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CRUDE OIL REVENUE, HUMAN CAPITAL INVESTMENT AND INDUSTRIAL SECTOR PERFORMANCE IN NIGERIA

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Abstract

The inflow of revenue from the sales of crude oil if properly used to develop the quality of Human capital in Nigeria has the potential of improving the industrial sector performance radically. Given the situation in Nigeria, it was imperative to investigate the effect of crude oil revenue, Human Capital Investment on the Industrial sector performance using time series data spanning from 1990 to 2018 sourced from the central bank of Nigeria, National Bureau of Statistics (NBS) and an annual release from the Nigeria National Petroleum Cooperation (NNPC). To achieve this objective, the ADF test was conducted to check the stationarity of the variables, ARDL test and error correction mechanism were also employed to check the relationship between the variables and correction of the distortion. The result indicates that labour force participation has a significant impact on the industrial sector in the long run while the past realization of Gross Fixed Capital Formation (GFCF), Crude Oil Revenue (ORN), investment in Education (XED), and its past values (XED (-1)) has a short-run significant impact on industrial sector performance. The study thus concludes that labor force participation is the major predictor of industrial sector performance in Nigeria. Thus, the paper recommends an increase in the education budget, effective utilization of income accruable from the sales of oil to provide the much-needed manpower to enhance the industrial sector in Nigeria. Income from oil resources should be judiciously used to improve the human capital which has the capacity of improving the performance of the industrial sector.

Keywords: Industrial Sector, Human capital, Crude Oil Revenue, Gross Fixed Capital Formation, Labour Force Participation.

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INTRODUCTION

Both industrialized and developing countries have agreed on the importance of promoting industrial sector performance as a development indicator. Scholars have emphasized the significance of industrial capacities as a vital road to economic growth and development. However, these advancements will be impossible to achieve without a well-thought-out human development strategy. The successful use of the income accruable from the sales of fossil fuel deposits may be connected to improvements in human capital investment such as the quality of education and health in countries such as South Korea, Hong Kong, Venezuela, Qatar, and others. The price of crude oil fluctuating owing to shocks in the international oil market governed by the Organization of Petroleum Exporting Countries (OPEC) should have no negative impact on the income-based of countries that invest the proceeds from oil sales in human capital development. Many countries, like Nigeria, have identified the crude oil market as a vital source of international revenue. However, using the profits from such an enterprise to produce strong human capital has proven to be an illusion.

According to Michael (2015), revenue from crude oil sales has been highlighted as a substantial source of income around the world, and it is thought to have a positive influence. In recent history, revenue from the sale of crude oil resources in Nigeria has been the main source of foreign exchange earnings, and the over-reliance on oil sector income following the discovery of oil in Oloibiri (1957) is one of the main distractions that has kept Nigeria in its current traumatized state. The agriculture sector, which had previously formed the backbone of the country's economy, has been ignored, with the primary focus on cash inflow being the sale of fossil fuels. The revenue earned from crude oil sales in Nigeria is estimated to have accounted for about 87 percent of all foreign exchange revenues, resulting in increased unemployment, poverty, inflation, and sloth. The abandoning of the rural people's main source of income leads to a rise in the consumption of imported food in Nigeria, as opposed to locally grown nutritious food.

Crude oil revenue has greatly led to an increase in crime rates, ethnic wars, religious tensions, and developed country consumption lifestyles, all of which have posed a horrible threat to the nation's progress. Hence, oil development has resulted in excessive environmental degradation, including water pollution, soil pollution, carbon dioxide emissions by exploration corporations, and oil spillages, all of which devastate the ecosystem and make life difficult for rural people in the Niger Delta region. To address the deficiency in industrial sector output, the Nigerian government has devised a number of policies and programs, as well as projects aimed at developing human capacities. Yet the ratio of industrial sector output to total GDP has been low, and human capital investment has fallen short of what is required to accelerate development in all sectors of the economy.

For example, in their review of the effect of crude oil revenue on industrial sector performance, Ijirsha (2015) and Micheal (2011) assert that crude oil revenue has a positive effect on industrial sector performance, whereas scholars such as Beghebo and Atima (2013) asserted that crude oil revenue has a negative effect on industrial sector performance. Okumoko et al. (2018), posited that Human capital investment has a positive effect on industrial sector performance. Consequently, there is no consensus on the simultaneous effect of Crude oil Revenue and Human Capital investments on Industrial sector performance in Nigeria which is the motivation for this research work. This paper seeks to investigate the concurrent effect of crude oil revenue and human capital on the industrial sector performance in Nigeria from 1990-

2018. The major objective of this work is to examine the effect of Crude Oil Revenue and Human Capital investments on the Industrial Sector Performance in Nigeria. The other section of the work was arranged as follows, section two present the conceptual framework, theoretical literature, and empirical literature. Section 3 deals with research methodology while section four presents the estimation, interpretation of findings, conclusion, and recommendations

CONCEPTUAL CLARIFICATIONS

Crude Oil Revenue

The term crude oil revenue is defined as the income a country receives from the sale of Crude oil either domestically or internationally. Revenue from oil is said to have contributed about 89% of Nigeria's foreign exchange and constitute over 80% in Nigeria. The importance of black gold is that it generates income which is used to finance the country's budget. Nigeria has continued her dependency on the revenue accruable from the sales of crude oil over time, making other sources of revenues unimportant. Crude oil revenue in the context of this work is the total annual revenue accrued from the sale of crude oil in Nigeria. The apriori expectation is that increase in crude oil revenue will have a positive effect on industrial sector performance.

Human Capital Investment

Human capital investment is defined as the conscious effect made by the government to develop human capital (education and health). Human capital deals with skills, knowledge, health, quality of life as perceived by the people. Human capital development implies the improvement in education and health of the people with private and social benefits which is accruable to either the public or the private individual. It increases the standard of living of the individual as well as the individual contributions to the growth of the society at large. Human capital development activates the required manpower or skills for the development of the industrial sector. The degree of skills one has acquired from the educational sector and health status will determine the degree of one's contribution to the industrial sector development. Human Capital investment in the context of this work means the total Government expenditure on health infrastructure and education for the good of the people.

Industrial Sector

The term industrial sector means the sector of the Nation's economy involved in the production of tangible goods and services for either human consumption or intermediate goods. Anyone et al. (1597), defined industrialization as the process of building up a nation's capacity to convert raw materials and other inputs into finished goods and manufacture goods for other production and final consumption. Ijirshar (2015), defined industrialization as being able to enhance the utilization of productive inputs (labour, capital, and raw materials) given the country technology, to produce durable and non-durable goods, intermediate goods, and capital goods for domestic consumption, export, and further production.

THEORETICAL LITERATURE

This study is hinged on the New Growth Theory (Endogenous Theory) and supported by Dutch Disease Theory. Recent development has made it imperative to scrutinize whether the increase in Crude oil Revenue and Human Capital Investment can improve the Industrial sector's performance in the light of the New Growth Theory (endogenous theory) and Dutch Disease. The endogenous theory explains the long-run growth rate of an economy based on endogenous factors against exogenous factors of the neoclassical growth model. It explains how the investment in Human Capital, Gross Capital Formation, Labor force participation has released the much-needed manpower for industrial sector performance in Nigeria while Dutch Disease Theory explains how crude oil revenue has led to reduction or improvement in Industrial sector performance in Nigeria. Ottawa (2001), posited that Dutch Disease is associated with how over-dependence in income from the sales of crude oil has led to the neglect of other sectors of the nation's economy. Ijirshar (2015), in his empirical study of oil revenue and industrial growth, advocated that inflow of cash from the oil sector tend to increase conspicuous consumption and overzealousness in the economy, promote an adverse balance of payment, kills the incentive to invest in the non-oil sector, kill agricultural practice and the manufacturing sector while Michael (2001) believes that oil state is a Rentier effect.

Review of Related Empirical Studies

Several empirical studies on the impact of crude oil revenue or human capital on industrial sector development have been published. For instance, Michael (2001) looked at the impact of oil money on Nigerian output growth from 1981 to 2014. The study used the fully modified ordinary least squared method (FMOLS) in its analysis, which was based on the Beghebo and Atima model with minor modifications. The Central Bank of Nigeria's Statistical Bulletin and Nigerian National, as well as the Petroleum Corporation's Statistical Bulletin, were used to compile data from 1981 to 2014. The study, therefore, discovered that oil revenue does not have a short-run impact on the economic activities of Nigeria. However, the policy's long-term impact was positive, as it was discovered that the country's continued increase in oil money will eventually lead to future economic growth. According to the report, the government should use the oil budget effectively and efficiently in important developmental initiatives to eliminate poverty and facilitate output growth.

Opuymi (2013) used data from 1980 to 2010 to look at the impact of human capital development on industrial development in Nigeria. The findings revealed that while human capital development has had a favorable impact on industrial development in terms of value-added, it has remained low in terms of industrial output. The study by Adejamo et al. (2013) looked at the impact of human capital development on the industrial sector. Using time-series data from 1980 to 2010 and a suitable econometric technique to account for variables such as educational enrolment rates. Human capital has been discovered to have a significant impact on industry value-added, although the impact of human capital on industrial output in Nigeria remains low.

Ijirshar (2015) used data from 1971 to 2007 to conduct an empirical analysis of oil revenue and industrial growth in Nigeria, concluding that: oil revenue (production), company income tax, real interest rates, and the real exchange rate all had a beneficial impact on industrial

sector development. Using annual time series data from 1981 to 2015, Ogunley et al. (2017) investigated the influence of human capital development on Nigerian economic growth. The empirical findings indicate that human capital development has a considerable impact on economic growth, as measured by GDP. The ordinary least square regression analysis is used in this study to see if indices of human capital development, such as secondary school enrolment, tertiary school enrolment, and total government expenditure on health, are related. and total government expenditure on education exhibit a positive and statistically significant impact on the economic growth of Nigeria. The study concluded that the Nigerian government should ensure to allocate adequate resources for the development of human capital to enhance economic growth in Nigeria and recommend an increase in total expenditure on education, health, and standard be set across all secondary and tertiary institutions for improvement in human capital productivity and Economic growth.

METHODS

Research Design

This work adopted a quasi-experimental research design in the investigation of the impact of globalization on the Nigerian manufacturing and telecom sectors and given its proficiency in social science research. The data for this study are time-series data obtained basically from secondary sources with the aid of econometrics software, E-view 10 to estimate the two models. Data spanning from 1990-2018 sourced from the Central Bank of Nigeria (CBN), National Bureau of Statistics, Nigeria National Petroleum Cooperation (NNPC) annual releases, and the internet. The work employed the Autoregressive Distribution Lag (ARDL) model of econometric research as were proposed by Pesaran et al. (2001) to evaluate the impact of crude oil revenue and human capital development on the industrial sector performance in Nigeria. The essence of adopting this method is based on two main reasons. Firstly, the bounds test is a simple technique since it allows the cointegrating relationships to be estimated by OLS once the lag length criteria have been known. Secondly, the long-run and short-run parameters of the model can be simultaneously estimated in the bound result.

Model Specification

This research work adopted a modified version of Ijirshar (2015) model. His empirical model is express as thus:

$$\ln INGR = b_0 + b_1 \ln OILR + b_2 \ln CTAX + b_3 \ln INTR + b_4 \ln REXR + U_i$$

Whereas, the functional form of my model is succinctly expressed as follows:

$$Y = F(AKLH)O$$

$$\ln INDU = F(A, GFCF, LBL, XED, XHT, ORN)$$

The stochastic expression of my model is:

$$\ln INDU = a_{0i} + a_{1i} GFCF + a_{2i} LBL + a_{3i} \ln XED + a_{4i} \ln XHT + a_{5i} \ln ORN + U_i \dots\dots\dots (1)$$

The Estimated Autoregressive Distributed Lag (ARDL) model specifications is as follows:

$$\Delta INDU = \alpha_0 + \alpha_{11} \ln INDU_{t-1} + \alpha_{21} GFCF_{t-1} + \alpha_{31} LBL_{t-1} + \alpha_{41} \ln XED_{t-1} + \alpha_{51} \ln XHT_{t-1} + \alpha_{61} \ln ORN_{t-1} + \sum \beta_{1i} \Delta INDU_{t-i} + \sum \beta_{2i} \Delta GFCF_{t-i} + \sum \beta_{3i} \Delta LBL_{t-i} + \sum \beta_{4i} \Delta \ln XED_{t-i} + \sum \beta_{5i} \Delta \ln XHT_{t-i} + \sum \beta_{6i} \Delta \ln ORN_{t-i} + eit \text{ ----- (2)}$$

The error correction model is as follows:

$$\Delta INDU = \sum \beta_{1i} \Delta \ln INDU_{t-i} + \sum \beta_{2i} \Delta GFCF_{t-i} + \sum \beta_{3i} \Delta LBL_{t-i} + \sum \beta_{4i} \Delta \ln XED_{t-i} + \sum \beta_{5i} \Delta \ln XHT_{t-i} + \sum \beta_{6i} \Delta \ln ORN_{t-i} + \epsilon ECT_{t-1} + et \text{ ----- (3)}$$

INDU= Industrial sector performance

ORN= Crude oil revenue

XHT= Human capital investment in health

XED= Human capital investment in education

LBL=Labour force participation

GFCF= Gross Fixed Capital Formation

ϵECT = the long run estimation.

U and eit = Stochastic element

Δ = changes

α^{ns} and β^{ns} are the parameters estimate of the variables.

DESCRIPTION OF VARIABLES

Dependent Variable: -

Industrial Sector Performance (INDU): means value of output from the industrial sector in Nigeria. It can be in terms of money or the monetary equivalent of the goods and services.

Independent Variables:

Expenditure in Educational Development (XED): means total budgetary allocation to the education sector in terms of payment of salaries and provision of basic infrastructures.

Gross Fixed Capital Formation (GFCF): Is a macroeconomics concept that is used in the official account which means the net increase in fixed capital.

Labour Force Participation (LBL): Defined as the section of the working population in the age of 16-64 years in the economy currently employed or seeking employment.

Expenditure on Health (XHT): means total expenditure used to provide basic health care in Nigeria.

Crude oil revenue (ORN): means the total revenue accruable from the sale of crude oil from domestic source or foreign countries through exportation of crude oil.

Descriptive Statistics

A close look at the 28 observations in table 1 has revealed that from 1990 to 2018, the industrial output, crude oil revenue, human capital investment in Education and Health, Gross Fixed Capital Formation, Labour Force Participation has been fluctuating. Human capital investment has been fluctuating because of the weak institutional framework inherited from the British colonial masters; Total expenditure on Education and Health in, 1991, 2001, and 2018 are 1.26%, 55.084%, 465.30%, and 0.62%, 24.52%, 296.94% respectively. Total gross fixed capital formation for the same period fluctuates at 48,40018billion, 30,03794billion, and 14,75592billion when the output from the oil sector fluctuates in response to international oil prices regulated by OPEC from 82,657billion, 1,707,56trillion, and 5,545,80trillion while the labor force has been fluctuating as well. The value of industrial output has been fluctuating since 1991, 2001, and 2018 as 119.88billion, 998.10billion, and 12.680.32trillion respectively.

	LOG(INDU)	GFCF	LABL	LOG (XEDU)	LOG(XHLT)	LOG(OLRV)
Mean	7.293419	28.08409	55.18728	3.969011	3.214168	7.294856
Median	7.334153	26.16650	55.10000	4.388630	3.704261	7.898745
Maximum	9.447806	53.12219	55.90000	6.142682	5.691845	9.091441
Minimum	4.498809	14.16873	54.73600	-1.237874	-1.897120	4.275137
Std. Dev.	1.416718	12.06119	0.320332	1.912617	2.131116	1.521388
Skewness	-0.239409	0.388211	0.764897	-0.960703	-0.742377	-0.630535
Kurtosis	2.085832	1.882550	2.850981	3.282209	2.529872	1.992079
Jarque-Bera	1.286838	2.237262	2.854662	4.557164	2.930833	3.149162
Probability	0.525493	0.326727	0.239948	0.102429	0.230982	0.207094
Sum	211.5092	814.4385	1600.431	115.1013	93.21088	211.5508
Sum Sq. Dev.	56.19851	4073.227	2.873147	102.4269	127.1664	64.80942
Observations	29	29	29	29	29	29

From the table above, the average of the series as reported by the means are 7.293419, 28.08409, 55.18728, 3.969011, 3.214168, 7.294856 for LOG(INDU), GFCF, LABL, LOG(XEDU), LOG(XHLT), and LOG(OLRV) while the median which is the robust measurement of the center of the distribution that is less sensitive to outliers in relations to the mean are: 7.334153, 26.16650, 55.10000, 4.388630, 3.704261, and 7.898745 respectively. The maximum value for each series is 9.447806, 53.12219, 55.90000, 6.142682, 5.691845, and 9.091441 respectively. With the minimum value: 4.498809, 14.16873, 54.73600, -1.237874, -1.897120 and 4.275137 respectively. The deviation of industrial growth, crude oil revenue, human capitals, and trade openness are 1.416718, 12.06119, 0.320332, 1.912617, 2.131116, and 1.521388. The skewness values for the variables are 2.085832, 0.388211, 0.764897, -0.960703, -0.742377, and -0.630535 indicating that INDU, GFCF, LABL, XEDU, XHLT, and ORN has a Long-left fail.

Kurtosis which measures the peakedness of flatness to the distribution showed that INDU is peaked (LiptoKurtic) whereas GFCF, LBL XEDU XHLT are (PlatyKurtic) relative to normal. Jarque-Bera statistics for each series reported that GFCF, LBL XEDU XHLT are not normally distributed given that their probable values are less than 0.05 while INDU is normally distributed with a probability value above 0.05. The total unit of industrial sectors growth and others are at 211.5092, 814.4385, 1600.431, 115.1013, 93.21088, 211.5508 respectively.

EMPIRICAL ANALYSIS

Test for Unit Root

The stationarity condition of the series was performed with a unit root procedure Augmented by Dickey-Fuller (ADF). Test statistics are extracted and presented below:

Variables	Level		1 st differences		Order of integration	
	T. statistics	Critical Value at 5%	T. statistics	Critical value at 5%		I(1)
Log(INDU)*	-0.557914	-2.945842	-4.776701	-2.945842		I(1)
Log(ORN) *	-1.368317	-2.943427	-6.068510	-2.945842		I(1)
Log(LABL) *	-2.594397	-2.976263	-3.025729	-2.976263		I(1)
Log(XEDU) *	-2.104396	-2.954021	-7.669317	-2.945842		I(1)
LOG(XHT) *	-1.483263	-2.954021	-9.966340	-2.945842		I(1)
Log(GFCF)	-3.267214	-2.943427	-	-		I(0)

Sources: Author Compilation from E-View s 8 Markinon (1996) One sided P-value

The Augmented Dickey-fuller test for stationarity of the model was conducted on all the variables in the model. The coefficient of all variables was non-stationary at level except the coefficient of gross capita formation which was original stationery at levels and all become stationary after the first difference. This is in line with the proposition of Box and Jerkins (1976) who argued that non-stationary data at a level will be made stationary after the first difference. If a time series has a unit root, it shows a systematic pattern in movement (unpredictable) known as a stochastic trend. When a systematic variation is predictable it is known as a deterministic trend. The value of the t-statistics showed that all variables were not stationary at levels but they became stationary after the first difference. Thus, all variables are not integrated at order one which necessitates the need for ARDL co-integration test to ascertain the long-run relationship if any.

Bounds for Cointegration Test

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Significance	I(0)	I(1)
F-statistic	27.77248	10%	2.08	3
K	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

The essence of the ARDL cointegration test is to verify the presence of a short and long-run relationship between the variables in the model. ARDL bounds test Cointegration test was adopted in this study in line with the propositions of Pesaran et al. (2001). If The value of F-Statistic is above the upper bounds critical value at the chosen level of significance, there exists a long-run relationship. If the F-Statistic fall below the lower bounds test critical values, there is no long-run relationship (short-run) and if it falls between the lower and upper bounds critical values, the model is inconclusive and explosive. The outcome of the bounds test above suggests that the variables in the model are cointegrated at a 5% significant level. The value of f statistics in the bounds test indicates (27.77246) which is above the upper bounds critical value of 3.38 and lower bounds critical value of 2.39 at a 5% significant level. That implies or indicates the presence of a long-run relationship or association ship between the models in the equation. We, therefore, reject the Null hypothesis of no relationship and accepts the alternative hypothesis that Null is not true. We then proceed to establish the long-run coefficient by estimating an ARDL of the order (1, 2, 1, 2, 0, 1).

Long Run Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GFCF	-0.021503	0.053937	-0.398664	0.6958
LABL	3.998146	2.102096	1.901981	0.0366
LOG(XEDU)	-0.989108	0.858979	-1.151494	0.2676
LOG(XHLT)	0.643346	0.546369	1.177493	0.2573
LOG(OLRV)	1.530246	0.990256	1.545304	0.1431
C	-220.6486	121.8721	-1.810493	0.0903

In the long run, Gross Fixed Capital Formation (GFCF) impacted negatively on Industrial sector output and was statistically insignificant. The insignificant posture of GFCF may not be unconnected with the low capital formation in Nigeria which has made it difficult to initiate and complete huge investment in human capital and massive diversion of the available capital by the managers of our patrimonial wealth. The coefficient of labour force participation has a positive impact and is statistically significant at a 5% level of significance. A percentage increase in the labour force will emit a 399 percentage increase in industrial output, all things being equal. The labour force participation variable appeared with the normal sign which affirmed the known fact that Nigeria has more abundant or redundant manpower. The increase in population will release the expected labour which is expected in the manufacturing industries that makes use of labor-intensive means of production. Industrial production in Nigeria still uses labour-intensive techniques. The significant posture of the variable has an important implication in policymaking.

The coefficient of investment in Education (XEDU) negatively impacted Industrial sector output (IND) and was statistically insignificant to cause a change in industrial output. Though the coefficient of investment in education is not statistically significant, the negative effect on output is important to policymakers. Its importance lies in the fact that there is an inverse relationship between investment in Education and industrial output. On the other hand, it will not be out of place to assert that the quality of education bequeathed to the country does not support industrial development. The coefficient of investment in health development and crude oil revenue impacted Industrial sector output positively but not statistically significant at a 5% level of significance. The coefficient of these variables appeared with the normal sign and is important

in policymaking. In line with the New Endogenous growth theory, an increase in economic growth is a function of an endogenous variable. The insignificant posture of the variables may be accounted to the inefficiency and corruption. This characterized present-day Nigeria where corruption and death have become a new normal.

ECM Regression

Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GFCF)	0.004365	0.003594	1.214405	0.2434
D(GFCF(-1))	0.008664	0.003568	2.428380	0.0282
D(LABL)	0.151606	0.107881	1.405302	0.1803
DLOG(XEDU)	-0.053867	0.012149	-4.433971	0.0005
DLOG(XEDU(-1))	0.077915	0.009608	8.109250	0.0000
DLOG(OLRV)	0.119486	0.022993	5.196745	0.0001
CointEq(-1)*	-0.112611	0.006826	-16.49759	0.0000
R-squared	0.867849	Mean dependent var		0.176750
Adjusted R-squared	0.830092	S.D. dependent var		0.092008
S.E. of regression	0.037925	Akaike info criterion		-3.494070
Sum squared resid	0.030205	Schwarz criterion		-3.161019
Log-likelihood	55.91698	Hannan-Quinn criter.		-3.392253
Durbin-Watson stat	2.066915			

Source: EViews Output

From the ARDL error correction Model (1, 2, 1, 2, 0, 1) above with Restricted Constance and no trend, one sees that the speed of adjustment appeared with the right sign and is very significant (0.000) probability value to explain variation in industrial sector performances. The speed of adjustment is though very low at 11%. Meaning that the disequilibrium of the previous years caused by variables in the model can be corrected in the present year at the speed of 11% to Equilibrium. The coefficient of the first-year lag value of Gross Fixed Capital Formation (GFCF) has a positive significant effect on industrial sector performance. Meaning that a one percent increase in GFCF will lead to a 0.08 percent increment in industrial sector performance. The GFCF appears with the right sign but the contribution is very poor. Labour force participation has positive signs which conformed to economic theory but the probability value is not significant to explain the variation in industrial sector performance. The coefficient of investment in education has an inverse relationship or effect on industrial sector performance and is signed with the probability value of (0.005). Meaning that a one percent increase in expenditure on education will lead to a 5% decrease in industrial sector performance in Nigeria. That does not conform to economic theory/expectations.

But, the one-year lag of education appeared with the right signs and is very significant. A one percent increase in the lag f expenditure on education will lead to a 7% increase in industrial sector performance in Nigeria. That by implication tells of the inconsistency in the contribution of the educational system in the nation's development. The coefficient of oil revenue appeared with the right signs and was very significant to explain the variation in industrial sector performance. A one percent increase in oil revenue will lead to an 11.9% increase in industrial sector performance in Nigeria which conforms to economic expectation or theory (Dutch

disease). The error correction term also appeared with the right sign negative but very poor speed of adjustment -1.26% and very significant. That indicates an 11.26% speed of adjustment to equilibrium given the inherent distortions occasioned by the poor and inappropriate educational quality in Nigeria. Meaning that the poor educational system inherent in Nigeria has a strong effect on the industrial sector performance as well as the performance of the economy at large. The growth rate in the nation's industrial sector is a function of an inappropriate educational system that is purely service base instead of production base. The Adjust R² of 83% indicates that the total variation in industrial sector performance in Nigeria is accounted for by 83% of the explanatory variables in the model while others are exogenously determined outside the model. The regression has a good fit. The value of the Durbin Watson test of 2.066915 indicates the absence of autocorrelation in the residual estimate and this is further verified by the use of the Breusch Godfrey serial correlation LM test.

The Implication of Research and Policymaking

The expenditure on the education component of human capital development negatively affected industrial sector performance in Nigeria in the long run and do not conform to economic expectation. Poor and inappropriate quality of education and high-level corruption is the major factor behind this outcome, this is in line with the expositions of Ijirsha (2015), Micheal (2001), and Opujami (2013). Nigeria's educational system is mal-functional and inappropriate to drive productivity. Labour force participation has a positive effect on industrial sector performance in Nigeria. This is due to the high population and massive labour-intensive production requirements. This outcome conforms to economic expectations and aligns with the position of Adejumo et al. (2013). An increase in population increases the labour force needed for productivity which is the hallmark of industrial growth.

The total expenditure on health has a positive effect on industrial sector performance and conforms to economic expectations. This outcome is supportive of the position of Ogunleye et al. (2017). A healthy population is desirable to increase productivity. The revenue from the sales of crude oil either domestically or internationally has a positive effect on the industrial sector performance in Nigeria. This also conforms to economic expectations and is in line with the positions of Ijirshar (2015). The oil sector provides much-needed finance to educate the manpower needed for industrial production. Gross Fixed Capital Formation on the other hand harms industrial sector performance. This outcome does not conform to theoretical expectations and is not desirable.

Finally, the result is in support of a total overhaul of the nation's educational curriculum toward the achievement of better prospects for industrial sector development in Nigeria. Autoregressive Distributed Lag is used to identify the relationship between the variable as well as correction of inconsistencies that occurs in the short-run and long run. The coefficient of the explanatory variables measures the short-run relationship which further suggests that the degree of receptiveness of industrial sector performance (INDU) to a lagged effect of the variation (change) in investment in Education is negative, inelastic, and thus has an inverse effect on industrial sector performance while the lagged value of the investment in health, Gross Fixed Capital Formation, Labour Force Participation and Total Health Expenditure were positive and elastic and thus has a direct effect on industrial sector performance as manifested in the negative signs in the equation[-0.112611] and its associated probability values of [0.0000] which is less than 5%.

Post Estimation Test

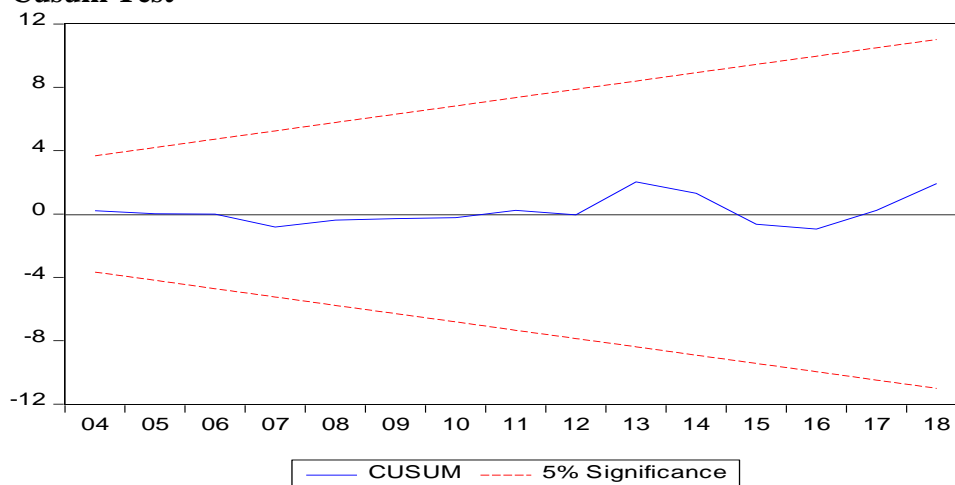
S/N	Test	f-stat	Obs*R
1	Normality Test	0.149562 (0.927947)	
2	Heteroskedasticity	1.122912 (0.4096)	13.25019 (0.35110)
3	Serial Autocorrelation	0.202237 (0.6598)	0.398715 (0.5278)
4	Ramsey RESET Test	0.095780 (0.9251)	

Source: EViews output

The probability value (0.927947) of the bell-shaped histogram and the associated Jargue-Bera value of (14%) indicates that the residual is normally distributed. Breusch-Pegan Godfrey test of heteroskedasticity indicates that the probability value of F-statistics, Obs. R squared and scaled explained SS are all more than 0.005% which means the absence of heteroskedasticity in the model. The Breusch-Godfrey serial autocorrelation test also has probability values above 0.05% which is indicative of the total absence of autocorrelation in the model. The Ramsey result test used to test the model specification and non-linearity of the semi-log model specified by the researcher has the same result as the p-value is more than 0.05 percent meaning that the model is correctly specified.

Finally, the Cumulative Sum of recursive residuals (CUSUM) and CUSUM of squares (CUSUMSQ) test proposed by Brown et al. (1975) is applied to confirm that the model satisfied the stability test. Figure 4 below presents plots of both CUSUM and CUSUMSQ test statistics that fall inside the critical bounds of 5% significance. This implies that the estimated parameters are stable over the period 1990– 2018.

Cusum Test



CONCLUSION AND RECOMMENDATIONS

The study explored the effect of crude oil revenue, gross fixed capital formation, labour force participation, and human capital development (Education and Health) on the industrial sector performance to conclude that total investment in Education harms the industrial sector

performance while investment in Health and crude oil revenue has a positive and significant effect on industrial sector performance. Gross fixed capital formation and labour force participation have a positive effect on industrial sector performance but they are not significant to explain the variation or changes. The outcome of this work indicates that Nigeria's educational system harms the industrial sector's performance. Given the above assertion, the following recommendations were made:

- That all stakeholders in the petroleum industry and industrial sector should be allowed to make input on areas affecting policy formulation for the industrial or oil sector.
- Revenue generated from the sales of oil should be reinvested into a productive venture to increase the numerical strength of the economy and provide an alternative to oil in the long run.
- The government should increase the investment in human capital development, especially the provision of qualitative technical Education that will generate the technological and technical know-how to drive industrialization.
- Nigeria's government should declare a state of emergency in the educational and health sector to enable them to produce the much-needed quality and healthy manpower that will facilitate the advancement of the industrial sector. That can be achieved by increasing the investment in human capital to 10% of the total Gross National income (GNI) with strong policies that will emphasize the implementation of production-based education void of corruption and tribalism as is presently constituted.

REFERENCES

- Abdul, M. K (2011). *Human capital and industrial development: The case of the German industry in Bangladesh*. LDP Cumbert Publication.
- Akintoye, V. A., Akanni, P., Olomola, O., & Adeyemo, O. (2013). The role of human capital development: The Nigeria case (1980-2010). *Modern Economy*, 4(10), 639-651. <http://doi:10.4236/me.2013.410069>.
- Anyanwo Y. C, Oyefus, A., Oaihansa, H., & Dimono, F. A. (1997). *The structure of Nigeria economy*. Joanec Educational Publication
- Central Bank of Nigeria (2010). CBN Annual report and statement of account for the year ended 31st December, 2010. <http://www.cenbank.org>
- Central Bank of Nigeria (2013). CBN Annual report and statement of account for the year ended 31st December, 2013. <http://www.cenbank.org>
- Guajarati, D. N. (2004). *Basic econometrics*. McGraw-Hill Publishing.
- Ijirshar V.U. (2015). The empirical analysis of oil revenue and industrial growth in Nigeria. *African Journal of Business Management*, 9, 599-607. <https://doi.org/10.5897/AJBM2015.7801>
- Michael, A. T. (2015). Oil revenue and output growth in Nigeria. *IIARD International Journal of Economics and Business Management*, 4(6), 65-74.
- Michael, R. (2001). Crude oil politics. *World Politics*, 3(3), 325-361.
- National Bureau of Statistics (2014). *Nigerian Gross Domestic Product Report, Quarter two 2014*, Abuja–Nigeria. NBS.

- Ogunleye, O. O., Owolabi, O. A., Sanyaolu, O. A., & Lawal, O. O (2017). Human capital development and economic growth in Nigeria. *Journal of Business Management*, 3(8), 17-37.
- Okumoko. T., Omeje, H., Danjuma, K., & Udoh, F. (2018). The dynamics of human capital development and industrial growth in Nigeria. *International Journal of Developing and Economic Sustainability*, 6(2), 41-51.
- Otawa, M. (2001). The National Security Strategy of the United States. *US Government Printing Office*.
- Todaro, M. P., & Smith, A. (2012). *Economics of development*. Person Education.