and substantial association with the expansion of the

economy. In contrast, research indicated that exporting pulses has a negative and insignificant influence on economic growth in the short term, but that it has a positive but insignificant effect in the long run. Additionally, the study established that there exist a bi-directional association amongst the coffee exports, oilseed exports and growth of economy while uni-directional relationship was established amongst the pulse's exports and growth of economy.

Kerubo (2021) conducted a study on agricultural output and economic growth in Kenya. The study looked at the causality between growth in economy and agricultural output in Kenya between 1971 and 2019. The ARDL model was employed in this study for estimating the short-run and long-run association amongst the agricultural output and real GDP. From the study findings, it was clear that agricultural output has no causal and non-significant influence on growth of economy. The study concluded that agricultural output does not substantially affect the growth of the economy for Kenya.

Mtaturu (2020) assessed the agricultural production and growth of Tanzanian economy. The study provided empirical evidence from time series data between 1971 and 2013. The study employed the Ordinary Least Square (OLS) and Newey-West estimators for analyzing the contributive impact of crop, livestock and fishery sub sectors to growth of Tanzanian economy. The study established that agricultural sub sectors positively affect the growth of Tanzanian economy. It was revealed that among the agricultural sub-sectors, livestock production exhibited greater impact on growth of the economy followed by crop sub-sector and then fishery sub sector. The policy perspective suggests that additional resources must be redistributed in the livestock sub-sector so s to increase the overall efficiency of agricultural production as among the keys to getting Tanzanians out of poverty and onto the path to economic progress.

Yusuf (2018) examined the agricultural production and economic growth in Somalia from 1986 to 2016. The hypothesis of the study were: that there is no casualty between agricultural production and growth of economy and that there was no substantial effect of agricultural production on growth of Somalian economy. The study used the multiple linear regression analysis to determine the association amongst the GDP and the independent variables. The Granger causality test revealed that the production of agricultural goods in Somalia did not granger induce an increase in the country's GDP. The regression model established that agricultural production ($\beta 1=0.5058$) substantially affects the growth of economy at 5 percent level of significance level. In conclusion, it was clear that there is no causality between growth of economy and agricultural production. This is an indication that production in agriculture substantially and positively affects the growth in the economy.

2.3.2 Economic Growth-Led Agricultural Expansion

Various studies have established that economic growth led to agriculture expansion. Bashir and Susetyo (2018) examined the relationship between economic growth and agriculture sector based on empirical evidence from Indonesia. The study used time series data between 1985 and 2017 extracted from world development indicators from the World Bank database. The study established that there is long-run and short-run causality in the direction of growth of economy and human capital for agriculture added value. The study also established that agriculture added value and foreign direct investment positively and significantly affects the growth of the economy.

Dabiri, Khoshnevis Yazdi & Zandi (2013) examined the agriculture productivity impacts on the Iran economic Growth. The data was utilised as yearly time series of data for the period of Persian date 1350 till Persian date 1387. And variable of agriculture productivity is calculated by

use of Kendrick index and then effect of agriculture productivity to growth of economy is projected by ARDL and ECM model that the test findings show the signs of projected coefficients for every variable match with visionary asters and the variable of capital, agricultural production, labor positively and significantly influenced the growth of economy. And Granger causality tests revealed that there is a uni-directional link from agricultural production to growth of economy.

Uddin (2015) looked at the causal association amongst the agriculture, industry and services sector for growth of GDP in Bangladesh. Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests showed that the time series data was stationary at first difference. Granger causality test found bi-directional causality between agriculture and GDP. This implies that growth of economy has a substantial effect on expansion of agriculture. Growth in economy guarantees availability of subsidies for farmers, higher process of agricultural products, affordable cost of transport and market for agricultural products.

Lanie and Bataka (2018) assessed the agricultural output and economic growth in Togo. The study performed Granger causality tests and estimate error correction models. The findings showed that there existed a uni-directional causal relationship from the agricultural output to growth of economy and consumption in households. The estimation results of error correction models established that deviations from the long-run equilibrium in the association amongst agricultural exports and growth of economy are reabsorbed at the rate of 44.9% annually while non-conformities from the long-run equilibrium in the association amongst the agricultural exports and consumption of households are reabsorbed at the rate of 28.4% annually.

2.3.3 Feedback Relationship between Agriculture and Economic Growth

The feedback hypothesis suggests aagriculture leads economic growth and vice versa. Katircioglu (2006) found a long term association linking economic growth and agriculture in North Cyprus over the 1975-2002 period. The yearly data covered between 1975 and 2002 period was utilised to establish the direction of causality in Granger sense amongst the agricultural expansion and growth of economy after using unit root tests to ascertain if the variables under deliberation are stationary. The research found that agricultural output and growth of economy assessed through use of real GDP growth are stationary at their levels, hence, they are certainly co-joined. Furthermore, the relationship was bidirectional.

Xuezhen, Shilei and Feng (2010) examined the relationship between economic growth and agricultural growth in the case of China. The study performed econometric model analysis in the case of China for the year 1952-2007 showing that there has always been an positive relationship between agricultural and growth in economy economic growth and describes how agriculture makes a contribution to growth of economy. The study concluded: (1) Despite the fact that the proportion of GDP contributed by agriculture has shrunk significantly over time, the contribution of agricultural growth has been on an upward trajectory ever since the price index was removed. Agriculture has also made substantial contributions to the expansion of non-agricultural sectors in the areas of market, foreign exchange, factor (finance and labour), and output growth, and it continues to be an irreplaceable engine of economic expansion; (2) the agricultural sector does not necessarily need to have a higher GDP growth rate in order for the economy to grow strongly. The Chinese government ought to enter the stage of industry nurturing agriculture, and they have the ability to do so. Increasing agricultural contributions must continue to promote the transference of rural labour, boost the consumption level of rural

dwellers, promote export, and improve farmers' income so as to facilitate the quick and orderly growth of the national economy.

Apostolidou, Kontogeorgos, Michailidis and Loizou (2014) looked at the role of agriculture in economic growth based on a comparison of mediterranean and northern views in Europe. So as to establish short run and long run linkages, recent methods of linear co-integration were adopted whereas the role of agricultural value added in economic growth is as well assessed using Granger causality tests. The study showed a bi-directional association amongst agricultural value added and growth of economy in the Northern European Union nations and only in one Mediterranean country. From a policy view point, this association is of essential significance as it could promote efficient economic decisions.

Faridi (2012) assessed the contribution of agricultural output to economic growth in Pakistan. The study projected the association amongst the Gross Domestic Product (GDP) and agricultural output for Pakistan by adopting Johansen co-integration technique between 1972 and 2008. The study results showed that the agricultural output negatively and significantly affected growth of economy whereas agricultural output elasticity is 0.58. Additionally, th study established that there existed bidirectional relationship amongst agricultural output and economic growth.

Jatuporn, *et al*. (2011) consider the case of Thailand with data for 1961-2009 and Granger causality approach. A Granger causality approach and the Wald (χ 2) coefficient statistic are used for revealing a long-run causal association. The time series analyses point to the existence of a long-term relationship as well as a sizeable impact that runs from agricultural to growth of economy and vice versa. These research results, along with the generalized conditional variance, indicate that agriculture has existed in a long-term stable in growth in the economy, while economic development motivates the growth of agriculture as a whole and this is supported by

the fact that agriculture is a major contributor to economic growth. In conclusion, the results obtained from a bivariate VAR model show a bidirectional link between agriculture and economic growth.

Ibrahimy, et al. (2021) used data for the 1980-2017 period to examine agriculture and Morocco's GDP. The vector autoregressive model (VAR) based Granger causality test was utilized. The general study objective was to econometrically assess the causality relationship amongst agriculture and GDP in Morocco, particularly because the sector has promoted from new strategies of development. Utilising Moroccan time series between 1980 and 2017, the study adopted the Granger causality founded on the vector autoregressive model (VAR) in a dynamic multivariate framework, utilising five macroeconomic variables: GDP per capita, agricultural GDP, rate of investment, money supply, and openness of trade. The study established that there existed a bi-directional Granger causality amongst agriculture and GDP, inferring a feedback association, and some uni-directional causal association in'volving th'e oth'er macro'economic varia'bles utilised in the VA'R mod'el. In conclusion, the results show bidirectional causality between agriculture and aggregate GDP growth.

Ouma, Kimani and Manyasa (2016) examined the agricultural output and economic growth in East African Community. Several bi-variate Vector Auto-Regressive (VAR) and Vector Error Correction Models (VECM) were as well estimated. The empirical results revealed mixed results for the various EAC member countries. The Granger causality tests showed that agricultural output does not granger cause growth of economy neither do growth of economy granger cause agricultural output for both Tanzania and Burundi. The study also established that there exist bi-directional association amongst agricultural output and growth of economy in Kenya and uni-directional association in Rwanda.

Where the feedback hypothesis is supported by evidence, the economy can experience significant growth when the policies in agricultural sector are changed. Furthermore, enhancing and accelerating growth would benefit the agricultural sector.

2.4 Overview of the literature

The theoretical literature provides three points of view on the fundamental relationship between the agricultural output and economic growth. Therefore, this research revealed the link between agriculture and economy with focus on Somalia. Certain studies have shown that agricultural output influences economic growth and economic growth influences the agricultural output while others (for example, Ibrahimy, *et al*., 2021 and Katircioglu, 2006) reveal a that agricultural output and economic growth have bidirectional relationship. This study added empirical evidence by examining the agricultural output and economic growth nexus in Somali. This indicated which of the three hypotheses about the two variables holds in Somalia. Either economic growth leads agricultural output, or agricultural output leads economic growth, or there is bi-directional association between agricultural output and economic growth.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter defines the concept of causality, describes the modeling approach, variable description, data sources and types, variable definition and measurements, and pre-estimation analysis.

3.2 Granger Causality

Consider two variables X and Y. The basic question is: Does X Granger-cause Y? First, construct autoregressive (AR) model, that is, predict Y using only its own lagged values. these represent the history of Y. Secondly, extend the AR model by adding lagged values of X, that is, past history of X. If adding lagged values of X significantly improves the predictive power of the AR model, the conclusion is X Granger-causes Y (Gujarati & Porter, 2009).

3.2.1 Testing for Granger Causality

The following two equations are used to test for causality between agriculture and GDP.

$$lnGDP_t = a + \sum_{i=2}^{p} \alpha_i lnGDP_{t-I} + \sum_{i=1}^{q} \beta_j lnAGR_{t-j} + \mu_t \qquad (2)$$

$$lnAGR = \delta + \sum_{i=1}^{r} \gamma_i lnAGR_{t-I} + \sum_{j=1}^{s} \delta_j lnGDP_{t-j} + \nu_t \qquad (3)$$

Where, GDP represents actual GDP; μ and ν are uncorrelated white-noise residuals; AGR represents agricultural production, ln denotes natural logarithms; and p, q, r, and s are lag lengths.

In equation (2) the Null Hypothesis: $\beta_1 = \beta_2 \ldots\ldots\ldots = \beta_q = 0$, that is, agriculture does not granger cause GDP. In equation (3) the null Hypothesis: $\delta_1 = \delta_2 \ldots\ldots\ldots = \delta_S = 0$ is GDP does not granger cause agriculture.

3.3 Description and Measurement of Variables

Table 3.1 shows the definition and measurement of variables in the study.

Table 3. 1: Variable Definition and Measurement.

Variable	Measurement
GDP	Value in monetary terms of the finished goods and services that are produced in Somalia over a specified time period.
Agricultural output	Agricultural output is a crop and livestock output. It consists of crop enterprises output (crops' value in the total which the farm produces some of the crops are used for consumption by household and as seed for production by farm business)

3.4 Data Source

Secondary data was used in this study, which spanned the years 1989 to 2020. The Economic and Social Research and Training Centre for Islamic Countries SESRIC is the source.

3.5 Data analysis and diagnostic tests.

Descriptive statistics (means, standard deviation, minimums, maximums, Skewness and Kurtosis) was used to describe the data. Inferential statistics entailed time series models to be estimated after undertaking tests to reveal the appropriate model to determining the effect of agricultural output on economic growth. A significance level of p of <0.05 was used.

3.5.1 Unit root test

Before carrying out the granger causality test, nonstationary of time series is checked. Nonstationary data have time-varying mean and variance (Gujarati and Porter, 2009). The test was conducted using Augmented Dickey Fuller Test based on;

$$\Delta y = \alpha + \gamma y + \alpha_2 t + \Sigma\beta_j \Delta y_{t-i-1} + \varepsilon_t \qquad (1)$$

Where, t, time (trend factor); y is the series; εt, random error term; p, the lag order and α, constant term (drift). Phillips and Perron (PP) test is an alternative to the ADF test. The PP test statistics are DF statistics robust to autocorrelation.

3.5.2 Normality test

The bulk of statistical procedures assume a normal distribution for the residuals, which is never the case (Ghasemi & Zahediasl, 2012). The normality assumption is critical because it allows appropriate statistical conclusions to be drawn from hypothesis tests. The Jarque-Bera test was used. The null hypothesis is the data is normally distributed.

3.5.3 Serial correlation

Serial correlation test checks if the error term transfers from one period to next. Errors can be correlated at first order (AR1) or second order (AR2). Breusch-Godfrey LM Test was employed to check for serial correlation in the error terms. If the p-value>0.05, data does not suffer from serial correlation, and if the p-value<0.05, data suffers from serial correlation. If serial correlation is detected in data the variables were then differenced.

CHAPTER FOUR

DATA ANALYSIS, INTERPRETATION AND DISCUSSIONS

4.1 Introduction

This chapter covers the information processed from the extracted data meant to examine the link between levels of agricultural output and gross domestic product in Somalia between 1989 and 2020. This chapter comprise of the following sub-section; descriptive statistic, trend analysis, diagnostic tests, inferential statistics and discussion of the findings.

4.2 Descriptive Analysis

The descri`ptive statistics including minimum, maximum, mean, standard deviation, kurtosis and skewness presented in this section. The descriptive statistics presented are for levels of agricultural output and gross domestic product as shown in Table 4.1.

Table 4. 1: Descriptive Statistics

	N	Min	Max	Mean	Std. Deviation	Skewness	Kurtosis
Log of Levels of agricultural output	32	20.02	20.61	20.30	0.1838173	0.9135	0.0097
Log of Gross domestic product	32	20.57	21.19	20.88	0.1927053	0.9089	0.0420

From the findings for levels of agricultural output, the mean was 20.30 and standard deviation was 0.1838173. This implies that agricultural output has been very high over the last 32 years between 1989 and 2020. Moreover, the minimum agricultural output was 20.02 and maximum agricultural output was 20.61. Further, the findings revealed that skewness statistic was 0.9135 which implies that it is skewed to the right about its mean and that the levels of agricultural

output have been increasing over the years. Additionally, the findings showed that the kurtosis statistic was 0.0097.

As per the findings for gross domestic product, the mean was 20.88 and standard deviation was 0.1927053. This implies that gross domestic product has been growing over the last 32 years between 1989 and 2020. Additionally, the minimum gross domestic product was 20.57 and the maximum gross domestic product was 21.19. Moreover, the findings revealed that skewness statistic was 0.9089 which implies that it is skewed towards the maximum gross domestic product and that the GDP of Somalia have been increasing. Further, the findings showed that and kurtosis statistic was 0.0420.

4.3 Trend Analysis

The trend analysis was conducted to show the trend of various variables in this study between 1989 and 2020. Findings are presented in various subsections.

4.3.1 Trend of Levels of Agricultural Output

The research established the trend for natural logarithm of the levels of agricultural output in Somalia between 1989 and 2020. The findings are shown in Figure 4.1.

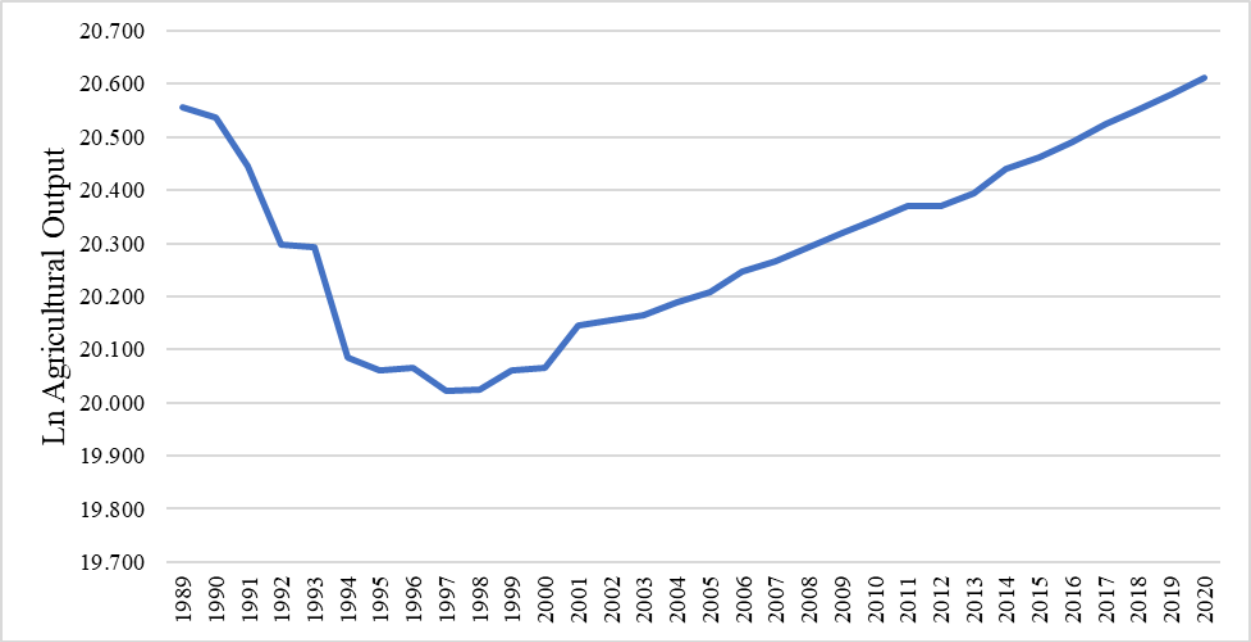


Figure 4. 1: Levels of Agricultural Output

From the findings, the natural logarithm of the levels of agricultural output decreased between 1989 and 1997. This could be attributed to the collapse of the government of Somalia and unending conflicts. However, from 1997 to 2010, the for natural logarithm of the levels of agricultural output have been increasing. This could be attributed to support the agricultural sector have been receiving from transitional government of Somalia that has stabilized major parts of Somalia.

4.3.2 Trend of Gross Domestic Product

The research established the trend for natural logarithm of the gross domestic product in Somalia between 1989 and 2020. The findings are shown in Figure 4.2.

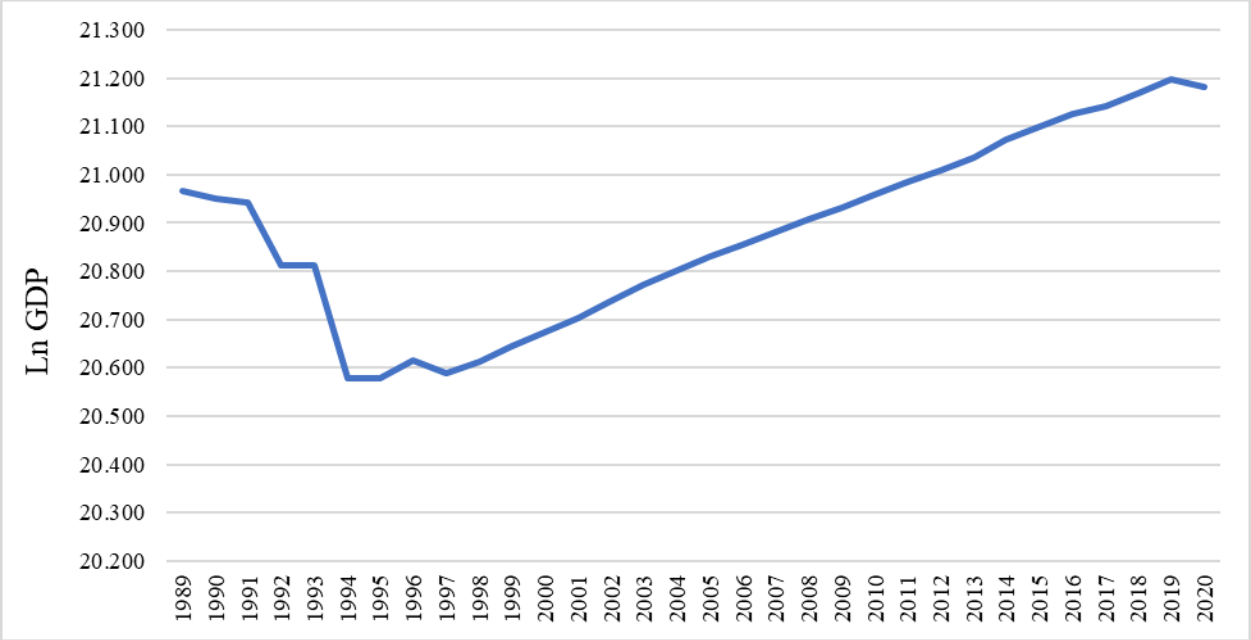


Figure 4. 2: Trend of Gross Domestic Product

As per the findings, the natural logarithm of the gross domestic product increased between 1989 and 1994. The decrease could be because of the collapse of the government of Somalia and unending conflicts. However, the natural logarithm of the gross domestic product increased between 1994 and 2020. This could be attributed to strategies laid down by the federal government of Somalia for enhancing the country's economy.

4.4 Diagnostic Tests Results

The pre-estimation tests that were conducted in this included augmented dickey fuller unit root test and normality test. The findings are illustrated in section 4.4.1 and 4.4.2.

4.4.1 Augmented Dickey Fuller Unit Root Test

This test was based on the Dickey Fuller test and is an accepted approach for testing if the order variable suggested by Dickey & Fuller (1979) is integrated. The findings are illustrated in Table 4.2.

Table 4. 2: Results for Augmented Dickey Fuller Unit Root Test

Variables		ADF	p-values	Critical Values		Conclusion
	Lags			5%	10%	
Log of Levels of agricultural output	4	-10.489	0.0000	-3.592	-3.235	*I (1)*
Gross domestic product	4	-19.205	0.0000	-3.592	-3.235	*I (1)*

***** I(1) represents the variables that are stationary at 5 percent level of significance***

ADF test was applied to determine if Levels of agricultural output and gross domestic product had unit root or not. The results showed that p-values (0.0000) for the variables were less than 0.05 and it was concluded that there was no unit root. And also ADF statistics test is less than the critical value at level of 0.05 and thus all the variables were stationary.

4.4.2 Normality Test Results

The normality assumption is critical because it allows appropriate statistical conclusions to be drawn from hypothesis tests. The Jarque – Bera test was used. The Jarque-Bera test statistic is always positive, and if it is not close to zero, it shows that the sample data do not have a normal distribution. The hypothesis is the data is normally distributed. The findings are shown in Table 4.3.

Table 4. 3: Results for Normality Test

	Jarque – Bera Statistics	P – value
Log of Levels of agricultural output	2.035	0.3615
Log of Gross domestic product	1.638	0.4408

From the findings, the Jarque-Bera Statistics for levels of agricultural output (2.105) p – value (0.3615) and gross domestic product (1.666) p – value (0.4404) this implies that the study

accepted the hypothesis. Since, the p – values of the variables more than 0.050. This implies that the data for both dependent and the independent variables is normally distributed and as a result it helps to predict dependent variables.

4.4.3 Serial correlation

Serial correlation test checks if the error term transfers from one period to next. Breusch-Godfrey LM Test was adopted to check for serial correlation in the error terms. If the p-value>0.05, data does not suffer from serial correlation, and if the p-value<0.05, data suffers from serial correlation. The findings are shown in Table 4.4.

Table 4. 4: Breusch-Godfrey LM Test Results

	Lags	**Breusch-Godfrey LM test Statistics**	**p-values**
Log Levels of agricultural output	4	20.251	0.0004
Log Gross domestic product	4	23.411	0.0001
First Difference			
Levels of agricultural output	4	0.560	0.9674
Gross domestic product	4	4.436	0.3502

In the table 4.4 the results showed that p-values for the variables were less than 0.05 and it was concluded that there was a serial correlation. The variables were then differenced and tested for Breusch-Godfrey tests. As shown in table 4.4, the higher probability values for the Breusch-Godfrey tests showed that the null hypothesis that data does not suffer from serial correlation could not be rejected. This implies that there was no serial correlation in the residual series from the regression.

4.5 Estimation Results

The study estimated the models to establish the levels of agricultural output and gross domestic product in Somalia between 1989 and 2020. The study conducted ordinary least square

4.5.1 Ordinary least square

By using Ordinary least square approach, structures of the causal relationships are analyzed among variables. This is a statistical hypothesis test to determine if one time series is useful to predict another. The hypothesis at this level was rejected if the probability value is less than any level of α. Here, we used ordinary least square to test for causality between agricultural value added and Gross Domestic Product. The causality could be unidirectional or bidirectional. The findings are show in Table 4.5.

Table 4. 5: Ordinary Least Square Test results

Null Hypothesis: Log level of agricultural output doesn't cause Log level of GDP.			
Variable	**Coefficient**	**t-Statistic**	**Prob**
Constant	.691	.562	.578
Log of levels of agricultural output	.994	16.422	.000
R-squared	0.900		
Adjusted R-squared	0.897		
F-statistic (1, 31)	269.697 (sig.=0.000)		
Null Hypothesis: Log level of GDP doesn't cause Log level of agricultural output.			
Variable	**Coefficient**	**t-Statistic**	**Prob**
Constant	1.407	1.22	0.231
Log of levels of GDP	.905	16.42	.000
R-squared	0.900		
Adjusted R-squared	0.897		
F-statistic (1, 31)	269.697 (sig.=0.000)		

From the findings in Table 4.5, the adjusted R-Square value of 0.897 implies that 89.7 percent of the variations in gross domestic product in Somalia are explained by the levels of agriculture output vice versa. Specifically, the coefficient of log of levels of agricultural output (0.994) was positive and statistically significant. This means that levels of agricultural output significantly determine gross domestic product in Somalia in the long run.

4.5.1.1 Agriculture leads Economic Growth

Based on OLS test results presented in Table 4.5, the null hypothesis that agriculture does not cause GDP could be rejected since the p-value of F-statistics was less than critical p-value at 5 percent level of significance. This implies that natural logarithm of agricultural output granger causes natural logarithm of economic growth. This is an indication that agricultural output leads to significant growth in economy of Somalia.

4.5.1.2 Economic Growth leads Agriculture

Moreover, the null hypothesis that GDP does not cause agriculture was rejected at 5 percent level of significance since the p-value is less than 0.05. This implies that natural logarithm of economic growth granger causes natural logarithm of agricultural output. This is an indication that growth in economy leads to significant increase in agricultural output in Somalia.

4.5.1.3 Feedback/Bidirectional Relationship

The findings therefore support the bidirectional causality between agriculture and gross domestic product. That is, agriculture causes increase in gross domestic product and GDP cause increase in levels of agriculture output.

4.6 Discussion of Findings

The study found that that levels of agricultural output and gross domestic product has been increasing over the last 32 years between 1989 and 2020. This could be attributed to efforts by the transitional federal government (TFG) (2004-2012) and federal government (2012 to date) to revolutionize the economy of the country by investing in major sectors like Agriculture. The findings concur with Mtaturu (2020) who assessed the agricultural production and economic growth in Tanzania and recommended that there is need for reallocation of extra funds for

livestock sub-sector so as to enhance the overall success of production in agriculture as one of the key measures to alleviate poverty and enhance growth in Tanzanian economy. Mohamed (2010) who did an assessment of the role of agriculture in Sudan economy and suggested that government initiatives might come in the form of packages that include things like research and development in agricultural and livestock practices, institutional and managerial reforms, credit services, increased market availability, and government investment.

The study found that agricultural output Granger-causes level of GDP in Somalia. This implies that increase in agricultural output significantly leads to increase in economic growth of Somalia ($r = 0.994$, p-value = 0.000). The findings are in agreement with Awan and Alam (2015) who examined how agricultural production related with Pakistan's economic growth in the years between 1972 and 2012 and established that agricultural production Granger-causes economic growth since increase in agriculture value added significantly increased GDP per capita. This could be attributed to the fact that Pakistan is an agricultural country and so agricultural productivity growth is vital the economic development in Pakistan. The above arguments are supported by Bakari and El Weriemmi (2022) who explored the impact of agricultural investment on economic growth in France and argued agricultural sector that investments are crucial factors of growth in French economy and motivates the desire to employ sound policies to further improve this sector. Moreover, Constanza, Pereira and Silva (2022) did an analysis of the impact of agriculture on economic growth in Brazil and concluded that agricultural activities are crucial in improving the growth of economy. The growth of agriculture is one of the most effective methods available for eradicating severe poverty, increasing shared wealth, and providing food for people. However, the findings are in disagreement with Yusuf (2018) who

examined the agricultural production and economic growth in Somalia from 1986 to 2016 and established that agricultural production does not granger cause GDP growth.

The study also established that level of GDP granger-causes agricultural output in Somalia. This implies that increase in economic growth significantly leads to increase in agricultural output of Somalia (r = 0.905, p-value = 0.000). The findings are agreement with Bashir and Susetyo (2018) who examined the association amongst the growth in economy and agricultural sector in Indonesia and established that there is long run and short run caus`ality in the direction of growth of economy and agriculture added value. The findings also corelate with findings of Uddin (2015) who looked at the causal relationship between agriculture, industry and services sector for GDP growth in Bangladesh and found that economic growth has a significant effect on expansion of agriculture. This could be attributed to the fact that the growth in economy guarantees availability of subsidies for farmers, higher process of agricultural products, affordable cost of transport and market for agricultural products.

The study also found that levels of agricultural output and gross domestic product have a bidirectional causality. The findings concur with Apostolidou, Kontogeorgos, Michailidis and Loizou (2014) who established that there is a bi-directional relation`ship between agricul`tural value added and economic growth in the Northern European union nations and only in one Mediterranean country. The findings also agree with Ouma, Kimani and Manyasa (2016) who examined the agricultural output and economic growth in East African Community and established that there existed bi-directional relationship between agricultural output and economic growth in Kenya. The above arguments are supported by Katircioglu (2006) who examined the association linking economic growth and agriculture in North Cyprus between 1975 and 2002 and established that that agricultural output growth and economic growth have a

bidirectional relationship. The findings also concur with Jatuporn, *et al*. (2011) who argued that agriculture and growth in economy have a long term relationship while development of the economy simulates the expansion in agricultural sector. In conclusion, Jatuporn, *et al*., (2011) asserted that there existed a bidirectional link between agriculture and economic growth in North Cyprus. However, the findings disagree with Odero (2017) who did an analysis of the cau`sal association amongst the agricultural value addition and growth of Namibian economy and concluded that there existed a uni-directional causal relationship running from agricultural value added to economic growth and not vice versa.

The study found that 89.7 percent of the variations in gross domestic product in Somalia are explained by the levels of agriculture output. The study established that coefficient of log of levels of agricultural output (0.994) was positive and statistically significant and this implies that levels of agricultural output significantly determine gross domestic product in Somalia in the long run. The findings agree with Pattanayak and Mallick (2017) who assessed the agricultural production and economic growth in India based on an econometric analysis and established that production of tea, cereals and tobacco are positively affecting the GDP growth The findings are in line with Awan and Alam (2015) who found that increase in agriculture value added significantly increased GDP per capita. Also, Runganga and Mhaka (2021) established that that agricultural production index had a positive significant effect on growth in the short term. The findings also concur with Mubita (2019) whose results of Granger causality test showed a positive significant association and that a 1% increase in agriculture value added would raise growth by 0.975%. Further, Oyakhilomen and Zibah (2014) revealed that agricultural productivity was positively associated to economic growth in Nigeria, both in the long and short run.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter provides a summary, conclusion and recommendations of the main findings on the link between levels of agricultural output and gross domestic product in Somalia between 1989 and 2020. This chapter puts forward the summary of the findings, conclusions of the study, recommendations of the study and suggestions for further studies.

5.2 Summary

The purpose of the study was to establish the link between levels of agricultural output and gross domestic product in Somalia between 1989 and 2020. Secondary data was used in this study, which spanned the years 1989 to 2020. The Economic and Social Research and Training Centre for Islamic Countries SESRIC is the source. Data for this study is time series data in which observations are made on the basis of several variables over a certain period and are usually organized sequentially when the time horizon, such as annually, is different. The study collected annual data for all the variables such as levels of agricultural output and gross domestic product. Descriptive statistics (means, standard deviation, minimums, maximums, Skewness and Kurtosis) was used to describe the data. Inferential statistics entailed time series models to be estimated after undertaking tests to reveal the appropriate model to determining the effect of agricultural output on economic growth.

The study established that levels of agricultural output and gross domestic product has been increasing over the last 32 years between 1989 and 2020. This could be attributed to efforts by the transitional federal government (TFG) (2004-2012) and federal government (2012 to date) to revolutionize the economy of the country by investing in major sectors like Agriculture. The

study also revealed that there is bidirectional causality between the levels of agricultural output and gross domestic product. The study found that 89.7% of the changes in gross domestic product in Somalia could be attributed to changes in levels of agriculture output. The study found that a unit change in levels of agricultural output would lead to a significant 0.994-unit changes in gross domestic product in Somalia. This is an indication that levels of agricultural output significantly determine gross domestic product in Somalia in the long run.

5.3 Conclusions

The study concluded that there exists a bidirectional causality between levels of agricultural output and gross domestic product in Somalia. This is an indication that levels of agricultural output and gross domestic product affect each other directly. The levels of agricultural output and gross domestic product have increasing over the years because of efforts by the federal government to revolutionize the economy of the country by investing in major sectors like Agriculture. The study concluded that 89.7% of the changes in gross domestic product in Somalia are linked to changes in levels of agriculture output. The study concluded that levels of agricultural output have a positive and significant effect on gross domestic product in Somalia.

5.4 Recommendations for Policy and Practice

The study established that agricultural output significantly influences the economic growth of Somalia. Hence, the study recommends that the federal government of Somalia should come with strategies to promote agriculture in the country. These policies should address the provision of agricultural input subsidies to encourage more people to practice agriculture.

The study also recommends that the federal government of Somalia should address the country's challenges currently facing the agricultural sector. This can be done by upgrading the road

networks to connect the farmers to the market, provide agricultural extension services and advancement of its workforce. Through augmented agricultural sector's productivity as a whole, growth rate of economy subsequently augments as recommended by the study and other studies.

The study also recommends that the government should allocate more funds for agricultural research. This would enable the research institutions to come with appropriate strategies for enhancing agriculture and also recommend better farming mechanisms suitable for the climate in Somalia.

The study also recommended that there is need for enhancing the extension service system and increasing its efficiency in promoting modem agriculture. The extension officials need to be updated with the nation's needs and offer extension services to allow the country attain its desired goals. This could allow the farmers to switch from competing (substitute crop ventures) and traditional crops to modern high yielding crops.

The study recommends that there is need for enhancing the relationship between research, extension and the farmers by improving the private sector engagement in delivery of extension services among other things. The government needs to augment its investments in agricultural research to promote development of progressive production technology in agriculture.

The study further recommends that to attain and endure high growth of economy, the government of Somalia need to execute the initiatives which facilitates agricultural trade, particularly agricultural exports, ensuring transparency in agricultural exports through reduction of technical barriers. This would encourage the investors in agricultural sector as well as farmer to produce more and augment the agricultural output in Somalia.

5.5 Suggestions for Further Research

The study only looked at the relationship between agricultural output and economic growth at a limited period of 32 years. Hence the study recommends should be conducted from the year of independence to date and establish the nexus between agricultural output and economic growth.

Future studies should also conduct comparative study pre and post collapse of federal government of Somalia in 1991 and establish the difference in relationship. Moreover, future studies could be conducted on the impact of agricultural output on economic growth while including other variables like FDI, private investment, government expenditure among others that also affect growth of economy.

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APPENDICES

Appendix I: Data Collection Sheet

Year	RGDP	Agricultural output, total value from all agricultural activities, crop, livestock
1988		
1989		
1990		
1991		
1992		
1993		
1994		
1995		
1996		
1997		
1998		
1999		
2000		
2001		
2002		
.		
.		
2020		

Appendix II: Raw Data

year	Agriculture, Value Added, Constant 2015 Prices	GDP, Constant
1989	846875613.9	1276553983
1990	829938643.3	1256131373
1991	756901767.3	1243568614
1992	653888281.9	1094339803
1993	649965216.4	1094339803
1994	527771847.7	864533067.5
1995	515470365.6	864533067.5
1996	517903573.7	898248072.8
1997	495939688.6	873975002.9
1998	497476950.7	895791869.2
1999	515783766.6	924457209.1
2000	518629304.7	952190925.3
2001	561110333.2	980756653.1
2002	566160326.2	1015083136
2003	571821929.4	1050611046
2004	585545655.7	1082129377
2005	597842114.5	1114593258
2006	621157957	1141343497
2007	632959958.1	1171018427
2008	649416917.1	1201464907
2009	668250007.6	1232702994
2010	684288007.8	1264753272
2011	702079496	1297636857
2012	702079496	1331375415
2013	720333562.9	1365991176
2014	753468906.8	1416532850
2015	769291753.9	1454779237
2016	793096450.8	1496777958
2017	818948876.8	1517600853
2018	842016516.4	1559952505
2019	867754993.5	1605127600
2020	894171506.3	1581128331

Appendix III: Refined Data for Analysis

year	Natural logarithm Agriculture, Value Added, Constant 2015 Prices	Natural logarithm GDP, Constant
1989	20.56	20.97
1990	20.54	20.95
1991	20.44	20.94
1992	20.30	20.81
1993	20.29	20.81
1994	20.08	20.58
1995	20.06	20.58
1996	20.07	20.62
1997	20.02	20.59
1998	20.03	20.61
1999	20.06	20.64
2000	20.07	20.67
2001	20.15	20.70
2002	20.15	20.74
2003	20.16	20.77
2004	20.19	20.80
2005	20.21	20.83
2006	20.25	20.86
2007	20.27	20.88
2008	20.29	20.91
2009	20.32	20.93
2010	20.34	20.96
2011	20.37	20.98
2012	20.37	21.01
2013	20.40	21.04
2014	20.44	21.07
2015	20.46	21.10
2016	20.49	21.13
2017	20.52	21.14
2018	20.55	21.17
2019	20.58	21.20
2020	20.61	21.18