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The Impact of Corporate Income Tax on Public Investment in the Agricultural Sector in Nigeria

Ajagun, Olusegun Peter [a*], Jinadu, Maumo Jerry [a] and Gabriel Praise Bose [a]

[a] *Lagos State University, Nigeria.*

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The study examined the effects of corporate income taxes on public investment in Agricultural sector in Nigeria from 1990-2022. The proxies for direct tax include Company Income Tax. The study adopted the ex-post facto research design as data collected were sourced from relevant publications of the Central Bank of Nigeria statistical bulletins, FIRS and National Bureau of Statistics. The independent variable for the study is Revenue from Company Income Tax while the dependent variable is public investment in Agricultural sector. The data were analysed using descriptive statistics and fully modified ordinary least square method in form of multiple regression technique. However, the results of the descriptive analysis showed significant variations of value of performance indices. The result of the regression analysis showed the positive effect of Direct Taxes (DTX) on Public Investment (PI) in agricultural sector in Nigeria. At 1% level of significance,

**Corresponding author: E-mail: olusegun.ajagun@lasu.edu.ng;*

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corporate income tax has significant and positive impact on agricultural funding. The significant of these discoveries is essential for policy makers in adopting a smart tax policy that priorities agricultural finance while effectively balancing the needs for other industries and it also enhance their fiscal plans to support sustainable agricultural growth and economic stability by comprehending and resolving the distinct impact of various tax categories on agricultural funding. However, the study recommended that the collaboration between government agencies, agricultural stakeholders, and the private sector should be encouraged to identify and address challenges in tax revenue utilizations

Keywords: Tax; direct tax; capital gain tax; company income tax; petroleum profit tax; public investment and agricultural finance.

1. INTRODUCTION

"The relevance of taxation as an instrument for economic growth and development is recognized globally in both developed, developing, and underdeveloped economies. From ancient times, public finance is majorly funded through taxes imposed on individuals, corporations, and other taxable institutions by the government through constituted authorities or institutions saddled with the traditional function of tax administration" [1].

"Taxation revenue permits the financing of government activities with the potential effects upon the rate of growth and/or development in relation to the level of government expenditure, on resources allocation, provision of social infrastructure and also on the distribution of income and wealth. Taxation also alters the determinants of economic development through capital formation, technological change, and factor supplies" (Etim, Umoffong, Nwese, Charlie & Udoette, 2021).

"The government uses taxation as a weapon to manage individuals by redistributing money and requiring compliance with civic responsibilities" [2]. "Taxation of companies and revenue generated is usually used as a major instrument for revenue generation and to sustain economic development" [3,4-7].

"Concurrently, many developed countries integrated into the OECD (Organization for Economic Co-operation and Development) are currently affected by the significant budget crisis within which they have problems repaying their short-term and long-term liabilities. Due to this, governments themselves are exposed to increased supervision from the financial markets and therefore they are forced to consolidate public budgets [8-10]. The public finance crisis is usually solved by two concrete channels – the channel of reducing public spending, and the channel of increasing taxes, or tax revenues. On one hand, the basic aim of the consolidation is to keep the criteria of budget responsibility as determined, and on the other hand, to restore economic growth as soon as possible" [11,8-10,12-14].

2. STATEMENT OF RESEARCH PROBLEM

The problems with Nigeria economy have been traced to failure of the successive government to use income generated from tax effectively in the development of other sectors of the economy. At the federal level, Nigeria dependence on oil almost halted her economy leading to a negative GDP growth of 1.8% in 2020. These signs impose an obligation for Nigerian government to search for an additional source of revenue.

"Agricultural financing can be an additional source of revenue to Nigeria economy if it is considered. Nigeria agricultural sector contributes to a significantly part of the country's GDP. Recent research has shown that Agriculture contributed 19.63% to nominal GDP in the first quarter of 2023. There is a lack of motivation amongst the farmers due to lack of financing, poor transportation due to bad roads and also lack of market" [15].

However, Nigeria can provide food for its citizens and also export food to other parts of the world but due to a lack of adequate financing in the agricultural sector and other relevant sectors in Nigeria, the economy has been going through tough stages of recession [16-22]. As a result of this, the above study attempts to build on earlier research by evaluating the effect of corporate income tax on public investment in the agricultural sector.

2.1 Research Objective

The primary objective of this study is to evaluate the effect of corporate income tax on public

investment in Nigeria using agriculture sector financing as the proxy for public investment. Below is the specific objectives of this study;

This paper attempts to find answers to the research questions,

i. Does corporate income tax influence public investment in the agricultural sector?

2.2 Research Hypotheses

To achieve this objective, the research hypotheses is constructed and presented in this null form.

i. H_{01}: Corporate income tax has no noticeable impact on public investment in the agricultural sector.

2.3 Scope of the Study

This study investigates and takes a more in-depth look at the impact of direct tax on public investment in the agricultural sector in Nigeria. The time frame covered by this study is from 1999 to 2022. For this analysis, the corporate income tax will be used as a proxy for direct tax. Agricultural funding will be used as a proxy for public investment. This study uses secondary sources of data that are sourced from the CBN statistical bulletin.

2.4 Definition of Terms

1. **Tax**: This is a compulsory levy or charge imposed on an individual, or company on income generated or property acquired and is paid directly or indirectly to the relevant tax authority to support and serve as a source of revenue to the government.
2. **Direct tax**: This is a form of tax paid by an individual or organization to the relevant tax authority directly. It is paid directly to the entity that levied the tax.
3. **Company Income Tax**: This is also called corporate tax or corporation tax. This is a type of direct tax imposed on the income generated by companies.
4. **Public Investment**: This is the money that a government spends on public services such as education, electricity, infrastructure, water corporations, health, etc.
5. **Agricultural finance**: This refers to the study, examination, and analysis of the financial aspects of farm business

2.5 Conceptual Framework

The conceptual framework explains the expected relationship between the independent and the dependent variables, it also examines the features and attributes of the study variables. The key concepts and variables are explained in this section of the paper. This will address the main issues.

2.6 Concept of Taxation

Taxation refers to obligatory or coercive cash collection through a levying authority, typically a government. The term "taxation" applies to all forms of involuntary levies, from profits to capital profits to property taxes. Taxation is the most important source of revenue for modern governments, typically accounting for ninety percent or more of their income.

It is a common source of income generation for financing government activities. Uzochukwu, Amahi & Ugbah, [23]. According to Etim, Ummofong & Confidence [1], taxation is a principal component of government fiscal policy measures, designed to stabilize the economy, create employment opportunities, and stabilize price levels and balance of payments and trade, grant incentives to the industrial and manufacturing sector and boosting productive capacity while encouraging investments in the different and most preferred sector of the economy.

Taxation revenue permits the financing of government activities with the potential effects upon the rate of growth and/ or development regarding the level of government expenditure, resources allocation, provision of social infrastructure, and also the distribution of income and wealth.

2.7 Concept of Direct Taxation

“A direct tax is paid directly by an individual or an organization. The ability-to-pay principle governs direct taxes. This is an economic principle that states that those with more resources or a higher income should pay more taxes. The ability to pay taxes is one way for a country’s wealth to be redistributed. Direct taxes cannot be passed on to another person or entity; the individual or organization levied with the tax is responsible for the full tax payment. A direct tax is the inverse of an indirect tax, in which the tax is imposed on one entity, such as a seller, and paid for by

another. In Nigeria, there are several types of direct taxes, including corporate income tax, petroleum profit tax, and capital gain tax" [24]. They are further explained below

2.8 Concept of Public Investment in Nigeria

"Investment is the act of utilizing personal assets or resources for projected positive outcomes. It is independent of saving and could have multiple effects for individuals" [25].

"Essentially, investment implies giving up present resources, such as time, money, and effort, with the potential of obtaining more resources in the future" [26].

"Public investment can be defined as an act of spending by the government to create fixed, long-term, and non-current assets. Public investment is also known as public capital expenditure or public finance. Public investment involves spending on physical assets such as roads, buildings, bridges, water corporations, and other infrastructural facilities. Public investment is the money or resources that a government spends on the provision of public services such as health, transportation, education, construction, and water supply. Public capital expenditure differs from current expenditure because current expenditure involves the spending on daily expenses and short-term assets. Public investment is very crucial as it supports the delivery of public services and it also plays a role in shaping wider economic growth. In economics, Public Investment has typically been seen as crucial for the delivery of some essential goods and services that are either unable to be efficiently supplied by the private sector (public goods) or are designed in such a way that only one supplier could economically invest in them (natural monopolies)" [27].

2.9 State of Nigerian Agricultural Sector

Agriculture remains the largest sector in Nigeria contributing an average of 24% to the nation's GDP over the past seven years (2013- 2019). In addition, "the sector employs more than 36% of the country's labor force, a feat that ranks the sector as the largest employer of labor in the country. Agriculture is broadly divided into four sectors in Nigeria. They include; crop production, fishing, livestock, and forestry. Crop production remains the largest segment and it accounts for about 87.6% of the sector's total output. This is followed by livestock, fishing, and forestry at 8.1%, 3.2%, and 1.1% respectively" [28].

2.10 Challenges of the Nigerian Agricultural Sector

According to Oyaniran [28], the following are the basic challenges faced by the agricultural sector in Nigeria;

a. **Revenue Shortage:** Over the past years, Nigeria has dealt with very low yields per hectare due to shortages in the supply of inputs such as seedlings and fertilizers as well as inadequate irrigation and harvesting systems, which hinder productivity and yield rates.
b. **Violent conflict:** Due to the desertification and water depletion in the northern part of Nigeria, nomadic herdsmen are now shifting towards the south of the country in search of grazing fields and water for animals. This has resulted in violent conflict with crop farmers in the south. Increased violence in the food-producing states is causing a decline in Nigeria's food production output.
c. **Outdated system of agriculture:** Outdated methods of agriculture such as hoes and cutlass reduce efficiency as these methods are costly and time-consuming. Nigeria's failure to adopt advanced mechanized systems has reduced the quality of its agricultural products.
d. **Absence of value addition and supply-chain linkages:** Nigeria focuses mostly on food production, thus neglecting the processing and manufacturing segment of the value chain. The chain reaction that arises from shortage of resources, lack of financing for small-scale farmers, and inefficient transport systems, exacerbates the development of food production along the value and supply chain.
e. **Lack of access to finance:** Although the Nigerian government has provided several facilities through the Central Bank of Nigeria (CBN)such as the Anchor Borrower's Program to help provide small-scale farmers with adequate financing, the farming industry still lacks adequate access to finance.

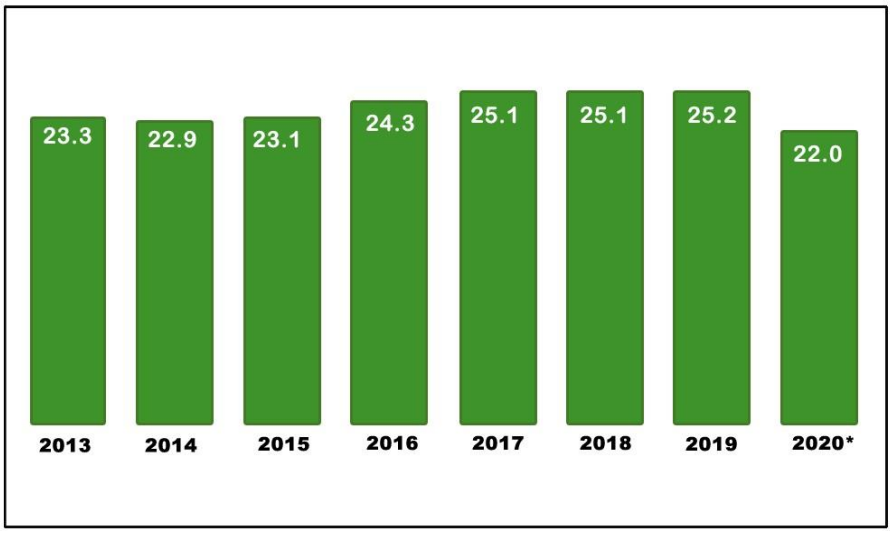

Fig. 1. Agriculture contribution to GDP%
Source: NBS, PWC analysis

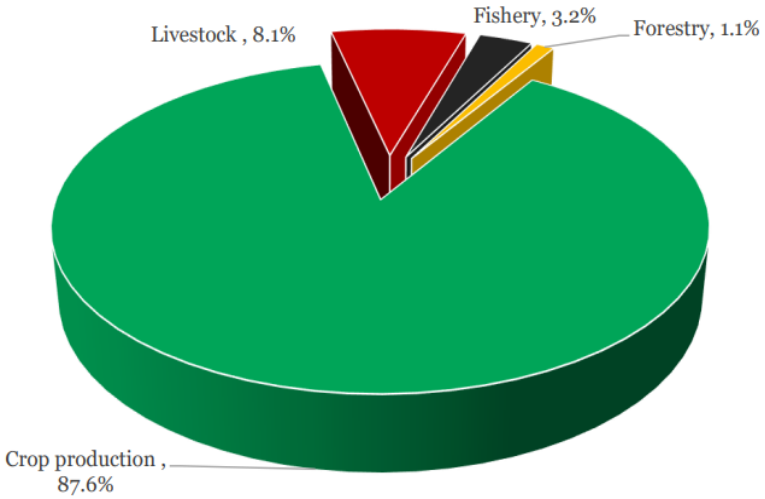

Fig. 2. Size of different segments in agricultural sector
Source: NBS, PWC analysis

2.11 Overview of Government Policy in the Agricultural Sector in Nigeria

In view of Ofana, Efefiom & Omini [29], believed that the need for active government intervention in the agriculture sector through reform programs was informed by the dearth and neglect of Agriculture in Nigeria, due majorly to the rising fortunes in crude oil in the early 70's. Until then, Nigeria had a very robust agricultural sector with self-sufficiency in food production and minimal imports of processed food for the elites; farmers produced enough food crops to feed the population, and foreign exchange receipts from exported crops were used to finance government expenditure in education, health, construction, and finance, etc. The period 1970- 1985 witnessed more direct Government intervention in agriculture in the face of the noticeable decline in agriculture performance. A variety of policies was introduced. The government has introduced some policies and programs in an attempt to enhance local trade and exports in the agricultural sector.

According to Oyaniran [28], some of the policies include;

a. Agriculture Promotion Policy: The policy aims to improve access to international markets by enhancing access to market

information through a National Agricultural Information System and also by creating specialized export market support teams to enhance export capacity.

b. Nigeria -Africa Trade and Investment Promotion Programme (NATIPP): This is a programme jointly launched by the Africa Export-Import Bank, Nigeria Export-Import Bank, and the Nigerian Export Promotion Council. NATIPP aims to facilitate the expansion of Nigeria's trade Investment into Africa.
c. Presidential Economic Diversification Initiative (PEDI): This aims to enhance trade capacity in Agriculture by facilitating new investments in the Agricultural and Agro-allied industries, reducing regulatory bottlenecks, and enabling access to credit.
d. Zero Reject Initiative: The Zero Reject Initiative was launched to enhance the acceptability of Nigerian products internationally. It aimed at improving Agricultural exports through the institution of global standards and product standardization.
e. Economic and Export Promotion Incentives: The Government has placed trade barriers on selected agricultural goods to protect local producers and stimulate the growth of the industry. In addition, several economic incentives are offered to Agric. Investors in Nigeria include income tax relief, zero import duty on equipment, VAT exemptions, etc.

He also opined that despite the interventions from the government Agricultural trade remains constrained by poor infrastructure which includes.

1) Transportation and logistics: Nigeria has significantly poor transport infrastructure and services (road and rail), particularly in the rural areas. The lack of cold chain logistics also contributes to a decreased trade capacity through losses from spoilage and impinge time to market.

2) Information and Communication Technology: ICT and e-commerce infrastructure play a crucial role in the availability of market information and rapidity of reaction. Despite recent improvements in the state and quality of digital and telecommunications technologies, ICT infrastructure in Nigeria still requires significant improvement to enable trade efficiently.

3) Ports and Border Infrastructure: Nigeria's six seaports are limited by capacity constraints and aging infrastructure. In addition to this, customs and border administration processes are relatively inefficient, with multiple bottlenecks. These negatively impact the cost, ease, and efficiency of cross-border trade

2.12 Public Investment in the Agricultural Sector in Nigeria

Hasan, Henry & Ajidani [25] suggested that "investing in agriculture is a smart and effective strategy for attaining fair and sustainable economic growth**.** Such investments have a transformative impact, enhancing food security, reducing hunger, generating income, alleviating poverty, fostering rural development, addressing regional disparities, establishing linkages with other sectors, promoting sustainable practices, and contributing to environmental conservation (In addition, they also state that investing in agriculture is crucial for fostering the growth and advancement of the sector. It enables farmers to access the necessary resources to adopt innovative technologies, enhance productivity, and meet the ever-growing global demand for agricultural products. Moreover, agricultural investment contributes to rural development, job creation, and overall economic growth".

According to Teimaa & Elghaweet [30] cited in Hassan, Henry & Ajidani [25], "Investments in agriculture are a significant engine of global economic growth, with wide-ranging repercussions on numerous dimensions of economic success. The agricultural sector bears tremendous significance as it provides a basic supply of food and raw materials for industries while also generating job opportunities for a considerable section of the population. By diverting resources into agriculture, economies may see tremendous beneficial impacts that reach well beyond the industry".

2.13 Relationship between Direct Taxes and Public Investment

Direct Tax is seen as a source of revenue to the government. It is a type of tax levied on an individual or corporate firm directly by the relevant tax authorities to generate revenue to the government which the government uses the revenue to finance public Investment. Public Investment is when the Government utilizes the returns generated from tax to finance public needs and provide public services such as the

building of roads, and infrastructure, providing health services, and education to the less privileged, and improving other sectors such as agriculture. There is a direct relationship between direct taxes and public Investment such that an increase in the revenue generated from direct taxes will eventually lead to an increase in public Investment. That is, if there is an increase in revenue derived from direct taxes there will also be an increase in the provision of public services by the government.

Based on this study, Direct tax is represented as;

CIT - Company Income Taxes

Public Investment is represented as;

Agricultural Funding

2.13.1 Conceptual model

The conceptual model shows the diagrammatical relationship between direct tax and public investment in the agricultural sector in Nigeria**.**

2.13.2 Theoretical framework

The theoretical framework shows or illustrates a comprehension of ideas and concepts relevant to the research work and related to the broader fields of knowledge being explored and carried out.
The following are some of the theories employed in this study;

i. Ability to Pay Theory
ii. Benefit Received Theory
iii. Laffer Curve Theory

Ability to Pay Theory: The first theory reviewed by this research work is known as the Ability-to-Pay Theory (APT). This theory was developed by Adam Smith and by an English economist- Arthur Cocil Pigou (1875 -1959). Ability-to-Pay Theory is considered to be one of the influential theories. Marvis, Abel & Emeka [31], believed that this theory was later modified and called "Equality of sacrifice or Faculty Theory". They also opined that Ability-to-Pay is a principle, which requires that collected taxes be distributed among individual taxpayers according to their capacity, taking into cognizance, all relevant individual taxpayers' characteristics. The APT theory suggests taxpayers whether persons or corporations should pay tax in accordance to the profit generated from their trade, businesses, and economic activities.

Benefit Received Theory: The second theory for this research work is hinged on the Benefit Received Theory. The benefit received theory was initially propounded by two Swedish economists- Johan Gustaf Knut Wicksell (1851 – 1926) and Erik Lindahl (1891 –1960). In view of Ekwe & Nuhu (2017), this theory indicates that taxpayers' willingness to pay tax to the state is determined by the nature of the benefits in terms of services received from the state. This justifies the imposition of taxes for the sake of obtaining revenue for the government which is critical for financing state activities, infrastructures, and sectors as well as in providing a basis for apportioning the tax burden between members of the society. The study therefore believes that imposing corporate income tax on companies, on the grounds of the benefits that are expected to be received by them through the activities of the government in controlling and growing the economy, and agriculture sector, justifies the choice of benefits received theory as a taxing system to be employed in this research work. The main justification of the Benefit Principle of Taxation is that the principle recognizes that the purpose of taxation is to pay for government services by paying taxes in proportion to the benefits they receive from government spending.

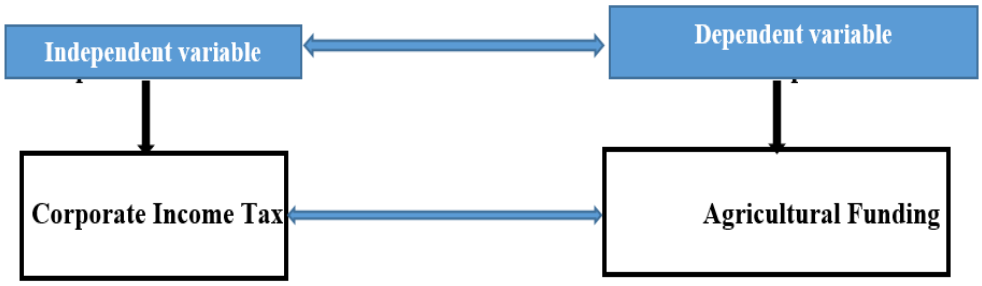

Fig. 3. Conceptual framework
Source: Researcher concept, 2024

Laffer Curve Theory: Laffer curve theory of taxation propounded by Arthur Laffer [32] cited in Adefolakemi & Omodera [33] explicates a possible correlation between taxation rates and the corresponding forms of government revenue. With an emphasis on taxable income elasticity. The theory states that no tax revenue is raised at the excessive tax rates of 0 percent and 100 percent, the government collects zero (0) revenue due to changes in the behavior of taxpayers in response to the rate of taxation either losing their incentive to do business or finding various ways to avoid paying tax just like 0 percent tax rate where no revenue is raised.

That the amount of the tax revenue is a function of income available for taxation multiplied by the tax rate. Thus, Revenue R is equal to t x B where't' is the tax rate and B is the taxable base (R = t x B). The economic effect however recognized the positive impact that lower tax rate has on work, output, employment and entrepreneurship growth as a result of helping to grow activities through incentives. In addition, Adefolakemi & Omodero (2022) also opine that the Arithmetic Effect is the polar opposite of the Economic Effect.

Empirical Review: Numerous empirical studies have examined the relationship between direct taxes and public Investment, employing various methodologies, covering different time frames, and focusing on different countries or regions.

Hassan, Henry & Ajidani, [25] examined the impact of Investment in Agriculture on Economic growth in Nigeria from (1981 to 2021). Secondary data from the National Bureau of Statistics, the autoregressive distributive lag (ARDL) model was adopted for this study data analysis. The findings of this study revealed a long-run relationship among the variables, with crop productivity being a substantial predictor of investment in agriculture. The research also employed the error correction version of ARDL to examine the pace of adjustment from short-run disequilibrium to long-run stability. The report suggests supporting agricultural sector growth by encouraging investment in crop and fisheries production, minimizing food import dependency for food security, and prioritizing long-term strategies for sustainable economic growth.

Adefolakemi & Omodero, (2022) assesses "the effects of tax revenue on the economic growth of Nigeria utilizing time series data spanning from the year 2000 till 2021. The study's specific goal is to evaluate the influence of hydrocarbon tax, corporation income tax, and Value Added Tax on Nigeria's economic growth. The study employs a secondary form of data which has been sourced from CBN statistical bulletin and published Federal Inland Revenue Statement. An ex-post facto research design is used for this study. The data collected are analyzed and tested for unit root using the Augmented Dickey-Fuller method. Thus, a Johansen co-integration test is also conducted and it reveals a long-run relationship. Consequently, the study utilizes the Vector Error Correction Model to evaluate the effects of PPT, CIT, and VAT on GDP. The findings reveal that PPT and VAT have positive and significant effects on GDP. It also reveals that CIT has a negative and significant effect on GDP".

Oboh, [24] used "Ordinary Least Square (OLS) data estimation technique to examine the relationship between direct taxes and foreign investment. The study found out that the relationship between petroleum profit tax and foreign direct tax is positive. The result of the study implies that PPT increases FDI but the increment is statistically significant. The result also shows a positive relationship between company income tax and Foreign Direct Investment, and a negative relationship between education tax and foreign direct investment".

Oluwaseun, Solomon & Yusuf, [34] examined the impact of fiscal policy on Agricultural Output in Nigeria from 1980-2017. Data for this study was sourced from Central Bank of Nigeria Statistical Bulletin. Augmented Dickey-Fuller Unit Root, Johnson Co-integration and Vector Error Correction Model were employed in order to achieve the objective of this study. Based on this study, the unit root test conducted shows that the variables were integrated of order one (1), which means that the variables are stationarity at first difference. According to this study, the co-integration result showed that the long-run equilibrium relationship exists among variables. The result of this regression shows that government capital expenditure on agriculture has a positive and significant impact on agricultural output, while Government recurrent expenditure on agriculture also has a positive impact on agricultural output in Nigeria. In addition, the study reveals that personal income tax has a negative and insignificant impact on agricultural output.

Oladipo, Iyoha, Fakile, Asalaye & Eluyela [15] used "Engel and Granger approach to examine

the relationship between tax revenue and agricultural performance in Nigeria. The study finds out that there is a positive and significant relationship that exists between revenue obtained in the agricultural sector, capital in agricultural sector proxy by loan and agricultural output, while employment and total tax generated are not significant in the short run. In the long run, employment, capital and total revenue are statistically significant with agricultural output, while tax is insignificant. According to this study, the implication of this result showed that tax has not yielded desirable result in promoting the agricultural sector in Nigeria. This study recommends among others the need for a systematic approach, given a significant percentage of the total tax generated to boost the development of the agricultural sector".

Between 1981-2017, Omodero & Dandago [35] employed "ordinary least square technique to investigate the impact of tax revenue on public service delivery. The findings of his study revealed that tax revenue impacts positively and significantly on education and health care services. The study recommends among others that the government should exploit all tax revenue sources and use same to maintain the health sector in Nigeria and provide adequate education including skill acquisition and entrepreneurship development programs for the citizens".

Another study which was carried out by Uzochukwu, Amahi & Ugbah (2017), examined "the effect of taxation on the Nigerian economy. The researcher used an Ex-post facto research design and secondary data which were sourced from CBN Statistical Bulletin and Federal Inland Revenue report. The study covered a period of 10 years (2011-2020). Multiple linear regression was employed to check the effect of taxation on Nigeria while analysis of variance was used to test the hypotheses. Based on this finding the study recommends, that government should make more adequate policies with respect to tax system to enable a high percentage of tax revenue collection which will create more avenues for the government to engage more in the infrastructural development and growth of the country".

This study will adopt the secondary source of data collection to determine the impact of direct tax on public investment in Agricultural sector in Nigeria, as secondary data is the suitable data collection source in examining the phenomenon.

3. RESEARCH METHODS

3.1 Research Design

Research design is simply a blueprint showing how the researcher will carry out the study and how the researcher will answer research questions. For this study, an Ex-Post Facto research design will be adopted. Ex-post facto research design is referred to as study that establish causal relationship between dependent and independent variables. Ex-post Facto research is a research method that examine how an independent variable affects a dependent variable in a study. It is aimed at investigating the relationship between variables i.e. the relationship between direct taxes and public investment in agricultural sector in Nigeria.

3.2 Research Population

The total population of this research work consist of Central Bank of Nigeria (CBN), National Bureau of statistics (NBS) and Federal Inland Revenue Service (FIRS) for the period of 10 years (2013-2023).

3.3 Sample and Sampling Technique

The purposive sampling technique will be used to select the sample from the population. Consequently, the Agricultural sector which includes crop farming, forestry, livestock and fishing and company income tax, capital gain tax & petroleum profit tax for ten years will be used as a sample for this study.

3.4 Sources of Data Collection

The study employed the use of quantitative secondary data collected from three very essential organizations in Nigeria namely the Central Bank of Nigeria (CBN), the National Bureau of Statistics (NBS), and the Federal Inland Revenue Service (FIRS) within the period of 10 yeas (1999-2022). Agricultural sector data is obtained from the Central Bank of Nigeria Statistical Bulletin and the Corporate income tax revenue obtained from published statement Federal Inland Revenue Service (FIRS) Statistical bulletin and National Bureau of Statistics (NBS). Secondary data is used as a source of data because information needed for this study can only be derived from published reports rather than a primary data.

Table 1. List of variables and their measurement

Variable	Variable Meaning	Types	Measurement	*A priori* expectation	Sources
AGF	Agricultural Funding	Dependent	Agricultural Funding from 2013 to 2023	Nil	Omodero, [36]
CIT	Company Income Tax.	Independent	30% tax for large companies and is charged on profits for the accounting year ending in the year preceding assessment.	+	Omodero, [36]

3.5 Methods of Data Analysis

For the purpose of this research work, an ordinary least square (OLS) in the form of multiple regression analysis will be employed with the aid of e-view software being a statistical package useful majorly for cross sectional, time series and panel data statistical analysis. Regression technique is adopted as a tool for hypotheses test and analysis, owing to the fact that it the suitable parametric (involving assumptions) tool that examine both a dependent and independent variable.

3.6 Description of Variables

A brief description of variables is presented below:

1. Independent Variables; the dependent variable used for this study is Corporate Income Tax.
2. Dependent Variables: The dependent variables used for this research work is Public Investment. The proxy for public investment is just Agricultural Funding.

3.7 Model Specification

The model of this study is built to support the variables of the study. The main model from which other model emerged is;

$Y = f(X)$

Direct tax is a function of public investment

$PI = f(CTX)$

X = Independent Variable (Corporate Income Tax)

Y = Dependent Variable (Agricultural Funding)

The model is further expressed as follows;

$Y = f(x)$

$AGF = f(CIT)$ ---------- (1)

Where;

AGF = Agricultural Funding

CIT = Corporate Income Tax

Thus, the regression model is specified as follows;

$AGF = \beta_0 + \beta_1 PPT + \beta_2 CIT + \beta_3 CGT + \varepsilon$

$AGF = \beta_0 + \beta_2 CIT + \varepsilon$ ---------- (2)

Where β_0 – intercept

$\beta_1, \beta_2, \beta_3$ -- parameters standing as independent variables.

ε – error term

3.8 Measurement of Variables

Measurement of variables has been depicted in Table 1.

4. DATA ANALYSIS AND RESULTS

4.1 Descriptive Analysis

Under this section, the summary of the descriptive statistics of corporate income tax (CIT), from 1990 to 2022 was examined. The outcomes are displayed in Table 2.

The descriptive statistics in Table 2 indicate that the corporation income tax (CIT) has a significant

mean value of 504,097.7 billion naira, underscoring its crucial role as a source of revenue. The standard deviation of tax payments across corporations is 507,312.6, demonstrating a significant variation in the amounts paid. A skewness value of 0.54 indicates a distribution that is fairly asymmetrical, while a kurtosis value of 1.62 shows a platykurtic distribution. The Jarque-Bera test yielded a value of 4.24 with a probability of 0.12, suggesting that the data generation process is normally distributed.

The mean agricultural funding (AGF) is 28.17 billion naira, with a standard deviation of 26.13. This indicates that the funding levels are largely steady, although with considerable variability. The skewness value of 0.59 shows a little degree of asymmetry in the financing amounts, while a kurtosis value of 2.07 denotes a platykurtic distribution, while the Jarque-Bera test yielded a score of 3.08, indicating a probability of 0.21. This result suggests that the distribution of AGF funding does not exhibit a considerable deviation from a normal distribution. By integrating these statistical indicators into the research, a more profound comprehension of the data's attributes is gained and their significance for the formulation of economic policies based on AGF funding.

The result in the matrix in Table 3 shows significant associations between agricultural financing and corporate income tax. From the finding, there is a significant and positive relationship between agricultural financing and corporation income tax (0.79). This suggests that greater levels of agricultural funding are linked to increased levels of these tax. In contrast. This implies that as agricultural funding grows CIT also grows. These data suggest that measures focused on increasing agricultural financing may have a good impact on firm income tax.

Conversely, “these findings are of utmost importance for policymakers, as they demonstrate that making changes to taxes in one sector can have a domino impact on other areas. This highlights the necessity of taking a comprehensive approach to fiscal policy, especially when striving to achieve a balance between agricultural growth and maximising tax income. In addition, the explanatory variables in relation to the dependent variable does not have a value higher than the 0.80 threshold, hence there is no sign of multicollinearity in the models” [37].

4.2 Stationarity Test (Unit Root)

“The empirical analysis in this study began with a test of stationarity of the time series utilized for the investigation. This is critical because most macroeconomic time series display non-stationarity in their level form, which frequently complicates econometric research and leads to erroneous conclusions if proper precautions are not adopted” [38].To avoid erroneous findings, 2nd generation unit root test such as the Elliott-Rothenberg-Stock (ERS) DF-GLS (Dickey-Fuller Generalized Least Squares) test developed by Elliott and Rothenberg [39] and KPSS tests developed by Kwiatkowski, Phillips, Schmidt and Shin, (1992) were used. Furthermore, with the null hypothesis that $H_O = 0$ and that the variables do not include a unit root, it is said to be integrated of order one (denoted as I(1)) if there is a unit root but differencing the series once renders it stationary (Gujarati, 2005). The outcome is shown in Table 4.

Table 2. Data statistics

	CIT	AGF
Mean	504097.7	28.17333
Median	244900.0	22.44000
Maximum	1409214.	81.87000
Minimum	21878.00	0.210000
Std. Dev.	507312.6	26.12517
Skewness	0.544407	0.585110
Kurtosis	1.622931	2.068010
Jarque-Bera	4.237526	3.077277
Probability	0.120180	0.214673
Sum	16635225	929.7200
Sum Sq. Dev.	8.240012	21840.78
Observations	33	33

Source: Researcher’s computation, 2024

Table 3. Correlation analysis

	AGF	CIT
AGF	1.000000	0.792673
CIT	0.792673	1.000000

Source: Authors' computation, (2024)

Table 4. Unit root test results

Variables	ERS DF-GLS Test Statistic	5% Critical Values	KPSS test statistic	LM-Stat	Remarks
AGF	-5.459991	-1.952473	0.285957	0.463000	I(1)
CIT	-4.904649	-1.952066	0.145983	0.463000	I(1)

Authors Commutation (2024)

Dickey-Fuller GLS and KPSS unit Test result in Table 4 shows that the ERS DF-GLS test statistic of Agricultural Funding (AGF) and Company Income Tax (CIT), are all significantly higher than their respective critical values at the 5% significance level while the KPSS test statistics are all significantly lower than their respective LM-Statistics. This indicates the presence of unit that and stationary at first difference I(1). The finding shows that the AGF model has a long run relationship.

4.3 Co-Integration Test

Following the findings above that the comprised of I (1) series only, The study utilises the Johansen and Juselius (1990) maximum likelihood framework. This implies that there exists a stable and enduring relationship or balance between the variables over an extended period of time. The stationarity test examines the long-term connection (co-integration) between the variables. The essence of this statement is that if, over a significant period of time, two or more sets of data exhibit a strong correlation, regardless of whether the data sets themselves have a clear trend, the discrepancy between them remains consistent. In theory, they have the potential to move an unlimited distance apart from one another. According to Johansen & Julius (1990), obtaining a result in this test is equivalent to devising a process that maximises the likelihood of the test.

The results of the co-integration test in Table 5 consistently show that there are up to three co-integrating equations among the variables. This is supported by the fact that the Trace statistics exceed their critical levels at each step up to "At most 2". The Max-Eigen statistics provide strong evidence for the presence of one to two co-integrating links, since they corroborate co-integration up to a maximum of "At most 1". These findings suggest that there are important and stable links among the variables being studied, which are essential for comprehending their linked changes throughout time.

4.4 Lag Length Criteria

The VAR lag length criteria result in Table 6 shows that the maximum lag length selected by all the information criteria depicts optimal lag length of one (1). Therefore, lag length one (1) was used for the purpose of our estimation.

Table 5. Johansen-Juselius maximum likelihood co-integration test results

Hypothesized No. of CE(s)	Trace Statistic	0.05 Critical Value	Max-Eigen Statistic	0.05 Critical Value
None *	68.53058	47.85613	35.02648	27.58434
At most 1 *	33.50410	29.79707	16.48377	21.13162
At most 2 *	17.02034	15.49471	13.55369	14.26460
At most 3	3.466651	3.841465	3.466651	3.841465

Trace test indicates 3 cointegrating equation(s) at the 0.05 level
** denotes rejection of the hypothesis at the 0.05 level*
***MacKinnon-Haug-Michelis (1999) p-values*

Table 6. VAR lag order selection criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-41.64346	NA	0.000246	3.042897	3.229724	3.102665
1	20.14025	102.9729*	1.18e-05*	-0.009350*	0.924781*	0.289487*
2	35.26005	21.16771	1.33e-05	0.049330	1.730767	0.587236
3	43.70920	9.575703	2.61e-05	0.552720	2.981462	1.329696

** indicates lag order selected by the criterion*

4.5 Test of Hypotheses

Corporate income tax has no noticeable impact on public investment in the agricultural sector: The Fully Modified OLS result of corporate income tax (LCIT) was found to be positive and statistically significant effect on public investment in the agricultural sector in Nigeria. The coefficient of LCIT (0.643194) was an indication that holding other variables constant, a 1 per cent increase in Company Income Tax (LCIT), would lead to 0.64 percent increases in public investment in Nigeria. The p=0.0012< 0.05 indicated that the null hypothesis of no significant effect was rejected and concluded that corporate income tax has a noticeable impact on public investment in the agricultural sector in Nigeria.

4.6 Fully Modified Ordinary Least Square (FMOLS)

The study utilises the Fully Modified OLS regression method due to the non-stationarity of the variables and their cointegration. FMOLS also tackles the problem of endogeneity, ensuring reliable estimates of long-run parameters even when there are biases present. The FMOLS method is effective since it accounts for serial correlation and provides reliable estimates of standard errors. The outcome is displayed in Table 7.

The Fully Modified Ordinary Least Squares (FMOLS) estimation results presented in Table 7 provide crucial insights into the relationship between agricultural funding and corporate income tax variable (CIT). The analysis reveals the effects of corporate income tax type on agricultural funding, carrying significant policy implications.

The corporate income tax (CIT) coefficient is 0.643194, with a p-value of 0.0012. The standard error is 0.179190 and the t-statistic is 3.589441. The likelihood value indicates that this link is statistically significant at a significance level of 1%. The positive coefficient suggests that there is a direct relationship between a rise in CIT and an increase in agricultural financing. A 1 percent rise in corporate income tax is projected to lead to a 0.64 percent increase in agricultural funding, on average. This discovery implies that increased corporate tax revenues can strengthen the government's capacity to commit additional resources to the agricultural sector, therefore promoting programmes for agricultural expansion, innovation, and sustainability.

On the other hand, the notable favourable impact of corporate income tax on agricultural finance emphasises the potential advantages of enhancing corporation tax systems. Increased corporate tax income can serve as a reliable and long-lasting financing source for agricultural initiatives, promoting growth and advancement in the industry. To optimise the beneficial effects on agriculture, policymakers should prioritise enhancing tax collecting methods and guaranteeing effective distribution of business tax funds. Furthermore, the R-squared value of 0.681190 suggests that around 68.1% of the variation in agricultural funding can be accounted for by the model. The adjusted R-squared value of 0.647032, which accounts for the number of predictors, indicates a good fit.

Overall, the study highlights the importance of adopting a smart tax policy that prioritises agricultural finance while effectively balancing the needs of other industries. Policymakers may enhance their fiscal plans to support sustainable agricultural growth and economic stability by comprehending and resolving the distinct impacts of various tax categories on agricultural funding.

4.7 Granger Causality Tests

A Granger causality test, developed by Granger and Newbold in the 1960s, was performed to establish the causal relationship between

agricultural funding and economic growth. The Table 7 displays the outcome of the granger causality analysis.

4.8 Post Estimation Test

Post estimation was also conducted to determine the reliability of the study. A coefficient diagnostic test using Wald coefficient and residual diagnostics test using histogram were conducted to ensure that the model explanatory variables are not colinear and from a normal distribution. The result in presented in Table 8.

The Wald test result in Table 8 shows the test statistic measures the difference between the estimated coefficient values and the hypothesized null values under the null hypothesis. The F-statistic measures the overall significance of the model with respect to the coefficients in the model. The reported F-statistic value of 13.58295 with degrees of freedom (2, 28) indicates that the model is statistically significant at a very high level ($p < 0.001$). The Chi-square statistic measures the goodness-of-fit of the model to the data. The reported Chi-square value of 27.16591 with 2 degrees of freedom indicates that the model fits the data very well ($p < 0.001$). From the finding, it is evident that there is a joint signifcant effect of Taxes on agricultural funding in Nigeria.

Table 7. Fully Modified OLS(FMOLS) Estimates: Dep.Var: Agric Funding

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LPPT	-0.763706	0.340908	-2.240211	0.0332
LCIT	0.643194	0.179190	3.589441	0.0012
LCGT	0.414825	0.321488	1.290330	0.2075
C	-0.113539	1.717999	-0.066088	0.9478
R-squared	0.681190	Mean dependent var		1.119436
Adjusted R-squared	0.647032	S.D. dependent var		0.714057
S.E. of regression	0.424229	Sum squared resid		5.039168
Long-run variance	0.265939			

Source: Authors computation, (2024)

Table 8. Wald test result

Test Statistic	Value	Df	Probability
F-statistic	13.58295	(2, 28)	0.0001
Chi-square	27.16591	2	0.0000
Null Hypothesis: C(1)=0, C(3)=2*C(4)			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
C(1)		-0.763706	0.340908
C(3) - 2*C(4)		0.641904	3.439714

Source: Authors computation (2024)

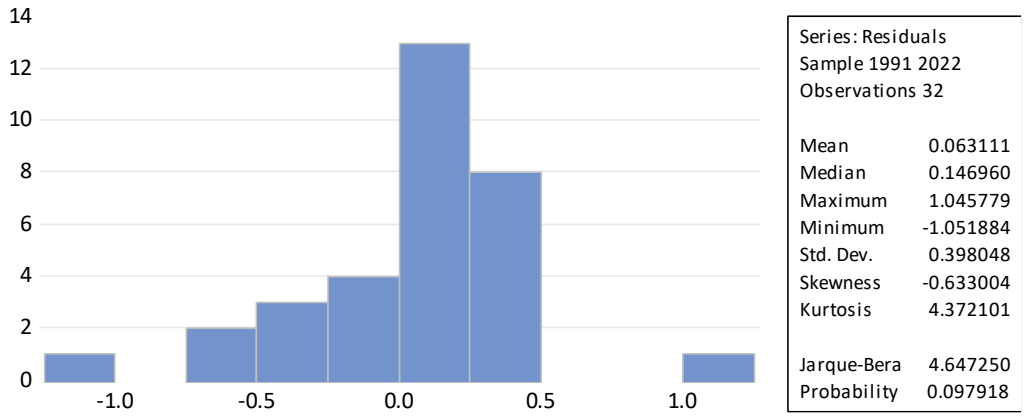

Fig. 4. Showing the result of the normality test

4.9 Normality Test

From histogram results in Fig. 4, the probability value of Jarque-Bera statistics is 0. 097918. This shows that the data generating process of the model is normally distribution because the probability value is greater than 5 percent level.

5. DISCUSSION OF FINDINGS

The tests were aimed at examining the effect of corporate income taxes on public investment in agricultural sector in Nigeria. Pre-estimation checks were applied to ensure the reliability of the result. More importantly, the parameters estimate, and the estimated times series regression was done to meet the assumptions of FMOLS. The explanatory variables explained about 68% of the variation in the dependent variable in the model. The whole model was found to be statistically significant. That is, the explanatory variables improve the model fit and from the findings, direct taxes have a signifcant effect on public investment in Nigeria.

Analysis of hypothesis one shows that corporate income tax has noticeable impact on public investment in the agricultural sector in Nigeria.

The finding may be attributed to the fact that corporate income tax (CIT) is a substantial contributor to government revenue. Increased collection of corporate income tax (CIT) by the government results in a greater pool of financial resources that may be allocated to different sectors, such as agriculture. The analysis suggests that the government's capacity to allocate more tax revenues towards public investment initiatives in the agriculture sector is responsible for the observed favourable effects. This investment encompasses many measures, such as infrastructure development, subsidies, research and development, and other activities, with the goal of enhancing agricultural production and sustainability. Ultimately, these measures will have positive impacts on both farmers and consumers [40]. Another possible factor might be the Nigerian government's emphasis on prioritising agricultural development. In light of the significance of agriculture in terms of economic growth, food security, and employment, the government may have deliberately designated a portion of the corporate income tax proceeds to support this sector. Proper allocation and optimal utilisation of these monies can result in significant enhancements in agricultural infrastructure, adoption of technology, and support services, hence improving the overall performance of the sector [41]. This specific investment is in line with wider economic strategies that aim to diversify the economy and decrease reliance on oil earnings, therefore promoting sustainable growth in agriculture [42].

Overall, the significant positive effect of corporate income tax (CIT) on public investment in Nigeria's agricultural sector can be attributed to two main factors. Firstly, the increased government revenue from CIT provides the government with more funds to invest in agriculture. Secondly, the government strategically prioritises agricultural development by effectively allocating these resources to support the growth and sustainability of the sector.

This is consistent with the research conducted by Stoilova [43], which analysed the influence of total tax revenue and tax structure on economic development in eleven European Union member states. Stoilova discovered a positive correlation between total tax revenue and economic development, indicating that effective distribution of tax money might provide assistance to other sectors, such as agriculture. The correlation between corporate income tax (CIT), and economic growth in various European Union (EU) nations is similar to the situation in Nigeria. In Nigeria, the increased revenue from CIT allows for significant public investment in the agricultural sector [43]. An important factor is the augmented government income derived from corporate income tax (CIT), which supplies the government with additional financial resources to deploy towards public investment projects in agriculture. These investments may involve the creation of infrastructure, the provision of subsidies, research, and development, all with the goal of increasing agricultural production and sustainability.

The finding is also reinforced by the research carried out by Hassan, Henry, and Ajidani [44], which analysed the influence of agricultural investment on the economic advancement of Nigeria. Their research uncovered a correlation between crop production and investment in agriculture, highlighting the necessity of continuous investment in the industry to attain enduring economic stability. These findings indicate that directing financial resources into agriculture by utilising revenues earned from corporate income tax (CIT) can result in long-

term economic development and decrease reliance on imported food, hence enhancing food security and economic stability [8]. A further crucial aspect is the deliberate ranking of agricultural development as a strategic priority by the Nigerian government. In light of the significance of agriculture in driving economic growth, ensuring food security, and generating job opportunities, the government may choose to dedicate a proportion of the corporate income tax proceeds to support this sector. Proper distribution and optimal use of these funds result in significant enhancements in agricultural infrastructure, the adoption of technology, and the provision of support services, hence improving the overall performance of the sector.

6. SUMMARY, CONCLUSION AND RECOMMENDATION

6.1 Summary of Findings

The primary objective of this study was to examine the impact of direct taxes on public investment agricultural sector in Nigeria. From the empirical findings, Corporate Income Tax (CIT) plays a crucial role in funding public investment in Nigeria's agriculture industry. Research repeatedly shows that the Comprehensive Income Tax (CIT) has a considerable and favourable effect, which is attributed to the tax's wide range of sources and regular collection of income. The monies generated by CIT (Corporate Income Tax) are vital for funding critical agricultural infrastructure, research projects, and programmes that aim to improve productivity and sustainability. The findings highlight the efficacy of CIT in mobilising resources for targeted development, reaffirming its position as a dependable financial provider for agricultural expansion [45-50]. The findings highlight the efficiency of CIT in mobilising resources for sector-specific development, reaffirming its significance as a dependable funding source for agricultural growth, especially in emerging regions.

To summarise, well-designed taxation policies, are essential for funding public investment in Nigeria's agricultural industry. These taxes are crucial for providing necessary funds for infrastructure, research, and development projects that aim to enhance sectors productivity and sustainability. Nevertheless, there are ongoing difficulties in maximising tax income, for agricultural objectives. To overcome these difficulties, Nigeria can boost its agricultural sector, ensure food security, and promote sustainable economic growth by implementing better fiscal management and focused policy measures.

6.2 Conclusion

The study investigates the effects of corporate income tax (CIT), on public investment in Nigeria's agricultural industry, emphasising the specific roles and consequences of corporate income tax (CIT). The corporate income tax continuously plays a crucial role in stimulating public investment in agriculture. Research suggests that CIT's extensive scope and consistent methods of collecting income offer a dependable means of supporting essential agricultural infrastructure, research, and development projects. This tax is crucial in funding programmes that aim to improve agricultural production and sustainability, therefore supporting the expansion of the industry and the resilience of the economy.

To promote sustainable agricultural development in Nigeria, it is necessary to enhance the efficiency of corporate income tax (CIT) policies, through enhanced revenue mobilisation and targeted allocation techniques. Policymakers should prioritise the efficient allocation of tax resources to achieve the highest possible impact on agricultural production, enhance food security, and promote equitable economic growth. Nigeria can enhance its agricultural sector, promote economic stability, and satisfy the changing requirements of its population by effectively tackling these difficulties and utilising taxes as a strategic instrument.

6.3 Recommendations

Based on the findings regarding the impact of taxes on public investment in Nigeria's agricultural sector, here are three concise recommendations:

1. Government should improve the efficiency of allocating Corporate Income Tax (CIT) revenues to prioritize agricultural infrastructure, research, and development projects. This ensures that CIT funds directly contribute to enhancing agricultural productivity and sustainability.
2. It is important that the government strengthen Fiscal Management: Implement robust fiscal management practices to ensure transparent and accountable

utilization of tax revenues in the agricultural sector. Enhance monitoring mechanisms to track the impact of tax-funded projects on sectoral outcomes.

3. Collaboration between government agencies, agricultural stakeholders, and the private sector should be encouraged to identify and address challenges in tax revenue utilization. Encourage dialogue and partnerships to leverage expertise and resources for sustainable agricultural development.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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