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INDUSTRIAL OUTPUT AND ECONOMIC GROWTH OF NIGERIA: A SUB-SECTORIAL ANALYSIS

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Abstract

The study evaluated the impact of industrial sector output on the economic growth of Nigeria. The ex-post facto research design was applied on aggregate secondary, time series data sourced from Central Bank of Nigeria (CBN) Statistical Bulletin for the period 1981 to 2021. Data collected were analysed using the Johansen approach to co-integration and Vector error correction model. Findings from the study indicated that there exists a long run and short run relationship between economic growth and industrial sector output. Furthermore, construction subsector, electricity, gas, steam and air conditioner subsector, mining and quarry subsector, manufacturing subsector and water supply, sewage, waste management subsector all had positive impact on the economic growth of Nigeria, but the impact of mining and quarry and manufacturing subsectors were not significant. The study concluded based on empirical evidence that Industrial sector output influences economic growth. The study among other things recommended that Government should make the mining and quarry sub sector more transparent to reduce corruption and attract more investment. Government should endeavor develop a more efficient framework to verify and pay contactors that have executed state projects. Electricity, gas, steam and air conditioner subsector should be opened up for real private sector participation. The ease of doing business in Nigeria should be streamlined to eliminate conflicting policies and multiple taxation. Finally increased budgetary allocation to stimulate water supply, sewage, waste management should be undertaken.

Keywords: *Industrial output, Economic growth, VECM, Sub-sector and Nigeria*

INTRODUCTION

The industrial revolution which started in Great Britain and swept like a wildfire all over the world has at its core structural changes, resulting into tremendous increase in the levels of production and employment, which has led to unprecedented income growth. This has prompted many scholars to hold the view that promoting the development of the industrial sector can be a key to achieving sustainable development (Afolabi, & Ogoh, 2017; Ndiaya & Lv, 2018; Pacheco-lopez & thirlwall, 2013). Put succinctly. Industrialization serves as the catalyst that increases the pace of growth, structural transformation and diversification of the economy, just as it provides the platform for any nation to proper use its factor endowments (Noko, 2016; Gylych & Enwerem, 2016; Anyanwu, 2001). The industrial sector is very critical to the development of any country, since the sector is the driving force for sustainable and paramount economic development of a nation (Sankaran. Vadivel & Jamal, 2020; Mandara & Ali, 2018). This is transmitted through its contribution to the economic growth, jobs creation, incomes, wealth, and improving the living standard

thus reducing poverty, ensuring full employment, promoting gender equality and better improvement and access to healthcare and education Afolabi,& Ogoh, 2017;Noko, 2016; Anyanwu 2001).

Nigeria is one of the fast-growing and largest economies in this world with an enviable economic performance but the structure of the Nigerian economy rests heavily on the primary sector with the agricultural and oil and gas sectors contributing about 95 percent and 85 percent of export earnings and national income, respectively (World Bank, 2019). Given this scenario Nigeria can be categorized as industrially underdeveloped this is at variance with the general expectation that the industrial sector is the productive base of the economy. In a bid to correct this anomaly the Nigerian authorities has designed and dissipated a lot of efforts into the industrialization process of Nigeria. Plan after plan, investment policies have been renewed, fine-tuned and at times completely revamped which includes promulgation of the Indigenization Decree of 1972, the introduction of the Structural Adjustment Program in 1985/86, the establishment of the Bank of Industry (BOI) etc. Also two main strategies have been has been the focus of these policies. The first is the import substitution strategy while the second is the export promotion strategy. The second strategy, which has been in vogue since the adoption of the SAP in Nigeria in mid – 1986, emphasizes the promotion of value – added non-oil exports, especially manufacturing (Ughulu 2021; Bennett, Anyanwu & Kalu, 2015, Uniamikogbo, 1996). Inspite of these efforts, significant results has not been achieved in increasing the contribution of the industrial sector to income and export earning even as the industrial sector still accounts for a paltry proportion of economic activity - hovering around 4 per cent and 6 per cent (NBS, 2005, 2011 & 2018).

Furthermore, the scenario above has become a source of concern to policy makers and researcher, as findings from researches has produced mixed result. For instance works of Ughulu (2021) and Ahmed and Mwadkon (2019) maintained that the industrial sector exerted a positive impact on economic growth, Senibi, Akiyepeku, Odutola, Ndaman, Eseoghene, Ogunlusi and Eldad (2017) disagreed as it documented a negative impact. While Afolabi and Ogoh (2017), Gylych and Enwerem (2016) Bennett, Anyanwu and Kalu (2015) and Tamuno and Edoumiekumo (2012) suggested that industrial sector had insignificant impact on the economic growth. Given level of conflicting findings and a deviation from established theory, it becomes imperative to critically investigate the impact of the industrial sector on the economic growth of with economic growth of Nigeria.

LITERATURE REVIEW

Concept of Industrial Output and Economic Growth

Industrialization has at its core the introduction and expansion of industries in a particular place, region or country (Obioma & Ozughalu, 2005). As it obtains now in some literature, the word industry is basically used as a synonym for manufacturing as in many developing economies. Conceptually manufacturing refers usually to changing of raw materials into products of more value. However, industry refers to an organized human skill and efforts to produce something more valuable and useful from the gifts of natural resources and primary products. Industrialization therefore, is a process of building up a country's capacity to produce many varieties of products – extraction of raw materials and manufacturing of semi-finished and finished goods (Ahmed & Mwadkon, 2019).

Furthermore Anyanwu (2001) describes industrialization as the ability of an economy to convert raw materials and other inputs to finished goods and to manufacture goods for other production or for final consumption. Industrialization enhances the utilization of productive inputs (labour, capital and raw materials), given the country's technology, to produce non-durable and durable consumer goods and intermediate goods for domestic consumption, export or further production.

Industrial development therefore is the application of modern technology, equipments and machineries for the production of goods and services, alleviating human suffering and to ensure continuous improvement in Industrialization has come to be regarded as a crucial and powerful engine in the overall development process their welfare. Ndiaya and Lv (2018) maintained that Industrialization represents a transition from an economy based on agriculture to one in which manufacturing represents the principal means of subsistence. Consequently, two dimensions of industrialization are the work that people do for a living (economic activity) and the actual goods they produce (economic output). Other dimensions include the manner in which economic activity is organized (organization). The energy or power source used (mechanization) and the systematic methods and innovative practices employed to accomplish work (technology

In Nigeria the Industrial sector is basically divided into 5 subsector namely Manufacturing subsector, construction subsector, electricity, gas, steam and air conditioner subsector, mining and quarry subsector and water supply, sewage, waste management subsector (CBN, 2021).

Industrial sector output can be defined as the total production of the output by the industrial establishments within the economy and covers such sectors as mining, manufacturing, electricity, gas and steam and air-conditioning, water supply, sewage, waste management (OECD, 2020). Put differently, industrial production measures the output of the industrial sector, which typically comprises mining, manufacturing, utilities and construction (Ughulu, 2021).

On the other hand, Economic growth refers to the ability of the economy to increase the production of goods and services with the stock of capital and other factors of production within the economy. It entails a long-term expansion of the productive potential of the economy. It is measured by the country's Gross Domestic Product (GDP) or GDP per capita in a year; that is the total amount of final goods and services produced in one year within a country. GDP shows how better off or worse off an economy's growth is (Afolabi & Ogoh, 2017; Nnanna, Englama, & Odoko, 2004).

Empirical Review

Ughulu (2021) evaluated the relationships between industrial sector output and the sustainable economic growth of Nigeria, data was sourced from World Bank, World Development Indicators and the CBN Statistical Bulletin for the period covering 1981 to 2018. In analysing the data collected, co-integration tests and error correction model (ECM) were employed. Findings revealed that positive a relationship between industrial sector output and economic growth existed, while capital expenditure and lending rate exerted negative impact on industrial output.

Ahmed and Mwadkon (2019) in their study x-rayed the impact of industrial sector on the sustainable economic development of Nigeria. They relied on data sourced from the

CBN Statistical Bulletin for the period 1981 to 2016, which was analysed using the multiple regression analysis. Findings from their study indicated that index for industrial production, capital formation and money supply all exerted positive and significant impact on the real gross domestic product, but the impact of money supply was not significant.

Adopting the ARDL framework, Mandara and Ali (2018) assessed the impact of industrialization on the Nigerian economy using data for the period 1981 to 2015 that was sourced from CBN Statistical Bulletin. Result from the study showed that industrial output exerted a positive and significant impact on economic growth

Relying on evidence from Senegal, Ndiaya and Lv (2018) examined the impact of industrialization on economic growth focusing on Senegalese manufacturing firms. The relevant data for the period between 1960 and 2017 was sourced from the World Bank (WDI 2015) and the National Agency of Statistic and Demography in Senegal (ANSD). The OLS estimation techniques of multiple regression was adopted in analyzing the data collected. Findings suggested that industrial output and FDI exerted positive and significant impact on economic growth, while inflation rate and exchange rate impacted negatively on economic growth of Senegal.

Similarly, Senibi et al (2017) investigated the impact of the industrial sector output on the Nigerian economy for the period 1981 to 2013, relying on data sourced from the CBN statistical bulletin. The co-integration and granger causality techniques were utilized in analyzing the data collected. The findings from the study revealed that in the long run industrial sector output expressed a negative a negative and significant impact on the economic growth of Nigeria. Also, the result of the Granger causality tests showed a one-way causality running from the industrial sector output to economic growth.

Afolabi and Ogoh (2017) investigated the impact of industrial output on the economic growth of Nigeria. They basically measured industrial output as Manufacturing Value Added. Relevant data employed was sourced from World development indicator for the period covering 1981 to 2014, while the Autoregressive Distributed Lag Cointegration Technique was utilized in analyzing the data collected. Findings from the study indicated that manufacturing value added exhibited a positive but insignificant impact on the economic growth of Nigeria, while agricultural value added exerted a significant impact, electricity production and government capital expenditure had insignificant impact on the economic growth of Nigeria.

Focusing on ten Economic Community of West African States countries Gylych and Enwerem (2016) investigated the impact of industrialization on economic growth with for the period covering 2000 to 2013. The OLS estimation technique of panel data regression was utilized in evaluating the data collected. Findings from the study suggested that industrialization negatively impacted the economic growth of the countries under study.

In the same vein, to examine the effect industrial development on the Nigeria's economic growth Bennett, Anyanwu and Kalu (2015) collected data from the CBN statistical bulletin for the period between 1973 and 2013 on variables such as GDP, foreign direct investment, industrial output, total savings and inflation. The study adopted the multiple regression analysis and the result of the study revealed that industrial sector output and Savings positively but insignificantly affected the economic growth of Nigeria. Inflation

negatively and significantly influenced the economic growth, while FDI's impact was positive and significant

Naudé and Szirmai (2012) have examined the arguments about the engine of growth hypothesis for some Asian and Latin American developing countries. Focusing on capital intensity and growth of output, he finds support for the engine of growth hypothesis, but for some periods capital intensity in services and industry turns out to be higher than in manufacturing. He concludes that in advanced economies productivity growth in agriculture is more rapid than in manufacturing.

To examine the nexus of industrialization, trade and economic growth in Nigeria, Tamuno and Edoumiekumo (2012) employed the co-integration and ECM test on data sourced from the CBN statistical bulletin. The findings from the study revealed that the industrial sector exerted insignificant impact on the economic growth of Nigeria.

Udah (2010) investigated the interrelationships amongst industrial development, electricity and economic growth in Nigeria for the period 1970 to 2008 using the ECM technique. Findings revealed that industrial sector output and electricity supply exerted positive influence on economic growth of Nigeria.

Given the volume of literature reviewed, researchers utilized various proxies for industrial development, such industrial output, industrial index etc. Some segregated but non to the best of my knowledge used the classification proposed by the CBN statistical bulletin to evaluate the various subsectors of the industrial sectors in relations to economic growth. Also none of the studies used data that was as recent as 2021

METHODOLOGY

The *ex-post facto* research design was adopted given the nature and scope of the investigation. Annual time series data for the variables being investigated were sourced from Central Bank of Nigeria (CBN) Statistical Bulletin. The dataset covered the period 1981 to 2021, which was basically predicated on the accessibility and availability of data. In analyzing the data collected, the Johansson approach to co-integration test and vector error correction model which was a deviation from previous studies were adopted. Furthermore, other complementary diagnostic tests such as the unit root test, serial correlation test, heteroscedasticity test and stability test were conducted to ensure appropriateness of the result.

Model Specification

In a quest to properly investigate the impact of industrial sector output on the economic growth of Nigeria, the model of Ughulu (2021) was adapted, then modified to reflect objectives of the study.

The model stated as;

RGDP= *f* (CONS, ELECT, MQ, MANU, WSSWM)…(1)

Where:

RGDP = Real gross domestic product
CONS = Contribution of Construction sub-sector to GDP
ELECT= Contribution of electricity, gas, steam and air conditioner sub-sector to GDP,
MQ = Contribution of mining and quarry sub-sector to GDP
MANU = Contribution of manufacturing sub-sector to GDP

WSSWM= Contribution of water supply, sewage, waste management sub-sector to GDP.

From equation (1) the long run relationship can be written as;

$RGDP_t = \lambda_0 + \lambda_1 CONS_t + \lambda_2 ELECT_t + \lambda 3 MQ_t + \lambda 4 MANU_t + \lambda 5 WSSWM_t + \mu_t$.... (2)

While the error correction representation of the series used to estimate the short run association can be specified as follows:

$\Delta RGDP_t = \lambda_0 + \lambda_1 \Delta CONS_t + \lambda_2 \Delta ELECT_t + \lambda 3 \Delta MQ_t + \lambda 4 \Delta MANU_t + \lambda 5 WSSWM_t + \eta ECMt\text{-}1 + \varepsilon t$...(3)

In the above model, Δ is the first-difference operator, and λ indicate long run coefficients.

The hypothesis of no co-integration deals with H_0: λ 1 = λ2 = λ3 = λ4 = λ5 = 0 and H_1: λ1 ≠ λ2 ≠ λ3 ≠ λ4 ≠ 0 is an alternative hypothesis of co-integration.

The *a priori* expectation of the parameters is given as β_1, β_2, β_3, β_4 and $\beta_5 > 0$

RESULTS AND DISCUSSIONS

Estimation of the econometric model specified in this study was preceded by an examination of the statistical properties of the series, including tests of stationary of the individual series. The Augmented Dickey Fuller (ADF) unit root test results for the variables used in the analysis were presented in Tables below

Table 1: Summary Statistics, using the observations 1981 – 2021

	CONS	ELECT	MQ	MANU	RGDP	WSSWM
Mean	1154.331	114.4742	6688.639	4219.768	37710.48	39.40507
Median	764.3285	89.79753	6572.894	3578.642	26658.62	18.12883
Maximum	2680.216	340.9234	9323.751	6684.218	72393.67	150.0131
Minimum	335.7586	5.117648	4096.993	2898.474	16048.31	7.665382
Std. Dev.	832.2375	119.5790	1422.085	1309.560	20309.83	39.54050
Skewness	0.844847	0.499774	0.132910	0.836511	0.575311	1.431139
Kurtosis	2.070110	1.683385	2.134502	2.094196	1.704524	3.687040
Jarque-Bera	6.354599	4.668143	1.400401	6.183282	5.128737	14.80213
Probability	0.041698	0.096900	0.496486	0.045427	0.076968	0.000611
Sum	47327.58	4693.442	274234.2	173010.5	1546130.	1615.608
Sum Sq. Dev.	27704773	571965.3	80893086	68597919	1.65E+10	62538.06
Observations	41	41	41	41	41	41

Source: *Computation by authors with E-view 9.0.*

Table 1 presented the summary statistics for values of real domestic gross product, construction, electricity, gas, steam and air conditioner, mining and quarry, manufacturing and water supply, sewage, waste management.

Table 2: Summary of Augmented Dickey Fuller (ADF) Unit Root Tests Result

Variables	ADF Test Statistics	Critical Values @ 5%	P-value	Order of Integration
CONS	-3.529794	-2.938987	0.0123	I(1)
ELECT	-5.720119	-2.938987	0.0000	I(1)
M_Q	-5.720119	-2.938987	0.0000	I(1)
MANU	-4.398204	-2.938987	0.0012	I(1)
RGDP	-3.288313	-2.938987	0.0223	I(1)
WSSWM	-6.449638	-2.941145	0.0000	I(1)

Source: *Computation by authors with E-view 9.0.*

From the ADF result presented in Table 2 suggests that the time series were integrated of the same order, since comparing the t-statistic values of real domestic gross product, construction, electricity, gas, steam and air conditioner, mining and quarry, manufacturing and water supply, sewage, waste management with critical values, in which their respective t-statistics are greater than the critical values, it therefore suggest the series are stationary at first difference.

Result of Co-integration Test

Since the ADF test result had suggested that the series has no unit root and are integrated at the same order, the Johansen co-integration test which was appropriate was conducted. The test operates on two statistics test namely: the trace test and the maximal Eigenvalue test, the result presented in Tables 3 and 4 below:

Table 3: Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.761499	130.7832	95.75366	0.0000
At most 1 *	0.587467	74.88131	69.81889	0.0186
At most 2	0.428058	40.34915	47.85613	0.2103
At most 3	0.275215	18.55918	29.79707	0.5250
At most 4	0.122531	6.005825	15.49471	0.6949
At most 5	0.023013	0.907976	3.841466	0.3407

Source: *Computation by authors with E-view 9.0.*

The trace rank result presented in Table 3 revealed that the Trace statistic values is 130.78 which is greater than the critical value of 95.75366 and also has a probability value of 0.000 which is lesser than 0.05, this suggest that we reject the null hypothesis that there is none co-integrating equation in the model.

Table 4: Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.761499	55.90193	40.07757	0.0004
At most 1 *	0.587467	34.53216	33.87687	0.0417
At most 2	0.428058	21.78997	27.58434	0.2314
At most 3	0.275215	12.55336	21.13162	0.4941
At most 4	0.122531	5.097849	14.26460	0.7294
At most 5	0.023013	0.907976	3.841466	0.3407

Source: *Computation by authors with E-view 9.0.*

The result on Table 4 indicated the Maximum Eigen value is 55.90193 which is greater than the critical value of 40.07757 and also has a probability value of 0.0000, this suggests that we reject the null hypothesis that there is none co-integrating equation in the model, and this result is consonance with the trace result. The above result denotes the existence of co-integration between real domestic gross product, construction, electricity, gas, steam and air conditioner, mining and quarry, manufacturing and water supply, sewage, waste management during the period under review. It shows the rejection of null hypothesis of no co-integration and acceptance of the alternative of co-integration. So, the results suggest existence of a stable long run relationship between economic growth and industrial sector output

Presentation of Vector Error Correction Model (ECM)

Having established the long run equilibrium relationship among the variables in the model, the focus was shifted to the short run error correction model. The error correction model result was presented in Table 5 below.

Table 5: Result of Error Correction Model (ECM)

	Coefficient	Std. Error	t-Statistic	Prob.
ect	-0.513175	0.165318	-3.104173	0.0048
RGDP(-1)	-0.252533	0.301607	-0.837291	0.4107
RGDP(-2)	0.130212	0.242675	0.536568	0.5965
CONS(-1)	8.738708	3.086882	2.830917	0.0092
CONS(-2)	-2.117570	3.043441	-0.695781	0.4932
ELECT(-1)	55.83091	10.81489	5.162413	0.0000
ELECT(-2)	31.75012	12.29539	2.582278	0.0163
MQ(-1)	0.396816	0.471714	0.841223	0.4085
MQ(-2)	-0.535766	0.408624	-1.311148	0.2022
MANU(-1)	0.301894	0.519767	0.580826	0.5668
MANU(21)	0.351631	0.566573	0.620628	0.5407
WSSWM(-1)	225.7700	90.33461	2.499264	0.0197
WSSWM(-2)	155.7333	86.45185	1.801387	0.0842
C	391.1290	270.4948	1.445976	0.1611
R-squared	0.755533	Mean dependent var		1478.023
Adjusted R-squared	0.623113	S.D. dependent var		1485.021
S.E. of regression	911.6712	Akaike info criterion		16.74575
Sum squared resid	19947465	Schwarz criterion		17.34907
Log likelihood	-304.1692	Hannan-Quinn criter.		16.96040
F-statistic	5.705586	Durbin-Watson stat		1.973215
Prob(F-statistic)	0.000122			

Source: *Computation by authors with E-view 9.0.*

The result of the error correction model as presented in Table 5 indicated that the error correction term as expected is negative and statistically significant, given its coefficient and P-value of 0.513 and 0.00 respectively, this supports the view suggesting the exists a short-run relationship between the variables. Its value -0.513 indicates a moderate adjustment process, approximately 51.3% of disequilibria from the previous year's shock converge back to the long-run equilibrium in the current year.

Furthermore, construction sub-sector has a coefficient and P-value of 8.738, signifying that construction sub-sector has a positive and significant impact on the real GDP of Nigeria. Implying that a billion increase in construction sub-sector will lead to approximately N8.738 billion increases in real GDP of Nigeria. This is consistent with *a priori* expectation. Furthermore, electricity, gas, steam and air conditioner sub-sector exerted a positive and significant impact on real GDP of Nigeria judging from the coefficient and P-value of 55.83 and 0.000 respectively. This suggests that as electricity, gas, steam and air conditioner sub-sector increases, real GDP of Nigeria increases too and vice –versa. This is also consistent with *a priori* expectation. While mining and quarry sub-sector with coefficients 0.39 expressed a positive impact on the real GDP of Nigeria, but the impact is not statically significant based on its P-value of 0.40. This may be attributed to the heavy corruption and leakages inherent in the sub-sector. In the same vein, the manufacturing sub-sector with a coefficient and P-value of 0.30 and P-value of 0.56 signifies that exerted a positive but insignificant impact on the real GDP of Nigeria. Given the poor state of facilities and amenities, double taxation and unfavourable then conflicting policies may have

accounted for this outcome. Finally water supply, sewage, waste management subsector with a coefficient of 225.77 and P-value of 0.02 suggests water supply, sewage, waste management subsector had a positive effect on real GDP of Nigeria. Suggesting that a N1 billion increase in the water supply, sewage, waste management subsector, real GDP increases by approximately N225.77 billion and vice-versa. This is consistent with *a priori* expectation. Given the findings it could be seen that electricity, gas, steam and air conditioner and water supply, sewage, waste management possessed greater prospects for economic growth of Nigeria.

In evaluating the entire model, the Coefficient of determination, R^2 which gauges the explanatory power of the multiple regression model had a coefficient of 0.755, which suggest that 75.5% changes in economic growth of Nigeria is accounted for by the explanatory variables. This indicates that the variables stated in the model were useful for explaining the changes in economic growth of Nigeria within the period under review. Also the F- statistic which is used to measure the overall significance of the model has a coefficient of 5.7 with a P-value of 0.000, given that P-value is lesser than 0.05, this indicates that the explanatory variable jointly has a significant impact on the dependent variable.

Results of diagnostic tests

To ensure reliability of the results, Diagnostic tests for serial correlation, heteroscedasticity and stability diagnostic test of CUSUM Test and CUSUM of Squares test, were conducted and the results are shown in tables 6, Figure 1 and 2.

Table 6: Results of diagnostic tests

	Test Statistics	P-value
Breusch-Godfrey Serial Correlation test	0.074695	0.9283
ARCH Heteroskedasticity Test	0.175847	0.6775

Source: *Computation by authors with E-view 9.0.*

Table 6 presented the result of the serial correlation LM test which tests for serial correlation in the model. The test is based on the null hypothesis that there is no serial correlation in the model. From the result, the F- statistic of 0.074 with a p-value of 0.928 is greater than 0.05, suggesting the acceptance of the null hypothesis. This implies that there is no presence of serial correlations in the model. Also the Breusch-Pagan-Godfrey Heteroskedasticity test was used to test for Heteroskedasticity in the model, and it is based upon a null hypothesis that the model is Homoskedastic, since the F-statistic of 0.17 has a P-value of 0.67 which is greater than 0.05, we then accept the null hypothesis. This suggests that there is no evidence of the problem of Heteroskedasticity in the model.

Fig 1: Plot of CUSUM Test

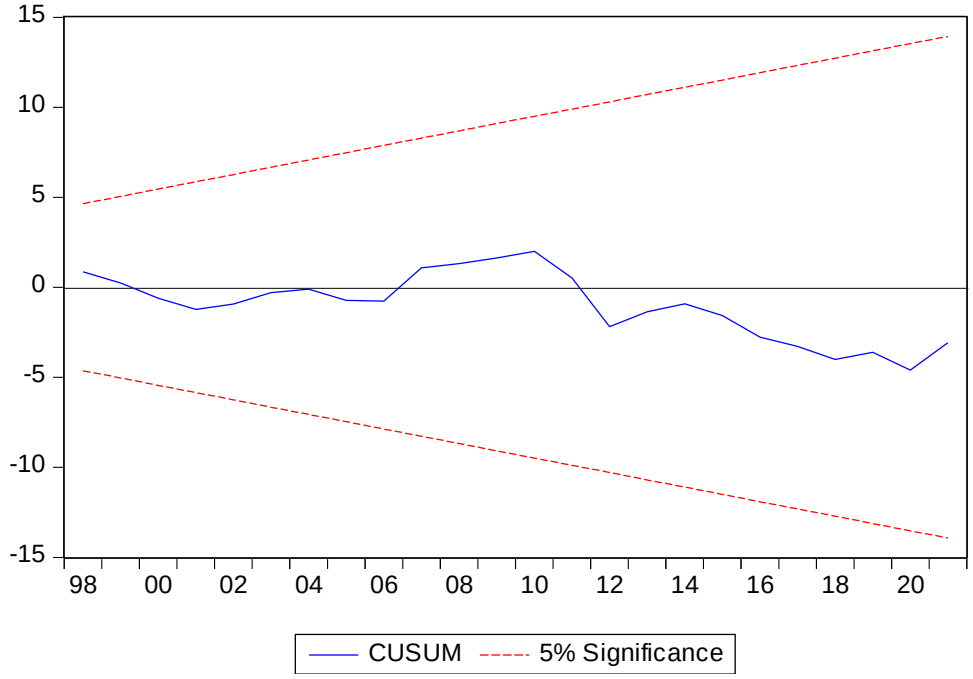
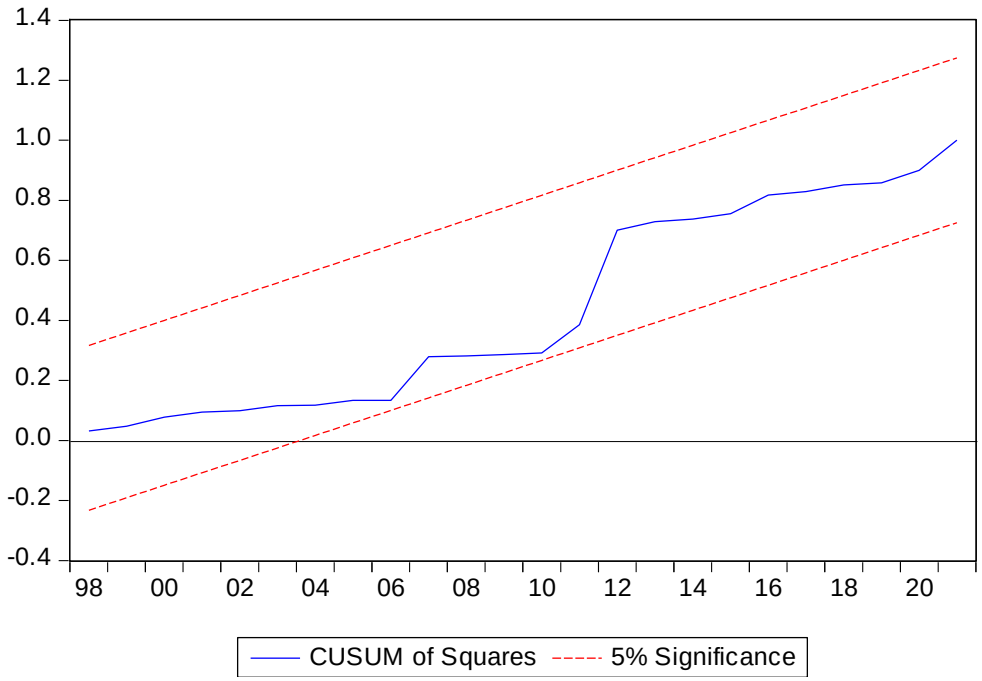


Fig 2: Plot of CUSUM of Squares Test



Figures 1 and 2 plots the CUSUM and CUSUM of squares statistics from a recursive estimation of the model. It is evidenced from Figure 1 and 2 that the plot of CUSUM and CUSUMSQ stays within the critical 5% bounds, thus indicating stability in the coefficients over the sample period.

CONCLUSION

The paper x-rayed the impact of industrial sector output on the economic growth of Nigeria. Based on the strength of the empirical analysis of the secondary data using Johansson co-integration test and the VECM, the findings indicated that there exists a long

run and short run relationship between economic growth and industrial sector output. The findings further revealed

that construction subsector, electricity, gas, steam and air conditioner subsector, mining and quarry subsector, manufacturing subsector and water supply, sewage, waste management subsector had positive impact on the economic growth of Nigeria, but the impact of mining and quarry and manufacturing subsectors were not significant causing serious concerns. Also water supply, sewage, waste management and electricity, gas, steam and air conditioner subsector outperformed other sectors showing signs of serious growth prospect. The study among other things recommended that the authorities should make the mining and quarry sub sector more transparent to reduce corruption and attract more investment. Government should endeavor develop a more efficient framework to verify and pay contactors that have executed state projects Electricity, gas, steam and air conditioner subsector should be opened up for real private sector participation. The ease of doing business in Nigeria should be streamlined to eliminate conflicting policies and multiple taxation. Finally, increased budgetary allocation to stimulate water supply, sewage, waste management should be undertaken.

References

Afolabi, B. & Ogoh, S. (2017) Industrial output and economic growth in Nigeria. *European Journal of Scientific Research,* 147 (1), 87-96.

Ahmed, A. & Mwadkon, M. D.(2019). Impact of the industrial sector on sustainable economic development in Nigeria. *International Journal of Comparative Studies in International Relations and Development*, 5(1), 149-169

Anyanwu, C.M. (2001). Productivity in the Nigerian manufacturing industry, *Research Department, Central Bank of Nigeria Pp 124-135.*

Central Bank of Nigeria. (2021). Central Bank of Nigeria Statistical Bulletin

Gylych, J., & Enwerem, H. I. (2016). *Impact of industrialization on economic growth; experience of ten countries of ECOWAS.* Conference paper on Social Science & Law, Africa, At Abuja / Nigeria, 2.

Mandara, B.,& Ali, M.B. (2018). Appraisal of the impact of industrialization on economic growth in Nigeria, *Journal of Business and Management,* 20 (1), 1-10.

National Bureau of Statistics.(2005).*Statistical Bulletin and Annual Report.*

National Bureau of Statistics.(2011).*Statistical Bulletin and Annual Report.*

National Bureau of Statistics.(2018).*Statistical Bulletin and Annual Report.*

Naudé, W. & Szirmai, A. (2012) The importance of manufacturing in economic development: past, present and future perspectives.

Ndiaya, C. and Lv, K. (2018) Role of industrialization on economic growth: The Experience of Senegal (1960-2017). *American Journal of Industrial and Business Management*, **8**, 2072-2085. doi: 10.4236/ajibm.2018.810137.

Nnanna, O. J., Englama, A., & Odoko, F.O. (2004). *Financial Markets in Nigeria.* Central Bank of Nigeria Publication.

Noko E.J. (2016). Impact of industrial sector on Nigeria economic growth. *A Research centre Project*, http://educacinfo.com.

Obioma, B. K, Anyanwu ,U. & Kalu, A. O.U (2015). The effect of industrial development on economic growth (An empirical evidence in Nigeria 1973-2013). *European Journal of Business and Management*,.7(13), 160-170.

Pacheco-López, P. & Thirlwall, A.P.(2013) A New Interpretation of Kaldor's First Growth Law for Open Developing Economies. University of Kent, School of Economics Discussion Papers, KDPE 1312.

Sankaran1, A., Vadivel, A. & Jamal, M. A. (2020). Effects of dynamic variables on industrial output in one of the world's fastest‐growing countries: case evidence from India. *Future Business Journal,* 6(1), 2-8. https://doi.org/10.1186/s43093-020-00023-y

Senibi, K.V., Aiyepeku, A., Odutola,O., Ndaman, I., Eseoghene, O., Ogunlusi, T., & Eldad, M., (2017). Industrial sector investment and industrial growth in Nigeria: A granger causality analysis, *International Journal of English Literature and Social Sciences (IJELS), 2*(4), 1-9.https://doi.org/10.24001/ijels.2.4.1

Tamuno, S. O.,& Edoumiekumo, S. G.(2012). Industrialization and trade globalization: What hope for Nigeria? *International Journal of Academic Research in Business and Social Sciences, 2*(6), 157-170.

Udah, E.B. (2010). Industrial development, electricity crisis and economic performance in Nigeria. *European Journal of Economics, Finance and Administrative Sciences, 18,*105-124.

Ughulu, S. E, (2021). Industrial output and economic growth in emerging economies: Evidence from Nigeria*. Applied Finance and Accounting*, 7(1) 32-43

World Bank, (2019).*World Development Indicator, Washington D.C.*