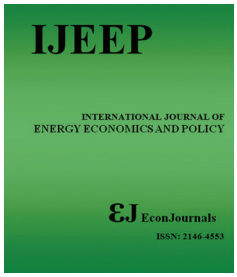

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# Foreign Direct Investment, Energy Infrastructure and Manufacturing Output in Nigeria

**Ademola Onabote[1]*, Ojamaliya Abuh[2], Oduntun Emmanuel[3], Oluwasegun Eseyin[1], Victoria Okafor[2]**

[1]Department of Economics, Landmark University, Omu Aran, Nigeria, [2]Department of Economics and Development Studies, Covenant University, Ota, Nigeria, [3]Department of Mathematics, American University of Nigeria. *Email: onabote.ademola@lmu.edu.ng

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**ABSTRACT**

In recent years, developing countries like Nigeria with large human and natural resources have attracted huge investment leading to a rise in foreign investment into the Nigerian economy. To create the conditions that would attract more Foreign Direct Investment into the manufacturing subsector, the right infrastructure must be put in place. This study examined the relationship between Foreign Direct Investment, infrastructure and manufacturing output in Nigeria. Time series data between the periods of 1981 and 2016 was used. Johansen cointegration was used to assess the relationship between Nigeria's foreign direct investment, infrastructure, and production efficiency. The result showed that the explanatory variables and the manufacturing production in Nigeria have a long-run relationship. The relationship between foreign direct investment, infrastructure and manufacturing production in Nigeria is also found to be significant and positive. Following the study's finding, specific policy recommendations were made to improve energy infrastructure for the manufacturing sector and keep foreign investment flowing into the economy.

**Keywords:** Foreign Direct Investment, Energy Infrastructure, Manufacturing Output
**JEL Classifications:** E22, F21, L60, O14

## 1. INTRODUCTION

Given the numerous positive advantages attached to economic growth and development, many nations of the world commit significant efforts towards attracting foreign direct investment especially to the manufacturing sector of their respective nations. With a drive to achieving the United Nations sustainable development goals by 2030, more investment in the energy infrastructure of Nigeria cannot be over emphasised as it often more than none leads to improved economic activities. On account of this, an increased Infrastructural investment particularly energy which currently are highly sought for globally plays a crucial role in spurring a country's inclusive and sustainable economic growth and Nigeria is no exception. African countries have witnessed a tremendous upswing in their records of foreign direct investment inflows. Nigeria is the largest beneficiary of such fund this is due to the nations market size, large labour force and natural endowment and the level of trade openness amongst others, but recent events have shown that the foreign direct investment inflow has not been consistent due to the political instability, and security issues (Boko Haram, Niger Delta Militant, Fulani Headsmen crisis etc.) in the various regions of the nation and unavailability of adequate infrastructure all this are detrimental to the economic health of the nation.

The manufacturing sector is a combination of appropriate technology, infrastructure, managerial skills and other essential resources. Its study has become a topical issue in the economics of development gaining considerable attention. After rebasing, the sector accounts for around 9% of Nigeria's total GDP National Bureau of Statistics (NBS, 2014) making it a strong driving force of the economy as it helps improve productivity, reducing unnecessary

reliance on imported foreign goods. Though Industrialization is at the forefront of Nigeria's economic recovery policy, the performance of Manufacturing Sector remains dreadful against its potential. With the increased revenues from oil, the manufacturing sector contribution to Gross Domestic Product (GDP) has declined and its growth rate very slow. Three factors were recognized by Ogundele (2014) as the major problems in the manufacturing sector. They included inadequate infrastructural base, high level of corruption and national insecurity. Anyanwu (2000), however, opined that the manufacturing sector in Nigeria to be suffering due to low level of technology and innovation, low capacity utilization which is caused by frequent power outages, inflation, labour union industrial action (strikes), low level of investments and high cost of production. The volume of foreign direct investment is considered a potent boost to the development of the manufacturing sector.

The value of International direct investment accounts for $542 million as at 1981 declining to $189 million towards the middle of that decade. That was the end of the oil boom period, amounting to almost 65.12% decline. Nevertheless, it picked up with a total of about 485.9 million USD in 1985. Since the implementation of the structural adjustment program (sap) in 1986, the inflow of foreign direct investment into Nigeria rose in about 216% which stood at 610 million USD in 1987. It indicates that the adoption of SAP attracted international investors. Despite so many policies formulated towards the growth of the manufacturing sector's growth such as: The four National Development Plans, Structural Adjustment Program, National Science and Technology Policies, Nigeria Industrial Revolution Plan, Economic Growth Recovery Plan the sector is still under performing. The study noticed that various studies had pointed out the relationship of electricity to the growth of the manufacturing sector but failed to capture it in their model. This present study seeks to fill this gap. The main objective of the study is to examine the impact of Foreign Direct Investment and Energy Infrastructure on the manufacturing output in Nigeria.

## 2. REVIEW OF LITERATURES

### 2.1.Conceptual Issues

#### *2.1.1. Foreign direct investment (FDI)*

Ogunleye (2014) views foreign direct investment a business or production investment by a company to one or more countries. According to the study, FDI enables host countries to achieve economic growth through investments that outweighs that of the host country's local investment. It increases the capital formation of host countries, which in the long run lead to growth in both the private and public sectors. Host countries usually benefit from foreign direct investment because of new technologies, capital, employee training, and other incentives which investors bring with them. As defined by OECD (1996), foreign direct investment is an incorporated or unincorporated undertaking in which a single foreign investor owns 10% or more of a company's ordinary shares or voting power, unless it can be proven that 10% ownership does not give the investor an effective voice in management.

#### *2.1.2. Energy infrastructure*

Infrastructure is viewed as the necessary inputs and criteria for the economy to work properly. Infrastructure was further defined as "strong" infrastructure relating to physical structures or facilities set up to sustain society and economy such as transportation (ports, roads and railways); energy (electricity generation, power grids, etc.); telecommunications (telephone and internet); and basic services (water supply, hospitals, schools, etc.). "Soft" infrastructure refers to non-tangible support for the construction and operation of hard infrastructures such as regulation, regulatory and institutional mechanisms and processes for this analysis, our focus is on energy infrastructure (UN HABITAT, 2011). Therefore, energy infrastructure is required to grow the Nigerian manufacturing sector.

### 2.2. Empirical Reviews

Javorcik (2004) conducted a study to assess if foreign direct investment improves domestic business productivity. The study's research was based on firm-level data from Lithuania in pursuit of spillovers by backward linkage, which provides evidence that is consistent with foreign direct investment positive productivity spillover. This was known to have occurred in upstream sectors through the interaction between foreign affiliates and their local supplies. Besides, the study pointed out that spillovers are correlated with joint domestic and foreign ownership ventures but not fully owned foreign investments.

The interrelationship between foreign direct investment, liquidity and real-country development in Nigeria was examined by Uremadu (2011). Dickey-Fuller, Augmented Dickey-Fuller, and Sargan Bargave Dubin Watson tests were used in the analysis for evaluating both individual time series and OLS regression residuals. The study further normalizes the structural equation on change in real GDP in Vector Auto's current regression and lagged first difference of all variables; it was discovered that capacity utilization and energy consumption index had the most significant effect on real growth in the region. The research recommendations include, inter alia, the following: That capacity utilization levels were having a positive and important effect on Nigeria's level of real economic development. The index of industrial energy consumption also affected real GDP in Nigeria negatively and significantly. That financial deepening has had both a positive and significant impact on Nigeria's real growth. The international liquidity which complements the domestic liquidity rate to boost gross domestic investment has had a negative and substantial impact on real domestic growth. The foreign direct investment backed by the Cumulative Foreign Private Investment Index is positively and moderately willing to grow real in Nigeria.

Adekunle et al. (2018) performed an empirical study of the impact of foreign direct investment, currency exchange rate and electricity infrastructure on domestic investment in Nigeria. The study that adopted the autoregressive distributed lag (ARDL) model discovered the direct and substantial effect of foreign direct investment on domestic investment. This also reported that the exchange rate affects energy infrastructure positively. Also, the study proposed that the government implement tighter exchange-rate regulation. Also, regulatory policy on energy infrastructure implementation should be formulated in tandem with mobilizing more funds to foresee energy infrastructure in an attempt to raise domestic investment to the required level in Nigeria.

Ogunjimi and Amune (2017) studied the impact of infrastructure on attracting foreign direct investment from 1981 to 2014 in Nigeria. The ARDL architecture was implemented after the outcome of their unit root testing. The study result shows that none of the variables in infrastructure (tractor, telephone lines and electricity) is significant in the short run to attract foreign direct investment to Nigeria. Nevertheless, energy output (power supply) has been found to have a long-run effect on foreign direct investment. The study further recommended revitalization of the power sector and priority should be given as it will draw FDI, increase national production and bring Nigeria closer to realizing its vision of being one of the twenty leading economies in the world by 2020.

Omri and Kahouli (2013) conducted a study to examine the causal relationships between energy use, foreign direct investment and economic development, using fresh evidence from complex simultaneous-equations models from 1990 to 2011. Using Panel-data analysis, they examined the interrelationship of a variety of sub-panels centred on the income level of countries leading to three income panels: high income, middle income, and low-income panels. In the empirical section, they draw on growth theory and increase the classic growth model with foreign direct investment and oil, which consists of capital stock, labour force, and inflation. The analysis ends by presenting a mixed outcome on the interrelationship between energy consumption, FDI and economic development.

Adenikinju (2003), in a more recent analysis of 162 companies on the costs of failure of electrical infrastructure for manufacturing firms in Nigeria, states that money is invested in private electricity procurement equipment's to facilitate the supply of electricity for their production activities.

In the Organization of Petroleum Exporting Countries from 1980 to 2003, Squalli (2007) investigated the correlation between electricity consumption and economic development. Long-term relationships between variables in all countries, including Nigeria, have been identified using the ARDL bounds testing technique. Tülüce et al. (2014), conducted a study about the effect of Foreign Direct Investments on the growth of SMEs. They suggested foreign direct investment could boost domestic firms' infrastructure, labour force productivity and R&D activities. It would be good in the long run, according to the report, but would not show in productivity measures. The regulatory climate in transition economies could be changing in response to the emergence of foreign direct investment.

### 2.3. Theoretical Framework

#### *2.3.1. Endogenous growth theory*

Most of the neoclassical theory of economic growth has been around capital accumulation. Nevertheless, Elhanan (1991) argues that its central tenet could explain only a fraction of the variations in growth rates when faced with evidence, while the rest is due to technological progress (Solow, 1957 and Maddison, 1987). On the other hand, attempts to justify technological advancement have sadly not been very successful, with Arrow (1962a) being an exception to the principle of learning by doing. But that theory suffers from the drawback that it assumes changes in productivity take place serendipitously as a byproduct of capital accumulation. Deliberate attempts to create new goods and innovations have also been highly prominent. Recalling the rapid advances in consumer electronics, computers and pharmaceuticals is enough to see the essential role that systematic innovation and development play in raising our living standards. In all the industrial nations R&D has increased significantly.

From the foregoing, we can derive the endogenous theory's aggregate output function as follows:

$$Y=F(A, K, L)$$

In which Y represents aggregate real output; K stands for the stock of capital; the stock of labour is denoted by L; the technological advancement is denoted by A.

It is worth bearing in mind that A is centred on the research and technology investment. Technology is considered as an endogenous variable that may be tied to energy. Most innovation through technology depends on the availability of useful energy to power it, as provided per time. The technology we are talking about here is that such as seeds, machinery and the likes. Such techniques are essentially useless without sufficient energy supply (in this case electricity or petroleum). The thermodynamics rule helps to explain this by saying that without energy exchange no output process can be guided. Energy is not the sole determinant of technology but is a critical factor in ensuring that technology is used (at any level). Energy processing in its raw state is highly technology-oriented. Taking into account the technology-oriented aspect of energy production; Energy production is often considered to be capital intensive. Huge machinery is required to produce energy that can be used. That will mean huge amounts of capital will be needed for energy production. Enormous spending on energy must then be made not only to generate but also to achieve energy efficiency. To order to explain the endogenous growth model, capital and labour must be included in the design of the model along with different energy sources.

## 3. MODEL SPECIFICATION

The work is based on the premise of endogenous growth. Technology is viewed as an intrinsic component that can be related to the existence of adequate infrastructure. Technology in this study refers to plants, machinery and the like; in this case, without sufficient and productive facilities, reliable electricity would be essentially useless for these technologies.

Thus, following Agu and Okoli (2015) model specification who worked on Foreign Direct Investment Flow and Manufacturing Performance? The variables were barely adapted, the parameters to be considered in this current research include: Contribution of manufacturing to Gross Domestic Product (a proxy for manufacturing output), Foreign Direct Investment, Electricity Consumption (a proxy for electricity infrastructure), Employment, Gross Fixed Capital Formation (a proxy for available manufacturing capital stock).

The model specification in a functional expression is shown in equation (1) below.

$$MSO_t = f(FDI_t, ELECON_t, GFCF_t, LMAN_t) \quad (1)$$

Meanwhile, the parametric specification of the model is presented in equation (2) below

$$MSO_t = A.FDI^{\hat{}}1.ELECON_t^{\hat{}}2.GFCF_t^{\hat{}}3.LMAN_t^{\hat{}}4.\mu_t \quad (2)$$

Where:
A= Constant
$MSO_t$= Manufacturing contribution to GDP which is proxy for (Manufacturing sector output)
$FDI_t$= Foreign Direct Investment at time t
$ELECON_t$ = Electricity Consumption
$GFCF_t$ = Gross Fixed Capital Formation at time t
$LMAN_t$ = Labour Force in the manufacturing sector at time t
t = time
ε = error term

Equation (2) is a basic growth accounting equation which decomposes the growth rate of output into Foreign Direct Investment, Electricity Consumption, available capital stock and labour force

Log linearizing equation (2) this transformation is required for some variables like Gross Fixed Capital Formation, Foreign Direct Investment, and Manufacturing Contribution to GDP to be in its log form. This study is incorporating the measure of logging to linearize the variables

$$\log_t gMSO_t = \beta_0 + \beta_1 \log FDI_t + \beta_2 \log ELECON_t + \beta_3 \log GFCF_t + \beta_4 \log LMAN_t + \quad (3)$$

$\beta_0$ is the Intercept, $\beta_1$, $\beta_2$, $\beta_3$ and $\beta_4$ are parameters of Foreign Direct Investment, Electricity Consumption, Gross Fixed Capital Formation, and Labour Force respectively.

### 3.1. Justification of Variables

#### *3.1.1. MSO*

Manufacturing sector output which can also be called Manufacturing value added to GDP is used as a proxy to capture the level of manufacturing sector output in Nigeria. GDP is a monetary measure of the market value of all final goods and services produced in a period.

#### *3.1.2. FDI*

Foreign direct investment is used as a proxy to capture investment into different sectors of the Nigerian economy from other nation.

#### *3.1.3. ELECON*

which is electricity consumption is used as a proxy to measure infrastructure. Stable electricity is needed in the manufacturing of products in any economy. Chen and Lo (2013) stated that a well-developed infrastructure allows foreign investors to reduce their operating cost.

#### *3.1.4. LMAN*

Labour force is included in this study because labour is one of the factor inputs necessary in the production process. An efficient labour force leads to an increase in output, the intensive nature of the Nigerian labour force makes economic sense to include this variable.

#### *3.1.5. GFCF*

The gross fixed capital formation is a proxy for the stock of accumulated capital and is used in this study to capture the physical aspect of capital which is also a vital factor input in the production processes. The short-run dynamic relationship is estimated using the error correction model specified as:

$$\Delta \log MSO = \delta_O + \sum_{t=1}^{p} \delta_1 \Delta \log MSO_{t-1} + \sum_{i=0}^{p} \delta_2 \Delta logFDI_{t-1} + \sum_{i=0}^{p} \delta_3 \Delta logELECON_{t-1} + \sum_{i=0}^{p} \delta_4 \Delta logGFCF_{t-1} + \sum_{i=0}^{p} \delta_5 \Delta logLMAN_{t-1} + \alpha ecm_{t-1} + \varepsilon_t \quad (4)$$

### 3.2. Data Availability

Time series data in the yearly form covering 1981 to 2016 was generated. They were sourced from the Central Bank of Nigeria statistical bulletin, World Bank Development Indicators, National Bureau of Statistics and Manufacturing Association of Nigeria.

## 4. ANALYSIS AND FINDINGS

### 4.1. Unit Root Test

The unit root test is used to determine the time series data stationary and non-stationary. In empirical time series, the problem of non-stationarity exists and this makes the traditional econometrics methods including two stages minus square and ordinary minus square unsuitable. To correct this, a check should be carried out for the stationarity of the time series results. Various methods can be used for this analysis. An Augmented Dickey-Fuller test would be used.

### 4.2. Co-integration Test

Additionally, the next step would be to check for a stable long-relationship between variables. Cointegration can be used to check the presence of a stable or long-term equilibrium relationship between economic variables (Agbola, 2013). We are going to use Johansen Cointegration. The cointegration test tests whether or not a white noise cycle is caused by any linear combination of the non-series in regression. We start the study by analyzing the variable's unit root. We also bear in mind that Johansen Cointegration involves the integration of all variables of the same order.

Table 1 indicates that all the variables are stationary at their first difference. The co-integration rank result in Table 2 reveals that there is one co-integrating equation in the trace statistics test at the 5% level. The maximum eigenvalue in Table 3 further substantiates the trace result by indicating the existence of at most one cointegrating equation among the variable of interest because the max-eigen statistics (34.31262) is greater than the 5% critical value of (33.87687).

The normalized co-integration equation presented above in Table 3 shows the long-run coefficient of our independent variable as they affect the dependent variable; Foreign Direct Investment (FDI), Electricity Consumption (ELECON), Gross Fixed Capital Formation (GFCF), Labour Force into the manufacturing sector (LMAN). The model is double logged; the t-stat is used to determine the statistical significance of each variable which is based on the rule of thumb.

### 4.3. Foreign Direct Investment

From the long-run estimate presented in the table above; it precludes that a per cent increase in Foreign Direct Investment brings about 1.66% boosts in the Manufacturing sector output in Nigeria. This relationship is in line with the a priori expectation from economic theory. This outcome also conforms to Okonkwo (2014) and the study of Agu and Okoli (2015). Since the relationship between Foreign Direct Investment and Manufacturing productivity is found to be positive and significant. The government should ensure FDI is channeled into the secondary sector rather than the primary sector so to increase the sector contribution to Gross Domestic Product, generate more employment and reduce over-dependency on foreign goods. This study is consistent with the study of Tavakoli (2004), Lui (2005) and Nunnenkamp (2008) who concluded in their different studies that FDI does not have positive effects on primary sector rather Foreign Direct Investment should be channeled to manufacturing and agricultural sectors respectively.

**Table 1: Augmented dicker fuller table**

| Variables | ADF t- statistics | Critical value | Integration order | Remark |
|---|---|---|---|---|
| LMSO | −5.79545 | 2.95113 | I (1) | Stationary |
| LFDI | −11.1514 | 2.95125 | I (1) | Stationary |
| ELECON | −8.20298 | 2.95113 | I (1) | Stationary |
| LGFCF | −3.25442 | 2.29571 | I (1) | Stationary |
| LMAN | −5.79545 | 2.95113 | I (1) | Stationary |

Source: Researchers compilation using Eview10

**Table 2: Johansen cointegration test (Trace Test)**

| Hypothesized | Trace | | 0.05 | |
|---|---|---|---|---|
| No. of CE (s) | Eigenvalue | Statistic | Critical value | Prob.** |
| None* | 0.635488 | 80.11868 | 69.81889 | 0.0060 |
| At most 1 | 0.404961 | 45.80606 | 47.85613 | 0.0769 |
| At most 2 | 0.333190 | 28.15568 | 29.79707 | 0.0764 |
| At most 3 | 0.294150 | 14.37719 | 15.49471 | 0.0731 |
| At most 4 | 0.071798 | 2.533211 | 3.841466 | 0.1115 |

Source: Researchers compilation using Eview10

**Table 2: Johansen Cointegration Test (Maximum Eigenvalue)**

| Hypothesized | Max-Eigen | | 0.05 | |
|---|---|---|---|---|
| No. of CE (s) | Eigenvalue | Statistic | Critical Value | Prob.** |
| None * | 0.635488 | 34.31262 | 33.87687 | 0.0444 |
| At most 1 | 0.404961 | 17.65039 | 27.58434 | 0.5244 |
| At most 2 | 0.333190 | 13.77848 | 21.13162 | 0.3835 |
| At most 3 | 0.294150 | 11.84398 | 14.26460 | 0.1166 |
| At most 4 | 0.071798 | 2.533211 | 3.841466 | 0.1115 |

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level * denotes rejection of the hypothesis at the 0.05 level **MacKinnon-Haug-Michelis (1999) p-values

**Table 4: Normalized cointegrating equation**

| | Normalized cointegrating coefficients (standard error in parentheses) | | | |
|---|---|---|---|---|
| LMSO | LFDI | LELECON | LGFCF | LLMAN |
| 1.000000 | −1.658038 | −7.923974 | 1.661544 | −3.045487 |
| S. E | (0.49370) | (2.5008 | (0.88594) | (0.89314) |
| T-Stat | 3.35839 | 3.16854 | 1.87546 | 3.40985 |

LMSO= +1.658038LFDI+7.923974ELECON-1.661544LGFCF+3.045487 LLMAN

Source: Researchers compilation using Eview10

### 4.4. Electricity Consumption

Similarly, from the above table, a percentage change in Electricity consumption will bring about 7.92 increases in the manufacturing sector output in Nigeria other things being equal. The relationship between ELECON and Manufacturing output is positive and statistically significant the result conforms to a priori sign. But the Nigerian economy does not reflect the above result. Nigeria power sector is unreliable; power transmission to the manufacturing sector is inadequate and unstable Adenikinju (2003). Manufacturing generates its power which leads to the high cost of production making it incapable to compete with its foreign counterparts NACCIMA (2012). Electricity consumption is proxy for infrastructure, Nigeria lacks adequate infrastructure such as good roads, sufficient power supply, communications facilities, all this should be examined to attract foreign inflows into the sector. Riker (2012) stated that improved Electricity efficiency enhances revenues to industry. Moreover, if greater performance is to be accomplished, the link between energy supply and output in machinery powered industry cannot be disentangled. Supply of energy is a major problem facing the Nigerian economy. Electricity is the preferred energy source for manufacturing activities in most economies because of its convenience and low operating cost, and the associate benefits to its users. Hence, there must be adequate and stable electricity supply for a progressive and growth of the industrial sector in Nigeria.

### 4.5. Gross Fixed Capital Formation

The result above shows that there is a negative and insignificant relationship between capital stock and Manufacturing sector productivity in Nigeria. A 1% increase in capital formation would bring about a 1.66% decrease in manufacturing productivity. This result does not conform to the a priori expectation. The Nigerian manufacturing sector lacks sufficient and efficient capital equipment. For the manufacturing sector to reach full capacity there has to be the availability of plants and machinery. The Ajaokuta steel industry is a practical example the industry has now become a shadow of itself so is the same for other Manufacturing industries like the textile in the north etc. The government has to channel part of the capital expenditure from the budget into the Manufacturing sector to revitalize the sector. If adequate capital is available the Manufacturing sector will attract more FDI inflows which will lead to more productivity, increase employment, increase the standard of living, reduce poverty and finally lead to economic growth (Agu and Okoli, 2015).

**Table 5: Error correction model**

| | D (LMSO) | D (LFDI) | D (LELECON) | D (LGFCF) | D (LLMAN) |
|---|---|---|---|---|---|
| VECM | −0.926240 | 0.073875 | 0.008035 | 0.008035 | −0.176894 |
| | (0.17284) | (0.09485) | (0.02290) | (0.02290) | (0.04620) |
| | (−5.35910) | (0.77883) | (0.35091) | (0.35091) | (−3.82898) |

Source: Researchers compilation using Eview10

### 4.6. Labour

Finally, we also found a positive and statistically significant relationship between labour and manufacturing output in Nigeria. Unit per cent variation in labour will bring about a 3.04% increase in the manufacturing sector. This result conforms to the a priori expectation from economic theory. Nigeria has a high population density but with very limited resource. The economy's productive capacity has not gained much impact like that of countries like China which has effectively managed its labour intensity. The Nigeria government in driving towards international recognition should focus more on capital investment to engage it teaming human resource. This will guarantee a multiplier effect if capital intensive projects are executed, the resultant effect will not only be the absorption of its idle manpower resource, but unemployment and crime rates in the nation will drastically abate. Hence, an increase in the standard of living and a rise in the aggregate output.

### 4.7. Error Correction Model (ECM)

The Error correction model limits the independent variables' long-run behaviour to include the equilibrium of short runs. Adjustment series are executed to remedy short-run inconsistencies in the variables in the model. Additionally, the ECM coefficient is known as the adjustment factor speed, the ECM tells how soon the framework responds to restore equilibrium. It also examines the convergence of variables over time between the disequilibrium state and the balanced span (Ogundipe et al., 2013). The justification for the use of vector error correction occurs when there is a presence of cointegration between the variables. In that case, the ECM can be used in the estimation process. The stability condition for the uses of ECM is that the Error Correction model should lie between 0 and 1, be negative and must be statistically significant.

As indicated by the coefficient of the error correction term, there exists a long-run convergence between manufacturing output and the regressors. The coefficient of the error correction term was found in Table 5 to be negative, less than unity and statistically significant at 5% level (that is, it met the a priori expectations. Thus, at −0.9262, the magnitude of the error correction coefficient implied a high speed of convergence of the model to its long-run equilibrium as about 92.62% of disequilibrium in manufacturing sector output (MSO) is corrected within a year.

## 5. CONCLUSION AND POLICY IMPLICATIONS

The study aimed to examine the effects of foreign direct investment and Energy Infrastructure on the manufacturing sector's output in Nigeria. Time-series data were used ranging from 1981 to 2016. Following the presence of unit in all the variables at level which depicts a short-run disequilibrium among the variables; the multivariate Johansen cointegration test was conducted to ascertain the existence of long-run equilibrium or otherwise among the variables of the estimated. The result of the test revealed a long-run relationship among the variables. Consequently, Error correction model (ECM) was formulated to determine the long-run relationship of the variables. The error correction term co-efficient was found to be −0.9262. Being negative and statistically significant at 5%, it indicates a fast speed of adjustment when disequilibrium occurs. The variables used in the model are manufacturing contribution to GDP, labour force, Gross fixed capital formation, foreign direct investment, and electricity consumption. The study revealed that Foreign Direct Investment, Electricity consumption and labour force conformed to the a priori expectation and were found to be significant. Meanwhile, Gross Fixed Capital Formation was found to be insignificant but conformed to a priori expectation.

Based on the outcome of the study, it is therefore recommended that:

- Government of Nigeria should discourage resource seeking and market seeking FDI but should encourage manufacturing seeking FDI. The study revealed the existence of a positive and significant relationship between foreign direct investment and manufacturing output. It has become imperative for the government to utilize the secondary sector by providing an effective and efficient economic and political environment to enhance productivity. Nigerian government need to formulate macroeconomic policies aimed at encouraging foreign capital inflows to derive the benefits of globalization like other developing nation
- The privatization of the power holding company of Nigeria is a step in the right direction. However, more hands should be on deck to increase the unit of electricity that is made available for the consumption of the manufacturing sector. Availability and stability of power supply are integral to the performance of the Manufacturing sector. It does not only spur to creation, but it also enhances the global competitiveness of the country's product, a rise in the overall national output.

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