THE ROLE OF AGRICULTURAL OUTPUT IN THE SUSTENANCE OF ECONOMIC GROWTH IN NIGERIA

BY

Elohor ESEOGHENE
SSC2003913

DEPARTMENT OF ECONOMICS
FACULTY OF SOCIAL SCIENCES
UNIVERSITY OF BENIN

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CERTIFICATION

We certify that this work titled, "**The Role of Agricultural Output in The Sustenance of Economic Growth in Nigeria"** was carried out by **Elohor ESEOGHENE** with matriculation number **SSC2003913** in the Department of Economics, Faculty of Social Sciences, University of Benin, Benin City, Edo State.

Dr. John Izevbigie **(Project Supervisor)**	**Date**
Dr. S.O Igbinedion **(Project Coordinator)**	**Date**
Dr. N.L. Arodoye **(Head of Department)**	**Date**

DEDICATION

This work is dedicated to God, the Father of our Lord Jesus Christ who created me and gave me the power, insight and knowledge required to complete this work and to all who have influenced my life positively.

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TABLE OF CONTENTS

ABSTRACT

The study analzsed how agricultural output impact economic growth in Nigeria, from 1981 to 2023.

The study employs Autoregressive Distributed Lag Model (ARDL), unit root test, co-integration test and diagnostic tests such as heteroscedasticity and autocorrelation

The study found out that there is a positie relationship between real gross domestic product growth rate and crop production, which satisfies our apriori expectation.,

Similarly, the study shows that there is a positive relationship between real gross domestic product growth rate and fishery, forestry, and livestock's which satisfies our apriori expectation, finally the study recommended that invest in agricultural infrastructure, ensure agricultural diversification, promote sustainable forestry practices and support fisheries sector development.

Chapter One

1.1 Background to the Study

Agriculture has historically been the backbone of the Nigerian economy, playing a vital role in employment generation, food security, and overall economic development. Before the

discovery of crude oil, agriculture was the mainstay of Nigeria's economy, contributing significantly to Gross Domestic Product (GDP) and foreign exchange earnings. The sector employed over 70% of the country's labor force and provided raw materials for the nascent manufacturing industry. Crops such as cocoa, groundnuts, palm oil, and rubber were major export commodities that positioned Nigeria as a leading player in global agricultural markets.

The agricultural outputs of various kinds have been made possible in Nigeria due to its diversity in agro-ecological conditions. The country has an abundance of natural resources favorable to agricultural production (Arokoyo, 2012). As far back as the early 1960s, the Nigerian economy prospered on the agricultural sector, which was seen as the main pillar for growth and development. The agricultural sector remains a major benefactor in low and middle-income countries, providing inputs, food, employment opportunities, and raw materials for manufacturing and other industries. It also serves as a source of foreign exchange from the exportation of agricultural products and benefits from the value added in numerous production processes (Okoro, 2011).

The significance of agriculture in most African economies implies that efforts to advocate and raise the initial stages of economic growth cannot neglect or relegate the agricultural sector (Anriquez & Stamoulis, 2007). Preceding the oil boom in the 1950s and 1960s, the agricultural sector constituted over 63% and 54% of Nigeria's Real Gross Domestic Product (RGDP). However, following the discovery of oil, Nigeria experienced a decline in the share contribution of agriculture to RGDP, ranging between 29.2% and 33.3% between 1970 and 1980 (Aigbokhan, 2011).

With the advent of oil in the 1970s, the focus shifted from agriculture to the oil and gas sector, which soon became the primary revenue generator for the country. This shift led to the neglect of agriculture, resulting in a decline in productivity, reduced contribution to GDP, and increased importation of food products. Despite Nigeria's vast arable land, favorable climate,

and abundant labor force, the sector faces challenges such as inadequate infrastructure, limited access to credit, and insufficient investment in research and technology. These issues have impeded the growth of the agricultural sector and hindered its potential to drive sustainable economic growth.

Due to the unstable nature and performance of agriculture in the country, governments at various levels have, over the decades, instituted and carried out numerous policies and projects aimed at restoring agriculture to its veritable position in the economy. However, evidence from empirical literature reveals that there is no breakthrough yet, owing to the many challenges facing the sector's performance (Yusuf, 2014). Economic growth and development are among the greatest desires of any poor nation, and agriculture significantly impacts Nigeria's growth by providing food and fiber for home consumption, labor supplies to the industrial sector, foreign exchange generation through exports, and a rise in domestic savings and the purchasing power of the rural populace (Poonyth et al., 2001).

In recent years, there has been a renewed interest in the agricultural sector as the government recognizes the need to diversify the economy away from oil dependence. Several policies and programs have been introduced to enhance agricultural productivity, improve food security, and promote value chain development. The Agricultural Promotion Policy (APP), also known as the "Green Alternative," and the Anchor Borrowers' Program are examples of initiatives aimed at revitalizing agriculture and making it a key driver of economic growth.

The role of agriculture in the sustainability of economic growth is crucial, particularly in a country like Nigeria, where a large proportion of the population depends on agriculture for their livelihood. Agricultural output not only ensures food security but also contributes to rural development, reduces poverty, and creates a multiplier effect across other sectors of the economy. The relationship between agricultural productivity and economic sustainability

becomes even more pertinent in the context of rising population growth and the increasing need to ensure food availability for all.

This study aims to assess the impact of agricultural output on the sustainability of economic growth in Nigeria. By understanding the contribution of the agricultural sector to the country's overall economic performance, this research seeks to provide insights into the potential of agriculture as a viable pathway to achieving sustainable development and long-term economic resilience.

1.2 Statement of the Problem

Despite the significant potential of agriculture to drive economic growth in Nigeria, the sector has faced numerous challenges that have hindered its ability to contribute effectively to sustainable development. The country is endowed with enormous resources for agricultural use, including vast available land for crop cultivation and rearing of animals. The agricultural sector was once well known for the exportation of products such as rubber, cocoa, groundnut, palm oil, and hides and skin, all of which played a major role in driving economic growth and development (Noko, 2015). However, despite Nigeria's large expanse of rich soil, many citizens still suffer from hunger and starvation due to the relegation of agriculture to the background. Furthermore, many industries have become dependent on imported raw materials for their productive activities, and a significant number of youths remain unemployed after graduation (Noko, 2015).

Before the discovery of crude oil, agriculture was the mainstay of the Nigerian economy, with the sector contributing over 63% of Nigeria's Real Gross Domestic Product (RGDP) in the 1950s and 1960s. However, following the discovery of oil, the share of agriculture in RGDP declined to between 29.2% and 33.3% between 1970 and 1980 (Aigbokhan, 2011). This decline can be attributed to the shift in focus from agriculture to oil, leading to the neglect of the agricultural sector and its infrastructure (Okoh, 2004). The over-reliance on

crude oil has not only affected Nigeria's market forces but also impacted the country's economic growth and development. The country was once a leading exporter of agricultural products between 1940 and 1950, but this has changed significantly in recent times as economic growth has become largely dependent on oil revenue (Okoh, 2004).

Nigeria possesses diverse agro-ecological conditions and abundant natural resources favorable for agricultural production (Arokoyo, 2012). However, the sector continues to face challenges such as inadequate infrastructure, limited access to credit, insufficient investment in research and technology, and inconsistencies in government policies. These challenges have led to low productivity, reduced output, and a high dependency on food imports, thereby undermining the role of agriculture as a driver of economic growth (Yusuf, 2014). While the government has made several efforts to restore agriculture to its former position in the economy through various policies and programs, empirical evidence reveals that there has been no significant breakthrough yet (Yusuf, 2014).

Agriculture remains a major sector in low and middle-income countries, providing inputs, food, employment opportunities, and raw materials for manufacturing and other industries (Okoro, 2011). However, the failure to harness Nigeria's agricultural endowment wisely has led to an over-reliance on the oil sector and increased importation, which has affected the country's balance of payment, employment level, and productivity in other sectors (Oyinbo et al., 2014). The unstable nature of oil prices and the rising cost of imported goods have contributed to inconsistencies in Nigeria's economic growth and development.

Economic growth and development are among the greatest desires of any poor nation, and agriculture plays a crucial role in this process by providing food and fiber for domestic consumption, labor supplies to the industrial sector, foreign exchange earnings from exports, and an increase in domestic savings and purchasing power for the rural populace (Poonyth et

al., 2001). The decline in agricultural productivity has not only affected Nigeria's economic growth but also posed a threat to food security, poverty alleviation, and rural development.

Given these issues, it is crucial to assess the impact of agricultural output on the sustainability of economic growth in Nigeria. Understanding the contribution of agriculture to economic growth and addressing the challenges facing the sector can help to unlock its full potential as a viable pathway to achieving sustainable development and long-term economic resilience. Moving into competitive international markets with agricultural products, beyond crude oil, can be key to achieving sustainable economic growth (Bekun, 2015). This study, therefore, aims to explore the role of agricultural output in promoting economic sustainability in Nigeria and to identify measures that can enhance the sector's contribution to overall economic development.

1.3 Research Questions:

1. What is the relationship between agricultural output and economic growth in Nigeria?
2. What is the impact of agricultural output on the sustenance of economic growth in Nigeria?

1.4 Objectives of The Study

The overall objective of this study is to assess the impact of agricultural output in sustenance of economic growth in Nigeria between 1985 and 2023. Specifically, the study aims to:

1. Determine the relationship between agricultural output and economic growth in Nigeria.
2. Examine the impact of agricultural output in the sustenance of economic growth in Nigeria.

1.5 Research Hypotheses:

A. **Null Hypothesis (H_0)**: Agricultural output does not have a significant impact on the sustenance of economic growth in Nigeria.

Alternative Hypothesis (H_1): Agricultural output has a significant impact on the sustenance of economic growth in Nigeria.

1.6 Significance of the Study

This study primarily examines the impact of agricultural output on the sustainability of economic growth in Nigeria. Understanding the relationship between different categories of agricultural output—specifically crop production, livestock, fishing, and forestry—and economic growth is significant for several reasons, part

icularly in terms of policy formulation, economic planning, academic research, public accountability, development partnerships, and socio-economic development.

The study contributes to the ongoing discourse on the effects of agricultural output on economic growth, a topic that has generated extensive discussion and varied conclusions due to different analytical approaches and regional contexts. By focusing on Nigeria, this research aims to provide specific insights that are crucial for policymakers and economic planners. It offers evidence-based recommendations for more effective allocation of resources across agricultural sub-sectors, which can enhance overall economic growth and sustainability.

Moreover, the study identifies the various components of agricultural output and their specific impacts on Nigeria's economic growth. Such country-specific insights are invaluable for policy formulation, as they provide a solid foundation for designing and implementing agricultural policies that promote sustainable growth and stability.

This research also adds to the existing literature by providing empirical evidence from a developing country context, thus bridging gaps in research regarding the specific impacts of different categories of agricultural output. It consolidates existing knowledge and fosters further interest in exploring the relationship between agricultural output and economic growth, creating fertile ground for future studies in related fields.

By analyzing agricultural production and its impact on economic growth, the study promotes transparency and accountability in the management of public resources related to agriculture. It helps identify areas where agricultural policies and expenditures have been inefficient or ineffective, prompting necessary reforms in public agricultural management. This increased transparency can enhance public trust in government institutions and their ability to manage the agricultural sector effectively.

Development partners, including international organizations and donor agencies, can benefit from the findings by aligning their support and interventions with the most impactful areas of agricultural production. This alignment ensures that external aid and investments are more effective in contributing to Nigeria's development goals.

The insights gained from this study into the relationship between agricultural output and economic growth have broader socio-economic implications. Improved allocation of resources toward agriculture can lead to better infrastructure, enhanced food security, and increased economic opportunities for citizens, contributing to poverty reduction and overall socio-economic development.

In summary, this study on agricultural output and its impact on economic growth in Nigeria is significant for informing policy decisions, guiding economic planning, contributing to academic research, promoting public accountability, assisting development partners, and fostering socio-economic development. It provides a detailed analysis of how different categories of agricultural output affect economic growth, supporting the creation of more effective and impactful agricultural policies in Nigeria.

1.7 Scope of the Study

This study primarily examines the impact of agricultural output on the sustainability of economic growth in Nigeria. By analyzing the relationship between agricultural output and economic growth over a 42-year period, from 1981 to 2023, the study aims to provide insights into the role of agriculture in fostering sustainable development in the country.

The chosen time frame of 1981 - 2023 allows the study to capture various economic cycles, including both periods of growth and downturns, while accounting for changes in agricultural policies, government interventions, and economic conditions. This comprehensive approach helps to identify the factors that have influenced the agricultural sector's contribution to economic growth and to recognize best practices and areas that need improvement.

The period under investigation likely includes significant events such as the decline in agricultural productivity following the oil boom, economic recessions, policy shifts, and other challenges that impacted the agricultural sector. By considering these factors, the study aims to contribute to a deeper understanding of how agricultural output has shaped the Nigerian economy, providing valuable insights for policymakers, stakeholders, and researchers to develop effective strategies to revitalize and sustain agricultural growth, diversify the economy, and reduce over-reliance on the oil sector.

This study primarily examines the impact of agricultural output on the sustainability of economic growth in Nigeria. Specifically, it assesses how different categories of agricultural output (crop production, livestock, fishing, and forestry) affect the country's economic growth, as measured by Gross Domestic Product (GDP).

1.8 Structure of the Study

This study covers five chapters. chapter one provides for introductory remarks, statement of the research problems, objectives and hypotheses of the study etc.

Chapter two entails the literature review, theoretical literature review, empirical review and literature gap.

Chapter three provides for theoretical framework, related methodologies and sources for data. chapter four analyses the empirical outcome of the study and provides policy implication, and the last chapter (i.e. chapter five) covers the summary. Recommendation and conclusion of the study

Chapter Two

Literature Review

2.1 Definition of Key Terms

1. **Agricultural Output**: This refers to the total quantity of agricultural products (crops, livestock, fishery, and forestry products) produced in a given period within a specific area or country. It includes all food and non-food products derived from farming activities.
2. **Economic Growth**: Economic growth is the increase in the production of goods and services in an economy over a period of time. It is typically measured as the

percentage increase in real gross domestic product (GDP). Economic growth reflects improvements in a country's living standards, productivity, and overall economic health.

3. **Crop Production**: This refers to the cultivation and harvesting of plants, especially food crops, for human consumption, animal feed, and other industrial uses. It includes products like grains, fruits, vegetables, and cash crops such as cotton or coffee.
4. **Livestock**: Livestock refers to domesticated animals raised in an agricultural setting for commodities such as meat, milk, wool, leather, and labor. Common livestock include cattle, sheep, goats, pigs, and poultry.
5. **Fishery**: A fishery is an entity engaged in raising or harvesting fish or other aquatic organisms. Fisheries can be classified into commercial, recreational, or subsistence fisheries, and they include activities like fish farming (aquaculture) or wild fish harvesting.
6. **Forestry**: Forestry refers to the management and conservation of forests for the sustainable production of wood, timber, and other forest resources. It also includes efforts to maintain biodiversity, protect water resources, and manage forest ecosystems for environmental and economic benefits.

2.2 Conceptual Framework

2.2.1 Concept of Sustainable Economic Growth

The concept of **sustainable economic growth** refers to a growth process that meets the needs of the present without compromising the ability of future generations to meet their own needs. In the context of Nigeria, sustainable economic growth involves a balanced approach to developing the economy, ensuring long-term viability while addressing immediate challenges such as poverty, unemployment, and inequality.

2.2.2 Concept of Agriculture output

Agricultural output refers to the total volume or value of agricultural products generated from farming activities, which include the production of crops, livestock, fisheries, and forestry products. It is a critical component of the overall economic activity in many developing countries, including Nigeria, where agriculture is not only a source of food and raw materials but also a significant contributor to employment, poverty reduction, and foreign exchange earnings (Ogunleye et al., 2020). Agricultural output provides the foundation for the agro-processing industry, and in countries with vast arable land like Nigeria, it plays a strategic role in the diversification of the economy away from dependence on crude oil (Central Bank of Nigeria, 2021).

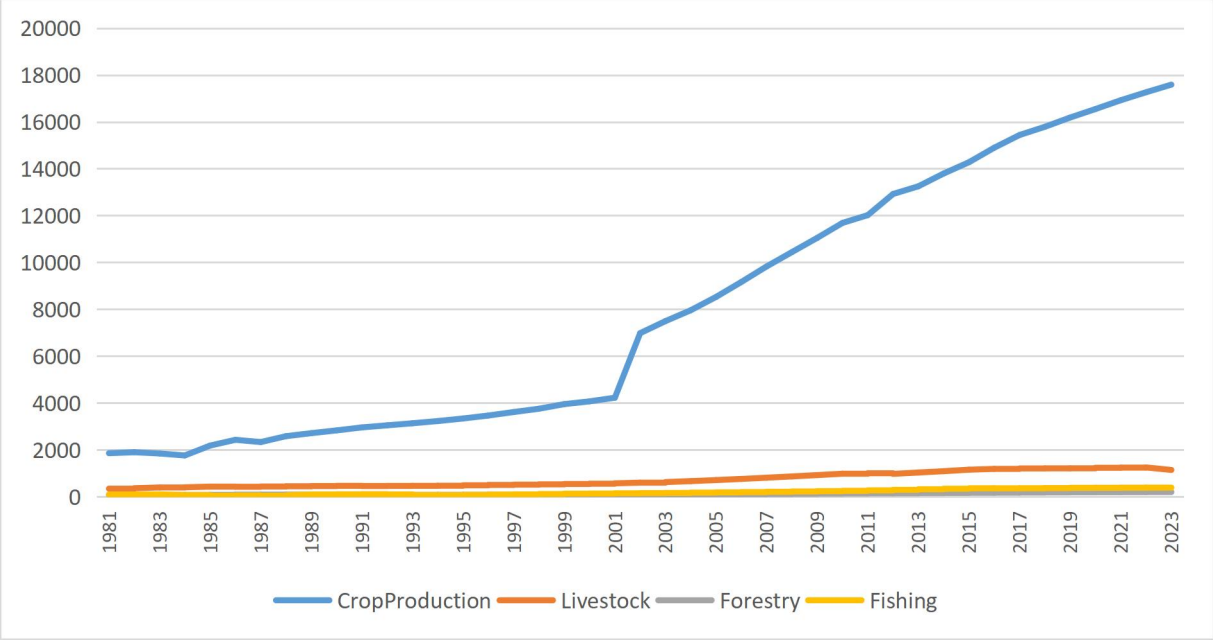
2.2.2.1 Components of Agricultural Output

Agricultural output encompasses a wide range of activities that include:

1. **Crop Production:** Crop farming represents the largest portion of agricultural output in Nigeria. Major crops include staples like maize, rice, cassava, and yams, as well as cash crops such as cocoa, palm oil, cotton, and rubber. These crops are essential not only for domestic consumption but also for export. Crop production contributes significantly to the country's GDP and supports the livelihoods of millions of Nigerians, especially in rural areas (FAO, 2021).
2. **Livestock Production:** Livestock farming involves the rearing of animals such as cattle, sheep, goats, poultry, and pigs for meat, milk, leather, and wool. Livestock production is crucial for ensuring protein supply, rural incomes, and food security. According to Eboh (2019), livestock contributes over 30% of the agricultural GDP in Nigeria. The country has substantial potential for livestock production, but challenges such as disease control, poor infrastructure, and conflict over grazing land have constrained growth in this sector.

3. **Fisheries and Aquaculture:** Nigeria's fisheries sector includes both inland and marine fishing, as well as aquaculture. Fisheries provide a vital source of protein and employment, particularly in the Niger Delta region. Aquaculture, which involves the controlled cultivation of fish, has seen increasing attention as a sustainable alternative to overfishing in Nigeria's water bodies (FAO, 2021). The sector is vital for ensuring food security and plays a role in export earnings, particularly with fish products like shrimps and prawns.
4. **Forestry:** Forestry, though often overlooked, is a significant part of agricultural output in Nigeria. It includes timber production, which supports construction and furniture industries, and non-timber forest products such as medicinal plants, fruits, and nuts. Forests also play a critical role in environmental conservation, providing essential ecosystem services like carbon sequestration and water regulation (Adejumo & Adewumi, 2017).

Figure 1: Components Trend of Agriculture output (Billions of Naira)



Source: Central Bank of Nigeria (2025)

The provided data illustrates the trends in agricultural output in Nigeria across four subsectors—Crop Production, Livestock, Forestry, and Fishing—from 1981 to 2023, with all figures expressed in billions of naira. Crop Production exhibits a remarkable upward trajectory, particularly after 2002, when output surged from 4.22 billion naira to an impressive 17.59 billion naira by 2023. This growth suggests significant improvements in agricultural policies, investment in crop farming, and advancements in technology. In contrast, Livestock production displays a steadier, more moderate increase, rising from 0.34 billion naira in 1981 to 1.14 billion naira in 2023. Although it has grown consistently, its contribution remains considerably smaller compared to crop production. Forestry output, on the other hand, has seen minimal growth over the same period, moving from 0.08 billion naira to just 0.20 billion naira, indicating its limited role in Nigeria's agricultural sector. Lastly, Fishing has experienced moderate growth, starting at 0.09 billion naira in 1981 and reaching 0.38 billion naira by 2023, reflecting gradual improvements in fisheries management and investment, albeit still far below the crop production figures. Overall, the data underscores the dominance of crop production in Nigeria's agricultural landscape, with livestock and fishing growing at much slower rates, while forestry remains the least significant subsector. The sharp increase in crop production since the early 2000s points to potential structural changes and better farming practices within the sector.

2.2.2.2. Historical Trend in Agricultural Output and Economic Growth in Nigeria

Agriculture has been an essential driver of Nigeria's economy, shaping its development and contributing to both GDP and employment. However, the relationship between agricultural output and economic growth has evolved over time, reflecting shifts in the structure of the economy, government policies, and global economic conditions. Understanding these

historical trends provides insight into the agricultural sector's role in sustaining economic growth and its potential to support Nigeria's economic diversification.

Pre-Independence Period (Before 1960)

Before Nigeria's independence in 1960, agriculture was the cornerstone of the economy, contributing over 60-70% of GDP (Ekpo & Umoh, 2018). The colonial government prioritized agricultural production, especially cash crops for export, such **as** cocoa, groundnuts, palm oil, cotton, and rubber. These crops earned significant foreign exchange and helped fund the infrastructure development that would later benefit the economy. However, despite its economic dominance, much of the agricultural production was focused on meeting colonial demands, with less emphasis on improving domestic food security or developing the local economy.

The dominance of agriculture during this period was evident in Nigeria's export composition, where agricultural exports represented over 50% of total exports (Olomola, 2017). The strong performance of the sector supported early economic growth and development by generating government revenue and promoting rural livelihoods. However, the limited use of modern farming techniques meant that agriculture remained predominantly subsistence-oriented and vulnerable to weather shocks and global price fluctuations.

Post-Independence Era (1960-1970)

Following independence, agriculture remained the driving force of Nigeria's economy. During this period, the sector continued to grow and support the newly independent nation, contributing over 60% of GDP and employing around 70-75% of the labor force (Eboh, 2019). Nigeria retained its position as one of the largest producers and exporters of cash crops like cocoa, groundnuts, and palm oil. However, the government began to focus more on industrialization, which gradually led to a shift in economic priorities.

Economic growth in this period was closely tied to agricultural output, as the sector generated significant foreign exchange earnings and provided the raw materials needed for emerging agro-industries. Agriculture's robust performance also helped to stabilize food prices, reduce inflation, and support rural incomes, which contributed to overall economic growth (Akinyele, 2018).

The Oil Boom and Agricultural Decline (1970-1980s)

The discovery of oil in Nigeria in the late 1950s and the subsequent oil boom of the 1970s marked a turning point in the relationship between agricultural output and economic growth. As oil revenues surged, the government increasingly focused on the oil sector, leading to the neglect of agriculture**.** This period saw a sharp decline in agricultural output as government investments in agriculture dwindled, and labor shifted from farming to oil-related industries (Falola & Heaton, 2008).

By the early 1980s, agriculture's share of GDP had fallen to around 20-30%**,** compared to the over 60% in the 1960s (Ekpo & Umoh, 2018). This decline in agricultural output also coincided with a slowdown in overall economic growth. While the oil sector fueled short-term economic growth, the neglect of agriculture led to food insecurity, increased dependence on food imports, and rural poverty. The collapse in oil prices in the 1980s exposed the vulnerabilities of the Nigerian economy, highlighting the dangers of over-reliance on oil.

Structural Adjustment Program and Agricultural Recovery (1980s-1990s)

The economic crisis of the 1980s, caused by falling oil prices, forced the Nigerian government to reassess its economic policies. In response, the Structural Adjustment Program (SAP) was introduced in 1986 under the guidance of the International Monetary Fund (IMF) and the World Bank. One of the key objectives of SAP was to diversify the economy and reduce dependence on oil by revitalizing the agricultural sector (Okunmadewa, 2018).

During the SAP era, agriculture began to recover as the government implemented policies aimed at improving agricultural productivity. These policies included subsidies for fertilizers, the creation of agricultural credit schemes, and market liberalization. While agricultural output grew modestly during the late 1980s and 1990s, the sector still struggled with structural issues such as poor infrastructure, lack of access to modern technology, and inadequate investment (Nwafor, 2017).

Despite these challenges, the agricultural sector's modest recovery contributed to economic growth during this period. Increased food production helped stabilize prices, reduce inflation, and improve food security, which had positive spillover effects on overall economic performance.

Agricultural Transformation Agenda (2011-2015)

In the 21st century, successive Nigerian governments recognized the need to revitalize agriculture as a means of promoting sustainable economic growth and reducing reliance on oil. Under President Goodluck Jonathan's administration (2010-2015), the Agricultural Transformation Agenda (ATA) was launched to modernize the sector and boost its contribution to GDP. ATA aimed to create value chains for key crops like rice, cassava, and maize, increase productivity, and reduce food imports (Adesina, 2017).

One of the key achievements of ATA was a significant increase in rice production**,** which helped reduce Nigeria's dependence on imported rice. The agenda also promoted the use of technology and innovation in agriculture, including the introduction of mobile platforms for distributing fertilizer subsidies directly to farmers. These reforms led to an increase in agricultural output and contributed to economic growth by reducing food import bills and improving rural livelihoods (Eboh, 2019).

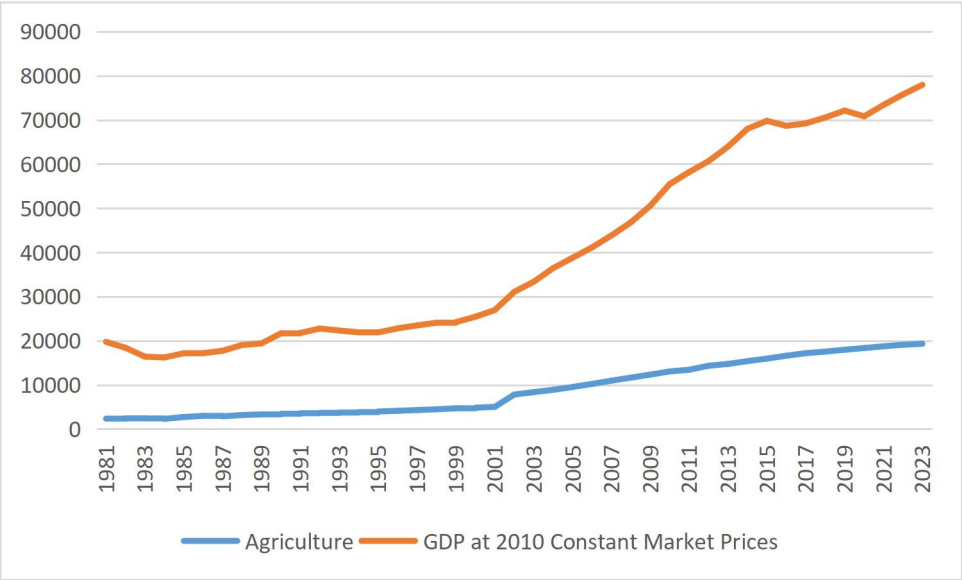
Recent Trends and Current Challenges (2016-Present)

In recent years, the Nigerian government has continued to prioritize agriculture as a driver of economic growth, especially in light of the volatility in oil prices. Under the Buhari administration (2015-2023), the Anchor Borrowers' Programme (ABP) was introduced in 2015, aimed at providing credit support to smallholder farmers. This initiative, along with other agricultural policies, has contributed to modest growth in agricultural output (CBN, 2021).

The agricultural sector's contribution to Nigeria's GDP has increased to around 24%**,** though it still faces significant challenges such as low productivity, climate change, insecurity in farming regions, and inadequate infrastructure (NBS, 2021). The sector's performance remains crucial for driving inclusive economic growth, given that agriculture employs around 36% of the labor force (FAO, 2021).

In the wake of the COVID-19 pandemic, which disrupted global supply chains and food systems, there has been renewed urgency to enhance agricultural output as a means of ensuring food security and promoting sustainable growth. While agriculture has played an important role in mitigating the effects of the pandemic on the Nigerian economy, it continues to face numerous constraints, including access to modern technology, financing, and climate-related risks.

Figure 2: Trend of Agriculture Output and Real Gross Domestic Product



Source: Central Bank of Nigeria (2023)

Agricultural output has consistently contributed to Nigeria's economic growth, playing a central role in driving the country's GDP. From 1981 to 1999, agricultural output grew from ₦2.36 trillion to ₦4.70 trillion, while GDP increased from ₦19.75 trillion to ₦24.22 trillion (both at 2010 constant prices). During this period, despite the slow growth of agriculture relative to GDP, the sector contributed around 12% to total GDP in 1981. Agricultural output provided a stable foundation for the economy, especially during oil price collapses in the 1980s. The sector's slower growth during these years can be attributed to Nigeria's focus on oil as its primary revenue source, alongside political instability and inconsistent agricultural policies.

Between 2000 and 2010, agriculture's contribution became more prominent, with agricultural output rising from ₦4.84 trillion to ₦13.05 trillion. Simultaneously, GDP expanded from ₦25.43 trillion to ₦55.47 trillion. Despite the decline in agriculture's share relative to other sectors like oil and services, its role in driving inclusive economic growth remained crucial. Government initiatives such as the Presidential Initiative on Agriculture and the Agricultural Transformation Agenda helped increase productivity, boost food production, and improve

agricultural value chains. Agriculture also acted as a buffer during economic downturns, notably providing resilience during oil price fluctuations.

From 2011 to 2023, agricultural output continued to rise, from ₦13.05 trillion to ₦19.31 trillion, while GDP grew from ₦55.47 trillion to ₦77.94 trillion. Despite its absolute growth, agriculture's share of GDP gradually declined as other sectors grew faster. However, the sector still played a vital role, contributing around 24.8% to GDP in 2023 (Central Bank of Nigeria). Even as sectors like oil and technology expanded, agriculture remained essential for economic stability, rural development, and employment generation, especially during economic crises such as the 2014 oil price crash and the 2020 pandemic-induced recession.

In conclusion Agriculture's contribution to GDP is amplified by its inter-sectoral linkages. The sector supplies raw materials to industries like food processing and textiles, and its growth supports sectors such as transportation, wholesale trade, and banking. These interconnections create multiplier effects across the economy, improving rural livelihoods and enhancing market access. Furthermore, agriculture remains the largest employer in Nigeria, with over **70%** of the rural population depending on it for income. As such, it plays a key role in poverty reduction and economic growth by stimulating demand for goods and services, especially in rural areas.

2.2.2.3 Measurement of Agricultural Output

The output of agricultural activities can be measured in physical quantities (e.g., tons of crops, liters of milk, number of livestock) or in monetary terms, where agricultural output is expressed in terms of the market value of all goods produced by the sector within a given period. Measurement in monetary terms is essential for evaluating the contribution of agriculture to the GDP, assessing productivity, and analyzing the sector’s overall performance (National Bureau of Statistics, 2021). This measurement is especially important for planning, policy formulation, and international trade.

In Nigeria, agricultural output is usually calculated as part of the country's national accounts, and it is reported by institutions like the Central Bank of Nigeria (CBN) and the National Bureau of Statistics (NBS). The sector has historically been a major driver of economic activity, contributing around 24-30% to Nigeria's GDP over the years, though its relative share has declined due to the growing significance of the oil sector (Eboh & Nwafor, 2017).

2.2.2.4 Agriculture Contribution to Poverty Reduction and Food Security in Nigeria

Agriculture plays a pivotal role in poverty reduction and food security in Nigeria, given its contribution to employment, income generation, and food availability. The sector provides direct employment to over 70% of the rural population, which is where poverty is most concentrated (National Bureau of Statistics [NBS], 2021). By improving agricultural productivity, smallholder farmers can increase their income, thereby reducing poverty levels. In fact, agricultural growth in Nigeria has been shown to have a more significant impact on poverty reduction compared to other sectors, as a large proportion of the population depends on it for their livelihood (World Bank, 2019). Between 2011 and 2021, for instance, rural poverty rates dropped from 64.1% to 52.1%, largely due to investments in agriculture through programs like the Agricultural Transformation Agenda (ATA) (NBS, 2021).

In addition to addressing poverty, agriculture is critical for ensuring food security in Nigeria. The sector produces staple crops such as maize, cassava, and rice, which form the bulk of the Nigerian diet. According to the Food and Agriculture Organization (FAO), agriculture contributes over 25% of the country's GDP and plays a key role in ensuring food availability, access, and affordability (FAO, 2022). Increased food production reduces Nigeria's reliance on food imports, thereby enhancing food self-sufficiency and improving national food security. For example, the Central Bank of Nigeria's (CBN) Anchor Borrowers' Program

(ABP), which was launched in 2015, has supported over 3.5 million farmers, increasing local food production and reducing food imports by over 30% by 2021 (CBN, 2022).

Despite these gains, challenges such as low agricultural productivity, limited access to credit, and the impacts of climate change continue to constrain the sector's potential to fully achieve food security. Poor infrastructure also restricts farmers' access to markets, limiting their ability to sell surplus produce and improve food availability for the wider population.

In terms of quantitative impact, agriculture's contribution to Nigeria's GDP was 25.88% in 2021, highlighting the sector's significant role in the economy, especially in rural employment (NBS, 2022). States with higher agricultural productivity, such as Kebbi and Ogun, saw notable reductions in poverty levels between 2009 and 2021, compared to less agriculturally developed regions (NBS, 2021). Moreover, rice production, supported by the ABP, grew from 3.7 million metric tons in 2015 to 5 million metric tons by 2020, reducing rice imports and making food more accessible to Nigerians (CBN, 2022).

In conclusion, agriculture has made significant contributions to poverty reduction and food security in Nigeria by providing employment, increasing incomes, and boosting food production. However, further investment in agricultural infrastructure, productivity, and market access is necessary to sustain these gains and fully unlock the sector's potential in addressing food insecurity and poverty.

2.2.2.5 The impact of agricultural technology and innovation on output in Nigeria

The impact of agricultural technology and innovation on output in Nigeria has been transformative, though challenges remain. In recent years, advancements in farming techniques, mechanization, and biotechnology have significantly boosted agricultural productivity, contributing to economic growth and food security. The introduction of improved seed varieties, such as drought-resistant and pest-resistant crops, has helped

farmers achieve higher yields, particularly in regions vulnerable to climate change. Technologies like drip irrigation, mechanized farming tools, and mobile applications for accessing market information have enhanced efficiency and reduced post-harvest losses.

Moreover, digital platforms that provide real-time weather updates and agricultural extension services have empowered farmers to make better-informed decisions, thereby increasing output. Programs like the Anchor Borrowers' Programme have further facilitated farmers' access to credit for purchasing modern inputs, such as fertilizers and equipment. This technological shift has led to a gradual transition from subsistence to more commercialized farming, boosting productivity and incomes in rural areas.

However, the adoption of these innovations is still uneven, with smallholder farmers often lacking the resources or knowledge to fully benefit from these advancements. High costs of technology, limited access to financing, and inadequate infrastructure in rural areas are major barriers to widespread adoption. Nonetheless, continued investment in agricultural research, capacity building, and infrastructure development can further unlock the potential of technological innovation, ensuring that agricultural output continues to grow and contribute meaningfully to Nigeria's economic development.

2.2.2.5 Role of Agricultural output in the sustainance of economic growth in Nigeria

Agricultural output plays a crucial role in sustaining economic growth in Nigeria. As one of the largest employers, particularly in rural areas, agriculture helps reduce unemployment and poverty by providing livelihoods to millions of Nigerians. This sector is also vital for ensuring food security, as increased agricultural production helps stabilize food prices and makes food more accessible, reducing hunger and malnutrition. A secure food supply supports a healthy workforce, which is essential for long-term economic growth.

Agriculture's contribution to Nigeria's sustainable economic growth extends beyond just employment and food security. It plays a pivotal role in promoting industrialization, regional

development, environmental sustainability, and overall economic stability. One of the critical contributions is its role in supporting other sectors through backward and forward linkages. For instance, the growth of agro-allied industries, such as food processing, textiles, and pharmaceuticals, is directly dependent on agricultural output. These industries rely on agriculture for raw materials, which helps to stimulate demand, drive innovation, and support the development of value chains that create jobs, foster entrepreneurship, and generate revenue.

In addition to providing raw materials, agricultural output also supports the transportation and logistics sectors. The need to move agricultural produce from farms to markets has led to improvements in rural infrastructure, such as roads and storage facilities. These developments not only benefit the agricultural sector but also open up economic opportunities for rural communities, contributing to regional development and reducing urban migration.

Agriculture also plays a significant role in generating government revenue through taxation and export earnings. As Nigeria diversifies its economy away from oil dependency, agricultural exports such as cocoa, sesame seeds, and rubber contribute to foreign exchange earnings, improving the country's trade balance. By expanding the export base, agriculture helps to stabilize the economy and insulate it from fluctuations in global oil prices. In addition, improved agricultural productivity leads to higher incomes for farmers, which increases their purchasing power and contributes to domestic consumption, further stimulating economic growth.

Environmental sustainability is another critical area where agriculture contributes to long-term economic growth. Sustainable farming practices, such as crop rotation, agroforestry, and the use of organic fertilizers, help maintain soil fertility, prevent deforestation, and conserve water resources. These practices ensure that agricultural productivity can continue over the long term without depleting natural resources, thereby supporting sustainable economic

growth. By reducing the environmental impact of farming, agriculture also helps mitigate the effects of climate change, which is increasingly important in a country like Nigeria that faces climate-related challenges.

Moreover, agriculture plays a strategic role in reducing poverty and inequality. The sector has the potential to lift millions of Nigerians out of poverty, especially in rural areas where poverty rates are highest. By improving access to credit, technology, and markets for smallholder farmers, agricultural growth can be more inclusive and lead to a more equitable distribution of wealth. This, in turn, helps reduce income disparities and promotes social cohesion, which is essential for sustainable development.

Lastly, agriculture fosters innovation and modernization in rural areas. The adoption of advanced agricultural technologies, such as irrigation systems, improved seed varieties, and mechanization, increases productivity and encourages further investment in the sector. By driving technological progress and improving efficiency, agriculture helps raise overall economic productivity, which is essential for sustained long-term growth.

In conclusion, agriculture’s contributions to Nigeria's economic growth are multifaceted. It supports industrialization, regional development, and environmental sustainability, while also playing a key role in poverty reduction, foreign exchange generation, and technological advancement. By addressing the challenges facing the sector, such as limited access to finance and infrastructure, agriculture can continue to be a cornerstone of Nigeria’s sustainable economic growth trajectory.

2.2.2.6 Constraints to Agricultural Output and Sustainable Growth

A. Structural Barriers to Agricultural Productivity in Nigeria

Agriculture in Nigeria faces several structural barriers that limit its productivity and contribution to sustainable growth. These barriers include:

1. **Poor Infrastructure**: Inadequate transportation networks, especially rural roads, hinder the movement of agricultural produce to markets, leading to high post-harvest losses. Inadequate storage facilities, poor access to electricity, and limited irrigation infrastructure further impede productivity.
2. **Access to Land**: Land tenure issues, including complex ownership structures, limit farmers' access to land. Most agricultural land in Nigeria is under customary ownership, creating challenges in obtaining formal titles for investment or expansion.
3. **Limited Access to Credit and Financing**: Smallholder farmers, who constitute the bulk of Nigeria's agricultural workforce, struggle to access affordable credit. High-interest rates and stringent collateral requirements from financial institutions prevent farmers from investing in modern inputs like seeds, fertilizers, and equipment.
4. **Low Technology Adoption**: Farmers in Nigeria often rely on traditional farming methods due to limited access to modern technology. Mechanization and the use of improved seed varieties, fertilizers, and pest control techniques remain low, leading to suboptimal yields.
5. **Labor Shortages and Skills Gap**: The migration of labor from rural to urban areas, especially among youth, has led to a shortage of skilled labor in agriculture. In addition, the lack of extension services reduces farmers' access to training and modern farming techniques.

B. Policy and Institutional Challenges

Several policy and institutional challenges further constrain agricultural output and sustainable growth in Nigeria:

1. **Inconsistent Agricultural Policies**: Frequent changes in government policies related to agriculture create uncertainty for farmers and investors. For instance, variations in tariffs, subsidies, and import-export restrictions make long-term planning difficult.
2. **Weak Institutional Frameworks**: There is a lack of coordination between various government agencies responsible for agriculture. This leads to inefficiencies in policy implementation, resource allocation, and service delivery. Corruption and bureaucratic bottlenecks also impede the effective execution of agricultural programs.
3. **Inadequate Agricultural Research and Development (R&D)**: Nigeria's agricultural sector suffers from underinvestment in R&D. Limited funding for agricultural research institutes and a disconnect between research outputs and farmers' needs result in poor adoption of innovations that could boost productivity.
4. **Suboptimal Government Support**: Government programs aimed at supporting agriculture, such as the Anchor Borrowers' Program (ABP), often face implementation challenges, including delayed fund disbursement and poor targeting of beneficiaries. Moreover, agricultural subsidies are not always equitably distributed, further limiting their effectiveness.

C. Environmental and Climatic Limitations

Nigeria’s agricultural productivity is also constrained by environmental and climatic factors, including:

1. **Climate Change and Variability**: Nigeria is highly vulnerable to the effects of climate change, which include unpredictable rainfall patterns, prolonged droughts, and increased flooding. These climate changes directly affect agricultural productivity, particularly for rain-fed crops. Smallholder farmers, who have limited access to climate-resilient technologies, are disproportionately affected.

2. **Soil Degradation and Erosion**: Unsustainable agricultural practices, such as continuous cropping without proper soil management, have led to soil degradation and erosion in many parts of Nigeria. Depleted soils reduce crop yields and hinder sustainable agricultural growth.
3. **Desertification**: The northern regions of Nigeria are experiencing increasing desertification due to overgrazing, deforestation, and the effects of climate change. This encroachment reduces available arable land and forces communities to relocate or abandon farming altogether.
4. **Pest and Disease Outbreaks**: Agricultural productivity in Nigeria is frequently disrupted by pest and disease outbreaks, such as locust invasions and the fall armyworm. These challenges are exacerbated by limited access to pest control measures, leaving many farmers vulnerable to crop losses.

2.2.2.7 Solutions to the Constraints on Agricultural Output and Sustainable Growth in Nigeria

To overcome the challenges facing agricultural output and foster sustainable growth, a multi-faceted approach is required. The solutions must address structural barriers, policy gaps, and environmental issues, while also empowering farmers with access to necessary resources and technology.

1. Addressing Structural Barriers

Infrastructure development is crucial for boosting agricultural productivity, with a focus on improving rural road networks to facilitate market access for farmers, reducing post-harvest losses and transportation costs. Public-private partnerships (PPP) could be a viable way to ensure the long-term maintenance of these roads. Similarly, establishing modern storage facilities, such as silos and cold storage units, alongside promoting local processing centers, can reduce losses and enhance the value of raw agricultural products. Expanding irrigation

infrastructure, especially in semi-arid regions, would help decrease reliance on unpredictable rainfall, allowing for year-round farming.

Improved access to land can be achieved through land tenure reforms that provide farmers with secure ownership, enabling them to use their land as collateral for loans, thus incentivizing agricultural investment. Cooperative land leasing models, such as sharecropping, should also be encouraged to allow smallholders access to land without complex ownership disputes.

Enhancing access to credit and financing is another priority, which can be addressed by establishing agricultural development banks with low-interest rates and flexible repayment terms to reduce farmers' reliance on informal, high-interest lenders. Leveraging digital financial services such as mobile banking and micro-credit programs can extend access to credit, savings, and insurance services to rural farmers.

The adoption of modern farming techniques, including mechanization, improved seed varieties, fertilizers, and precision farming technologies, should be promoted by providing subsidies and training. Strengthening agricultural extension services with better training and ICT-based platforms, like mobile apps and radio programs, will further enhance the dissemination of modern farming practices to rural areas.

Addressing labor shortages requires promoting agricultural education and engaging youth in farming through vocational training programs that focus on modern farming techniques and agribusiness skills. Moreover, by providing funding and mentorship, agribusiness can be positioned as a viable entrepreneurial opportunity for young people, attracting them into the agricultural sector.

2. Overcoming Policy and Institutional Challenges

Policy stability and the development of a long-term agricultural strategy are essential for sustainable agricultural growth. Ensuring consistency in agricultural policies, even amidst

government changes, can be achieved by formulating a national agricultural strategy that is insulated from political fluctuations. Additionally, aligning agricultural policies with industrial policies focused on value chain development and export-led growth can foster agro-industrial linkages, integrating agriculture with other sectors for enhanced productivity.

Strengthening institutional capacity is equally important. This can be done by implementing reforms that streamline operations within agricultural institutions, improve coordination between agencies, and reduce bureaucratic inefficiencies. Moreover, enhancing transparency and accountability in the disbursement of agricultural subsidies and loans will ensure that resources are allocated fairly and reach their intended beneficiaries.

Boosting agricultural research and development (R&D) is crucial for innovation in the sector. Increasing government funding for agricultural R&D will help develop climate-resilient crops, modern farming techniques, and pest-resistant seed varieties. Collaboration with international research bodies can further introduce new innovations. Strengthening the link between R&D and farmers is also vital, with the need to involve farmers in field trials and demonstrations of new technologies to ensure practical application and adoption at the grassroots level.

3. Mitigating Environmental and Climatic Limitations

Adapting to and mitigating climate change is essential for the sustainability of agriculture. Promoting climate-resilient agricultural practices, such as agroforestry, conservation tillage, and crop diversification, can help farmers build resilience to climate shocks. Developing early-warning systems for climate risks and disseminating them through ICT channels will further enhance farmers' preparedness. Additionally, research and distribution of drought-tolerant and flood-resistant crop varieties are crucial for regions prone to extreme weather events.

Combatting soil degradation and erosion requires sustainable farming practices. Soil conservation programs that promote crop rotation, cover cropping, and the use of organic

fertilizers can prevent soil degradation. Government-backed soil restoration projects can rehabilitate degraded farmland. Afforestation and anti-desertification efforts, particularly in northern Nigeria, are essential to protect arable land from desert encroachment. Initiatives such as the Great Green Wall project are vital for reversing desertification.

Effective pest and disease management is key to preventing crop losses. Integrated Pest Management (IPM), which combines biological, mechanical, and chemical methods, should be promoted to control pests with minimal environmental impact. Timely access to affordable pesticides and farmer training are also necessary. Investing in surveillance systems for early detection of pest and disease outbreaks, along with establishing rapid response teams, will enable swift pest control measures, minimizing the damage caused by infestations.

4. Strengthening Agricultural Value Chains

Promoting agro-processing and value addition is crucial for enhancing agricultural productivity and economic growth. Establishing special agro-processing zones (SAPZs) where agricultural products can be processed into higher-value goods will reduce post-harvest losses, create jobs, and increase exports. Encouraging public-private partnerships (PPP) can further support investment in value-added processing and distribution infrastructure, helping farmers access better markets and secure higher prices for their produce.

Improving market access is equally important. Strengthening farmer cooperatives and building strong market linkages will enable farmers to sell directly to consumers, supermarkets, and export markets, thus improving their bargaining power and minimizing the influence of middlemen. This will ultimately lead to increased profitability for farmers and enhanced market efficiency.

2.3 Theoretical Literature Review

2.3.1 Classical Growth Theory

Classical economists like Adam Smith, David Ricardo, and Thomas Malthus emphasized agriculture's critical role in economic development. Adam Smith, in *The Wealth of Nations* (1776), highlighted that agriculture is central to wealth creation as it generates a surplus that can be reinvested in the economy, driving growth in other sectors. In Nigeria, agriculture contributes significantly to GDP and employs a large share of the population, aligning with Smith's view that agricultural productivity boosts national income and supports broader development.

David Ricardo's Law of Comparative Advantage (1817) suggests that countries should concentrate on producing goods where they have a comparative advantage. For Nigeria, agriculture holds this advantage due to its favorable climate, fertile land, and diverse crop systems. By focusing on agricultural production, Nigeria can enhance exports, improve food security, and increase foreign exchange earnings, all of which are essential for economic growth.

Thomas Malthus, in his *Essay on the Principle of Population* (1798), warned that unchecked population growth could surpass food production, leading to stagnation. This view highlights the importance of improving agricultural productivity in Nigeria to meet the needs of its rapidly growing population. Without sustainable agricultural practices, there is a risk of food shortages, inflation, and environmental degradation, which could hinder long-term growth.

2.3.2 Physiocrats' Theory of Economic Growth

Physiocracy is an economic theory developed by 18th-century French Enlightenment economists, notably Francois Quesnay and Anne-Robert-Jacques Turgot. This theory posits that the wealth of a nation stems entirely from its agricultural sector (Quesnay, 1759). The Physiocrats argued that a nation's economic growth is driven by agricultural production, with surplus yield being the primary source of revenue. They believed that a country's wealth is not measured by its reserves of gold and silver, but by the net output of its agriculture.

According to this view, agricultural productivity leads to increased output due to the surplus created when inputs generate greater outputs.

The Physiocrats divided society into three classes: the productive class (farmers and tenants), the landowners, and the sterile class (artisans and shopkeepers). They held that the productive class, particularly in agriculture, was essential for generating wealth, while the sterile class consumed agricultural outputs but did not contribute to the creation of wealth. Key features of Physiocracy include individualism, minimal government intervention in commerce (laissez-faire), private property rights, diminishing returns, and the importance of reinvestment (Batia, 1978). This study adopts the Physiocratic theory due to its focus on productive work, particularly agriculture, as the foundation of a nation's wealth. However, the theory has been criticized for overemphasizing agriculture while neglecting the role of manufacturing and seeking an idealized economic system.

2.3.3 Lewis' Theory of Economic Growth

Lewis' theory connects economic growth with the agricultural sector, arguing that surplus labor from agriculture can be transferred to other sectors to promote growth (Lewis, 1979). He suggested that underdeveloped economies consist of two sectors: a traditional sector with low or zero marginal productivity, and a modern industrial sector. This reflects the structure of the Nigerian economy, where there is a backward rural sector alongside a developed capitalist one (Onuoha, Kromtit, and Abimiku, 2015). The key aspect of Lewis' model is the transfer of labor and the subsequent growth in output and employment in the modern sector. In developing countries like Nigeria, labor supply in the traditional sector is abundant and largely unskilled. For sustainable development to occur, growth must include rural areas, particularly the agricultural sector (Todaro and Smith, 2003).

Lewis' model has faced criticism, particularly concerning the concept of "surplus labor," which implies zero marginal productivity in agriculture. T. Schultz (1964) contested this,

using evidence from India to show that the withdrawal of large portions of the agricultural workforce did not lead to a decline in agricultural output (Ranis, 2004).

2.3.4 Sustainable Livelihoods Approach

The Sustainable Livelihoods Approach (SLA), developed by development scholars like Robert Chambers and Gordon Conway, focuses on how agriculture can be both productive and sustainable. This theory emphasizes the importance of promoting agricultural practices that ensure long-term productivity while safeguarding natural resources, such as soil, water, and biodiversity. In Nigeria, sustainable growth in agriculture involves adopting environmentally friendly practices like organic farming, conservation agriculture, and agroecology, which preserve ecosystems while improving agricultural output. The SLA also highlights the importance of social and economic factors, such as access to credit, land tenure security, and market access, in ensuring that agriculture contributes to sustainable livelihoods and economic growth.

2.3.5 The Agricultural Surplus Theory

John W. Mellor's Agricultural Surplus Theory explains that agricultural output creates a surplus that drives the overall economy's growth. The surplus produced in agriculture can be used to finance investments in other sectors, including industry and infrastructure. In the context of Nigeria, this theory underscores the importance of increasing agricultural output to generate revenue that can be reinvested into national development projects. As agriculture provides both food security and raw materials for industries, its surplus contributes directly to economic sustainability. Sustainable growth in Nigeria, therefore, can be driven by increasing agricultural productivity and ensuring that the surplus is efficiently reinvested into other economic sectors.

2.3.6 Rostow's Stages of Economic Growth Theory (1960

Rostow's Stages of Economic Growth Theory (1960) outlines the economic and development process through five stages: traditional society, pre-conditions for take-off (transitional stage), take-off, drive to maturity, and the age of high mass-consumption. Rostow emphasizes that the take-off stage is crucial, as it marks the point where economic growth becomes a normal and sustained condition within a society. In the traditional society, agriculture plays a pivotal role, serving as a primary source of income for the state and elites. According to this theory, agriculture acts as a driving force during the early stages of economic development—particularly in the traditional, transitional, and take-off phases—by significantly influencing industrial and economic structures. This, in turn, sets the foundation for a country's economic growth and development. In less developed economies, agricultural productivity is particularly emphasized as it addresses key needs such as rural transformation, income redistribution, poverty reduction, and socio-economic progress.

2.3.7 Endogeneous Growth Theory

Endogenous growth theory highlights that economic growth is primarily driven by internal factors, such as human capital development, innovation, and knowledge spillovers, rather than external influences. Unlike neoclassical growth models, which rely on diminishing returns to capital and exogenous technological advancements, endogenous growth theory underscores the role of internal mechanisms in fostering sustained economic growth. The theory emphasizes that investments in education, training, and research lead to the accumulation of knowledge, which drives technological advancements and enhances productivity. Similarly, continuous innovation and research and development (R&D) are critical for sustained growth, as they result in the creation of new technologies and improved production methods.

An essential aspect of endogenous growth theory is knowledge spillovers, where ideas and technological advancements in one sector benefit other sectors, creating a multiplier effect on

overall economic performance. Additionally, the theory underscores the importance of government policies in fostering growth. Strategic interventions, such as subsidies for research, investments in education, and the provision of infrastructure, are crucial in creating an environment conducive to sustainable growth.

In the context of agriculture, endogenous growth theory demonstrates how the sector can act as a catalyst for sustained economic growth. Agriculture contributes significantly to human capital development by providing resources for education and training, particularly in rural areas. Innovations in agricultural practices, such as the adoption of modern technologies, improved crop varieties, and sustainable farming techniques, lead to increased productivity and efficiency. Furthermore, the sector generates knowledge spillovers by influencing industrial and service sectors, such as agro-processing and logistics, thus promoting broader economic development. Government investments in agricultural research, extension services, and infrastructure further strengthen the sector's ability to sustain long-term economic growth. Consequently, agriculture, underpinned by the principles of endogenous growth theory, remains vital in driving economic progress, particularly in developing economies.

2.4 Empirical Literature Review

Nigeria Based Studies

Oluwatoyese and Applanaidu (2019) conducted a study examining the agricultural sector's influence on economic growth, employing a time series econometric model over a 30-year period from 1980 to 2011. The research analyzed various agricultural variables, including food and crop production, fisheries, and forestry, as explanatory factors against gross domestic product (GDP) as the dependent variable. Using Ordinary Least Squares (OLS) techniques, their findings indicated a positive correlation between agricultural activities and

economic growth, suggesting that enhancing this sector could significantly boost exports if adequately supported through funding and a conducive environment for stakeholders.

In another study, Sunday, Samuel, and Inimfon (2021) explored the relationship between agricultural sub-sector outputs and economic growth in Nigeria, particularly focusing on per capita GDP as a proxy for economic performance. They utilized time series data and performed analyses through descriptive tests and multivariate regression, specifically applying the autoregressive distributed lag (ARDL) approach to cointegration. The results revealed a significant influence of agricultural sub-sector production on per capita GDP in both the short and long run, underscoring the importance of intensifying agricultural production to achieve sustainable economic growth.

Odetola and Etukudoh (2021) analyzed the contribution of agriculture to Nigeria's GDP using descriptive and regression analysis. Their findings indicated that the sector contributes about 25% to the nation's GDP, with crop production and livestock driving rural development and food security. The study recommended enhanced government interventions to boost productivity and ensure sustainable growth.

Adeyemo and Yusuf (2021) employed a panel data regression model to explore the relationship between agricultural output and poverty reduction. Their findings showed that agricultural productivity significantly reduces poverty and enhances food security. The authors emphasized the importance of infrastructure and technology investment to address productivity challenges and post-harvest losses.

Ibrahim and Aliyu (2022) used a vector autoregressive (VAR) model to examine the influence of agricultural exports on economic growth. The study revealed a positive and significant relationship between agricultural exports and GDP growth, underscoring the need for export-oriented policies to diversify the Nigerian economy.

Okafor and Uche (2022) utilized econometric techniques, including Ordinary Least Squares (OLS), to investigate the impact of agricultural financing on economic growth. Their findings highlighted that limited access to credit facilities constrains smallholder farmers' productivity. The authors recommended strengthening agricultural credit schemes to maximize the sector's contributions to growth.

Adeniran et al. (2022) adopted a mixed-method approach combining quantitative analysis and field surveys to assess the impact of agricultural technology adoption on economic growth. They concluded that modern farming techniques significantly enhance productivity, which supports long-term economic growth. The study emphasized the need for policies encouraging technology dissemination.

Olaleye and Bello (2023) analyzed the challenges of food inflation and insecurity using time-series econometrics, specifically ARDL models. The study found that insecurity, market access limitations, and rising input costs have adversely affected agricultural productivity. The authors called for targeted policy measures to address these challenges and sustain economic growth.

Nwosu and Eze (2023) employed a sectoral analysis approach to assess the contributions of fisheries and livestock to agricultural GDP. Their findings revealed that these sub-sectors are underutilized but have substantial potential to drive diversification and employment. The study suggested increased investments and supportive policies for these sub-sectors.

Chukwu and Obi (2023) evaluated the effectiveness of government agricultural programs, such as the Anchor Borrowers Program, using impact evaluation methods. Their findings showed that while these programs have contributed modestly to post-COVID-19 economic recovery, there is a need for improved implementation and resource allocation to maximize their benefits.

These studies collectively underscore the pivotal role of agriculture in Nigeria's economic growth, highlighting the need for strategic investments in infrastructure, technology, and policy reforms to overcome persistent challenges and sustain the sector's contributions.

Olajide (2019) investigated the connection between agricultural resources and economic growth in Nigeria, employing OLS econometric techniques from 1970 to 2010. The study found a positive causality between GDP and agricultural output, indicating that despite experiencing setbacks after the discovery of oil, the agricultural sector accounted for approximately 35 percent of GDP variations, emphasizing its significance in the economy.

Emeh (2017) examined the role of agriculture in Nigeria's economic growth and development over a 30-year period from 1981 to 2012. His research utilized the Solow growth model, incorporating gross capital formation (GCF) and post-secondary enrollment as proxies for labor. The findings indicated that agriculture plays a crucial role in Nigeria's economic progress, even as its contribution to GDP has declined since the 1990s due to the emergence of oil as a dominant economic force.

Onunze (2016) analyzed the impact of agricultural development on Nigeria's economic growth between 1980 and 2014. The study addressed ongoing debates among economists regarding agriculture's potential as a driver of national development and industrialization. Through OLS analysis, the study found a positive relationship between agricultural development and economic growth, reinforcing the sector's importance.

Edeh, Ogbodo, and Onyekwelu (2020) investigated the effects of government expenditure on agriculture on agricultural output in Nigeria from 1981 to 2018. Their study employed time series data from the Central Bank of Nigeria, modeling agricultural value added as influenced by various factors, including labor force, capital expenditure, and rainfall. The results showed a significant positive relationship between capital expenditure and agricultural output, while

recurrent expenditure exhibited a negative and insignificant impact, leading to recommendations for increased capital investment in the agricultural sector.

Peter, Tarila, and Oghenefejiro (2020) explored the contributions of agricultural funding to Nigeria's agricultural performance from 1986 to 2018, applying financial intermediation theory. The study employed an ex-post facto design and used data from the Central Bank of Nigeria. Their findings revealed that total government expenditure and agricultural credits positively affected crop, livestock, and fishing production, while foreign direct investment had a negative impact on agricultural output. The analysis confirmed a long-term relationship between the variables, concluding that agricultural funding is crucial for enhancing sector performance.

Lastly, Oluwatoyin and Adegboye (2010) studied the role of the agricultural sector in Nigeria's economic development using data from 1970 to 2008. Employing the Johansen co-integration technique, their findings indicated a lack of significant impact from agriculture on economic development. They recommended that government investments in research and technology are essential to boost agricultural productivity and facilitate large-scale agricultural production, emphasizing the need for policies addressing poverty through agricultural development as a pathway to sustainable growth.

Bitrus (2018) investigated agriculture's role in Nigeria's economic growth and development using secondary data from various sources, covering the period from 1981 to 2010. The analysis highlighted upward trends in overall GDP, agricultural GDP, and government spending on agriculture, demonstrating the significant influence of these factors on economic development. The study concluded that agriculture remains vital for Nigeria's economic growth, advocating for policies that enhance credit flow to the agricultural sector to bolster its contributions further.

Kenny (2019) investigated the impact of agricultural sector performance on Nigeria's economic growth and development. The study revealed a significant long-term relationship between agricultural domestic production and several explanatory variables, including the Agricultural Credit Guarantee Scheme Fund, federal government spending on agriculture, total employment, and the effects of trade liberalization. The Vector Error Correction Model (VECM) indicated that it takes approximately 24 months for half of the interventions in agriculture to show significant effects on production. The findings highlight the necessity for consistent government policy and commitment to ensure that such interventions yield the desired outcomes.

Ogen (2007) conducted a comparative study on the agricultural sector's role in Nigeria's development by analyzing the Brazilian agro-industrial economy from 1960 to 2011. Using an expository approach, the research found that successive Nigerian governments have been insincere regarding agricultural development. The study underscored the importance of the agricultural sector as a growth engine in developed economies.

Ogwuike (2018) explored the effects of agricultural output on Nigeria's economic development between 1981 and 2016, focusing on crop production, livestock, fishery, and forestry. Secondary data on per capita income and agricultural outputs were analyzed using econometric methods such as ordinary least squares, cointegration, and error correction mechanisms. The results indicated a significant relationship between agricultural outputs and economic development, with the model showing a strong fit. Recommendations included improving structures to enhance agricultural output.

Oyakhilomen and Zibah (2014) examined the relationship between agricultural production and Nigeria's economic growth, focusing on poverty alleviation. The study employed time series data analyzed through unit root tests and the bounds testing approach to cointegration. The results demonstrated that agricultural production plays a significant role in fostering

economic growth, despite increasing poverty levels, which calls for a shift away from an oil-dependent economy towards a more diversified one with agriculture at the forefront. The authors recommended designing pro-poor policies that encourage public and private investments in agricultural development.

Olajide, Akinlabi, and Tijani (2012) investigated the connection between agricultural resources and economic development in Nigeria using ordinary least squares regression analysis. Their findings revealed a positive cause-and-effect relationship between sustainable development and agricultural output, with the agricultural sector accounting for 34.4% of the variation in sustainable development between 1970 and 2010. The study highlighted the need for the government to provide special incentives to farmers, adequate funding, and improved infrastructure to boost agricultural productivity.

Olabanji, Adebisi, Ese, and Emmanuel (2017) explored the long-term relationship between agricultural output and economic development in Nigeria from 1981 to 2014, employing time series data and the Johansen maximum likelihood cointegration approach. The study confirmed a long-run relationship between the two variables and established causality, indicating that agricultural output positively influences economic development. The researchers recommended enhancing agricultural policies, particularly regarding funding, storage, and market access, to increase agricultural production and attract investments.

Bakare (2013) examined the relationship between sustainable agriculture and rural development in Nigeria using a Vector Auto Regression model. The study found that past agricultural output values could predict future rural development trends. The main conclusion suggested that while agriculture remains crucial to Nigeria's economy, it is currently unsustainable, with insufficient food supply and deteriorating rural development. The study called for policies to promote sustainable agricultural practices and improve rural development.

Odetola and Etumnu (2013) investigated the agriculture sector's contribution to Nigeria's economic development using a development accounting framework and time series data from 1960 to 2011. The findings indicated that agriculture has consistently contributed positively to economic development, reaffirming its importance in the economy. The causality test further confirmed that agricultural growth Granger-causes sustainable development, but no reverse relationship was identified. The research highlighted the resilience of the agricultural sector, particularly its ability to recover from shocks such as civil wars and economic recessions, with crop production being the most significant contributor to agricultural output. The study emphasized the need for increased attention and investment in agricultural subsectors beyond crop production.

Oyetade and Oluwatoyese (2014) studied the agricultural sector's influence on economic development from 1980 to 2011, using time series econometric models. By modeling variables like food production, fishery, and forestry as explanatory factors, they found a positive relationship between agriculture and economic development. The study emphasized the need for better funding and environmental support to enhance the sector's progress, though it noted several constraints to agricultural growth.

Okoro (2011) examined the agricultural sector’s contribution to Nigeria’s economy from 1986 to 2007. Using panel data analysis, the study found a positive relationship between agriculture and economic growth. Foreign Direct Investment (FDI) and domestic savings explained 81% of economic growth variation. The study called for government policies to support the agricultural sector, including accessible loans for farmers and improved research institutions.

Utuk, Akpan, Eduno, and Udo (2023), evaluated the effect of agriculture value-added in the relationship between agricultural exports and economic growth in Nigeria from 2000 to 2022. Utilizing time series data and employing the Augmented Dickey-Fuller unit root test, ARDL

framework, and Dynamic Ordinary Least Squares technique, the findings indicated that agricultural raw materials exports positively affect real GDP, while agriculture value-added exhibited a negative relationship with real GDP. The study suggests that Nigeria needs to improve its primary agriculture production base to generate sufficient income from exports and incorporate value addition in its exports.

Akpan, Etim, and Udoh (2022), assessed the impact of agricultural productivity on economic growth in Nigeria from 1981 to 2019. Employing the ARDL bounds testing approach to cointegration, the study found that agricultural productivity has a significant positive impact on economic growth in both the short and long run. The authors recommend increased investment in the agricultural sector to sustain economic growth.

Lyndon, Eke, and Ukoha (2022), examined the contribution of agricultural productivity to economic growth in Nigeria using data from 2000 to 2018. Applying the Ordinary Least Squares method, the findings revealed that agricultural productivity significantly positively impacts economic growth. The study emphasizes the need for policies that enhance agricultural productivity to foster economic development.

Outside Nigeria Based Studies

Corral, Diaz, Monagas, and Garcia (2017) assessed agricultural policies and their impact on poverty reduction in rural areas of Cape Verde, analyzing data from 2006 to 2013. The study revealed that the implemented agricultural policies contributed to the diversification and enhancement of agricultural production, leading to poverty reduction. However, it emphasized that these policies must align with other economic sectors to be effective.

Noula, Gustave, and Munchunga (2013) examined the effect of agricultural exports on Cameroon's economic development, focusing on banana, coffee, and cocoa between 1975 and 2009. Using the Cobb-Douglas production function, Engle-Granger approach, and Vector Error Correction Model (VECM), they found mixed results. Cocoa exports negatively and

insignificantly impacted economic development, while coffee and banana exports had a positive and significant relationship with economic growth.

Ouma, Kimani, and Manyasa (2022), assessed the relationship between agricultural trade and economic development within the East African Community (EAC) from 2000 to 2012. Utilizing Vector Error Correction Models and bi-variate Vector Auto-Regressive models, the results varied across EAC member states, with some showing a unidirectional link between agricultural exports and economic development, while others showed no significant relationship.

Kwakwa, Arku, and Aboagye (2022), analyzed the effects of agricultural growth and economic development on environmental degradation in Ghana between 1971 and 2008. Using the Johansen cointegration technique, the study found that while economic growth initially led to environmental degradation, technological advancements reduced degradation over time, supporting the Environmental Kuznets Curve hypothesis.

2.5 Gaps in the Literature

My study differs significantly from other researchers' work in several aspects. Unlike previous studies (for examples, Oluwatoyese and Applanaidu (2019), Olajide (2019) and Onunze (2016)), that employed ordinary least squares and error correction models, my research utilizes the auto-regressive lag model estimation technique to estimate in the long run and error correction model for the short run disequilibrum. This methodological difference is notable, as it offers distinct advantages in capturing temporal dynamics and dependencies within the data.

Moreover, a comparative audit reveals that researchers employing similar techniques (for example, Akpan, Etim, and Udoh (2022), Aremu (2014)), did not use the same model

specification as I did. This underscores the uniqueness of my approach and its specific focus within the research landscape.

Additionally, the variables included in my model specification diverge from those used by other researchers. This choice ensures that my study captures nuanced aspects relevant to the phenomenon under investigation, thereby contributing new insights to the field.

Furthermore, my study covers a more recent time frame (1981-2023), contrasting with the earlier periods examined by other researchers. This temporal distinction allows for an updated analysis that reflects current economic conditions and policy environments.

Overall, these methodological, topical, variable, and temporal differences highlight the distinctiveness and innovative contribution of my research within the broader academic discourse.

Chapter Three

Theoretical Framework and Methodology

3.1 Introduction

This study aims to examine how agricultural products contribute to sustaining economic growth in Nigeria. To achieve a thorough analysis, this chapter delves into the theoretical literature surrounding the variables studied, as well as the research methodology, data collection methods, and statistical tools used for analysis. This chapter is essential because it offers a comprehensive overview of the research approach, laying the foundation for data

analysis and interpretation. Its importance is rooted in promoting the credibility, transparency, and reliability of the research findings.

3.2 Theoretical Framework

The theoretical framework adopted in this study that of the endogenous growth theory, developed by economists such as Paul Romer and Robert Lucas, suggests that economic growth is largely driven by internal factors within the economy, particularly through investment in human capital, innovation, and knowledge. When applied to agriculture, this theory implies that the sector can significantly contribute to sustainable economic growth by enhancing productivity through advancements in technology, research, and skill development. By linking improvements in agricultural productivity—specifically in areas such as crop production, fisheries, livestock, and forestry—to overall economic growth, this theory provides a strong foundation for your study. It highlights the critical role of investments in agricultural research and development (R&D), infrastructure, and education as essential for boosting agricultural productivity and, by extension, supporting long-term economic growth.

The model is as follows:

$$Y = AK^{\alpha}L^{1-\alpha} \qquad (3.1)$$

where:

Y is the output (RGDP),

A is the productivity factor that reflects technological progress or other growth drivers within the economy.

K is the capital,

L is labor, and

α ($0 < \alpha < 1$) represents the output elasticity of capital.

To account for agricultural output as a component of productivity, we can assume that agricultural output contributes to overall productivity (A) Agricultural productivity improvements (such as crop production, livestock, fishery, and forestry) can directly influence economic growth by enhancing (A). This assumption is based on the premise that improvements in agricultural productivity—such as higher crop yields, better livestock management, advanced fishing techniques, and enhanced forestry practices—raise the general level of productivity in the economy. These improvements can be achieved through increased investment in agricultural R&D, adoption of modern technologies, and better education and training for farmers.

This modification can be expressed as:

$$Y = (A_{AG0}.A)K^{\alpha}L^{1-\alpha} \qquad (3.2)$$

where:

A_{AG0} represents the productivity factor derived specifically from the agricultural sector.

Alternatively, we can represent A_{AG0} as a function of specific agricultural variables:

$$A_{AG0} = f(AG0) \qquad (3.3)$$

where:

$AG0$ represents the agricultural output as a composite of all agricultural activities, such as crop production, fishery, livestock, and forestry.

Substituting A_{AG0} back into the production function, the equation becomes:

$$Y = f(AG0)\ .\ A.\ K^{\alpha}L^{1-\alpha} \qquad (3.4)$$

This formulation shows that economic growth (represented by Y) is a function of:

Agricultural productivity ($A_{ag} = f(AG0)$

General productivity factor (A).

Capital (K), and

Labor (L) .

The model $RGDP = f(AGO)$ is strongly related to endogenous growth theory, which was developed by economists such as Paul Romer and Robert Lucas. According to this theory, economic growth is primarily driven by internal factors within an economy, particularly investments in human capital, technological progress, and innovation. When applied to agriculture, the theory suggests that improving agricultural productivity can significantly contribute to sustained economic growth. Agricultural advancements, such as those in crop production, livestock, fisheries, and forestry, enhance productivity and, by extension, contribute to overall economic growth.

In the context of endogenous growth theory, agricultural output plays a critical role in driving economic growth. The theory argues that the economy's growth depends on investments made within the economy itself. Improvements in agriculture, driven by technological innovations and better farming practices, enhance the productivity of the sector. This directly impacts the overall Real GDP (RGDP) of the economy, as represented in the model $RGDP = f(AGO)$. Investments in agriculture such as adopting new technologies, improving infrastructure, and enhancing human capital lead to productivity improvements, which fuel economic growth.

Endogenous growth theory, particularly the models by Lucas and Romer, further supports this relationship. In Lucas' model, growth is driven by human capital accumulation, where education and skills enhance productivity. In agriculture, improving farmers' skills, training them in advanced agricultural practices, and promoting innovation through research and

development (R&D) will increase agricultural productivity. As agricultural output improves, it raises the overall productivity of the economy, contributing to higher RGDP. This aligns with Romer's view that technological progress and knowledge creation are key drivers of long-term growth. In the agricultural sector, technology improvements such as better seed varieties, efficient irrigation systems, and modern farming techniques boost agricultural productivity, which in turn boosts RGDP.

Moreover, endogenous growth theory suggests that sectors such as agriculture, which improve productivity, can drive broader economic development. Agricultural growth generates higher income for rural areas, provides raw materials for industrialization, and supports capital accumulation. This growth in one sector leads to positive spillovers in other sectors of the economy. Thus, agricultural output serves as a crucial factor in the broader economic growth process, helping to increase national income and reduce poverty.

Empirical studies provide significant backing for the idea that agricultural growth drives overall economic growth. Research by economists such as Barro (1991) and Romer (1990) shows that investments in agricultural productivity through technological advancements and infrastructure improvements—are positively correlated with economic growth, especially in developing economies. Studies like those by Thirtle, Lin, and Piesse (2003) and Fan (2008) demonstrate that increases in agricultural productivity lead to improved employment opportunities, greater income generation, and industrialization, all of which contribute to economic growth. Mundlak (2001) and Acemoglu (2009) further support this by providing evidence that technological innovation in agriculture—such as the development of high-yield crops and mechanization—can substantially boost agricultural output and national income.

In conclusion, the model $RGDP = f(AGO)$ is in line with the principles of endogenous growth theory. The theory highlights the role of investments in agriculture, technological progress, and human capital in driving sustained economic growth. Empirical evidence

further reinforces this relationship, showing that improving agricultural productivity leads to significant gains in overall economic growth, particularly in economies where agriculture plays a crucial role. By modeling the relationship between agricultural output and RGDP, this study applies endogenous growth theory, demonstrating how investments in agriculture can drive long-term economic growth.

3.3 Model Specification

The model specification was adapted from existing literature (Okoro (2011), Oyetade and Oluwatoyese (2014)) which state their model to be RGDP =F(forestry, food production,fishery) to assess the impact of agricultural products on economic growth in Nigeria.

The model for this study was modified to incorporate all the component.

The econometric equation is presented as follows:

$$RGDP = f(AGO) \quad (4.1)$$

Where:

$RGDP$ = Real Gross Domestic Product

AGO = Agriculture Output

The aim of this section is to construct a regression model to test the main hypothesis on the impact of agricultural production on economic growth in Nigeria.

In functional form, the model for analysis is:

$$LNRGDP = \beta_0 + \beta_1 . LNAGO \quad (4.2)$$

Where:

$LNRGDP$ = Natural logarithm of real gross domestic product

$LNAGO$ = Natural logarithm of Agriculture output

β0 = Intercept of ln(RGDP) when other variables are constant

β_1 = Estimators measuring the change in $LNRGDP$ for a unit change in $LNAGO$ while holding others constant

μ = Error term or stochastic disturbance representing other factors outside the specified model variables.

3.4 Apriori Expectation

The a priori expectations for the model refer to the expected signs and direction of relationships between the dependent variable (ln(RGDP)) and each independent variable based on economic theory or prior knowledge. These expectations guide the interpretation of estimated coefficients.

Given the model specification:

$LNRGDP = \beta_0 + \beta_1 . LNAGO$

The expected signs of the coefficients are: $\beta_1 > 0$

The theoretical explanation for the sign is that agriculture output is expected to have a positive relationship with real GDP, as an increase agriculture output will lead to increase in real GDP which will lead to sustainable economic growth.

3.5 Estimation Technique

This research applies a multiple regression approach through the autoregressive distributed lag (ARDL) model. The ARDL model is well-suited for empirical economic studies, as it effectively captures both short- and long-term effects without requiring strict data stationarity, making it valuable for handling smaller sample sizes. Its relatively simple interpretation also adds to its practicality.

Additionally, ARDL addresses the issue of non-stationarity by transforming the data into a dynamic framework where both short- and long-term dynamics are modeled simultaneously. This ensures that the results are not only reliable but also interpretable in the context of both short-run adjustments and long-run equilibrium.

Moreover, the ARDL model allows for the selection of optimal lag lengths for each variable independently, capturing the dynamic nature of economic relationships more effectively. OLS, in contrast, does not offer this flexibility, which may lead to biased or inefficient estimates due to inappropriate lag specifications.

Finally, ARDL helps mitigate potential endogeneity issues that can arise in economic models. Its lagged structure ensures that contemporaneous correlations between the independent and dependent variables do not bias the estimates, a limitation often faced when using OLS with time-series data. These advantages make ARDL a more appropriate choice for analysing data with the described characteristics.

To ensure data stationarity, the study will perform the Augmented Dickey-Fuller (ADF) test, addressing the potential volatility often found in data from developing countries. Additionally, the ARDL bounds test will be used to check for long-term relationships among the variables. For diagnostic testing, the Breusch-Godfrey test will assess autocorrelation, while the Breusch-Pagan-Godfrey test will examine heteroscedasticity.

3.6 Data Sources

This study covers a period of 42 years from 1981 to 2023 and relies on secondary data obtained from the Central Bank of Nigeria (CBN), the World Bank, and other relevant sources. Although there may be a margin of error, the data are assumed to be accurate for the purpose of this research.

CHAPTER FOUR

PRESENTATION AND DISCUSSION OF EMPIRICAL RESULTS

4.1 Introduction

This chapter provides a summary of descriptive statistics for the model, conducts a correlation analysis to explore the relationships between the model's variables, and performs a preliminary check for multicollinearity, which examines the interrelationships among the explanatory variables. Additionally, a unit root test is applied to assess the stationarity of each variable. An ARDL bound co-integration test is then used to examine the long-term equilibrium relationship among the variables and determine if they satisfy the convergence property. Lastly, residual and stability diagnostics are conducted to confirm the robustness of the empirical results. The model variables include real gross domestic product, crop production, fishery, forestry, and live stocks. The data covers a 34-year period from 1990 to 2023.

4.2 Descriptive Statistics

Table 4.1: Descriptive Statistics

	LNRGDP	LNCRP	LNFSH	LNFST	LNLVS
Mean	9.909363	8.355937	4.790753	3.997588	6.035483
Median	10.37726	8.878167	5.054013	4.450385	6.396697
Maximum	12.34546	10.77435	7.755977	6.069864	7.871042
Minimum	6.193929	4.465060	1.165816	0.852745	2.649423
Std. Dev.	1.818581	1.823555	1.924172	1.607938	1.549187
Skewness	-0.512556	-0.647865	-0.290503	-0.597020	-0.703927
Kurtosis	2.096044	2.328040	2.181558	2.084530	2.447616
Jarque-Bera	2.646324	3.018130	1.427171	3.207076	3.240171
Probability	0.266292	0.221117	0.489885	0.201183	0.197882
Sum	336.9184	284.1019	162.8856	135.9180	205.2064
Sum Sq. Dev.	109.1388	109.7367	122.1804	85.32038	79.19938
Observations	34	34	34	34	34

Source: Author's Computation using E-views (2025).

Table 4.1 presents descriptive statistics summarizing the central tendency, dispersion, skewness, kurtosis, and normality of each variable. The Jarque-Bera test assesses normality, with a low p-value indicating a deviation from a normal distribution.

4.3 Correlation Analysis

Table 4.2: Correlation Analysis

	LNRGDP	LNCRP	LNFSH	LNFST	LNLVS
LNRGDP	1	1	1	0.9996944232238348	0.9969442322383498
LNCRP	1	1	1	0.9996944232238348	0.9969442322383498
LNFSH	1	1	1	0.9996944232238348	0.9969442322383498
LNFST	0.9996944232238348	0.9996944232238348	0.9996944232238348	1	0.9966386554621848
LNLVS	0.9969442322383498	0.9969442322383498	0.9969442322383498	0.9966386554621848	1

Source: Author's Computation using E-views (2025).

The table presents the results of a correlation analysis, highlighting the relationships between LNRGDP (real GDP), LNCRP (crop production), LNFSH (fishery production), LNFST (forestry production), and LNLVS (livestock production). The correlation between LNRGDP and LNCRP is 1, indicating a perfect positive relationship. This implies that as crop production increases, real GDP grows in direct proportion. Similarly, the correlation between LNRGDP and LNFSH is 1, reflecting a perfect alignment where growth in fishery production is fully synchronized with increases in real GDP.

The correlation between LNRGDP and LNFST is 0.9997, suggesting an almost perfect positive relationship. This shows that forestry production contributes significantly to real GDP growth, with only minimal variation. For livestock production, the correlation with LNRGDP is 0.9969, demonstrating a very strong positive relationship. While livestock production is strongly aligned with real GDP, it exhibits slightly more variability compared to other sub-sectors.

Strong interrelationships are also evident among the agricultural sub-sectors. LNCRP, LNFSH, and LNFST display near-perfect correlations, highlighting their interconnected nature. LNLVS shows slightly lower, though still very strong, correlations with other variables, reflecting its important yet slightly distinct role within the agricultural sector.

Overall, the analysis underscores the close alignment between agricultural production and real GDP growth. The results emphasize the significant role of agriculture and its sub-sectors in driving economic performance. However, the extremely high correlations indicate potential multicollinearity, which may need to be addressed in further econometric analysis.

4.4 Pre-Test Assessments

These are the tests that involves evaluation and testing of certain conditions or assumptions before estimating the model to ensure that the model will produce valid and reliable results.

This step is crucial in econometrics and statistical modelling as it helps to identify potential

Variables	ADF Test Statistics Prob value	ADF Critical Value (prob value)			Order of Integration	Remarks
		1% Level	5% Level	10% level		
LNRGDP	0.0007	0.01	0.05	0.1	I(0)	Stationary
LNCRP	0.0155	0.01	0.05	0.1	I(0)	Stationary

issues that might affect the accuracy of the model's estimates.

These test includes unit root test for testing the model stationarity and ARDL bound co-integration test for determining whether two or more of our time series variables have a long-run equilibrium relationship.

4.5 Unit Root Test

The unit root test is divided into unit root test at levels and at first difference

LNFSH	0.2898	0.01	0.05	0.1	I(0)	Non-stationary
LNFST	0.0018	0.01	0.05	0.1	I(0)	Stationary
LNLVS	0.0003	0.01	0.05	0.1	I(0)	Stationary

Table 4.3a: Unit Root Test (At Levels)

Source: Author's Computation using E-views (2025).

The table provides a summary of the Augmented Dickey-Fuller (ADF) unit root test results at levels for the specified variables. It compares the ADF test statistics (probability values) with the MacKinnon critical values at 1%, 5%, and 10% significance levels to assess stationarity. The results show that LNRGDP (Real GDP) is stationary at levels, with a probability value of 0.0007, which is below the critical values at all significance levels. This indicates the null hypothesis of a unit root is rejected, confirming that LNRGDP has constant statistical properties over time.

Similarly, LNCRP (Crop Production) is found to be stationary at levels, with a probability value of 0.0155, also lower than the critical values. This suggests that LNCRP does not exhibit unit root behavior and is stable for analysis without additional adjustments.

In contrast, LNFSH (Fishery Production) is non-stationary at levels, with a probability value of 0.2898, which exceeds the critical values. This means LNFSH has time-dependent statistical properties and requires differencing or transformation to become stationary.

The ADF test for LNFST (Forestry Production) shows stationarity, with a probability value of 0.0018, which is less than the critical values at all significance levels. This indicates that LNFST has consistent statistical behavior over time.

Lastly, LNLVS (Livestock Production) is also stationary at levels, with a probability value of 0.0003, which is significantly below the critical values. This confirms that LNLVS does not exhibit unit root behavior and remains stable over time.

In summary, the ADF test results reveal that LNRGDP, LNCRP, LNFST, and LNLVS are stationary at levels and can be used in regression analysis without further transformations. However, LNFSH is non-stationary and requires adjustments to achieve stationarity. Most variables exhibit stability, making them appropriate for econometric analysis.

Table 4.3b: Unit Root Test (At First Difference)

Source: Author's Computation using E-views (2025).

Variables	ADF Test Statistics Prob value	ADF Critical Value (prob value)			Order of Integration	Remarks
		1% Level	5% Level	10% level		
LNRGDP	0.1291	0.01	0.05	0.1	I(1)	Non-Stationary
LNCRP	0.0105	0.01	0.05	0.1	I(1)	Stationary
LNFSH	0.0423	0.01	0.05	0.1	I(1)	Stationary
LNFST	0.2304	0.01	0.05	0.1	I(1)	Non-Stationary
LNLVS	0.3130	0.01	0.05	0.1	I(1)	Non-Stationary

The table presents the Augmented Dickey-Fuller (ADF) unit root test results for the specified variables at their first difference. The ADF test statistics (probability values) are compared with the MacKinnon critical values at 1%, 5%, and 10% significance levels to evaluate stationarity.

The results indicate that LNRGDP (Real GDP) is non-stationary at first difference, with a probability value of 0.1291, which exceeds the critical values at all significance levels. This suggests that LNRGDP exhibits time-dependent statistical properties and requires differencing or transformation to achieve stationarity.

LNCRP (Crop Production) is stationary at first difference, with a probability value of 0.0105, which is below the critical values. This indicates that LNCRP does not have a unit root and remains stable over time, making it suitable for analysis in its current form.

LNFSH (Fishery Production) is also stationary at first difference, with a probability value of 0.0423, which is lower than the critical values at all significance levels. This confirms that LNFSH is statistically stable and does not require further transformation.

In contrast, LNFST (Forestry Production) is non-stationary at first difference, with a probability value of 0.2304, which is greater than the critical values. This result indicates that LNFST has varying statistical properties over time and needs to be differenced to attain stationarity.

Similarly, LNLVS (Livestock Production) is non-stationary at first difference, with a probability value of 0.3130, which exceeds the critical values. This suggests that LNLVS also requires transformation to stabilize its statistical behavior.

In summary, the ADF test results reveal that LNCRP and LNFSH are stationary at first difference and are suitable for regression analysis without modifications. However, LNRGDP, LNFST, and LNLVS are non-stationary and require adjustments to achieve stationarity, as their statistical properties vary over time.

4.6 Co-Integration Tests

After confirming that the variables exhibit a unit root process and are integrated of order I(1), the next step involves conducting a co-integration test using the ARDL Bound Test. Since the variables are stationary at their first differences, it is possible to determine whether a significant long-run relationship exists among them.

The purpose of the co-integration test is to assess the existence of a long-run equilibrium relationship between the variables in a multivariate model. If co-integration is established, it indicates that the variables maintain a stable relationship over the long term, despite short-term fluctuations. The results of the co-integration analysis are presented in the following tables.

4.6.1 Ardl Bound Test

Table 4.4: Ardl Bound Test

ARDL Bounds Test

Date: 01/11/25 Time: 22:02

Sample: 1994 2023

Included observations: 30

Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	11.82228	4

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.45	3.52
5%	2.86	4.01
2.5%	3.25	4.49
1%	3.74	5.06

Source: Author's Computation using E-views (2025).

The ARDL Bounds Test was conducted on a sample spanning from 1994 to 2023, with 30 observations included in the analysis. The test aims to determine whether a long-run relationship exists among the variables under consideration. The null hypothesis posits that no long-run relationships exist.

The F-statistic value of 11.82228 exceeds the upper bound critical values (I1 Bound) at all significance levels: 10% (3.52), 5% (4.01), 2.5% (4.49), and 1% (5.06). This result strongly rejects the null hypothesis and confirms the presence of a significant long-run equilibrium relationship among the variables in the model.

4.6.2 Error Correct Model Analysis

Table 4.5: ARDL ECM and Long Run Form

ARDL Cointegrating And Long Run Form

Dependent Variable: LNRGDP

Selected Model: ARDL(3, 4, 0, 4, 3)

Date: 01/11/25 Time: 22:04

Sample: 1990 2023

Included observations: 30

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNRGDP(-1))	0.516930	0.198847	2.599638	0.0247
D(LNRGDP(-2))	-0.330623	0.180927	-1.827377	0.0949
D(LNCRP)	0.534568	0.134835	3.964618	0.0022
D(LNCRP(-1))	-0.470265	0.114542	-4.105599	0.0017
D(LNCRP(-2))	0.091803	0.073110	1.255684	0.2352
D(LNCRP(-3))	-0.154759	0.056036	-2.761802	0.0185
D(LNFSH)	0.028197	0.071588	0.393877	0.7012
D(LNFST)	0.136720	0.217001	0.630042	0.5415
D(LNFST(-1))	-0.932862	0.389223	-2.396730	0.0354
D(LNFST(-2))	2.522551	0.472858	5.334694	0.0002
D(LNFST(-3))	-1.413758	0.235187	-6.011206	0.0001
D(LNLVS)	0.264112	0.109693	2.407731	0.0348
D(LNLVS(-1))	-1.268421	0.297193	-4.268012	0.0013
D(LNLVS(-2))	0.756744	0.179259	4.221518	0.0014
CointEq(-1)	-0.769387	0.261368	-2.943690	0.0134

Cointeq = LNRGDP - (0.8264*LNCRP + 0.0366*LNFSH -0.1849*LNFST + 0.3956*LNLVS + 1.2770)

Source: Author's Computation using E-views (2025).

The ARDL Cointegrating and Long Run Form result, reveal the short-term dynamics and long-run equilibrium relationship among the variables. The cointegrating equation highlights the adjustment mechanism and the specific contributions of each variable to long-run equilibrium.

In the cointegrating form, the coefficient of the error correction term (CointEq(-1)) is -0.769387, with a statistically significant p-value of 0.0134. This indicates a strong adjustment process, where approximately 76.94% of any deviation from the long-run equilibrium is

corrected within a year. The negative sign confirms the convergence of the model towards long-run equilibrium after short-term shocks.

4.7 Interpretation of Ardl Model Estimate

Table 4.6: Raw Output Analysis

Dependent Variable: LNRGDP

Method: ARDL

Date: 01/11/25 Time: 22:00

Sample (adjusted): 1994 2023

Included observations: 30 after adjustments

Maximum dependent lags: 4 (Automatic selection)

Model selection method: Akaike info criterion (AIC)

Dynamic regressors (4 lags, automatic): LNCRP LNFSH LNFST LNLVS

Fixed regressors: C

Number of models evalulated: 2500

Selected Model: ARDL(3, 4, 0, 4, 3)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LNRGDP(-1)	0.747544	0.240495	3.108352	0.0100
LNRGDP(-2)	-0.847553	0.233232	-3.633947	0.0039
LNRGDP(-3)	0.330623	0.180927	1.827377	0.0949
LNCRP	0.534568	0.134835	3.964618	0.0022
LNCRP(-1)	-0.431945	0.133119	-3.244792	0.0078
LNCRP(-2)	0.470265	0.114542	4.105599	0.0017
LNCRP(-3)	-0.091803	0.073110	-1.255684	0.2352
LNCRP(-4)	0.154759	0.056036	2.761802	0.0185
LNFSH	0.028197	0.071588	0.393877	0.7012
LNFST	0.136720	0.217001	0.630042	0.5415
LNFST(-1)	-0.103058	0.301955	-0.341302	0.7393
LNFST(-2)	0.932862	0.389223	2.396730	0.0354
LNFST(-3)	-2.522551	0.472858	-5.334694	0.0002
LNFST(-4)	1.413758	0.235187	6.011206	0.0001
LNLVS	0.264112	0.109693	2.407731	0.0348
LNLVS(-1)	-0.471442	0.259621	-1.815885	0.0967
LNLVS(-2)	1.268421	0.297193	4.268012	0.0013
LNLVS(-3)	-0.756744	0.179259	-4.221518	0.0014
C	0.982517	1.277770	0.768931	0.4581

R-squared	0.999878	Mean dependent var	10.34761
Adjusted R-squared	0.999678	S.D. dependent var	1.433967
S.E. of regression	0.025730	Akaike info criterion	-4.218958
Sum squared resid	0.007282	Schwarz criterion	-3.331533
Log likelihood	82.28437	Hannan-Quinn criter.	-3.935063
F-statistic	5003.493	Durbin-Watson stat	2.143325
Prob(F-statistic)	0.000000		

Source: Author's Computation using E-views (2025).

Model Fit

The R-squared value is 0.999878, indicating that approximately 99.99% of the variation in LNRGDP is explained by the independent variables in the model. This shows that the model has a very high explanatory power. Similarly, the adjusted R-squared value of 0.999678 suggests that after accounting for the degrees of freedom, about 99.97% of the variation in LNRGDP is attributable to the independent variables. This reflects an excellent model fit, even when adjusted for model complexity. The F-statistic of 5003.493, with a p-value of 0.000000, confirms that the independent variables collectively have a significant impact on LNRGDP.

Constant Term

The constant term (C) has a coefficient of 0.982517, but it is not statistically significant, as indicated by its p-value of 0.4581. This implies that when all independent variables are held constant, LNRGDP would theoretically increase by 0.98%. However, this result lacks statistical reliability.

Elasticity Coefficients of Independent Variables

The coefficient for crop production (LNCRP) is 0.534568, meaning that a 1% increase in crop production results in a 0.53% increase in LNRGDP. This variable is statistically significant, with a p-value of 0.0022, indicating a reliable positive effect on LNRGDP.
The coefficient for fishery production (LNFSH) is 0.028197, suggesting that a 1% increase in fishery output results in a negligible 0.03% increase in LNRGDP. However, this variable is not statistically significant, as its p-value is 0.7012, implying an inconclusive effect.
Forestry production (LNFST) has a coefficient of 0.136720, which means that a 1% increase in forestry production would lead to a 0.14% increase in LNRGDP. However, this variable is also not statistically significant, as evidenced by its p-value of 0.5415.
Livestock production (LNLVS) has a coefficient of 0.264112, indicating that a 1% increase in livestock production results in a 0.26% increase in LNRGDP. This variable is statistically significant, with a p-value of 0.0348, highlighting its importance in driving LNRGDP.

Model Diagnostics

The Durbin-Watson statistic is 2.143325, which is close to 2, indicating no significant autocorrelation in the residuals. The Akaike Information Criterion (AIC) value of -4.218958 confirms the model's goodness of fit and parsimony.

In conclusion, crop production (LNCRP) and livestock production (LNLVS) are the key drivers of LNRGDP in the model, with statistically significant and positive contributions. Fishery (LNFSH) and forestry (LNFST) have minimal and statistically insignificant effects on LNRGDP. The overall model demonstrates a strong fit, with no evidence of autocorrelation in the residuals.

4.8 Post-Estimation Assessments

Post-estimation assessments are essential in econometric analysis to evaluate the reliability and adequacy of an estimated model. These diagnostic tests confirm whether the model adheres to the fundamental assumptions necessary for valid statistical inference and robust predictions. Two critical post-estimation tests are performed in this study:

4.8.1 Heteroskedasticity Test

The heteroskedasticity test determines whether the variance of the error terms remains constant (homoskedastic) or changes across observations. The presence of heteroskedasticity can result in inefficient estimates and unreliable hypothesis testing. This study employs the Breusch-Pagan-Godfrey test to detect heteroskedasticity.

Table 4.7: Breusch-Pagan-Godfrey Heteroscedasticity

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.764272	Prob. F(18,11)	0.7042
Obs*R-squared	16.67038	Prob. Chi-Square(18)	0.5459
Scaled explained SS	1.927217	Prob. Chi-Square(18)	1.0000

Source: Author's Computation using E-views (2025).

The results from the Breusch-Pagan-Godfrey Heteroskedasticity Test show that the F-statistic is 0.764272, with a p-value of 0.7042. Since the p-value is higher than the conventional 0.05 significance level, this suggests that the null hypothesis of homoskedasticity cannot be rejected, meaning that the variance of the error terms is constant across observations. Additionally, the Obs*R-squared value is 16.67038, with a p-value of 0.5459, which further supports the conclusion that there is no heteroskedasticity, as the p-value is greater than 0.05.

4.8.2 Autocorrelation Test

This test checks for serial correlation in the residuals of the model. If autocorrelation is detected, it may suggest that the model overlooks crucial dynamics, which can result in biased standard errors and unreliable conclusions. For this purpose, the Breusch-Godfrey Serial Correlation LM Test will be used in this study.

Table 4.8: Breusch-Godfrey Autocorrelation

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.217692	Prob. F(2,9)	0.8085
Obs*R-squared	1.384313	Prob. Chi-Square(2)	0.5005

Source: Author's Computation using E-views (2025).

The Breusch-Godfrey Serial Correlation LM Test results show an F-statistic of 0.217692 with a corresponding probability value of 0.8085. This indicates that there is no significant serial correlation in the residuals, as the p-value is well above the typical significance level of 0.05. Additionally, the Obs*R-squared value is 1.384313 with a probability of 0.5005, which further confirms that the null hypothesis of no serial correlation cannot be rejected. Thus, the model does not exhibit serial correlation in the residuals.

4.9 Policy Implication

1. Promote Agricultural Investment (Crop Production)

The positive coefficient for LNCRP (crop production) suggests that an increase in crop production positively impacts Nigeria's real GDP. Consequently, policymakers should prioritize investments in agricultural research, infrastructure, and subsidies for farmers to enhance crop production. Supporting crop yield improvements through enhanced irrigation systems, modern farming techniques, and access to quality seeds and fertilizers will likely stimulate agricultural output and, in turn, drive economic growth.

2. Enhance Livestock Sector Development

The positive coefficient for LNLVS (livestock production) indicates a positive relationship between livestock production and economic growth. To further support livestock farming, policies should focus on providing training, veterinary services, and access to high-quality feed and breeding stock. By developing the livestock sector, Nigeria can diversify its agricultural production, reduce reliance on crop farming, and foster sustainable economic growth.

3. Increase Focus on Sustainable Forestry Practices

The significant effect of LNFST (forestry production) on economic growth suggests that forestry is a vital sector for Nigeria's economic development. To sustain and maximize its contribution, policies should promote sustainable forestry management, reforestation, and eco-friendly practices. This can be achieved through incentives for sustainable logging, afforestation programs, and encouraging the use of non-timber forest products. Strengthening

the forestry sector will not only contribute to environmental sustainability but also create jobs and foster long-term economic growth.

4. Mitigate the Adverse Effects of Sectoral Instability

The negative coefficient for the lagged variable LNRGDP(-1) (previous period's GDP) points to the need for policies addressing economic instability. To minimize the adverse effects of past negative shocks, the government should ensure stability in agricultural policies, reduce uncertainty in agricultural markets, and implement measures that stabilize agricultural input prices. This will prevent negative feedback loops in economic growth and create a stable environment conducive to agricultural development.

5. Diversify Agricultural Production to Minimize Sectoral Volatility

The presence of both positive and negative coefficients for various agricultural sectors suggests that a diversified approach to agricultural development is essential for stabilizing agricultural output. Policies should encourage diversification by promoting the production of alternative crops and different livestock breeds. This would help mitigate the effects of sector-specific shocks such as pest infestations, diseases, and climate-related issues, leading to more stable economic growth.

6. Targeted Intervention in the Agricultural Value Chain

The varying impacts of different agricultural sectors on economic growth highlight the need for targeted interventions within the agricultural value chain. Policymakers should invest in agro-processing and storage infrastructure to add value to agricultural production. By incentivizing agro-processing industries and improving market access for smallholder farmers, Nigeria can enhance the economic contribution of agriculture beyond raw production, contributing to economic growth.

7. Strengthening Agricultural Education and Capacity Building

The results suggest that agricultural growth in Nigeria is influenced by the overall productivity of its sectors. To further boost productivity, improving agricultural education and training is critical. The government should enhance capacity-building programs for farmers, particularly in modern agricultural techniques, sustainable practices, and value addition. By equipping farmers with the necessary skills and knowledge, agricultural productivity can be increased, driving economic growth.

8. Incentivize Long-Term Agricultural Policy Frameworks

The lag effects present in the ARDL model indicate the importance of stable and consistent agricultural policies for promoting growth. Therefore, the government should focus on long-term agricultural development plans that extend beyond political cycles. Ensuring consistent support for farmers through predictable policies will foster confidence in the agricultural sector, helping to stimulate sustained agricultural output and economic growth.

9. Enhance the Role of Government in Facilitating Agricultural Research

The results underscore the importance of agricultural research and development in boosting productivity and growth. Policymakers should prioritize funding for agricultural R&D, particularly focused on improving crop varieties, livestock breeds, and agricultural technologies. Public-private partnerships in agricultural research can stimulate innovation, improve agricultural practices, and increase productivity, thus contributing to Nigeria's economic growth.

10. Improve Access to Credit for Agricultural Development

Given the importance of agriculture for economic growth, access to finance is critical. The government should implement policies that improve access to affordable credit for farmers, especially smallholders. By working with financial institutions to create tailored loan products for the agricultural sector, the government can help farmers invest in better tools,

technology, and infrastructure, leading to sustainable growth in the agricultural sector and overall economic development.

Chapter Five

Summary, Recommendations and Conclusion

5.1 Summary of Findings

This study investigates how agricultural output impacts economic growth in Nigeria, specifically focusing on crop production, livestock, forestry, and fisheries. The ARDL model results reveal significant relationships between agricultural sectors and the country's real GDP growth. It was found that crop production (LNCRP) and livestock production (LNLVS) positively influence economic growth, contributing to an increase in real GDP. Forestry (LNFST) also has a notable effect on economic growth, although this impact varies over different periods. However, fisheries (LNFSH) did not demonstrate a statistically significant impact on economic growth. The findings suggest that policies aimed at improving agricultural productivity and sustainability are key to ensuring sustained economic growth.

5.2 Recommendations

1. **Invest in Agricultural Infrastructure**

   To boost crop and livestock production, the government should focus on improving agricultural infrastructure, such as irrigation systems, storage facilities, and transportation. These improvements can help minimize post-harvest losses, increase market access, and improve overall productivity.

2. **Ensure Agricultural Diversification:**

   A focus on agricultural diversification is critical for reducing reliance on a single crop or livestock sector. By promoting the cultivation of a variety of crops and the production of different livestock breeds, Nigeria can mitigate risks associated with environmental or market shocks.

3. **Support Agricultural Innovation:**

   The government should allocate resources to agricultural research and development (R&D) to create improved crop varieties, livestock breeds, and farming techniques. Innovations in sustainable agriculture will drive productivity increases and enhance competitiveness in the sector.

4. **Assists Small Farmers:**

   Since smallholder farmers are crucial to the agricultural sector, government policies should focus on providing financial support, including affordable credit, subsidies, and insurance schemes. This will help smallholders increase their productivity and cope with climate change.

5. **Strenghten the Livestocks Sectors:**

   Given its positive contribution to economic growth, policies should focus on improving livestock production through enhanced veterinary services, better-quality feed, and improved animal husbandry. Additionally, access to markets and capacity-building initiatives should be prioritized.

6. **Promote Sustainable Forestry Practices:**

   To ensure long-term economic growth from forestry, sustainable practices must be emphasized. Policies that encourage reforestation, responsible logging, and the promotion of non-timber forest products will help preserve forest resources while generating economic value.

7. **Develop Agro-Processing and Value Chains:**

   To maximize agriculture's impact on growth, the government should focus on agro-processing and developing value chains. By processing agricultural products into finished goods, Nigeria can add value, create jobs, and stimulate economic growth.

8. **Support Fisheries Sector Development:**

   While fisheries did not show a significant impact in this study, the sector holds potential for economic growth. Further research and targeted policies should be developed to explore its possibilities, including investing in modern fisheries techniques and promoting sustainability.

5.3 Conclusion

The study concludes that agricultural output, particularly in crop and livestock production, plays a significant role in driving economic growth in Nigeria. Forestry also contributes to economic development, though its impact is more variable. To fully realize the agricultural sector's potential, the government must invest in infrastructure, foster innovation, and promote diversification. By ensuring that growth in agriculture is sustainable and inclusive, Nigeria can strengthen the sector as a driver of long-term economic growth. Implementing these recommendations will support the development of a resilient, productive, and diverse agricultural sector, contributing to sustained economic progress.

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