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Acceleration, Deceleration and Stagnation of Agricultural Investments and Productivity in Nigeria (1981 – 2020)

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Abstract

This study examines the acceleration, deceleration and stagnation of agricultural investments (public and private) and agricultural productivity in Nigeria. Data were obtained for the period 1981 to 2020 and analysed using exponential time series function and the quadratic time trend model. The obtained result showed that FDI growth rate for the period was 13.24%, public investment in agriculture (26.95%) and private sector investment in agriculture (20.32%), whereas, agricultural productivity declined by 0.78%. Further results showed that there was acceleration in growth of public and private sectors' investment in agriculture while FDI in agriculture and agricultural productivity stagnated. It was concluded that increased investments in agriculture has not improved the productivity of agriculture in Nigeria. Therefore, investments should focus on agricultural technologies in order to maximize the yield per input.

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Introduction

Agricultural investment plays a salient role in poverty reduction and extreme hunger eradication witnessed among the very poor. Investment in agriculture is expected to increase and improve employment for the poor who are the majority of the farm labour workforce, . What is more, it increases their productivity and raises their incomes. The low productivity and poor development of the agricultural sector in developing countries is attributed to the insufficient investment in the sector (UNCTAD, 2015; Liu, 2014; Fowowe, 2020). Olomola and Nwafor (2018) attributed low productivity to insufficient and inefficient extension services, the low level of adoption of improved technologies, poor-quality inputs and the inefficient input distribution system, ineffective and inadequate mechanization and irrigation facilities, poor access to credit, poorly managed soil fertility profile and aging farm population. With the problem of hunger, food insecurity and rising food prices and ever-increasing population, increasing the productivity of agriculture is imperative for the country to achieve sustainability in food production. In the past two decades, several administrations of the government of Nigeria have made efforts to attract FDI to the country. These efforts have yielded to the large inflow of large proportion of foreign capital in to Nigeria viz-a-viz other countries in the African continent (Bashir and Sunkanmi, 2015). The United Nations Conference on Trade and Development reported that in 2021, Nigeria's FDI doubled to $4.8 billion, the largest in West Africa (UNCTAD, 2022). Notwithstanding the FDI inflows, investment in the agricultural sector has remained low and it is of great concern that the sector that feeds over 170 million people and contributes significantly to the yearly GDP is given little attention.

Given that government expenditure acts as a complement to private investment, we expect that an increase in government expenditure will enhance growth in production especially in the agricultural sector. This is because agriculture draws from investments such as roads, electricity, land improvement, irrigation, Research and Development (R&D) to improve its performance. The problem of efficiency of government expenditure in the agricultural sector depends on the kind, size and the timing of expenditure. Despite the relative rise in government expenditure in the agricultural sector in Nigeria over time, there are still public outcries over low agricultural production and productivity in Nigeria. For instance, the contribution of agriculture to Nigeria's GDP decreased from 41.2% in 1970 to 21.4% in 2018 (CBN, 2019). The lack of synergy between public and private expenditure in promoting agricultural production is a major drawback to agricultural development in Nigeria (Ewubare and Eyitope, 2015; Chikezie et al., 2020; Tahir, 2022).

Farmers' investment decisions are largely influenced by the investment climate within which they operate. Given that many farmers, notwithstanding the unfavourable

and unsupportive business environment, make investments especially in the areas they feel are safe, it is however certain that farmers invest more in conducive investment climates, and their investments are more likely to have socially and economically beneficial outcomes (FAO, 2012; Zhang et al., 2015). It is also a fact that government policies and investment expenditure in agriculture especially in research, agricultural extension and training, agricultural marketing, input supplies and subsidies, irrigation, crop and livestock development, creates the enabling environment for greater private sector participation and investment. However, the total government expenditure on agriculture has been too low to support significant transformation and the development of the country's agriculture (Mogues et al., 2008; Nosike and Ihugba, 2019). The annual budgetary allocation to agriculture has been fairly low (never up to 5%) even after the Maputo Declaration of 2003 in Mozambique, where it was agreed on Comprehensive Africa Agriculture Development Programme (CAADP) that at least 10% of national budgetary resources should be spent on agricultural and rural development. This situation is largely responsible for the underdevelopment of the agricultural sector in Nigeria since the government is consciously not providing the enabling environment that would attract both local and foreign investors in agriculture.

The objectives of this research were to:

i) examine the growth rates of agricultural investments and agricultural productivity in Nigeria; and

ii) ascertain the presence of acceleration, deceleration or stagnation in growth of agricultural investments and agricultural productivity in Nigeria.

Literature review

Foreign direct investment

The world economy has witnessed firms owning investments and/or operating in other countries beyond the country of origin. Such firms are viewed as foreign investors, and their investments beyond their domestic shores are referred to as foreign investments. FDI as a concept has been viewed from many perspectives – capital, management, technology and know-how. IMF (1993) in its Balance of Payment Manual defined FDI as "the category of international investment that reflects the objective of a resident entity in one economy obtaining a lasting interest in an enterprise resident in another economy". The resident entity represents the investor while the enterprise is known as the investment or enterprise. Direct investment refers to capital provided directly to the investment enterprise through related enterprises, by an investor and/or capital received directly from the investor to the direct investment enterprise. Todaro and Smith (2011), and Dass and Jamal (2018) defined direct investment as the private multinational corporations' overseas equity investments. The multinational corporations are business entities that conduct their business activities in more than one country. A great number of these multinationals are based in countries

with high incomes in Europe and America. However, some Asian countries such as China, Japan and Korea have joined the league of multinationals.

Also, the Organization for Economic Cooperation and Development and Statistical Office of the European Union categorized FDI as a cross-border investment made by a resident in one economy (the direct investor) with the ultimate intention of establishing a lasting interest in an enterprise (the direct investment enterprise) that is resident in an economy other than that of the direct investor (OECD, 2008; Eurostat, 2017). However, there is a succinct but comprehensive definition of foreign direct investment enterprise to be either "the (unincorporated) branch of a non-resident corporate or unincorporated enterprise (treated as a quasi-corporation) or a corporation in which at least one foreign investor (which may, or may not, be another corporation) owns sufficient shares to have an effective voice in its management" (EC et al., 2009). The main reason countries seek FDI is to make up for the shortages in savings, management and foreign exchange (Jhingan, 2001; Todaro and Smith, 2011). Through FDI, the host country generates revenue for development projects, by taxing the income of the MNCs. In this regard it is considered that FDI is socially desired because it leads to a net increase in capital formation, output and employment (Moses et al., 2013; Demir and Lee, 2022).

Government investment in agriculture

Public investment refers to investments by the government. It is the money spent by the government or state on public goods and services such as railway, roads, electricity, portable water, education, health, etc. It is defined as the gross fixed capital formation of the government in the areas of social security, construction of buildings, means of transportation, information Technology infrastructure, ammunitions, etc. (National Bank of Belgium, 2017). It is regarded that only investments which are directly financed by the government's budget can be classified as public investment, since some private organizations also invest in public infrastructure (Välilä and Mehrotra, 2005; United Nations, 2009; Funke et al., 2013). Government investment in agriculture, amongst others, is seen in areas of irrigation and flood control (Dhas, 2009; Mazibuko et al., 2021). The aim of such expenditure by the government is to provide for its citizens and residents the basic resources and infrastructure which the private sector does not have the capability to deliver, improve the living standards of the people, improve the working environment, and encourage the nature, size and type of private investments in the economy. By devoting resources to the country's needs of physical infrastructure (such as roads, bridges, railways, portable water, airport), innovations, clean energy sources and education, the government (federal, state and local) builds and boosts the country's capital stock (Bivens, 2012; McNichol, 2019). Public investment has been identified as a virile catalyst that facilitates better economic growth. Through the provision of infrastructure hubs such as airports, seaports and networks which support telecommunications, transport and electricity production and transmission, public investment connects citizens and firms to economic opportunities for increased output (IMF, 2015). One important point to note is that the

benefits of government's investment in one sector impacts significantly other sectors as access to the public assets are not usually restricted.

Private sector investment in agriculture

The private sector represents all profit-oriented businesses, which are not owned and operated by the government. Notwithstanding the size, structure and ownership, the private agricultural sector encompasses the food, agriculture, marketing, financing and insurance sub-sectors. FAO defines the private sector as encompassing the farmer organizations, cooperatives, small and medium-size enterprises, large enterprises, private financial institutions, industry, trade associations and the huge international corporations (Graziano da Silva, 2019), which are involved in both production and consumption. However, the most important private sector comprises the producers and related private agribusiness enterprises (FAO, 2000; GAP, 2018). These sets of people usually commit their resources (sometimes on a long-term basis) to assets which are engaged in production.

Agricultural productivity

Agricultural productivity may be defined as the index of the ratio of the value of total farm output to the value of the total inputs used in farm production (Olayide and Heady, 1982; Capalbo and Antle, 2015). The basic concept in productivity measurement is total factor productivity (TFP), the ratio of an index of aggregate output to an index of aggregate input. Aggregate Agricultural Productivity or Total Factor Productivity (TFP) is given by:

$$Total\ FactorProductivity\ (TFP) = \frac{\text{total value of output}}{\text{total value of inputs}} \quad \ldots 1$$

Two approaches to TFP measurement or estimation have been identified in literature. These are:

the growth accounting (index number) approach, and

the econometric approach

The growth accounting approach involves compiling detailed accounts of inputs and outputs, aggregating them into input and output indices, and using the indices to calculate TFP index. According to Capalbo and Antle (2015), the index number calculations can be used when econometric models are infeasible. The econometric approach to productivity measurement is based on econometric estimation of the production technology, and production change and technology change are synonymous. In using the econometric approach, the production function may be specified in the Cobb-Douglas form with a constant exponential rate of extended Hick-neutral technological change. The equation is specified as:

$$Q_t = A_t X_{it}^{ai} \ldots X_{nt}^{an} \quad \ldots 2$$

Where $A_t = e^{aot}$ ... 3

Thus, the measured rate of productivity growth under constant returns to scale is:

$$\text{TFP} = \frac{\partial L_n A_t}{\partial_t} = a_0 \quad \ldots 4$$

The translog model also can be used to measure changes in TFP in a manner analogous to the Cobb-Douglas model by adding a time trend to the translog model thus:

$$LnQ = Lna_0 + \sum_i a_{i0} LnX_i + 0.5 \sum_i \sum_j a_{ij}(LnX_i)(LnX_j) + \beta_0 t + 0.5\beta_1 t^2 + t \sum_i \gamma LnX_i \quad \ldots 5$$

Where $\gamma_i = 0$ for all i (known as the Hicks neutrality).
The time trend variable (t) in this study is the period represented by 1981 – 2020.

The objectives of productivity measurement include tracing the change in technology, examining the technical efficiency (optimum allocation of resources), real cost saving, benchmarking the production process and living standards (OECD, 2001; Diewert and Lawrence, 1999). Efforts to increase the productivity of a system must focus on increasing the output produced using the same level of input (output-cantered productivity (United States Bureau of Labour Statistics, 2020), maintaining the same level of output using lesser input (cost-oriented productivity), or a combination of both (generating the maximum output with every unit increase in the input).

Theory of agricultural development – the high pay-off input model

T. W. Schultz in 1964 was the first scholar to contribute to the high pay-off input model, stemming from the inefficiency of the diffusion model to move agricultural technology from the most productive countries to the less productive during the 1960s. The theory's position is that farmers in these lagging areas are rational but their exposure to economic and technical knowledge is limited. He argued that the key to transforming the traditional sector agriculture into productive entity is investment to make modern high-pay off inputs available to farmers in these less developed countries. This model was premised on the assumptions that public and private sector research institutions have the capacity to produce new technical knowledge; the industrial sector has the capacity to develop, produce and market new technical inputs; and farmers have the capacity to acquire new knowledge and use new inputs effectively.

The theory emphasized that the development and propagation of new inputs can be accelerated through investment in research. This process leads to increase in productivity in resource use especially among the poor farmers and developing countries that may not possess all the necessary resources to actualize agricultural development. It was however noted that though the public sector performed poorly in its various functions towards agricultural development, it constantly limited the private engagement in the production and marketing of new technical inputs (Ruttan, 1987). However, when a continuous stream of new biological and mechanical technology becomes available, the returns to the

acquisition of new skills in production and marketing are driven up. This model found its typical application in Africa and Nigeria, and it forms the basis for the establishment of research institutes and the high demand of foreign capital for investments. The high pay-off input model was widely accepted and it led to the proliferation of studies reporting high rates of returns to public investment in agricultural research (Udemezue and Osegbue, 2018).

Theory of productivity of capital

Capital productivity shows how efficiently capital is used to generate output, and the joint influence of labour input per unit of capital used (OECD, 2015). The neoclassical theory of economic growth suggests that capital inflows increase output because foreign financial capital is transformed into physical capital and increases output in the recipient countries (Chatterjee and Naknoi, 2009). This is the first line of argument in favour of FDI, because it is believed that capital (which is usually a limiting factor in production) inflow increases the capital stock of the receiving country, which is used for further production. This theory assumes that imported investment goods such as machinery occupy a small share in the aggregate investment expenditure, and suggests that prices of investment goods are largely driven by fluctuations of price of non-traded investment goods such as structure; the price of investment goods relative to output is volatile particularly in developing countries; and fluctuations in the price of investment goods relative to output is largely driven by the price of investment goods, not the price of output. The price of capital goods relative to consumption is reported to be higher in poor countries, and this was considered to be fundamental when explaining the lower investment rates, living standards and growth in these economies (Lian et al., 2019). One factor that affects the price of investment good is the inflationary trend in a country as it was noted that the price of capital goods aligns with the trend of inflation (Zhang et al., 2019). The price of a capital good is also affected by a country's efficiency in the production of machinery and equipment which forms its capital stock. For countries that import a significant part of their capital, the prices of the machinery and equipment is determined by the prices that international suppliers charge for these goods, import tariffs, custom regulations, time and cost associated with logistics of importing, investment tax credits, subsidies, etc. (Lian et al., 2019).

Empirical review

In Nigeria, despite the fact that over the years government has played a key role in the provision of capital resources and financial incentives for the agricultural sector (Udoka et al., 2016), the total expenditure on agriculture has been fluctuating and consistently low – quite distanced from the FAO's 2008 recommendation that governments of developing economies should allocate about 25% of its annual budget to the agricultural sector. Meanwhile, the African Union Assembly of Heads of State and their Ministers for Agriculture had, in July 2003, in a Comprehensive Africa Agriculture Development Programme (CAADP) of the New Partnership for Africa's Development (NEPAD), made Declaration on Agriculture and Food

Security in Africa (popularly known as Maputo Declaration) that within the following five years, the Heads of State and Government should adopt sound policies for agricultural and rural development, and commit themselves to allocating at least 10% of national budgetary resources for their implementation (FAO, 2004). Notwithstanding that the 10% allocation as endorsed in Maputo may be considered low and inappropriate for every country because of their various agricultural needs for development (World Bank, 2008), it serves as a minimum benchmark to demonstrate the commitment of the leaders towards agricultural development in their countries and in Africa.

Public expenditure in agriculture has been low in most developing countries, especially in Africa, where it has been below 7 per cent of the yearly budgetary allocations (Hallam, 2011). Despite the Maputo agreement, is it seen that the government of Nigeria has consistently shown lack of commitment to invest in the agricultural sector (Osabohien et al., 2020). For instance, following the trend for the years 1986-1993, 1994-1998 and 1999-2005, the total expenditure on agriculture, as percentages of overall expenditure, fluctuated from 4.57% to 4.51%, and to 3.53% respectively, while the capital expenditure on agriculture declined from an annual average of 4.33 % per annum (between 1986-1993) to 2.37 % per annum (between 1999-2005) (Udoh, 2011). The reduction in expenditure reflects the government's intensified efforts to reduce its size and functioning of the agricultural sector and retard its development. Between 2001 and 2005 the average total share of agriculture in the budget was 1.78% while the actual expenditure was 1.67%, with an average annual reduction of 22.2% between the budgeted amount and the actual expenditure. Meanwhile, capital allocation to agriculture in Nigeria was an average of 4.74% from 1970-1980. But it rose to 7.0% from 1980-2000, and further rose to 10% from 2001- 2007, but the increases still fall short of Food and Agricultural organization recommendation that 25 per cent of government capital budget be assigned to the agricultural development capital budget (FAO, 2008).

Several reports state that government spending on agriculture in sub-Saharan Africa lags behind other regions, and the effectiveness of the expenditures are further reduced by subsidy programs and transfers that tend to benefit elites to the detriment of poor people and the agricultural sector itself (World Bank, 2017). For instance, for the decade 1991-2000, the total agricultural expenditure as a percentage of total government spending for countries in Africa was as follows: Nigeria (0.74), Cote d'Ivoire (1.46), Togo (1.78), Cameroon (2.01), Ghana (2.57) respectively; Morocco (3.29), Tunisia (5.76), Ethiopia (6.55), Egypt (6.85) respectively; and Zimbabwe (1.70), Botswana (4.29), Zambia (5.08) respectively.

Methodology

This study employed time series data spanning from 1981 to 2020. Data were sourced from the Central Bank of Nigeria (CBN) publications, National Bureau of Statistics, FAOSTAT, Food and Agriculture Organization and The World Bank Development Reports

and Indicators. Data obtained were analyzed using the exponential time series function adopted from Onyenweaku and Okoye (2005), Okoye et al. (2006) and Akpaeti et al. (2014).

The exponential time series function is specified as follows:

$Y = b_0 e^{bt}$ ... 6

When linearized in logarithm, equation 6 becomes

$lnY_{it} = b_0 + b_1 t + u_t$ ... 7

Where,

Y_{it} = FDI

b_0 = intercept

b_1 = slope coefficient

t = Time trend variable (1 – 40 years)

Hence,

$\ln FDI_t = b_0 + b_1 t + \mu_i$ ... 8

For the other endogenous variables (IF, IR, GIA, and PIA), we have:

$\ln GIA_t = bo + b_1 t + \mu_i$ ... 9

$\ln PIA_t = bo + b_1 t + \mu_i$ ... 10

$\ln TFPA_t = bo + b_1 t + \mu_i$ ... 11

Where,

FDI_t = Foreign Direct Investment (₦billion)

GIA_t = Government Investment in Agriculture in year t (totalgovernmentexpenditure on agriculture in ₦billion)

PIA_t = Private Investment in Agriculture (proxied by total volume of credit to agricultural sector by the commercial banks ₦billion).

$\ln TFPA_t$ =Total Factor Productivity of Agriculture (index)

t = Trend variable (1 – 40 years representing 1981 – 2020)

b_0 and b_1 =Parameters estimated.

ln = Natural logarithm

μ_t = error term

The coefficients from equation 8 to 11 were used to derive the growth rate (r) of FDI, GIA, PIA and TFPA as specified by Onyenweaku and Okoye (2005) and Demenongu et al. (2014) as follows:

$$r = (e^b - 1)\ X\frac{100}{1} \quad \text{... 12}$$

Where e is Euler's exponential constant (2.71828).

A positive r value indicates growth (i.e. increase in annual value) while a negative r value indicates reduction in annual value (negative growth).

Acceleration, deceleration and stagnation in FDI, government investment in agriculture, private sector investment in agriculture, and productivity of agriculture were tested using the quadratic equation in time variables which were fitted to the data as specified by Onyenweaku (2004) and Demenongu et al. (2014). The quadratic trend model was fitted as;

$$\ln FDI_t = b_0 + b_1 t + b_2 t^2 + \mu_i \quad \ldots 13$$
$$\ln GIA_t = b_0 + b_1 t + b_2 t^2 + \mu_i \quad \ldots 14$$
$$\ln PIA_t = b_0 + b_1 t + b_2 t^2 + \mu_i \quad \ldots 15$$
$$\ln TFPA_t = b_0 + b_1 t + b_2 t^2 + \mu_i \quad \ldots 16$$

Where,

t^2 = Squared trend variable (t = 1, 2, 3, …, 40)

b_2= Parameter to be estimated

In the above specification, the linear and quadratic time variables gave the secular path in the dependent variable. The quadratic time variable t2 allowed for the possibility of acceleration, deceleration or stagnation in growth during the period under study. A significant positive value of the coefficient of t2 confirms acceleration in growth, significant negative value of t2 confirms deceleration in growth, while non-significant coefficient of t2 implied stagnation or absence of either acceleration or deceleration in the growth process for the period under study.

Results and discussion

From Table 1, the mean of the major variable of this study were recorded as follows: FDI ($4,803.76m), GIA (N19.40b), PIA (N160.98b) and TFPA (0.12). The low mean TFPA value shows that the technological progress observed in the Nigerian agriculture is very low within the four decades studied. This therefore implies that there has not been a major shift or advancement in technology within the period and this has been the bane of agricultural transformation and advancement in Nigeria.

Table 1. Descriptive statistics for FDI, GIA, PIA and TFPA

	FDI ($m)	GIA (₦b)	PIA (₦b)	TFPA (index)
Mean	4803.775	19.39816	160.9836	0.11796
Median	1905.915	7.300950	44.79520	0.13797
Maximum	33824.40	76.60099	1049.678	0.61180
Minimum	127.3300	0.012770	0.590600	-0.73362
Std. Dev.	7419.916	23.23570	248.0323	0.27096

Skewness	2.614934	0.971195	1.891935	-1.00613
Kurtosis	9.878206	2.701295	6.044955	2.14755
Observations	40	40	40	40

Source: Authors' calculation

The correlation results in Table 2 shows that GIA had very strong positive association with PIA (0.8179 = 81.79% relationship). Therefore it is believed that government expenditure or investments in the agriculture sector highly motivated private investments, since it is the natural role of the government to create conducive investment climate for private sector investments. Strong positive correlations existed between FDI and GIA (49.79%), and FDI and PIA (47.32%). This result indicated that possibly, the foreign investors mirrored the investment options and patterns of domestic investments in the agriculture sector and sub-sectors in order to thrive. No relationship was established between TFPA (which represents technological progress in the agricultural sector) and FDI (-3.25%), GIA (-12.46%) and PIA (0.28%).

Table 2. Correlation Matrix for FDI, GIA, PIA and TFPA

Variables	FDI	GIA	PIA	TFPA
FDI	1	0.4979	0.4732	-0.0325
GIA	0.4979	1	0.8179	-0.1246
PIA	0.4732	0.8179	1	0.0028
TFPA	-0.0325	-0.1246	0.0028	1

Source: Authors' calculation

Table 3 showed the growth rates (r) of the variables. The growth rates (r) were computed using the exponential time series specified in equation 12, while the acceleration, deceleration or stagnation in growth rates with respect to time (t2) were estimated using the quadratic time variable equations of 13 to 16.

Table 3. Growth Rates of FDI, GIA, PIA and TFPA (1981 – 2020)

Variable	Coefficient	t-statistic	Probability	Growth Rate (r) (%)	R^2	F-Statistic
FDI						
Time (t)	138.5803	0.399198	0.6920	13.24	0.341110	9.577545
Time Square (t^2)	5.552725	0.676245	0.5031			
Constant	-1110.555	-0.359854	0.7210			
GIA						
Time (t)	-0.524535	-0.805020	0.4260	26.95	0.763295	59.65628
Time Square (t^2)	0.052994	3.438480***	0.0015			
Constant	0.819174	0.141419	0.8883			
PIA						
Time (t)	-27.46911	-6.379457	0.0000	20.32	0.909283	185.4306
Time Square (t^2)	1.081613	10.61994***	0.0000			
Constant	125.4273	3.276654	0.0023			
TFPA						
Time (t)	-0.032240	-2.009350	0.0518	-0.78	0.14855	3.227714
Time Square (t^2)	0.000595	1.569236	0.1251			
Constant	0.471244	3.304242	0.0021			

Source: Authors' calculation

From the results, there were observed positive annual growth rates in government investments, private sector investments and foreign direct investments at 26.95%, 20.32% and 13.24% respectively. Increased agricultural investments from these sectors resulted in an observed overall increase in the annual total agricultural output, and this corroborated with the findings (Mason-D'Croz et al., 2019). This provides justification for increased agricultural spending by the government and private investors.

It was also seen in Table 3 that the coefficients of t2 for PIA and GIA were positive and statistically significant at 1%. This confirmed the presence of acceleration in private and public sectors investment in the agricultural sector in Nigeria. This implied that over the period of the study, there was considerable and consistent increase in agricultural investment from both private sector and the government. Some authors observed that public and private investments in agriculture were capable of increasing the productivity of agriculture, increasing incomes from agriculture and reducing poverty (Eseyin et al., 2016; Benfica et al., 2018). The coefficients of t2 for FDI and TFPA were statistically insignificant. This confirmed the absence of acceleration or deceleration. In other words, the variables stagnated.

Conclusion

The results from this study showed that there has been increased investment in the agricultural sector through foreign direct investment, government investment and private sector investment, yet these investments have not translated into improved productivity of the sector. It is concluded therefore that these investments have not been targeted towards technology advancement. Poor or zero investment in technology translates into poor growth and declining productivity, as witnessed in Nigerian agriculture today.

Rather than continued investment in the traditional agricultural production methods, public and private sectors' investment should now focus on improved technologies such as precision agriculture, agri-biotechnology (eg. seed technology), vertical farming and automated farming systems which are known to increase yield per unit input. Since it is the responsibility of the government to provide an encouraging climate for investment, it can partner with the foreign investors on such technology transfer projects to provide the necessary training and financial support to the private sector for speedy adoption.

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