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Infrastructural Decay in Sub-Saharan Africa: Evidence from the Nigerian Manufacturing Sector

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Abstract: The growth and development of any nation is highly dependent on the level of infrastructure. Infrastructural decay has taken a big toll on the economic development of most Sub- Saharan African nations. This paper investigated the effect infrastructural decay on the growth of the manufacturing sector in Sub-Saharan Africa with particular reference to the Nigerian situation. The data necessary for this study were obtained from secondary sources. The results of unit root suggest that all the variables in the model are stationary. The ordinary least square regression with a coefficient of 0.92 revealed a strong positive relationship between the variables of interest. A co-integration test was performed on these variables to determine the long-run relationship between the variables. The results of causality tests suggest that electricity supply, transport infrastructure and inflation rate (the explanatory variables) jointly explain changes in the manufacturing sector performance. The result also reveals a one-way causation running from interest rate to manufacturing sector performance. The Johansen cointegration result reveals the existence of a common trend among the variables of interest. Electricity decay was found to have the greatest negative impact on the manufacturing sector's financial performance and output followed by inflation and transportation. The government is therefore enjoined to continue the reform programmes across the infrastructural segments of the economy.

Keywords: Infrastructural decay; Pioneer status; Hard-core infrastructure; Soft-Core infrastructure; Manufacturing sector Performance; inflation.

1. Introduction

The growth and development of an economy is dependent on the state of her infrastructure. Infrastructure definition falls into two complimentary categories. These are social or soft-core infrastructure (provision of health care, security, education, good governance etc.) and the physical or hard core infrastructure (telecommunication, power, transportation, water supply, sewage, good roads etc.). The soft-core infrastructure is seen as the driving force for economic activity, while the hard core infrastructure is seen as the wheel for economic activity (Ubi *et al.*, 2012).

The importance of the manufacturing sector to economic growth cannot be overemphasized. Indeed, nation's economic efficiency, according to Amakom (2012) is measured by the virility of its manufacturing sector. In Nigeria, from a modest 4.8% in 1960, the contribution of manufacturing to GDP has been fluctuating over the years. The surge of 7.4% in 1975 tumbled to 5.4%, by 1980 only to attain to a record high of 10.7% in 1985. By 1990, the share of manufacturing in GDP which stood at 8.1% fell to 7.9% in 1992 and further declined to 6.7% and 6.3% in 1995 and 1997 respectively. As of 2001 the share of manufacturing in GDP crashed to the lowest ebb of 3.4% after it has risen modestly to 6.2% in 2000. It gained some traction at 4.16% in 2011 which was less than its contribution at independence in 1960 (Central Bank of Nigeria - CBN, 2012). According to the 2010 annual report of the Manufacturers Association of Nigeria, (MAN) presented during the 39th Annual General Meeting of the association, the Nigerian manufacturing sector only contributed 4.21% to the GDP in 2009.The results of the rebasing of Nigeria's GDP, hitherto 1990 to 2010 which show that the Nigerian economy is more diversified than previously reported, show manufacturing as contributing only 6.46% and 6.83% of the GDP in 2011 and 2013 respectively (National Bureau of Statistics, 2014).

The power generating capacity of the Nigerian nation has been epileptic. The United State International Trade Commission (USITC) (2009) asserts that poor infrastructural conditions increase costs and compromise product

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quality which accounted for the significant competitive disadvantage of most manufacturing firms in sub- Saharan Africa. Nigeria is no exception in the experience of the same debilitating impact of infrastructural debilitation. Banjoko (2009) posits that the downturn experienced over the years in the manufacturing sector and the economy as a whole is as a result of the total neglect of critical infrastructure necessary for economic growth and development. One of the major challenges facing the Nigerian manufacturing sector in the opinion of Onuoha (2012) includes high cost of production, limited scope of operation and poor infrastructure. He further reported that the qualities of infrastructure ranging from electricity supply to Ports infrastructure and road network are all in shambles. The electricity and power sector has been seriously sub-optimized and sadly marked by low generating capacity. This parlous state of things was also confirmed by the United State International Trade Commission (USITC) (2009).

Nigeria has the lowest generating capacity and the greatest population. It was seen from the report that South Africa with a population of about fifty million people produces about 45,000 MW of electricity. While, Nigeria with over 160 million populations produces only about 4000 MW of electricity, this is a far cry from the goal of becoming one of the leading nation in the world by year 2020. Ladipo (2014) opined that one of the root causes for the relocation of major part of the investment of some conglomerates such as Cadbury and Nestle to Ghana and the complete closure of some Nigerian based manufacturing firms such as Afprint Nigeria Plc, Western textile Mills, First Sippner PLC in Lagos, United Nigerian Textile limited, Finetex Limited, Unitex, Dangote textiles in Kaduna and Kano to mention but a few (Nigerian Textile Manufacturers Association, 2009).

The cumulative effect of this decay has left the nation's manufacturing sector in jeopardy. The need for a critical and in depth investigation into the disaggregated impact of infrastructure on the manufacturing sector becomes manifest. Therefore, the focus of this paper is to examine the effect of infrastructural decay in Sub-Saharan Africa using the Nigeria experience

2. Review of Extant Literature

Manufacturing firms are catalysts for industrial and economic development. They also play active role in international trade and foreign exchange earnings. As such, most countries encourage investments in these industries (Chima, 2013). The perception of investment in this country needs to be more business friendly. So if Nigeria wish to attract foreign investors, the government need to make the international communities trust and be happy in investing here rather than going somewhere else (Chinyere, 2008). According to Lewis (2008), Nigeria required about $500 billion to tackle its infrastructural decay and must liberalize its market in order to attract foreign investors for the achievement of vision (2020). Indeed, according to CBN (2010), the manufacturing growth rate declined from 7.03% in 2009 to 6.43% in 2010 as a result of the poor state of infrastructure, especially, energy, increased cost of funds, multiplicity of taxes, weak demand as a result of low purchasing power and trade malpractices. The contribution of manufacturing sector to GDP was 4.1% in 2010 compared to 4.21% in 2009. Average manufacturing capacity utilization decreased from 47% in 2009 to 45% in 2010.

While some economists associate infrastructure with economic and social overhead capital, which includes facilities such as power, transport and communications, others see it as embracing social overhead which includes facilities for water supplies, education, health, information, town and country planning and social welfare. (Oshikoya (1999) as cited in Onuoha (2012) and (Ubi *et al*., 2011)). Theoretically, Hirschman's theory of unbalancing development can be used to justify the treatment of infrastructure as a 'lead' sector whose expansion promotes and supports the development of other sectors. In Hirschman's view, since developing countries do not possess sufficient resources for investing simultaneously in all sectors of the economy, investments in strategically selected industries or sectors of the economy will lead to new investment opportunities and so pave the way to further economic development Hirschman (1958).

The negative environmental effects of inadequate infrastructures like air and water pollution are most evident in densely populated, inner cities, where the poor are concentrated. Whittington (1990) and Israel (1992) as cited in (Chinyere, 2008) infrastructural problems can affect the poor more disproportionately such that they are forced to obtain more expensive and less safe alternatives. Inadequate services can also affect the labour productivity of the poor and access to employment. The bottom line of the infrastructure-poverty nexus is that activities that have a high potential to generate employment for the poor are particularly hurt by infrastructure deficiencies Israel (1992) as cited in (Chinyere, 2008).

The relevance of infrastructure to agriculture was of concern to the World Bank Development Report (2008) which asserts that adequate communication networks, road, storage facilities, and electricity, enables farmers to obtain the information needed to grow the most profitable crops, store, move them to market and receive the best prices for them. The report states that about 15 percent of production is lost between the farm gate and the consumers because of poor infrastructure. Given the fact that agricultural products constitute a veritable source of inputs into the manufacturing process, the consequential deleterious effect of the paucity and infrastructural decay as confirmed by Bamidele, (2013) as cited in Ladipo (2014) cannot be overlooked.

The importance of electricity has been brought to the fore. Some scholars have argued that unemployment and power supply for industrial development are two common challenges confronting most economies. Asaolu and Oladele (2006) submit that infrastructural decay is the major problem confronting Nigeria and that electricity generation is one of the instances of the infrastructural decay in Nigeria. This is corroborated by Ayodele (2001) who argues that the development of Nigerian economy as an emerging market is technically a function of adequate provision and supply of electricity power. Similarly, Okafor (2008) contends that poor power generation represents a

major setback for the Nigeria's industrial development. In the same context, Rabiu (2009) posits that for three decades, inadequate quantity, quality and access to electricity service remain a big challenge to the Nigerian economy and the resolution of the challenge would boost the economy, reduce unemployment and the resultant social vices. Tribune (2014) provided a break-down of power generation and consumption status of some countries (Table 1).

Table-1. Power Generation and Consumption Status of some Countries as of 2013

Country	Population Millions	Power Generation '000KW	Per Capita Consumption KW
United States	250.00	813,000	3.20KW
Cuba	10.54	4,000	0.38KW
United Kingdom	57.50	76,000	1.33KW
Ukraine	49.00	54,000	1.33KW
Iraq	23.60	10,000	0.42 KW
South Korea	47.00	52,000	1.09 KW
South Africa	44.30	45,000	1.015 KW
Libya	5.50	4,600	1.015 KW
Egypt	67.90	18,000	0.265 KW
Nigeria	140.00	4,000	0.03 KW

Source: Tribune Newspaper (September, 2014)

From Table 1 it will probably take Nigeria another 50 years before it attains the same level of electricity consumption per capita as South Africa currently enjoys today.

Banjoko (2009) clearly assert that adequate power supply is not only a strategic input to our national development, it is undoubtedly the most vital infrastructure necessary to move the economy and the manufacturing sector forward. NEEDS (2004) reveals how the power sector has been neglected over the years, stating that no new power station was built between 1979 and 1999 no major overhauling has also taken place. The partial privatization of the sector and unbundling of its operation portend good omen which should reduce the onus on the manufacturers for local and expensive provision.

Road network is vital to socio-economic development of any nation. As a well-known fact, road network is seriously lacking in all the sub-national states of the Nigerian nation (Uhunmwuangho and Epelle, 2007). Banjoko (2009) opines that good road transportation system is an important factor to commerce and even national development. The bulk of Nigeria road network is not only inadequate, not good for motors but unsafe. The situation has not only endangered many lives, it has adversely affected vehicular movements of goods from one part of the country to another (Uhunmwuangho and Epelle, 2007). Given the importance of infrastructure to the manufacturing sector, the next section will discuss the research methodology.

3. Methodology, Data and Analysis

3.1. Model Specification

In order to empirically determine the impact of infrastructural decay on manufacturing sector performance in Nigeria, the multiple regression model was specified. The multiple regression equation is explicitly specified in the functional forms as follows:

$$MSo = f(ELEC, TRANS, INFL) \quad (1)$$

Where:

MANo = Total Manufacturing sector contribution to GDP as the dependent variable
ELECT = Electricity contribution to GDP (%) as independent variable
TRANS = Transportation contribution to GDP (%) as independent variable
INFL = Inflation rate (%) as independent

Equation 1 can be specifically expressed in explicit econometric form as follows:

$$MANo = \beta_0 + \beta_1 ELEC + \beta_2 TRANS + \beta_3 INFL + U_t \quad (2)$$

Where:

U_t is stochastic or random error term with usual properties of zero mean and non-serial correlation
$\beta_1 - \beta_2$ = Coefficient of associated variables
β_0 = Constant intercept

It is interesting to note that the poor performance of the electricity power sector in Nigeria has been a significant barrier to private investment in the country and to the overall development and economic growth hence it is assumed that inverse relationship exists between shortage in the supply of electricity and manufacturing sector performance in Nigeria. It is expected that an increase in power supply in the manufacturing sector would lead to increasing manufacturing output and contribution to GDP hence increasing manufacturing sector performance, *ceteris paribus*.

In addition, it is also expected that improved transportation system will have a positive impact on manufacturing sector performance; in such situation transportation contribution to GDP shall then be increased. In like manner is the inflation rate, it is no news that the Nigeria Naira is losing its purchasing power day after day evidence from the exchange rate of Naira to a dollar, this has resulted to a persistent increase in the price level of manufacturing resources which unequivocally has a great implication on the manufacturing sector performance. It is expected that an increase in the currency value will reduce the inflation rate (price level) hence improving the performance of manufacturing sector financially.

3.2. Data Source and Description

The challenge of data as identified by Goldsbrough *et al.* (2007), have bedeviled developing countries including Nigeria as a result of the fundamental limitations in national data tracking systems. The need for data sourcing from several sources therefore becomes mandatory. The data used in this paper are annual figures covering the period of 1980 to 2013.

The National Bureau of Statistics (NBS) has proven to be less than adequate as a sole source of data on the variables. Data of employment in the manufacturing sector were obtained from NBS. We have had to extrapolate for some years for which data was unavailable. This has also been augmented by the Central Bank of Nigeria's Statistical Bulletin (CBN, 2014). The data on the output manufacturing which is the index of real output in manufacturing (1990=100) was sourced from the National Bureau of Statistics and the Central Bank of Nigeria before the GDP rebasing exercise of 2014.

3.3 Estimation Procedure

The Ordinary Least Squares (OLS) technique is utilised in estimating the model. However, the method cannot be applied unless it can be established that the time series data on the variables concerned are stable over time. This requires that the Augmented Dickey-Fuller (ADF) Unit Root test be deployed in order to prevent spurious regression results. If the calculated ADF statistic is higher than Mckinnon's initial values the series are considered stationarity or integrated of order zero 1(0). If the series are not integrated at level, this would lead to conducting the test on the difference of the series in order for them to reach stationarity. If the calculated ADF statistic is higher than Mckinnon's initial values the series are stationarity or integrated of order zero 1(0). If the series are not integrated at level, this would lead to conducting the test on the difference of the series in order for them to reach stationarity.

In the event of non-stationarity, the Johansen co-integration test and Vector error correction model (VECM) will be conducted in order to determine whether there is a long run relationship between two or more variables in a model Aminu *et al.* (2013).

The test of co-integration employed in this study is Johansen and Juselius (1990) maximum likelihood framework. In order determine whether long run relationships exist between our variables, the Trace statistics and the critical value at an appropriate level of significance is used determine whether to accept or reject the null hypothesis. If the Trace statistics value is greater than the critical value, the null hypothesis is rejected; on the other hand, if the Trace statistics is less than the critical value, the null hypothesis is accepted. The hypothesis indicates the number of co-integrating equation(s) and the usual levels of significance are 1 and 5 percent. The Granger causality test will also be conducted as a confirmation of the relationship between the variables.

The hypothesis to be tested in the null is that infrastructural decay do not exerts significant influence on manufacturing sector performance in Nigeria. The null hypothesis (Ho) would be rejected if P-value > 0.05 at 95 percent confidence level. The Eviews 7.1 software will be used for testing and estimation.

4. Data Analysis and Discussion of Results

This section is concerned with the presentation of analyzed data and discussion of results.

Table-2. Descriptive Statistics of the Variables

	MANo	ELECTR	TRANS	INFL
Mean	14.02	1.10	1.90	20.14
Median	9.50	0.34	2.05	12.30
Maximum	38.40	3.60	3.20	72.80
Minimum	1.86	0.12	0.89	5.40
Std. Dev.	12.01	1.16	0.64	18.04
Skewness	0.76	0.95	-0.28	1.59
Kurtosis	2.24	2.44	2.06	4.24
Jarque-Bera	4.11	5.54	1.70	16.46
Probability	0.13	0.06	0.43	0.00
Sum	476.68	37.50	64.54	684.80
Sum Sq. Dev.	4,763.32	44.66	13.37	10,735.74
Observations	34	34	34	34

Source: Author's Computations (2015).

4.1. Preliminary Analyses

The preliminary characteristics of the data and summary of the statistics of the variables are presented in Table 2. There is evidence of significant variation in the trends of the variable over the period of consideration. This is shown by the large difference between the minimum and maximum values of the series. As regards the statistical distribution of the series, the results show that the series are all positively skewed except for Transport. All the variables except for Inflation are platykurtic in nature since their values for kurtosis are less than 3. This indicates a higher than normal distribution.

The Jarque-Bera statistic is a goodness of fit of whether sample data have the skewness and kurtosis matching a normal distribution. It is a test of normality that combines skewness and kurtosis. From the probability for the Jarque-Bera, the manufacturing contribution to GDP (MANo), electricity contribution to GDP (ELECTR) and transportation contribution to GDP (TRANS) are normally distributed while the inflation rate (INFL) is not normally distributed. This result is supported by the skewness and kurtosis statistics for MANo, ELECTR and TRANS are not substantially far or different from the threshold (0 and 3 respectively). However, skewness and kurtosis statistics for INFL are significantly different from the threshold.

4.2. Stationarity Test Results

The result of the Augmented Dickey Fuller (ADF) unit root test is presented in Table 3. From the result in Table 3, all the variables are stationary at first difference except electricity, with constant but without deterministic trend. Hence we reject the null hypothesis and accept the alternative hypothesis that the series data are stable at first difference (second difference for electricity).

Table-3. Result of Augmented Dickey Fuller (ADF Unit Root Test

	Endogenous Variables			
	Mano	Electr	Trans	Infl
ADF statistics	-7.63	-9.37	-5.52	-5.24
1% Test critical value	-3.65	-4.28	-4.27	-4.27
5% Test critical value	-2.96	-3.56	-3.56	-3.56
10% Test critical value	-2.62	-3.22	-3.21	-3.21
Order of Integration	I(1)	I(2)	I(1)	I(1)
Prob (F-Statistics)	1.97	2.15	1.94	1.92
Durbin Watson	1.97	2.15	1.94	1.92
Prob (F-Statistics)	0.00	0.00	0.00	0.00

Source: Authors' computation using E-views 7.0

The probability values for all the variables are highly statistically significant which buttresses the rejection of the null hypothesis. The Durbin Watson statistics for all the variables also reveals the absence of auto-correlation among the variables.

4.3. Results of Model Estimation

The result of the multiple regression analysis is presented in Table 4.

Table-4. Result of Multiple Regression Analysis

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ELECTR	9.72	0.52	18.67	0.00
TRANS	1.72	0.98	1.750	0.09
INFL	0.08	0.04	2.34	0.03
C	-1.60	2.25	-0.71	0.48
R-squared	0.93	Mean dependent var		14.02
Adjusted R-squared	0.92	S.D. dependent var		12.01
S.E. of regression	3.46	Akaike info criterion		5.43
Sum squared resid	358.52	Schwarz criterion		5.61
Log likelihood	-88.29	Hannan-Quinn criter.		5.49
F-statistic	122.86	Durbin-Watson stat		1.98
Prob(F-statistic)	0.00			

Source: Authors' computation using E-views 7.0

The estimated model is presented as equation (3).

$$MSo = -1.60 + 9.72ELEC + 1.72TRANS + 0.08INFL + U_t \quad (3)$$

Equation (3) means that the coefficients of electricity and inflation are positive and statistically significant at 5 percent level, which implies that manufacturing sector performance is significantly affected by the level of electricity supply and the rate of inflation. Transportation is also positive but statistically significant at 10 percent level.

In terms of magnitude, this implies that every 1 percent increase (decrease) in electricity and transportation on the average, will lead to =N=9.71 billion and =N=9.71 billion increase (decrease) in manufacturing sector contribution to the GDP respectively. In the same vein, every 1% increase in inflation rates would on the average lead to a =N=80 million increase (decrease) in manufacturing sector performance. Of all the three variables, the influence exacted by electricity is the most pervasive.

The second partition of the Table 4 reveals the quality of the results. The coefficient of determination (R^2) = 0.93, Adjusted ($\overline{R^2}$ = 0.91) reveals that the regressors (manufacturing sector performance, electricity, transportation and inflation rates) account for 91 percent in explaining the variation in the manufacturing sector's performance. However, the rather high $\overline{R^2}$ value may be indicative of a spurious. Since the Durbin-Watson Statistics (DW) test result is higher the results can be accepted as valid (Granger and Newbold, 1974; Gujarati, 2003).

With respect to the F-ratio of 122.86 and probability value of 0.000, it means that there is a significant relationship between manufacturing sector performance, electricity infrastructure, transportation and inflation rates. The significant nature of the F-stat implies that the overall goodness of fit of the model is satisfactory, (the model has a good fit which can be used for forecasting performance of manufacturing companies).The Durbin-Watson statistic value of 1.98, which is between the threshold of 1.90 and 2.2, reveals the absence of serial correlation amongst the variables, which is a demonstration of the adequacy of the predictive power of regression model.

From the above discussions, the study finds that infrastructural adequacy is sine qua non for a productive manufacturing performance. In effect, the null hypothesis that infrastructural decay do not exerts significant influence on manufacturing sector performance in Nigeria is rejected since P-value < 0.05 at 95 percent confidence level. Indeed, infrastructural decay exerts a non-significant influence on manufacturing sector performance in Nigeria. The finding that paucity of electricity infrastructure had non-significant positive effect on manufacturing sector performance is consistent with the assertion of Oshodi (2006) as cited in Banjoko (2009) that the erratic nature of Nigeria's power supply cannot guarantee any meaningful industrial development. This is also consistent with the findings of the Council for Renewable Energy in Nigeria (CREN) that power outages brought about loss of 126 billion naira (USS984.38 million) annually to the country. In Kano, it has been estimated that more half of the city's 400 industrial establishments have been forced to closed down due to lack of power. With these closures some half a million workers have been retrenched (Adesina, 2011) as cited in Aminu *et al.* (2013).

The finding that transportation infrastructure had significant positive effect on manufacturing sector performance is in sympathy with a priori expectation. The finding concurs with the previous studies of Adeniji (2000) as cited in Aminu *et al.* (2013) and Obi (2011). According to them, less than 50% of the National road network are in fair or good condition causing an average death of 50 people per day; Less than 300,000 tonnes of freight and less than 2.3 million passenger are been transported by rail; More occurrences of air crashes in the Aviation sector; High rate of congestion in the sea port; and More vandalization of pipeline.

4.4 Results of Model Estimation

The result of the pairwise estimation of Granger causality is presented in Table 5.

Table-5. Pairwise Granger Causality Tests

Null Hypothesis:	F-Statistic	Prob.	Decision
ELECTR does not Granger Cause MANU	5.39433	0.0107	Reject
MANU does not Granger Cause ELECTR	0.88025	0.4262	Reject
TRANS does not Granger Cause MAN	0.17122	0.8435	Reject
MANU does not Granger Cause TRANS	0.03995	0.9609	Reject
INFL does not Granger Cause MANU	1.75493	0.1921	Reject
MANU does not Granger Cause INFL	1.13693	0.3357	Reject
TRANS does not Granger Cause ELECTR	0.55971	0.5779	Reject
ELECTR does not Granger Cause TRANS	0.03905	0.9618	Reject
INFL does not Granger Cause ELECTR	1.85421	0.1760	Reject
ELECTR does not Granger Cause INFL	3.26830	0.0536	Accept
INFL does not Granger Cause TRANS	0.12795	0.8804	Reject
TRANS does not Granger Cause INFL	1.53104	0.2345	Reject

Source: Authors' computation using E-views 7.0

The causality result from the table above reveals that electricity is the major determinant and granger cause of the manufacturing sector's performance. The null hypothesis are rejected at 5% as indicated by the probability value of 0.011, this is confirmed by its F-stat value of 5.39. The result also reveals that transportation and inflation singularly will not cause a significant change in the manufacturing sector's performance.

Therefore electricity infrastructure should be given a major and immediate attention by the present government. The result further shows that there exist no causation between all other variables, evidence that to a large extent of no likelihood of multicollinearity.

4.5 Results of Johansen Co-integration test

The result of the Johansen Co-integration test is presented in Table 6.

Table-6. Johansen Co-integration Test Results

Unrestricted Cointegration Rank Test (Trace Test)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.48	41.25	47.86	0.18*
At most 1	0.30	20.56	29.80	0.38*
At most 2	0.17	9.09	15.49	0.36*
At most 3	0.09	3.03	3.84	0.08
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.48	20.66	27.58	0.30*
At most 1	0.30	11.51	21.13	0.60*
At most 2	0.17	6.06	14.26	0.61*
At most 3	0.09	3.03	3.84	0.08

Source: Authors' computation using E-views 7.0
*denotes the rejection of the hypothesis at the 0.05 level
**MacKinnon *et al.* (1999) p-values
Note: Trace test and Max-eigenvalue statistics indicate 2 cointegrating equations at 0.05

The time series variables integrated of the same order are considered to be cointegrated. The cointegrated variables are hereby concluded to have common trend, that is, there exists a long run equilibrium relationship between them. Since all of the time series variables are integrated of the same order we proceeded to check number of cointegration vectors by using Johansen (1988) cointegration procedure.

The results of the Johansen cointegration test are reported in Table 6. Since there are two cointegrating vector, an economic interpretation of the long-run relationship MANU, ELECTR, TRANSCON, and INFL in Nigeria can be obtained by normalizing the estimates of the unconstrained cointegrating vector on manufacturing sector output. The identified cointegrating equations can then be used as error correction term (ECM) in error correction model. This series will form the error correction variable presented in Appendix 1.

A perusal of the VECM estimates results in Appendix 1 show how the infrastructural decay has affected the performance of the manufacturing sector in Nigeria. It can be observed that the model fits the observed data fairly well as indicated by the adjusted R^2 (0.65) and F-statistic (7.92) of the relevant error correction equation. More so, the signs of the coefficients meet *a priori* expectations except the coefficient of lagged inflation rate (INFL) that is positive (lagged for almost 2 years) though not statistically significant at 5 per cent level. Thus, this implies that electricity supply, transport infrastructure and inflation rate (the explanatory variables) jointly explain changes in the manufacturing sector performance (dependent variable) in Nigeria during the periods under investigation.

The coefficient of electricity supply (ELECT) lagged for 2 years in the short run has positive sign and statistically significant at 5 per cent level. This means that an increase in electricity supply for the last two years will enhance the rise in manufacturing sector output by 0.422970% and vice versa. However, the coefficient of electricity supply is unity (1.00) in the long-run. This is an indication that electricity supply as well as policy geared towards improving the power sector in Nigeria may not achieve its purpose, at least in the short-run.

The coefficient of transportation output (TRANS) in the short-run was -0.33, while the long-run estimate is -0.10. Both estimates are negative but the short-run estimate remains statistically significant at 5 per cent level. This implies that a 1% rise in transportation output would reduce manufacturing sector output by 0.33 percent in the short-run, and by 0.101100 in the long-run. Clearly, transportation infrastructure is not desirable in the short and long run estimates. This indicates possible decay in the concerned infrastructure.

The coefficient of inflation rate is -0.006242 in the long-run, while the short-run estimate was 0.001055 (lagged 2). Only the short-run estimate is with the expected sign, and not statistically significant respectively. This implies that a 1% rise in inflation rate would reduce in manufacturing sector output by 0.006242% in the long-run, while the same amount of increase in inflation rate would increase manufacturing sector output by 0.001055% in the short-run. Thus, a rise in inflation would evoke a proportionate increase in supply in the long-run. Thus, this means policy actions to significantly control inflation would be meaningful in the long-run compared to the short-run estimate.

The error correction coefficient (-0.63), which measures the speed of adjustment towards long-run equilibrium carries the expected negative sign and it is very significant at the 5% level. The coefficient indicates a feedback of about 62.68% of the previous year's disequilibrium from the long-run elasticity of electricity supply, transportation output and inflation rate. This implies that the speed with which electricity supply, transportation output and inflation rate adjust from short-run disequilibrium to changes in manufacturing sector output proxy for manufacturing sector performance in order to attain long-run equilibrium is 62.68% within one year. This indicates a relatively high speed of adjustment of the short-run and long-run equilibrium behaviour of manufacturing sector output and its explanatory variables.

The strong significance of the ECM support co-integration and suggest the existence of a long-run equilibrium relationship between manufacturing sector performance and the aforementioned explanatory variables, which determines it. These facts suggest that short-run changes in electricity supply, transportation output and inflation rate remarkably shaped manufacturing sector output in Nigeria from 1983 to 2013.

5. Conclusion

The study found that the sagging economy situation of sub-Saharan African nations using Nigeria as a case study is as a result of poor infrastructural development especially in the manufacturing sectors. Electricity decay was found to have a greater negative impact on the manufacturing sector's financial performance and output followed by inflation and transportation. The finding on electricity's impact on manufacturing sectors output is in agreement with the result of Banjoko (2009) that is of the opinion that the downturn experienced over the years in the manufacturing sector and the economy as a whole is as a result of the total neglect of critical infrastructure (electricity) necessary for economic growth and development.

The current sectorial policy reform in the electricity sector where the activities of the electric power industry are unbundled such that generation, transmission and distribution/supply are managed by separate enterprises is a welcome development. Government should critically pursue the option of public-private partnership (not excluding foreign parties) in this sub-sector in order to mobilize resources in this sector and create a more competitive environment thereby injecting economic and technical efficiency into the industry. This would reduce the level of decay currently experienced in this sub-sector.

A major reason for the high cost of doing business in Nigeria is the country's decaying infrastructure. Basic infrastructures are vital for the effective and efficient functioning of the economy. They are also the primary dominant factors in competitiveness in both the domestic and global markets. As a matter of priority and urgency therefore, concrete efforts must be made and everything done, to provide adequate and efficient infrastructural support services in the country.

References

Amakom, U. (2012). Manufactured exports in sub-saharan african economies: Econometric tests for the learning by exporting hypothesis. *American International Journal of Contemporary Research,* 2(4): 195-206.

Aminu, U., Manu, D.and Salihu, M. (2013). An empirical investigation into the effect of unemployment and inflation on economic growth in Nigeria. *Interdisciplinary Journal of Research in Business,* 2(12): 01-14.

Asaolu, T. O. and Oladele, P. O. (2006). Public enterprises and privatisation policy: The Nigerian Experience in Nigerian economy: Essays on Economic Development ed. (Feridun and Akindele). *Munich Personal RePEc Archive, MPRA*: 293 – 394.

Ayodele, A. S. (2001). Improving and sustaining power (electricity) supply for socio-economic development in Nigeria. http://www.cenbank.org/out/Publications/occasionalpapers/rd/2001/Owe-01-3.PDF

Banjoko, S. A. (2009). *The Nigerian manufacturing sector: Bumpy past and shaky future what options for survival?* : University of Lagos Inaugural Lecture series:

CBN (2010). Central Bank of Nigeria Statistical bulletin. *CBN Nig.* , 21.

CBN (2014). Central Bank of Nigeria Statistical bulletin. *CBN Nig.*, 25.

Chima, B. O. (2013). Factors militating against the global competitiveness of manufacturing firms in Nigeria. *American International Journal of Contemporary Research,* 3(4): 54.

Chinyere, A. (2008). UK recover £40 million for Nigeria. http//.www.vanguardngr.com/index.php? option = com – content & task = view & id = 9236 & item.

Goldsbrough, D., Adovor, E.and Elberger, B. (2007). Inflation Targets in IMF-Supported Programs.Center for Global Development, Washington, DC. https//ww.un.org/en/development/desa/policy/capacity/country_documents/Bangladesh_dec11Sessions2and3.pdf

Granger, C. W. J. and Newbold, P. (1974). Spurious regressions in econometrics. *Journal of Econometrics,* 2(2): 111–20.

Gujarati, D. N. (2003). *Basic econometrics.* 4 edn: McGraw-Hill: New York.

Hirschman, A. (1958). *The strategy of economic development.* Yale University: New Haven.

Johansen, S. (1988). Statistical analysis of cointegration vectors. *Journal of economic dynamics and control,* 12(2–3): 231–54.

Johansen, S. and Juselius, K. (1990). Maximum likelihood estimation and inference on cointegration– with applications to the demand for money. *Oxford Bulletin of Economics and Statistics,* 52(2): 169–210.

Ladipo, O. (2014). Domestic Energy and Conservation needs for indigenous Forest Species in Nigeria. A paper delivered at FAN 28th Annual Conference, held in Akure, Ondo State Nigeria from 4th -8 th November 2002.

Lewis, D. (2008). Infrastructural Decay in Nigeria Wikipedia cached of June 2011.

MacKinnon, J. G., Alfred, A., Haugand Leo, M. (1999). Numerical distribution functions of likelihood ratio tests for cointegration. *Journal of Applied Econometrics,* 14(5): 563-77.

National Bureau of Statistics (2014). Measuring better: Frequently asked questions on the rebasing / re-benchmarking of Nigeria's Gross domestic product (GDP). http//www.nigerianstat.gov.ng /index.php//

NEEDS (2004). National economic empowerment and development strategy. National Planning Commission.

Nigerian Textile Manufacturers Association (2009). Situation of the nigerian texile industry (1985-2008) AGO A Civil Society Forum Nation Newspaper, Sunday 28th April 2012. p. 4.

Obi, O. F. (2011).'Sustainable agricultural development in Nigeria: The role of ergonomics'.*11th International Conference and 32nd Annual meeting of the Nigerian Institution of Agricultural Engineers (NCAE Ilorin).*Ilorin. Nigeria.

Okafor, E. E. (2008). Development crisis of power supply and implications for industrial sector in Nigeria. *Stud Tribes Tribals*, 6(2): 83-92.

Onuoha, B. C. (2012). The environments of manufacturing sector in nigeria: Strategies towards vision 20:2020. *International Business and Management*, 5(1): 67.

Rabiu, A. (2009). The cost of electricity in Nigeria. *International Association for Energy Economics, First Quarter*: 15 -17.

Tribune (2014). Tribune Newspaper Nigeria. Saturday September, 13.

Ubi, P. S., Eke, F. A.and Oduneka, A. E. (2011). The role of infrastructure in industrialization in a developing economy: The case of electricity supply and education in Nigeria: In Industrial Development: A catalyst for rapid economic growth edited by Udoh, Elijah, Ogbuagu, U. R and Essia, Uwem, 224-255. P.N.Davidson Publications, Owerri, Imo State, Nigeria.

Ubi, P. S., Eko, S. A.and Ndem, B. E. (2012). Corruption and its implications for Actualizing Nigeria Vision 20 2020. *Global Journal of Social Sciences, , a publication of D. O. Hanson Print Investment*, 11(1): 41-52.

Uhunmwuangho, S. O. and Epelle, A. (2007). Problems and Prospects of Rural Development Planning in Nigeria (1966-2006). *International Journal of Communication*, 2(7): (UNN, NSUKKA).

United State International Trade Commission (USITC) (2009). Recent trends in U.S. Services Trade, 2009 Annual Report, USITC Publication 4015. Washington, DC: USITC.

Whittington, P. S. (1990). *Civil-Military Relations, The Soldier and the State in Joseph V. Monttvilled (ed) Conflict and Peacemaking in Multiethnic Societies.* Lexington Books: Lexington.

World Bank Development Report (2008). The importance of infrastructure to economic development. An example from China. http://www.//.allatrica.com /stories /200 708240645. Html

Appendix 1

Estimates of Long and Short-run Vector Error Correction (VEC) on Impact of Infrastructural Decay on Manufacturing Sector Performance in Nigeria

Cointegrating Eq:	**CointEq1**		
ELECTR(-1)	1.000000		
TRANS(-1)	-0.101100		
	(0.11310)		
	[-0.89392]		
INFL(-1)	-0.006242		
	(0.00431)		
	[-1.44830]		
C	-0.666160		
Error Correction:	D(ELECTR)	D(TRANS)	D(INFL)
CointEq1	-0.626827	-0.282450	7.317722
	(0.11656)	(0.30796)	(10.5320)
	[-5.37771]	[-0.91717]	[0.69481]
D(ELECTR(-1))	0.302923	0.259815	-19.80381
	(0.16382)	(0.43282)	(14.8022)
	[1.84913]	[0.60028]	[-1.33790]
D(ELECTR(-2))	0.422970	-0.060315	-3.523786
	(0.13017)	(0.34392)	(11.7618)
	[3.24936]	[-0.17537]	[-0.29960]
D(TRANS(-1))	-0.169005	-0.023240	4.850678
	(0.07814)	(0.20645)	(7.06054)
	[-2.16282]	[-0.11257]	[0.68701]
D(TRANS(-2))	-0.333221	-0.154625	-1.865916
	(0.07897)	(0.20865)	(7.13557)
	[-4.21952]	[-0.74108]	[-0.26150]
D(INFL(-1))	0.006037	-0.002299	0.009791
	(0.00232)	(0.00612)	(0.20923)
	[2.60730]	[-0.37576]	[0.04680]
D(INFL(-2))	0.001055	-0.002583	-0.314309
	(0.00216)	(0.00572)	(0.19560)
	[0.48714]	[-0.45163]	[-1.60690]
C	-0.687744	-0.403052	4.768048
	(0.13818)	(0.36508)	(12.4856)
	[-4.97713]	[-1.10400]	[0.38188]
MANU	0.052521	0.031150	-0.584759
	(0.01246)	(0.03291)	(1.12558)
	[4.21610]	[0.94646]	[-0.51952]
R-squared	0.742236	0.078881	0.282205
Adj. R-squared	0.648503	-0.256071	0.021189
Sum sq. resids	0.727359	5.077348	5938.378
S.E. equation	0.181829	0.480405	16.42943
F-statistic	7.918662	0.235499	1.081178
Log likelihood	14.17391	-15.94452	-125.4428
Akaike AIC	-0.333800	1.609324	8.673726
Schwarz SC	0.082518	2.025643	9.090045
Mean dependent	-0.110957	-0.043691	0.129032
S.D. dependent	0.306692	0.428647	16.60631
Determinant resid covariance (dof adj.)		1.774048	
Determinant resid covariance		0.634086	
Log likelihood		-124.8999	
Akaike information criterion		9.993545	
Schwarz criterion		11.38127	