



## IMPACT OF INDUSTRIALIZATION AND HUMAN CAPITAL INVESTMENT ON ECONOMIC GROWTH IN NIGERIA

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### ABSTRACT

*This study examined the impact of industrialization and human capital investment on economic growth in Nigeria. Using a time series data spanning from 1985-2018, the ARDL bound test for co-integration was employed to determine the short-run and long-run relationship among economic growth, industrial output, foreign direct investment and other macroeconomic variables involved in the specified model. The empirical results revealed that at 5% significance level, there is a long-run relationship among variables from the ARDL bound test for co-integration. It also revealed the long-run and short-run relationship among variables with an error correction term (ECT) value of -0.922 which indicates that a shock in the model will result in a high convergence to equilibrium with about 92% of adjustment occurring in the first year. Both industrialization and human capital investment have positive effect on economic growth in Nigeria. In conclusion, on the strength of the results obtained, there is need for technological advancement in the industrial sector in order to improve productivity. Increased investment in human skills development through formal training, skill acquisition and on the job training is desirable for economic expansion.*

**Keywords:** *Industrialization, Human capital development, Economic growth and Nigeria.*

**JEL Code:** L25, J24, H25, O47

### 1.0 Introduction

The cause of the industrial revolution has been a long debate overtime. Large proportion of changes both in the size and structure of manufactured exports from developing countries does not correspond to changes in the value added in manufacturing sector. The need to create the critical mass linkages that will provide pecuniary externalities to industrial firms in developing countries becomes necessary (Jorg, 2004). The Nigeria economy structure is a typical underdeveloped economy, where over half of the GDP is accounted for by the primary sector in which agriculture continues to play an important role.

The oil and gas sector is a major driving force of the economy which accounts for over 95% of export earnings and 85% of government revenue in the year 2011-2012. During the period of independence in 1960, agriculture was the major sector of the Nigerian economy. Providing food and employment generation for the population, raw materials for industries thereby, resulting in huge amounts of government revenue generation and other foreign earnings. Due to the discovery of oil and its exploration and exportation in large quantities, the value of agriculture gradually diminished while crude petroleum took its place as the dominant source of government revenue and export earnings (Chete *et al.*, 2014). However, this was a major

drive for industrial development in Nigeria as far back to the early 1960s. Nigeria's quest to be an industrialized economy along-side with a high level of sustainable growth rates, has been the major concern of every administration since the gain of independence.

Prior to this struggle to attain high levels of sustainable growth, the Nigerian economy has had poor performance since the late 1970s which was as a result of economic stagnation and increasing levels of poverty. Industrialization therefore, has been seen as the main viable means in order to break through this poverty. The government, launched the Structural Adjustment Programme (SAP) which was seen as the means to consolidate the industrial aspirations. However, the outcome of the industrialization drive was short-lived due to incessant change of government and government policies. Therefore, Nigeria's experience with industrialization since independence has not been satisfactory.

The industrial sector in Nigeria, comprises manufacturing, mining, and utilities which accounts for little proportion of the economy activity of about 6% with the manufacturing sector contributing 4% to GDP in 2011 (Chete *et al.*, 2014). With all these, the economic policy transformation agenda, known as the vision 2020, sets the direction for the current industrial policy in Nigeria. These industrialization strategies aim at achieving greater global competitiveness in the production of manufactured goods by linking industrial activities with the primary sector, domestic and foreign trade, and service activities in order to achieve economic growth in Nigeria.

It can be said that the most valuable assets in both developed and the developing countries are humans (Hadir & Lahrech, 2015). In order to achieve a high level of development, this asset need to be managed properly and made use of effectively. For this to be achieved, there should be a high level of adequate investment in human capital. Nigeria as a country can be classified as developing country in the sub-Saharan Africa. In an attempt to develop the country and achieve sustainable growth, the role of human capital development and enhancement cannot be overemphasized. Nigeria embarked on some educational and developing programs in the past. The federal government has launched several development programmes such as the universal basic education (UBE) Programme in 1999 which aim at providing a greater access to and also ensuring the quality of basic education all over Nigeria. In addition to the development of human capital necessary for the growth of the Nigeria economy, it has been said that the current administration has launched a wide range of social investment programmes which caters for human development for which a budgetary allocation of over five hundred billion naira has been made available. Meanwhile, the committee for the Defense of human rights (DHR) has equally emphasized on the need for human capital development.

However, not long after all these programs commenced, it was reported by the federal government that the low standard of the educational system in Nigeria is as a result of the acute shortage of well-educated and qualified teachers in the basic (primary) school level. It has also been reported that 23% of over 400,000 teachers that were employed in the nation's primary schools do not have the teachers grade two certificate. Despite the fact that the national certificate for education (NCE) is set as the minimum requirement for education one should possess before he or she can teach in the nation's primary schools (Ogbeifun & Olisa, 2001).

Considering China as a developing country with a high rate of population compared to other countries in the world, the People's Republic of China is faced with peculiar challenges in developing its human resources. The reforms in the late 1970s has moved the country towards the establishment of a nationwide policy of developing human capital and adopting practical measures for implementing policies so developed (Baiyin and Xiaohui, 2009).

Generally, developing countries are faced with the problem of low level of development in human resources which have also reduced the potentials of industrial activities and has resulted in a major controversy in growing the economy. Proper development activities in improving human resources will result in profitable outcomes in the manufacturing sector that will enhance growth in the economy.

It has been observed over the years that industrialization in Nigeria has had a positive effect on the growth of the economy, but, due to some lapses and challenges faced by the economy such as environmental problems which arise from water pollution, soil pollution and air pollution, has led to a negative impact on the growth of the economy. The major problem of industrialization in Nigeria is the high reliance and dependability on the primary resources (raw materials). Though industrialization is faced with both environmental, social and political problems, the major problems of industrialization in Nigeria is the improper utilization of primary resources that have been extracted which would have helped in the development of industries and other economy based sectors in Nigeria.

On the other hand, human capital development has vital challenges and problems in Nigeria despite its impact on the growth of the economy. Amongst them is low utilization and inadequate capacity, unfavorable working conditions and improper implementation of development policies by policy makers or the government. The problem faced with Nigeria's economy is not the problem of policy formulations but that of implementation. Some of these problems can be addressed through consistent human development programs required for the new era of the technology age. Thus, to what extent has the industrialization drive of the government and human capital development policies over the last decades contributed to the economic growth of the country?

The objective of this study, therefore, is to analyze the impact of industrialization and human capital development on economic growth in Nigeria. Specifically, ascertain the;

- i. Effects of industrial output on economic growth in Nigeria.
- ii. Impact of human capital development via government spending on education on economic growth in Nigeria.

The rest of the paper is organized as follows: section two focuses on the review of the extant literature. The methodology and empirical analysis were presented in Sections three and four respectively.

## **2.0 Review of Related Literature**

Industrialization is basically dominated by manufacturing activities which can be explained as a process through which the economy system is transformed from a system that is primarily based on agriculture to an economy which engages in manufacturing activities such as the production of goods for the consumption of individuals (Jim, 2019). This transformation will lead to transforming from individual manual labour to a form of mechanized system of mass production. Industrialization therefore, increases total output of the country and increases productivity level which will lead to economic growth in the country.

Industrial policy of a country are strategies or measures put forth with the aim of encouraging and promoting the development and the growth of all or some part of the economy. This is majorly concerned with the focus on the manufacturing sector as a whole. The government of the country develops policies and put forth measures aimed at improving and enhancing competitiveness and capabilities for domestic firms engaged in manufacturing activities. All

these measures will lead to the transformation of the economic structure if properly applied. Some of these policies and strategy of industrialization in Nigeria aim at promoting these manufacturing activities includes;

- i. Import substitution industrialization (1960).
- ii. The Nigeria indigenization policy (1977).
- iii. Trade and financial liberalization policy (1989).
- iv. Structural adjustment programmes (1986).
- v. Bank for industry (2000).

All these strategies are the measures put in place by the government of the country in order to promote industrialization and enhance productivity in the country.

According to Boldizzoni (2008), the fact that the human element takes charge of all economic activities such as production, consumption, and the transaction process that is necessary to move these products to the consumers, means that human capital is a key element of production that adds value to the process of production. Human capital is a measure of the skills of individuals, the level of education, individuals' capacity and its quality of labour which has an impact on productive capacities and their potentials (Pettinger, 2017). Human capital development ranges from on-the-job training to rendering financial assistance in tuitions and then to team-building activities in order to achieve greater performance. Human capital development is an essential vitamin to the growth and productivity of an organization.

Economic growth is basically concerned with how the per capital output of a given country increases over a period of time. An economy is said to be experiencing growth when there is sustained increase or continuous increase in the per capita output over a given period of time in a particular country. The growth of an economy can be used in the measurement of the percentage rate of an increase in the real gross domestic product (RGDP). The growth of the country gross domestic product (GDP) is basically influenced by economic activities going on in the country. According to Mladen (2015), economic growth is changes in material production in an economy which involves a relatively short period of time basically a year. The following are some of the factors affecting the growth of an economy which has led a country to be dependent on other countries for survival. These factors include; Low level of human capital; Lack of entrepreneur's activities; Structural changes in the economy; Political instability; Lack of innovations.

Industrialization has led to the demand of skilled labour needed for production such that the industrial sector activities, require more workers who have the efficient skills needed to perform in the industry. High performance in the industry through efficient skills from laborers result into increase in output level thereby leading to growth in the economy. Increase in productivity is as a result of increase in the efficiency of labour through proper development of individual's skills which will in turn contribute to the growth of the Nigeria economy. In summary, the performance of the industrial sector can be determined by the level of performance of well-developed skills of individuals engaged in industrial activities which in turn increases in the level of industrial output. When there is large output it will result in the growth of the economy as a whole such that the income made from the sales of output.

The basic neoclassical growth model was developed by Solow and Swan (1957). The neoclassical growth theory based on the work of Solow-swam assumes that economic growth is as a result of three basic factors; labour, capital and technology. The theory holds that an economy with limited resources in terms of its labour and capital, will require a contribution of technology for growth to be boundless. Florina (2014) based his work on the growth theory

of the neo classicalists which is the core basic for modern analysis where the neo classicalists in their work explained how the accumulation of capital and changes in technology will have effect on the economy as a whole. The neoclassical growth theory states that equilibrium in the short-term is as a result of varying amounts of labour and capital in the production function. In the work of Gregory *et al.* (1992) on the contribution to the empirics of economic growth, the augmented Solow model comprises the accumulation of both physical and human capitals. This made available an excellent description of data in cross-countries in which evidence discovered showed that population growth and the accumulation of constant capital being held, countries converged with approximately the rate in which this augmented Solow model predicted.

A variant of the neo-classical growth model is the endogenous theory of growth. The endogenous growth theory was developed by group of growth theorists such as Arrow (1962), Lucas (1988) and Romer (1994). Other scholars have also written on this theory. They all advocated for growth as an endogenous factor and were no longer convinced by the fact that exogenous factor determines growth in the long-run. The theory explains how gaps in wealth between the developed, developing and underdeveloped countries will continue if investment in physical capital is subject to diminishing returns. The endogenous growth theory is based on the assumption that economic growth is majorly the result of endogenous factors in attaining long-term growth rather than exogenous factors. These endogenous factors which include human capital investments, innovations and knowledge are the significant factors for attaining long-run economic growth (Arrow, 1962). In the work of Ogunleye *et al.* (2017) economists have tried to draw out the relationship between human capital development and the growth of the economy. Economists explained physical capital accumulation as being sufficient enough to help in the determination of total output. This is based on the assumption that the growth of output (per worker) is positive and the increase in the productivity of knowledge in the creation of human capital while assuming that human capital growth is the same for some given efforts.

The endogenous growth economists hold that increase in productivity can be possible through the investment made in humans and innovations. Therefore, investment in human capital is a major component of growth. In the work of Romer (1986-1994) on endogenous growth, he presented a variance on Arrow model of 1962 known as “learning by investment”.

It is clearly assumed that the creation of knowledge is as a result of the product made by investment. He uses knowledge as an input in his production function;  $Y=A (R) F (R_i, K_i, L_i)$

Where Y = Aggregate output.

A= Public stock of knowledge from research and development.

$R_i$ = Stock of result from expenditure or the methodology of research by firm i.

$K_i$  &  $L_i$ = Capital stock and labour stock of firm i.

Romer assumes the function F to be homogeneous of degree 1 which implies a constant return to scale of used input and uses  $R_i$  as a rival of growth. Romer’s model on factors of endogenous economic growth posits that creation of new knowledge is the major determinant of long-run growth which is determined by the investment made in research technology. The endogenous growth theory based their theory on some key assumptions below;

- i. The endogenous growth theory assumes large numbers of firms in the market.

- ii. The theory assumes that knowledge can be created by everyone and therefore not a rival commodity.
- iii. According to the endogenous growth theorists, they assumed that new knowledge discovery by individuals or firms in the economy maximizes profit to that individual or firm.
- iv. The theory assumes that advances in the technology system are as a result of things that people do based on the development of new ideas.

However, the major shortcoming of this theory as put forward by the endogenous growth theorists is that it failed to explain conditional divergence that exists in the economy, and also, the theory is based on assumptions that cannot be measured in terms of accuracy. Despite its shortcomings, this theory is considered relevant to this research work as it throws more light on the need for investing in education, human capital and innovations which will lead to the creation of new knowledge and result in advancement in technology in order to achieve economic growth in Nigeria.

Bennett *et al.* (2015) examined the effect of industrial development on economic growth in Nigeria. In the study GDP was used as the dependent variable in which the model stated explained that the influence of industrial output and inflation on economic growth in Nigeria is not statistically significant despite the positive impact while the independent variable such as savings has a significant and positive impact on economic growth. However, despite the reduction in the contribution from the manufacturing sector in the past years as a result of the major challenges faced by the industrial sector and neglects from government in providing solution measures, the research study by Mandara and Ali (2018) revealed that industrialization has a positive impact on the gross domestic product (GDP) of Nigeria. Based on the empirical results, they recommended that the Nigeria government should implement policies that can create fair opportunities for foreign investors which will therefore attract certain numbers of foreign investors to invest locally which will result in enhanced level of economic growth in the country. Also, they recommended that key industries that have been abandoned for some periods needs be revived and proper management of currently existing industries should be undertaken to ensure a positive outcome on the growth of the economy.

Ogunleye *et al.* (2017) examined the impact of human capital development on economic growth in Nigeria by using the ordinary least square (OLS) regression analysis. The data used for the study covered a period of 1981 to 2015 and were obtained from central bank statistical bulletin and World Bank development indicators. The empirical results showed that human capital development has a significant impact on the growth of the Nigeria economy. The major short-comings in this study is its focus majorly on education and health as a key to economic growth without recognition to various human capital development programmes which can help in developing individuals in the organization such as on-the-job training programmes which will result to an increase in productivity. Also, neglected is the role of employers on their employees on skills development, but focuses only on the role of the government and policy makers on the allocation of adequate resources and increasing of expenditures.

Babatope (2017) used the recently developed autoregressive distributed lag (ARDL) bounds testing approach in co-integration approach by Pesaran and Shin (1995) to examine the existence of short-run and long-run dynamic relationship that exists between the formation of human capital and economic growth in Nigeria by using a single reduced form equation. The empirical results of this research study shows that a long-run dynamic relationship exists between the formation of human capital and economic growth in Nigeria using the analysis of the autoregressive distributed lag (ARDL). In his empirical results he concluded that the implication of the study for policy formation is that education and training need to be

improved not just in the quantity but in quality in order to improve the performance of human capital which will result in economic growth in the country. Also, he opined that positive efforts must be made in the allocation of sufficient funds to the expenditure of the government on the health sector which will result in the improvement of the quality of human lives, the physical well-being and life expectancy of individuals in Nigeria.

Further, Paul and Akindele (2016) focused on the impact of human capital development on economic growth in Nigeria by using the Autoregressive distributed lagged estimate (ARDL) approach. Based on the empirical results from the research study, Paul and Akindele (2016) were able to establish long-run cointegration among the variables by revealing from the findings of their study the positive long-run statistically insignificant relationship that exists among secondary school enrolment (SSE), public expenditure on education (PEE), life expectancy rate (LER), gross capital formation (GCF) and economic growth. Also, their result showed that there exists a negative long-run relationship among primary school enrolment (PSE), tertiary school enrolment (TSE), public expenditure on health (PEH) and economic growth in Nigeria which established that a high rate of life expectancy would increase economic growth.

Adelekan (2011) study was on Human capital development and economic growth in Nigeria where he employed the ordinary least square (OLS) estimation method in analyzing the relationship between human capital development and economic growth in Nigeria. Using GDP as a proxy for economic growth his analysis revealed that there exists a strong positive relationship between human capital development and economic growth.

A recent study by Onyeizugbe *e al.* (2020) examined the impact on Re-engineering Nigerian economy through human capital development: A case of manufacturing firms in southern part of Nigeria where the study employed the descriptive survey research design with the population of 828 employees from basically two manufacturing firms in Anambra and Rivers state. From the result obtained in their study it was discovered that between skill development and corporate performance in the manufacturing firms in the two organizations considered is positively significant. Human capital is an essential tool in improving the nation's key human assets for development. Odo *et al* (2016) from their research on the Analysis of the relationship between human capital development and economic growth in Nigeria discovered that a significant long-run relationship exists between human capital development and economic growth in Nigeria using the result obtained from the co-integration analysis.

This study therefore, extend the frontier of knowledge by employing a more recent dataset to verify if there have been any significant change on the impact of human capital development on economic growth in Nigeria alongside the interaction or channel of industrial development.

### 3.0 Research Methodology

The endogenous growth theory is a theory of the economy which hinges on the fact that an economy experiencing growth generates its growth factors from within the system through various internal processes. This theory focuses on the fact that development of human capital is a resultant factor of growth in the economy through the means of generating new systems of technology of production alongside with efficient and effective means. The endogenous growth theory is a long-run period economic growth theory which grows at a percentage rate that is determined solely by internal forces in the economic system precisely all those factors governing the various opportunities and incentives to generate technological knowledge.

The endogenous growth theory was developed as an extension of the neoclassical growth theory through the introduction of technical progress as an endogenous factor on their model of growth. Generally, the mathematical model for the endogenous growth model is based on the assumption that growth is developed within a system where  $Y$  represents the output level, ' $A$ ', the public stock of knowledge and technical efficiency, ' $K$ ', is the stock of capital, and ' $L$ ', the stock of labour efficiency.

Hence, the endogenous mathematical model can be written as;

$$Y = f(A, K, L) \tag{1}$$

The above variables are classified as flow variables due to the ability to be measured over an interval of time. Romer's model is based on learning by investment which assumes creation of knowledge as a result of investment where knowledge functions as an input in its production function. Hence, the model can be specified as;

$$Y = A(R)f(R_i, K_i, L_i) \tag{2}$$

Where  $Y$ , represents the aggregate output

$A$ , represents the public stock of knowledge as a result of research and development  $R$

$R_i$  represents the stock of results from expenditure on research and development by firm  $i$  and

$K_i$  and  $L_i$  represents the capital stock and the stock of labour of firm  $i$  respectively.

Romer in his model assumes  $F$  as a homogeneous function of degree one in all its input factors  $R_i$ ,  $K_i$  and  $L_i$ . Thereby, treating  $R_i$  factor as a rival goods. This present is hinged on the endogenous growth model.

### 3.1 Model Specification

For the purpose of this study, the endogenous growth model as adopted by Romer will be used. This model is satisfactory for this research work as it fits in for analyzing industrialization and human capital development on the level of growth experienced in the economy of Nigeria.

The Romer model therefore is written below;

$$Y = A(R)f(A, L) \tag{3}$$

Where  $Y$  = is the aggregate output

$A$  = is the public stock of knowledge obtained from research and development ( $R$ )

$K$  = is the stock of capital

$L$  = is the labour stock

Based on the above model, equation (iii) the model is specified in the form below;



$$Y = f [A (R) F (K, L)]$$

$$ECGR = f [A (R) f (K, L)] \quad (4)$$

Where ECGR, Denotes Economic growth which represents the aggregate output, IND Denotes Industrialization and HCD, Denotes Human capital development

ECGR is the dependent variable while IND and HCD are the independent variables. This implies that economic growth depends on industrialization and human capital development.

From equation (iv) above, the specified model of the Romer model is modified in equation (v) below to allow for the use of other variables that determine aggregate output. It is assumed that the value of labour is included in the industrial output as stated in the Romer model.

$$ECGR = f (IND, FDI, RGEE, RGEH, GCF, INF) \quad (5)$$

Where ECGR, Denotes Economic growth

IND, Denotes Industrial output.

FDI, Denotes Foreign direct investment.

RGEE, Denotes Real government expenditure on education.

RGEH, Denotes Real government expenditure on health.

GCF, Denotes gross capital formation.

INF, Denotes inflation.

This can be expressed as an econometric model in equation (vi) below;

$$ECGR = \beta_0 + \beta_1 IND + \beta_2 FDI + \beta_3 RGEE + \beta_4 RGEH + \beta_5 GCF + \beta_6 INF + \mu \quad (6)$$

Where; ECGR, Denotes Economic growth

IND, Denotes Industrial output.

FDI, Denotes Foreign direct investment.

RGEE, Denotes Real government expenditure on education.

RGEH, Denotes Real government expenditure on health.

GCF, Denotes gross capital formation.

INF, Denotes inflation.

The bound test equation is as specified in equation (vii) the variables remains as previously defined.

$$\begin{aligned} \Delta ECGR_{t-1} = & \beta_0 + \sum_{i=1}^q \beta_{1i} \Delta ECGR + \sum_{i=0}^q \beta_{2i} \Delta IND_{t-1} + \sum_{i=0}^q \beta_{3i} \Delta FDI_{t-1} \\ & + \sum_{i=0}^q \beta_{4i} \Delta RGEE_{t-1} + \sum_{i=0}^q \beta_{5i} \Delta RGEH_{t-1} + \sum_{i=0}^q \beta_{6i} \Delta GCF_{t-1} + \sum_{i=0}^q \beta_{7i} \Delta INF_{t-1} \quad (7) \\ & + \beta_8 ECGR_{t-1} + \beta_9 IND_{t-1} + \beta_{10} FDI_{t-1} + \beta_{11} RGEE_{t-1} + \beta_{12} RGEH_{t-1} \\ & + \beta_{13} GCF_{t-1} + \beta_{14} INF_{t-1} + \lambda ECT_{t-1} + v \end{aligned}$$

The econometric technique employed in this study to analyze the multiple regression model and the Time series data is the Autoregressive distributed lag (ARDL) error correction model estimation method. This technique is preferred because it accommodates combination of different orders of stationarity which are not I (2).

#### 4.0 Presentation and Analysis of Results

Table 4.1 shows the result of the unit root test. The Augmented Dickey-Fuller unit root test was employed. Real government expenditure on education (RGEE), Real government expenditure on health (RGEH), Gross capital formation (GCF) and Inflation (INF) value were not stationary at their levels but were stationery at first differencing. Other variables were stationary at levels.

**TABLE 4.1: The Augmented Dickey-Fuller Unit Root Test**

Variables	T-value	Critical value (%)	Stationarity
ECGR	-3.860	-3.552	The value of ECGR is stationery at levels.
IND	-5.768	-3.552	The value of IND is stationery at levels.
FDI	-4.052	-3.552	The values of FDI is stationery at levels
RGEE	-5.137	-3.557	The values of RGEE were made stationery at 1 <sup>st</sup> difference.
RGEH	-6.160	-2.960	The values of RGEH were made stationery at 1 <sup>st</sup> difference.
GCF	-11.52	-3.562	The values of GCF were made stationery at 1 <sup>st</sup> difference.
INF	-4.032	-3.612	The values of INF were made stationery at 1 <sup>st</sup> difference.

**Source:** Extracted Augmented Dickey-Fuller Unit Root test using E-views 10.0

It can be observed that the stationarity of the values of the dependent and independent variable are a combination of levels [Id (0)] and first [Id (1)] difference where the value of economic growth (ECGR), the value of industrial output (IND) and the value of foreign direct investments (FDI) are stationary at levels while the value of real government expenditures on education (RGEE), the value of real government expenditures on health (RGEH), the value of gross capital formation (GCF) and the value of inflation (INF) are not stationary at levels but were made stationery by first differencing. Therefore, this will result in the carrying out of the co-integration test and the Autoregressive Distributed Lag Model (ARDL) to test for a long-run and short run relationship between these variables.

#### 4.1 Cointegration Test

**Table 4.2: ARDL Bound Test for Cointegration**

Statistics	Value	Significance level	I(0)	I(1)
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F-Statistics	3.367	5%	2.27	3.28
K	6			

**Source:** Extracted ARDL bound test for cointegration using Eviews 10.0

In Table 4.2, ARDL bound test result for co-integration shown, the value of the F-statistics is higher than the 5% critical value of the upper and lower bound. This indicates that a long-run relationship exists among variables. Therefore, based on the result obtained from the unit root test and ARDL bound test for co-integration, this study will employ the Autoregressive distributed lag (ARDL) error correction model.

#### 4.2 Error correction model

**Table 4.3: ARDL Error Correction Regression**

**Selected Model: ARDL (1, 1, 1, 0, 0, 2, 2)**

The Error correction model allows for the correction of any distortions in the economy.

Variables	Coefficient	T-statistics	P-value
<i>Long-run Estimates</i>			
IND(-1)	0.433	2.519	0.021
FDI(-1)	0.263	0.328	0.747
RGEE	0.012	0.659	0.518
RGEH	-0.033	-1.145	0.267
GCF(-1)	0.068	1.019	0.322
INF(-1)	-0.143	0.056	0.020
<i>Short-run Estimates</i>			
$\Delta$ IND	0.274	4.865	0.0001
$\Delta$ FDI	-1.017	-3.119	0.0059
$\Delta$ GCF	0.031	1.799	0.0887
$\Delta$ GCF(-1)	-0.045	1.799	0.089
$\Delta$ INF	-0.110	-3.587	0.0021
$\Delta$ INF (-1)	0.135	4.286	0.000
CointEq (-1)*	-0.922	-6.116	0.0000
R-Squared	0.801		
Durbin-Watson Test value	2.152		

**Source:** Extracted ARDL error correction model using E-views 10.0

Table 4.3 shows the long-run and short run relationship in line with the model stated earlier. The value of industrial output (IND) in the long-run with a one year lagged period has a positive value of 0.433, which imply that a 1% increase in industrial output will result in a 43% increase in economic growth. The P-value of 0.021 shows that industrial output is statistically significant at the 5% significance level in contributing to economic growth. The elasticity of the value added on economic growth in the long-run with respect to foreign direct investment (FDI) with a one year lagged period has a positive value of 0.263 which implies that a 1% increase in the value of foreign direct investment will result in a 26% increase in economic growth. The P-value of 0.747 imply that foreign direct investment is not statistically significant in determining the growth of the economy.

The long-run estimate on the value of real government expenditure on education which is a proxy for the extent of human capital development (RGEE) has a positive value of 0.012. This implies that a 1unit increase in real government expenditure on education will result in a 1.2% increase in the level of economic growth though, it's not statistically significant at 5 percent. The value of real government expenditure on health (RGEH) has a negative value of -0.033 in

the long-run which imply that a 1 unit increase in real government expenditure on health will result to 3.3% decrease in economic growth with a P-value of 0.322 implying that real government expenditure is not statistically significant at 5% significance level.

In addition, A one year lagged period of the value of gross capital formation (GCF) has a positive value of 0.068 in the long run estimates. This implies that a 1% increase in the value of gross capital formation will result in a 6.8% increase in economic growth. The P-value of 0.322 imply that gross capital formation is also not statistically significant at the 5% significance level.

The value of inflation (INF) in the long-run estimate has a negative value of -0.143 which means that a 1% increase in the level of inflation will result in a 14% decrease in economic growth. The P-value of 0.020 shows that inflation is statistically significant at the 5% significance level which violates the prior expectation of a positive outcome. The coefficient of the industrial output (IND) value and gross capital formation (GCF) in the short-run estimates are positive signifying a positive short run relationship between the independent variable and the dependent variable.

The elasticity of the value added of economic growth (ECGR) with respect to industrial output (IND) in the short-run is 0.274 and a P-value of 0.0001 shows that industrial output (IND) is statistically significant at the 5%. This implies that a unit increase in the value of industrial output will result in a 27% increase in the growth of the economy. Hence, this variable does not violate the prior expectations of a positive impact on the economic growth of Nigeria. The elasticity of the value added of economic growth (ECGR) with respect to foreign direct investment (FDI) is negative with a value of -1.017 and a P-value of 0.0059 shows that foreign direct investment (FDI) is statistically significant at the 5% level of significance in the short-run. This implies that a 1 unit increase in the value of foreign direct investment will result in a 1.7% decrease in the growth of the economy. Hence, this variable violates the prior expectations of a positive impact on the economic growth of Nigeria. Perhaps, most of the foreign direct investment are not into the industrial sector.

It was also discovered that the elasticity of the value added of economic growth (ECGR) with respect to gross capital formation (GCF) is positive with a value of 0.031 and a P-value of 0.0887 show that gross capital formation (GCF) is not statistically significant at the 5% level of significance but does not violates the appropriate expectations of a positive impact on the economic growth of Nigeria. This implies that a unit increase in gross capital formation will result to 3.1% increase in the growth of the economy and a 1% increase in gross capital formation (GCF) lagged by one period will result to -0.045 decrease in economic growth and with a P-value of 0.000 show it is statistically significant in the short-run estimates.

The elasticity of economic growth (ECGR) with respect to inflation (INF) is negative in the short run with a value of -0.110 and a P-value of 0.0021 shows that inflation (INF) is statistically significant at the 5%, but violates the appropriate expectations of a positive impact on the economic growth of Nigeria in the short-run. This implies that a unit increase in inflation factor will result in an 11% decrease in the growth of the economy in the short run and a unit increase in inflation rate lagged by one period will result to 0.13% positive increase in economic growth but with a P-value of 0.000 shows it is statistically significant.

The result of the Autoregressive distributed lag (ARDL) error correction model shows the long-run and short-run relationship among variables. The error correction term (ECT) for the model is a value of -0.922 which is also statistically significant at 5 percent. This indicates that a shock in the model will result in a high convergence to equilibrium with about 92% of adjustment occurring in the first year.

Further, the estimated model has some other statistically desirable properties such as the value of the F-statistics, R-squared and the standard Durbin-Watson test statistics. The R-squared value of the model shows that 80% of the variations in the dependent variable are explained by the independent variables. This indicates the model is a good-fit-model. The F-statistics value of 3.367 shows that there exists a long run relationship among variables and the Durbin-Watson test statistics value of 2.15 shows that there is no problem of Autocorrelation. Table 4.4 further corroborates the no serial correlation using the LM test.

**Table 4.4 Breusch-Godfrey Serial Correlation LM Test:**

F-statistic	0.25270	Prob. F(2,16)	0.7797
Obs*R-squared	0.98017	Prob. Chi-Square(2)	0.6126

**Source:** Extracted Breusch-Godfrey Serial correlation LM Test using Eviews 10.0

The result of the test from the Breusch-Godfrey serial correlation LM test indicates that there is no serial correlation. This implies that the residuals are not serially correlated. Therefore, the result is useful for forecasting.

## 5.0 Summary, Conclusion and Recommendations

### 5.1 Summary

This study in line with the objectives stated earlier, has been able to analyze the impact of industrialization and investment in human capital in Nigeria on the development of Nigeria economy. The huge dependency on importation of manufactured goods and the exportation of primary raw materials has also led to the low contribution of the industrial sector economic growth. The need for effective policy formation that will help promote industrialization can help transform an economy into a manufacturing economy thereby, reducing the high level of dependency on the importation of goods that can be manufactured in the country. From the research question, to what level has industrialization impacted on the economic growth of Nigeria and the result obtained it can be said that industrialization has positive impact on economic growth both in the short-run and in the long run, the magnitude is small. This could be as a result of policy somersaults and the inability to harness the available human technological resources to improve productivity. Besides, the mono-economy has not helped in the expansion of the industrial sector.

Similarly, the study analyze the impact of human capital development on economic in Nigeria and how well it has contributed to the development of Nigeria economy despite the lapses and short-comings of which it was discovered that human capital development can be the building block for every less developed or developing country who desires to experience growth.

The development of human skills is vital in order to increase the productivity level in the economy. Individuals with low knowledge and inadequate skills cannot be able to perform up to desired productivity level. From the research study carried out based on the research question which is in line with the research objectives it can be said that the level of contribution of human capital is very low with about 6.8% in the long-run and 3% in the short-run contribution to economic growth in Nigeria which could be as a result of lack of effective training skills and development in individual specialization.

The following were the key findings from the research study

- a. There exists a long run relationship among variables using the ARDL bound test for co-integration which resulted in the carrying out of the ARDL error correction model to estimate both the short-run and long-run relationship among variables.
- b. The research study also showed that the values of the variables were stationary at levels and other variables were not but were stationary at first differencing in order for the result to be reliable for decision making and used for proper forecasting.
- c. The analysis carried out using the Autoregressive distributed lag (ARDL) error correction model revealed that a shock in the model, will result in a high convergence to equilibrium with about 92% of adjustment occurring in the first year from the error correction term (ECT) value.
- d. The major discovery of this study from the result of the analysis carried out, revealed that only the value of industrial output (IND) as measurement for the effect of industrialization, the value of real government expenditure on education (RGEE), and the value of gross capital formation (GCF) which are part of the measurement of human capital development among other independent variables employed has positive impact on the economic growth of Nigeria.

## 5.2 Conclusion

In conclusion, the analysis revealed the existence of long-run relationships among the variables of choice. The results obtained in this research study is in line with the result obtained by Babatope (2017) and Paul and Akindele (2016). Industrialization, government spending on education and investment on capital employed by labour as a factor input, impact positively on economic growth in Nigeria. Policies directed towards expanding the industrial sector while improving on both the physical capital and human capital development will lead to a greater economic growth in the long-run.

## 5.3 Recommendations

The following are the recommendations for this study based on the result obtained and the conclusion above;

- a. From the results obtained in the research study, there is an urgent need for technological advancement in the industrial sector given the result of 43% contribution to growth via the industrial sector. This will help to improve productivity. There is also need for increasing the level of total expenditure allocated to the industrial sector in order to allow for the convenient purchase of the required technology needed for the manufacturing processes to be effective and efficient.
- b. Effective policies should be developing that favors local production and consumption thereby discouraging importation by imposing high excise duties on commodities that can be locally produced so as to reduce the level of high dependency on importations and in turn foster the activities of the manufacturing industries.
- c. Also, the diversification of the economy will help to improve the industrial sector generally, rather than a specific industry. The government and policy makers in the country could develop attainable goals towards improving various sectors that will enhance the activities of the manufacturing sector thereby increasing productivity.

- d. Emphases should be made on the need for developing human skills through establishing effective policies that will promote individual's development through the setting up of the minimum standard requirement for individuals who desire to engage in productivity activities in the country. These policies should be monitored and in order to ensure that is in line with the stated goals.
- e. Finally, the result show that the level of contribution from human capital development to Nigeria economy growth is 6.8% which is low for developing an economy. Therefore, policies that will put some standard criterion requirements to which companies hiring workers/laborers should provide adequate training skills that will increase the level of productivity from employees and that will lead to the general improvement and success of the organization as a whole should be developed.

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