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Article · January 2017

DOI: 10.24001/ijels.2.6.10

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https://dx.doi.org/10.24001/ijels.2.6.10 *ISSN: 2456-7620*

Assessing the Performance of Cocoa and Oil-palm Production on Inclusive Growth in Nigeria[1]

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Abstract— *Over the years, cocoa and oil palm production have been one of the major market of export for international trade and a major source of economic growth in Nigeria. However,the production of cocoa and oil palm has been below expectation as a result of government diverting its attention to the oil and gas sector and consequent low attention in the agricultural sector. This study, therefore, examines the relationship between performance of cocoa and oil palm production on inclusive growth in Nigeria (1981- 2014). It employed Johansen co-integration test to determine the long run relationship between the performances of cocoa-oil palm production on inclusive growth in Nigeria, which is complemented with the Error Correction Mechanism (ECM). The results revealed that cocoa and oil palm production exact positive and significant effect on inclusive growth in both short and the long run. Thus, it is recommended that the Federal Government of Nigeria should invest in activities such as basic and applied agricultural research, agricultural extension and capacity building, irrigation development and agribusiness development that will promote agricultural production resulting in pro-poor growth.*

Keywords— Inclusive Growth, Cocoa, Oil palm, Agriculture.
JEL Codes— G18; O13; O15.

I. INTRODUCTION

Generally, the agricultural sector contributes to the development of an economy in four major ways namely: product contribution, factor contribution, market contribution and foreign exchange contribution. The sector has the potential to be the industrial and economic springboard from which a country's development can take off (Osabuohien, 2014). Indeed, more often than not, agricultural activities are usually concentrated in the rural areas where there is a critical need for rural transformation, redistribution, poverty alleviation and socio-economic development (Stewart, 2000). However, the impact of agriculture in maintaining sustainable inclusive economic growth has been a major subject of controversy in many researches.A close examination of the agricultural sector's contribution to the Nigeria economy shows that the sector employs about 75 percent of Nigeria's labour force, similar in most Sub-Saharan African economies (Philip, Nkonya, Pender & Oni, 2009; Osabohien, Osabuohien & Urhie, 2017). Also, agriculture is the major source of food and livelihood in Nigeria, making it a critical component of programmes that seek to alleviate poverty and attain food security (Osabohien, *et al*, 2017). However, since the 1970s the sector had witnessed significant fall in its productivity.

Inclusive growth on the other hand is broadly understood as growth that raises the pace of socio-economic progress and enlarges the size of the economy while creating conducive environment for investment and increasing productive employment opportunities (Ianchovichina & Lundstrom, 2009). Therefore, agriculture which possesses multi-dimensional effect on the economy can be a sustainable driver of inclusive growth in an agrarian and labour intensive country like Nigeria. Similarly, examining the initial role of the agricultural sector in Nigeria, the sector is seen to be an indispensable sector in establishing the framework for the country's economic growth.

Some studies on agriculture and economic growth in Nigeria concluded that the current poor performance of the sector was due to the advent of oil boom and the effect of trade liberalization on the economy (World Bank, 2008; Ukeje, 2003). Some school of

[1]***Acknowledgments***
The research draws insights from the Dissertation of Deborah E. Agene, Department of Economics & Development Studies, Covenant University, Ota, Nigeria. The comments received from the external examiner, faculty and participants in the Seminar held May 2017 where the first draft was presented are appreciated. The authors appreciate the supports from Covenant University Centre for Research, Innovation and Development (CUCRID). The views expressed are those of the authors'.

https://dx.doi.org/10.24001/ijels.2.6.10 *ISSN: 2456-7620*

thought rejects this argument; Aliyu (2001) asserted that public capital allocated to the agricultural sector during the pre-oil boom (1962-1974) were less than those of the post oil boom of 1975. Also, a number ofresearchers such as:Adofu, Abula and Agama(2012), Izuchukwu (2011), Udoh, Akpan and Effiong, (2011), Awokuse (2009), World Bank (2008), Ogundele and Okoruwa (2006), Adebayo (2006), Awotide (2004) among others examined various objectives such as effects of domestic savings, foreign direct investment on agricultural output and agricultural production as well as effect of agriculture on economic growth in Nigeria. However, these studies have not examined the isolated short and long run effects of cocoa and oil palm outputs on inclusive growth in Nigeria. Cocoa and oil palm are the two major drivers of crop production while crop productions substantially contribute not less than 70 percent of the agricultural outputs in the country.

In addition, few available empiricalstudies on inclusive growth did notcapture the three dimensions of inclusive growth, which this study brought to bear. This could have provided a more robust empirical finding on dynamics of inclusive growth. Therefore, in order to address this observed gap, this study incorporated the three core drivers of inclusive growth (that include:economic productivity, human capital development, and governance) into the analysis of coca-oil palm inclusive growth nexus. Consequently, the objective of this paper include an assessment of the trends of cocoa and oil palm production, determine the short and long run implications of cocoa and oil palm production on inclusive growth in Nigeria.This study consists of five sections, namely: the introductory section followed by literature review section which covers conceptual, theoretical and empirical review of the relationship between cocoa, oil palm production and inclusive growth components.The third section focuses on methodology, whichcovers the description of the data sources and techniques of analysis. The fourth section consists of analysis and discussion of findings while final section is the conclusion.

II. REVIEW OF LITERATURE

The Oil palm tree *(Elaesisguineensis*) belongs to the family *palmae* having 225 genera with over 2600 species is one of the most important economic crops in Nigeria. It was discovered thousands of years back in western Africa as a result of European merchants who traded with West Africa and purchased palm oil occasionally for use in Europe (Adeyemo, 2015).

The cocoa tree known as *Theobroma Cacao* belongs to the family *stericuliniacea*. Cocoa has its gene centre in the upper Amazon region of the South America from where it spread to different parts of the world (Amos, 2007). It is generally believed that cocoa cultivation in Nigeria started about 1879 when a local chief established a plantation at Bonny in the defunct Eastern Nigeria.

Inclusive growth has been described as output growth that is sustained over decades, which is broad-based across different economic sectors, creating productive employment opportunities for a great majority of the country's working age population, and reduces poverty (Ianchovichina&Lundstrom, 2012; The Commission on Growth and Development, 2008). Inclusive growth focuses on ways to raise the pace of growth by utilizing more fully parts of the labour force trapped in low-productivity activities or completely excluded from the growth process.

Olaiya (2016) examine the political economy of cocoa exports in Nigeria from 1970 to 2010. The study employed Ordinary Least Squares (OLS) analytical technique and subjective descriptive statistics such as tables, graph and trends. The study found that continued marginal decline in the aggregate output of cocoa attributes to low capacity building and utilisation for controlling the economic and ecological variables affecting cocoa producers. Likewise, Osarenren and Emokaro (2015) assessed the profitability of cocoa production under different management systems in Edo State Nigeria. A multistage sampling technique was used to select cocoa farmers in the study area. A well-structured questionnaire administered through interview schedules was used to collect data from the respondents. Data were analysed using descriptive statistics and budgeting analysis. They found that there is profitability from cocoa production irrespective of the type of government.

Another state level study by Alamu (2013) provide an analysis of the seedling subsidy policy and cocoa production in South-West Nigeria used data collected through interviews and questionnaire. The study employed both content and descriptive analytical techniques. The study found that 96 percent, 95 percent and 79 percent of the local governments in Osun, Ondo and Oyo state respectively are cultivating cocoa. Also, both Oyo and Ondo states had supplied more than one million seedlings while Osun supplied about 800,000 seedlings to their farmers every year since the launch of the seedling subsidy policy. In addition, Adefila (2013) evaluate the spatial effects of cocoa production on rural economy in Idanre-Ifedore area, Ondo State Nigeria. The study employed both secondary and primary data; primary data were generated from 80 randomly sampled households in the study area. Descriptive statistics such as mean and percentages, and analysis of variance (ANOVA) with and regression statistics were employed to analyse the data. The study found that socio-economic factor such as age of the cocoa farmer, their annual

https://dx.doi.org/10.24001/ijels.2.6.10 *ISSN: 2456-7620*

income, age of their cocoa farms and farm size had strong positive influence on cocoa production in the State. They found that the adoption of innovation among the oil palm farmers is quite low.

On palm oil, Adeyemo (2015) provide an analysis of the determinants of palm oil production in Nigeria. The study employed Augmented Dickey Fuller unit root test, Johansen Co-integration test and Error Correction Mechanism on secondary data coving 1971 to 2010. The study found that palm oil price and the exchange rate are the major determinants of agricultural productivity in the long-run while price of crude oil is the most important determinant of palm oil productivity in the short-run. Likewise, Ayinde*et al*. (2012) examine the impact of emerging innovations on palm oil production in Osun State, Nigeria. Their study employed data sourced through questionnaire administer to 100 oil palm farmers in the state. The study employed descriptive statistical, t-test analysis and the logistic regression model. Akpan, *et al*. (2012) established empirical relationship between agricultural productivity and some key macroeconomic variables in Nigeria. The short-run and long-run elasticity of the agricultural productivity with respect to some key macro-economic variables were determined using the techniques of co-integration and error correction model.More so, Ugwu (2009) conducted a studying assessing the problems and prospects of commercial small and medium scale cocoa and palm oil production in Cross River, Nigeria. The study employed primary and secondary data analysed with simple descriptive statistics. It found that though the farmers makes profit in the long run, they are challenged by restricted land for cultivation, high cost of starting nurseries and plantations, increase labour cost and unavailability of skilled and unskilled labour.

From the foregoing and to the best of the knowledge of the researcher, there is dearth of studies evaluating the roles of cocoa and oil palm in agriculturally driven inclusive growth in Nigeria. Thus, this paper provides an empiricalassessment of the relationship between cocoa-oil palm production with inclusive growth components such as employment, income and consumption in Nigeria economy.

III. METHODOLOGY

3.1 Theoretical Framework

The theoretical model in figure 1 exhibits the key drivers of inclusive growth in an economy are economic growth, human development and good governance. First and foremost, faster and sustainable economic growth is pre-requisite of inclusive growth (Elena & Susana, 2010). Perhaps this best explains why the emerging economies like Brazil, Russia, India, China and South Africa (BRICS) focus more on the accelerated economic growth in the last couple of decades. Economic growth should provide basic socio-economic amenities in the form of food security, health for all, education for all, electricity for all, access to all weather-good roads and safe drinking water (Asian Development Bank, 2013). Government should achieve administrative efficiency and should guarantee gender equity so that the trickle-down effect of the growth will actually materialise. Good governance and gender equity will enhance the human capabilities component of inclusive growth (Alfredo, 2010).

Followed by economic growth productive employment is the key driver of inclusive economic growth since jobless growth is as dangerous as stagnation. Productive employment can increase the labour productivity. Employment outcome is an important outcome of inclusiveness. Naturally employment should be capable of poverty reduction. Inclusive growth assumes significant since it alone can uproot the absolute poverty. Inclusive growth can substantially reduce the income inequality both vertical and horizontal (Raunier&Kanbur, 2010). All these will enhance the quality inclusive growth in an economy (Paramasivan, Mani &Utpal, 2014).

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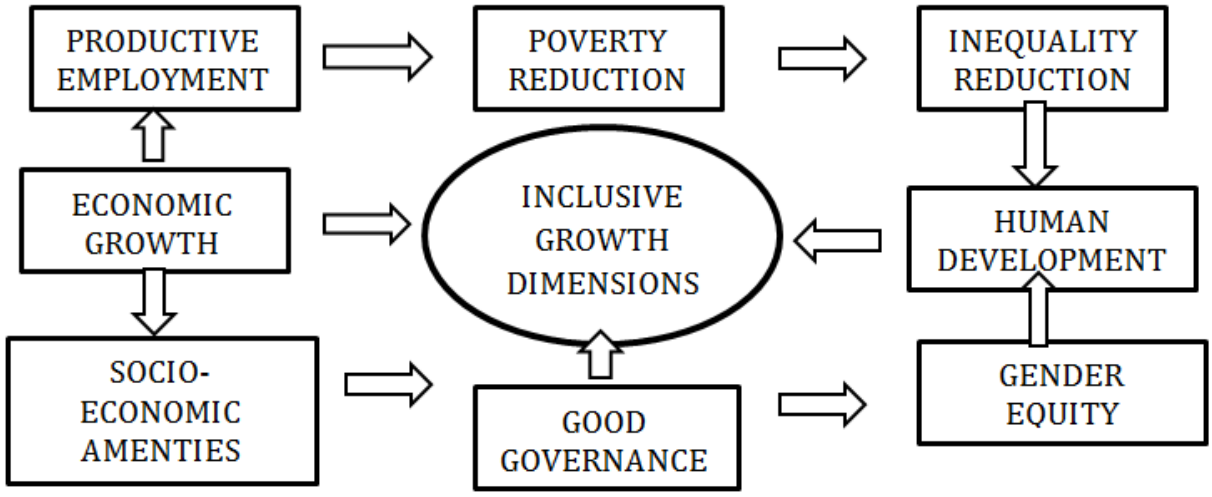

Fig.1: Theoretical framework of Inclusive Growth

Source: Adopted from Paramasivan, Mani and Utpal(2014)

3.2 Model Specification

This study adapts the model by Ozurumba and Onuorah(2016) where the effect of sectorial output on inclusive growth in Nigeria was employed both examined. This study modified their model by assessing of subsector of share of agriculture in Gross Domestic Product and replace HDI with inclusive growth index. Human Development Index is a composite of life expectancy at birth, education and per capita income which consist two out of the three major components of inclusive growth. Therefore, Ianchovichina&Lundstrom(2009) posit that inclusive growth should raise the pace of growth and enlarge the size of the economy, while levelling the playing field for investment (which access to electricity can foster), and increasing productive employment opportunities. Thus, the inclusive growth index employed in this study is a composite of per capita income, access to electricity (proxy by percentage change in electricity consumption per head), and active labour force (proxy by labour force participation rate from 15 to 65) using Principal Component Analysis (PCA). The PCA is used to convert three variables into one variable regarded as an index. This variable possesses the combined features and behaviour of all the time series variables involved. The model employed in this study is specified in equations (1):

$$InIGR_t = \alpha_0 + \beta_1 InOPLM_t + \beta_2 InCCOA_t + \beta_3 InLE_t + \beta_4 PSE_t + \beta_5 CPI_t + \varepsilon_t \quad (1)$$

Where; InIG: Inclusive Index in percentage; CCOA : Cocoa outputs expressed in tons; OPLM : Oil Palm outputs expressed in tons; LE : Life Expectancy at birth; PSE: Post-secondary school enrolment; CPI: Corruption Index.

α_0 = intercept; ε_t= the stochastic error term; β_{1-5} = Parameter estimates

$\beta_1 > 0$; $\beta_2 > 0$; $\beta_3 > 0$; $\beta_4 > 0$; $\beta_5 > 0$

3.3 Techniques of Estimation

This paper first ascertains the test of the stationary properties of the series using the standard Augmented Dickey Fuller (ADF) test. After which, a co-integration test is performed to identify the existence of a long-run relationship, normalized co-integration to examine long run impacts and Error Correction Model (ECM) applied to estimate the speed of adjustment of the variables towards the long-run equilibrium path in response to any divergence occurring in the short-run.

3.4 Data Sources and Description of Variables

This paper employed annual time series data covering periods from 1981 to 2015 sourced from Central Bank Statistical Bulletin (2015), National Bureau of Statistics (2016), and World Bank's World Development Indicators (2016).

Table.1: Variable Description and Measurement

Variables	Definition	Measurement	Source
IG	Inclusive growth index	PCA of per capita income, employment generation and access to infrastructure (electricity consumption per head in khw)	WDI (2016)

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CCOA	Cocoa outputs (in 1,000 metric tonnes)	Effect of cocoa on inclusive growth	NBS (2012-2016)
OPLM	Oil palm outputs (in 1,000 metric tonnes)	Effect of oil palm on inclusive growth	WDI (2016)
LE	Life expectancy at birth (in years)	Effect of Health on inclusive growth	WDI (2016)
PSE	post-secondary enrolment	Effect of education on inclusive growth	CBN (2015)
CPI	Corruption Index	Effect of good governance on inclusive good	Transparency International (various issues).

Source: Authors' compilation

IV. ANALYSIS AND DISCUSSION

4.1 Descriptive Statistics

Descriptive statistics are useful to have the clear picture about the quantitative description in a manageable form. It describes the basic feature of the data used in this study. The results for descriptive statistics for Nigeria are illustrated in the Table 2.

Table.2: Descriptive Statistics

Variables	IG	OPLM	CCOA	LE	PSE	CPI
Mean	-2.62E-15	768.6882	227.9529	47.74297	409537.7	1.133529
Median	-0.199517	792.0000	237.6000	46.33476	393735.0	1.100000
Maximum	3.929391	949.4000	345.0000	52.75427	915586.0	2.700000
Minimum	-3.308292	500.0000	100.0000	45.85241	7791.000	0.000000
Std. Dev.	1.457898	122.2907	64.09106	2.256475	266071.1	1.045568
Skewness	0.339308	-0.849120	0.017451	1.092090	0.315067	0.146307
Kurtosis	3.105702	2.865031	2.010507	2.633048	1.821392	1.445381
Jarque-Bera	0.668232	4.111497	1.388778	6.949167	2.530430	3.545156
Probability	0.715971	0.127997	0.499379	0.030975	0.282179	0.169894
Sum	-7.08E-14	26135.40	7750.400	1623.261	13924281	38.54000
Sum Sq. Dev.	70.14038	493515.9	135552.9	168.0254	2.34E+12	36.07598
Observations	34	34	34	34	34	34

Source: Authors' computation from E-views (8.0) (2017)

The maximum oil palm outputs of Nigeria was 949,900 tonnes, minimum was 51,700 tonnes while the mean was 768,700 tonnes with standard deviation of 122,000 tonnes (as shown in Table 2). While outputs of cocoa was maximum at 345,000 tonnes, the minimum 100, 000 tonnes while the mean was 227.700 tonnes with standard deviation of 64,000 tonnes. Additionally, maximum life expectancy in Nigeria was 52.8 years, minimum was 45.9 years and mean of 47.7 years with standard deviation of 2.3 (as shown in Table 2). The post secondary school enrolment peak at 915,586 with minimum of 7,791 and mean of 409,537. The best reported corruption index of the country was 2.7 and the worst index was 1.1 as shown in Table 2.

4.2 Stationarity Test

The summary of results of Augmented Dickey Fuller (ADF) unit root presented in Table 3 shows that all the variables are stationary after first difference at 5% significant level. Therefore, this implies that all the variables are I(1) series. This is the condition for employing Johansen technique of co-integration to assess the long run association in the model.

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Table.3: Unit Root Test Summary of ADF

Variables	ADF Test Statistic Value	5% Mackinnon Critical Value	Remark	Order of Integration
D(IG)	-7.1302	-3.5578	Stationary	I(1)
IG	-3.1158	-3.5529	Non-Stationary	I(0)
D(InOPLM)	-8.5129	-3.5578	Stationary	I(1)
InOPLM	-2.6932	-3.5529	Non-Stationary	I(0)
D(InCCOA)	-7.2272	-3.5578	Stationary	I(1)
InCCOAP	-2.8818	-3.5529	Non-Stationary	I(0)
D(LE)	-4.8285	-3.5628	Stationary	I(1)
LE	-0.3674	-3.5529	Non-Stationary	I(0)
D(InPSE)	-6.2961	-3.5629	Stationary	I(1)
InPSE	-1.8391	-3.5628	Non-Stationary	I(0)
D(CPI)	-5.5169	-3.5578	Stationary	I(1)
CPI	-2.6773	-3.5590	Non-Stationary	I(0)

Source: Authors' computation using E-view (8.0)

4.3 Co-integration Test

The co-integration test establishes whether a long-run equilibrium relationship exist among the variables of interest.The Johansen Co-integration test employed confirmed the presence of long run association in the inclusive model employed (as shown in Table 4).

Table.4: Summary of Co-integration Results

Ho	Ha	Eigen value	Trace Statistics	0.05 Critical Value	Max-Eigen Statistics	0.05 Critical Value
r=0	$r = 1$	0.912325	227.3053	95.75366**	75.45761	40.07757**
$r \leq 1$	$r = 2$	0.856390	151.8477	69.81889**	60.16023	33.87687**
$r \leq 2$	$r = 3$	0.732185	91.68747	47.85613**	40.84124	27.58434**
$r \leq 3$	$r = 4$	0.585915	50.84622	29.79707**	27.33221	21.13162**
$r \leq 4$	$r = 5$	0.520824	23.51401	15.49471**	22.80630	14.26460**
$r \leq 5$	r =6	0.022571	0.707706	3.841466	0.707706	3.841466

Source: Authors' computation using E-view (8.0) NOTE: (**) significant at 5% level of significance.

4.4 Error Correction Mechanism (ECM)

The ECM is used to correct for disequilibrium in a co-integrating relationship. This mechanism serves as a means of reconciling short run disequilibrium behaviour of an economic variable of interest with its long run behaviour. The coefficient of the parameters and the t-statistics or probability value are the two parameters used in error correction model. The coefficient is expected to possess negative sign, indicating that a convergence of the variables back to equilibrium path following every period of disequilibrium. The P-value is used to check the significance of the variables testing at 5 percent level (0.05)

Table.5: Summary of Parsimonious ECM result

Dependent Variable: D(IGR)	Coefficient	P-value
Constant	5.844606	0.7581
LCCOA(-1)	2.446361	0.0004**
LOPLM(-1)	5.938945	0.0233**
LLE(-1)	6.265733	0.1987
LPSE(-1)	-0.634002	0.5765

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CPI(-1)	0.153477	0.7410
D(LCCOA(-1))	2.459422	0.0019**
D(LCCOA(-2))	1.308994	0.0242**
D(LOPLM(-1))	2.551076	0.2691
D(LOPLM(-2))	1.588620	0.3263
D(LLE(-2))	110.9326	0.1030
D(LPSE(-1))	1.101948	0.0296**
D(CPI(-2))	1.097502	0.0116**
ECM(-1)	-0.944310	0.0001**
Adj R square = 0.719		
Prob (F-statistic) = 0.0017		

Source: Authors 'computation (2016) usingE-view (8.0) NOTE: (**) significant at 5% level of significance.

The adjusted R square of 0.719 indicate that the explanatory variables jointly explained 71.9 percent variations in inclusive growth drive in Nigeria which is a good fit while other factors not captured in this model explained 28.1 percent variation. Also, the error correction term of this study is statistically significant at 5 percent and indicates that the model possessed 94.4 percent speed of adjustment. This implies that the model adjust fast back to equilibrium after any disturbance (as shown in Table 5). Likewise, the model possess overall statistical significance at 5 percent since probability value of F (0.0017) is less to 0.05.

The short run estimates of cocoa outputs in the last period (year) [D(LCOCOA (-1))], cocoa outputs in the previous two periods [D(LCOCOA (-2))], post-secondary school enrolment in the last period [D(POSTSEC(-1))] and corruption index in the previous two periods [D(COPI(-2))] were found confirm with expectation and statistically significant at 5 percent significant level (as shown in Table 5). Similarly, the long run estimates of cocoa outputs and oil palm outputs were found to be statistically significant at 5 percent significant level (as shown in Table 5). However, the short run estimates of oil palm and life expectancy confirmed with expectation but were statistically insignificant at 5 percent significance level. In the same vein, the long run estimates of life expectancy, post-secondary school enrolment and corruption index failed to confirm with expectation and were statistically insignificant at 5 percent significant level.

Specifically, 1 percent increase in cocoa outputs induces an improvement of 2.45 percent in inclusive growth and 1 percent raise in oil palm outputs induces 5.94 percent increase in inclusive growth in the long run. Similarly, 1 percent raise in cocoa outputs in the last period and last two periods induces 2.46 and 1.31 percent improvement in current inclusive growth respectively. Likewise, 1 percent increase in post-secondary enrolment in the last period and corruption index in the last two periods induces 1.1 and 1.09 percent in inclusive growth respectively (as shown in Table 5).

4.5 Implicationof Findings

The dynamic estimated result shows that cocoa outputs have the potential to drive inclusive growth even though the foreign exchange earning potential of cocoa has not been optimally utilized in Nigeria. This support the finding by Abolagba, Onyekwere, Agbonkpolor and Umar (2010) that cocoa export exert positive and significant effect on economic growth in the country while Uremadu, Onyele and Ariwa (2016) found positive but insignificant impact on economic growth. These varied findings from literature could be due to the fact that most of the cocoa trees in the country have almost attained 30 years of age with plummeting outputs. These old trees coupled with their vulnerability to pest attack are responsible for noticeable fluctuations quantity of cocoa outputs of the country (Alamu, 2013; Nwachukwu*et al*., 2008).

As expectation, this study found direct relationship between oil palm outputs and inclusive growth in Nigeria in the long run but insignificant in the short run. This is due to the fact that oil palm production stagnant from 1986 to 1993 and 1994 to 2007 which coincides with the indirect government involvement in agricultural production; the extension of export crops/processing facilities and the utilization of more modern technology (Antia-Obong&Bhattarai, 2012). Ugwu (2009) had equally found that oil palm positively influence the economy in the long run.

In addition, this study found that corruptive index exerts positive and significant effect on inclusive growth in the short run. This implies that increase in the corruption index indicate an improvement in the prevalence of corruption in the country. This is in line with the findings of Ajie and Oyegun (2015), Odi(2014) and Fabayo*et al.* (2011) that increase in the prevalence of corruption depresses the Nigerian economy. Similarly, Adewale (2011) and Odi (2011) asserted that corruption had crowding-out effect on economic growth in Nigeria.

https://dx.doi.org/10.24001/ijels.2.6.10 *ISSN: 2456-7620*

V. CONCLUSION

There is a general consensus among some researchers that agriculture is less productive than other non-agricultural sectors, early research relating to the impact of agriculture in maintaining sustainable economic growth and development were qualitative in nature emphasising potential effect of inter-sectoral linkage between agricultural and industrial/manufacturing sector.Therefore, this study examines the impact of cocoa-oil palm production on inclusive growth in Nigeria, using endogenous growth theory which provides a theoretical framework for analysing persistent growth that is determine by the system governing the production process within the economy rather than by forces outside the system.

This study found that there is a long run association between cocoa-oil palm and per capita income in Nigeria. The Error Correction Mechanism tested the speed of adjustment of the model and reveals that the model adjusts fast back to equilibrium after any disequilibrium (at the 72 percent per year). Hence, concludes that sustained improvement in quantity and quality outputs from both cocoa and oil palm can advance inclusive growth in Nigeria. Thus, recommend that the Federal Government of Nigeria should broadly align agricultural spending and policy priorities in cocoa and oil palm production in order to stimulate qualitative growth in the sub-sector by giving financial and land support to actual farmers. Such support however, must be monitored and periodically reviewed in order to evaluate its effectiveness and prevent misallocation of funds. Also, the Federal Government of Nigeria should invest in activities that will promote agricultural gains which would lead to pro-poor growth. Such investments should include basic and applied agricultural research, agricultural extension and capacity building, irrigation development and agribusiness development. All these dimension of intervention will quicken and enhance the quality of cocoa and oil palm yields.

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