INDUSTRIAL SECTOR PERFORMANCE AND HUMAN CAPITAL INVESTMENT: NIGERIAN EXPERIENCE

BENEDICT AZU (PhD) & ONYEMAECHI UGBOH (PhD)
Department of Economics, University of Delta, Agbor.
Department of Agriculture Science, University of Delta, Agbor
+2348037847512, +2348033808687
benedict.azu@unidel.edu.ng&onyeamechi.ugboh@unidel.edu.ng

Abstract
This study investigates the extent which human capital investment has influenced industrial sector performances in Nigeria over the periods of 1981 to 2022. An Autoregressive Distributed Lagged model was employed to examine the influences of education investment, health investment, domestic credit to private sector and the cost of capital on industrial sector performance. The study found that government expenditure on education maintained positive and significant impacts on the measure of industrial sector performances while government expenditure on health exhibited negative and insignificant influence on industrial sector performances. It was recommended that government should increase not just the amount of expenditure on education and health sector but the percentage of its total expenditure accorded to these sectors needs urgent improvement, especially now that the over dependent on oil revenue is rapidly failing the country.

Keywords: Human Capital, Investment, Industry sector, performances, Nigeria.

Introduction

Nigeria's most important macroeconomic objective remains how to achieve accelerated economic growth and reduce poverty. In order to achieve this laudable objective, certain variables which have the capacity to accelerate growth have to be identified. Of all the contributory variable or factors to economic growth and increased productivity, human capital stands out as a major catalyst. To this end, effective investment in human capital is a key component of long run economic growth and improved productivity Gennaid, La Porta, Lopezede-Silanes & Shieifer (2013).

World Bank development indicators (WDI, 2020) show that the industrial sector provided only 13% of Nigeria's total employment in 1991. This however, dropped to 10.86% in 2007 and rose to 12% in 2019. As employment in sectors experience drastic reduction, the services sector kept experiencing increase in its employment. The employment rate in the service sector in 1991 was 36.7% this increased to 43.61% in 2005 and 53.03% in 2019.

Human capital development has been the subject of most prior research on the subject and its effects on Nigeria's economy, either in specific industries or overall. Saka & Olanipeku (2021) investigated the part that human capital plays in the relationship between Nigeria's growth and industrialization. Okumoko, Omeje, & Udoh (2018) studied the relationship between Nigeria's industrial progress and the development of human capital. James (2021) examined how Nigeria's agricultural growth, national security, and human capital development relate to one another.

In further research, Ifunanyachukwu (2019) assessed Nigeria's health care, education, and overall quality of life. Popoola, Alege, Gershon & Asaleye (2019) and Ogunleye, Owolabi, Sanyaolu, & Lawal (2017) investigated the effects of developing human capital on Nigeria's economic growth during various time periods. In other climes, Xuewei & Xiao. (2020) examined how government spending on healthcare affected 31 Chinese provinces' economic growth.. Ethem & Merve (2021) evaluated the impact of health spending on Turkey's economic growth. Although the impact of human capital on economic growth has been

examined in previous research, this study was driven by the dynamic nature of human capital and the ongoing need to update the knowledge.

In Nigeria, the human capital development indices have clearly showed a disappointing low expenditure on education and health. For instance, an insignificant proportion of financial resources (less than 10% of local government expenditure) in 2019 were allocated to educational sector (CBN, 2022). Government health expenditure as a percentage of GDP in Nigeria was 4.8% in 1995. This increased to 5.6% in 2015 and 7.5% in 2017. It decreased to 5.74% in 2018; increased to 6.08% in 2019 and again reduced to 5.07% in 2020 (World Bank, 2022). Budgetary allocations to formal education system have an inverted pyramid shape in which secondary and tertiary education receive more than four times much of public resources as primary education in Nigeria. In most cases primary schools are starved of financing while Universities received heavy subsidies.

The industrial sector in the other hand is known to be the strength of the value-added processes in many economies. Nigeria Industrial sector encountered the problem of low price elasticity of export and lack of comparative advantage. This means that Nigeria share of foreign exchange market cannot appreciate despite the numerous incentives granted to the industrial sector. The absence of an indigenous entrepreneurship class couple with other problems of multinational corporation affect the structure and influence the nature of utilization of scientific and technological labour for national development.

The realization of the crucial role of education and health, as component of human capital investment, on productivity and growth most have informed the recommendations by the United Nations that developing countries should invest a minimum of 26% of her GNI on education and the World Health Organisation specified at least 5% on health (UNDP, 2021 & WHO, 2022). Nigeria has not been able to meet this bench mark. In 2012, the education sector got a meagre 8.4% of the budget while the health sector got about 6% (2022 National Budget-Provisional). The human development index (HDI) has three indicators: income, life expectancy (proxy for health), and knowledge (proxy for education). The rank of countries (as indicated in the 2021 report, page 131) showed that Nigeria ranked 156 with a value of 0.459 among 187 countries.

Therefore, without denying the fact that there exist a plethora of empirical efforts investigating the impacts of human capital as a whole on economic growth in Nigeria (Ihensekhiem & Soriwei 2023, Johnson, Akinloye, Mijinyawan & Oyakhiromhe 2023 and a host of others), there is still paucity of empirical evidences linking education and health on industrial sector performance and by extension, economic growth in Nigeria from 1981 to 2022. Thus, using the most current data set on this factors, this paper investigate the extent to which investment in education and health have affected the growth performance of the industrial sector in Nigeria. This paper differs from previous works based on the addition of other variables to depict human capital apart from education and health.

Brief Literature Review
Conceptual Review

The concept of human capital describes the processes that led to the development of human capital, including the supply of formal education, adult education, on-the-job training, health services, labour market information, and assistance with internal migration, among others Smauel, Udoh, Prince, Okoh, & Ndu (2019). The ability and capabilities of an individual are referred to as human capital, while the process of acquiring and increasing the number of people with the knowledge, training, and work experience required for a nation's economic success is known as human capital formation. Effective human capital investment is therefore essential for raising national productivity and fostering sustainable economic growth. (Okumoko et al., 2018).

Okochi & Ateke (2021) implies that it is critical to invest in the development of people, or human capital, as they are the organisational resource that determines effectiveness and efficiency and contributes to an organization's success. The primary purpose of education and training investments made by businesses or

individuals is to anticipate a return on such investments in the form of money or revenue. World Bank, (2023). In economic theory, there are two basic approach to human there are two basic approach to human capital which are macro-economic and micro economic approach. The manufacturing sector benefits from human capital development in that it boosts worker productivity, encourages technical innovation, increases returns on capital, and makes growth more sustainable—all of which contribute to the elimination of poverty (Okoye, Olokoyo, Okoh, Ezeji & Uzohue,2020).

Theoretical Review
Numerous theories have been proposed in the literature to explain the topics of human capital development and behaviour. The following is a summary of some of the theories.
Human capital theory: In the 1960s of the 20th century, an economist who represented the Chicago school of thought developed the concept of human capital. The development of human capital theory was another area of emphasis for Chicago economists, and this made a significant contribution to theoretical studies in education. Their human capital idea has evolved into a Chicago school "decoration." (Schultz,1961). The founder of this school, Schultz, wrote this in 1981. Consider both acquired and innate skills. The most significant author and proponent of human capital created a theoretical framework for choosing which investments to make in human capital in 1964. Those are significant, may invest to grow, and will constitute the human capital. (Backer,1993)
Endogenous Growth theory: Paul Romer was linked to this hypothesis in the middle of the 1980s. Another name for it is the Ak-model. They give more weight to the requirement that the government aggressively promote technological innovation. They contend that because companies under the conventional free market approach will find it difficult to make a profit in markets that are competitive, they may not be motivated to invest in innovative technology. Make sure you prioritise raising labour and capital productivity. They contend that while labour productivity may increase, it does not necessarily have a decreasing return. "According to Romer (1986) Growth can be greatly aided by human capital, as he felt that innovation leads to technology, which is a product of human capital development.
Lewis theory of unlimited supplies of labour; The concept, which was put up by Prof. Kwon in 2009, holds that underdeveloped nations are characterised by overpopulation of labour that is transferred from the agricultural sector, which dominates, to the industrial sector, preserving a zero-marginal labour force because no output would be lost in the process (Jhingan,2013). This may result in the growth of already-existing industries or the formation of new ones. According to the hypothesis, there is an endless supply of labour in developing nations because of factors including high birth rates, high unemployment, and a dual economy with traditional and industrial sectors. Lewis proposed that industrial sector wages stay the same. This current, self-sustaining growth and job-creation process will not stop until all of the excess agricultural labour is employed in the emerging industrial sector.
Kaldor's model of economic growth: In an attempt to establish a framework for connecting the origins of technological advancement to capital accumulation, Kaldor proposed a growth model. According to Kaldor's analysis and theory, development is dependent on four key ideas: growing manufacturing returns, effective demand-constrained growth, the interaction between the agricultural sector and industry, and internal and external market relations (Thirlwall, 2013). He proposed that the rate at which capital accumulates determines the direction of technological advancement (Jhingan,2013). According to Kaldor's theory, investment decisions are influenced by both changes in output and changes in capital gains or losses from the prior period. The production function was replaced by the technical advancement function in the model.
Sustainable resources theory: The main distinction between scarcity and sustainable resource theories is that the former emphasises short-term goals above long-term objectives (Thurrow, 1993; Odhon'g & Omolo 2015). New process technologies will have a greater impact on sustainable advantage than new product technologies would. Future industries will rely heavily on brain capacity; this hypothesis implies, for the sake of this article, that investing in human capital must provide value in order to create long-term, sustainable economic performance (Swanson & Holton, 2001).

Empirical Review

Okoye, Omankhanlen, Okoh, Adeleye, & Ezenji, (2021) examined the relationship between Nigeria's economic growth and financial intermediation. Ordinary Least Square (OLS) regression technique was utilised for the estimate of the hypotheses per capital, and quarterly time series data produced from the World Bank Development Index and the Nigerian Bureau of Statistics over the period 1994 QT to 2018as were used for analysis. While bank deposits, bank credit, and bank reserves are indicators of financial intermediation, GDP was employed to quantify economic growth. Further investigation reveals that bank deposits positively and significantly correlate with GDPs, indicating that a rise in bank deposits corresponds with an increase in economic growth of 0.244193. We also noticed that bank loans had a favourable effect on economic growth. Though the impact was found to be insignificant. As a result, we also discovered that bank reserves had a noteworthy and favourable impact on economic growth. Based on these findings, we recommend sound policy reforms that might support bank development and efficiency, both of which are essential for Nigeria's economic growth.

Ofuoma (2021) carried out research on the connection between organisational success and human capital development in the Nigerian aluminium industry. Survey research and sampling are the types of research designs used in this work. The study's hypotheses were tested using the multiple regression statistical tool with the help of SPSS version 23 as the basis for testing the hypotheses, and the results also showed that training and other aspects of human capital development had a significant impact on the manufacturing firms' organisational performance, which in turn tied the study's organisational profit to training.

Favour, Adeyemi, Paul & Ngosi (2020) examined how human capital affected manufacturing production in Nigerian industrial enterprises. The theoretical underpinning of the study is based on human capital theory. The specific effect of human capital on manufacturing value added for Nigerian industries is investigated using micro-data from the World Bank enterprise survey through spearman correlation. Formal training and research, as well as high school education, were found to have a weakly positive but significant impact on the level of manufacturing output. Thus, the study ultimately enhanced the quality of human capital through public-private partnerships promoting educational research projects and a biased-friendly business climate.

Chigozie (2018) examined the impact of developing human capital on the performance of organisations in the manufacturing sector in southeast Nigeria. 6230 employees of a particular manufacturing company from southeast Nigeria make up the population. The survey approach was employed in the investigation. The undirected finding indicates that knowledge significantly improves the quality of products. As to the study's findings, an organisation would not be able to effectively compete in the global market if it does not engage in continuous learning and cannot properly list, produce, share, disseminate, mobilise, cultivate, put into practice, review, and propagate knowledge.

Asghar & Rehman (2017) evaluated labour productivity and human capital. In order to analyse the relationship between labour productivity and human capital in the Lahore area, a cross-sectional study was carried out, and data from 243 businesses in the manufacturing, trading, and service sectors were gathered. The results of the empirical investigation show that the impact of human capital on labour productivity varies across all sectors. Education seems to have a major and favourable impact on labour productivity across all industries, although it has a stronger influence in the manufacturing sector. Training and skill have a discernible impact on labour productivity as well.

Afrah, (2016) examined the impact of human capital development on the functioning of organisations; Benard University in Mogadishu, Somalia was used as the case study. The findings indicate that the impact of human capital on organisational performance is critical for maximising the organization's potential. Additionally, organisations take great pride in their human capital over time, with HR practise playing a significant role in developing employees' potential. This analysis highlights the importance of human capital development on organisational performance. The analysis justifies the investigation's conclusion that Benard University and human capital have a favourable relationship. The assessment recommends a favourable

relationship between Benard University and human capital. According to the evaluation, using a single organisation configuration limits the system's capacity to be used to other organisations.

Model specification
In an attempt to determine the effect of education and health investment (as components of human capital development) on industrial sector performances in Nigeria, it is necessary to develop a model to justify the correlation that exists between these variables. In this regard, a Classical Linear Regression Model (CLRM) is thus developed in multivariate functions.

The model for this study is theoretically stated as: the annual % growth of Industry value added (GIV) is a function of Total Health Expenditure (HX), Total Education Expenditure (EX), Domestic credit to private sector (% of GDP) (DCP) and Interest rate spread (lending rate minus deposit rate, %) (IRS).

$GIV = f(HX, EX, DCP, IRS)$……………………………………………………………… (1)

Note that instead of industrial output stock, the present study employed annual % growth of Industry value added (GIV) as the best measure of industrial sector performance. Annual growth rate for industrial value added is based on constant local currency. It comprises value added in mining, manufacturing, construction, electricity, water, and gas. Value added on the other hand, is the net output of a sector after adding up all outputs and subtracting intermediate inputs. It is calculated without making deductions for depreciation of fabricated assets or depletion and degradation of natural resources (International Standard Industrial Classification, ISIC, revision, 2022).

Therefore the above specification can be done in an econometric format as follow:

$$GIV_t = \beta_0 + \beta_1 HX_t + \beta_2 EX_t + \beta_3 DCP_t + \beta_4 IRS_t + \mu_t \ ………………......... (2)$$

where

GIV_t = annual % growth of Industry value added at time t,

HX_t = total health expenditure at time t,

EX_t = total education expenditure at time t,

DCP_t = domestic credit to private sector (% of GDP) at time t, and

RRS_t = interest rate spread (lending rate minus deposit rate, %).

β_1 to β_4 = parameters to be estimated

β_0 = the constant term (intercept)

μ_t = stochastic error terms at time t.

Note that the inclusion of interest rate spread is to account for both the depositor price of saving their money and the investor or borrowers cost of accessing the funds for investment. The logic is that when the deposit rate is too low, saving money will not make since, thus declining the availability of investment funds, which could negatively affect the industrial performance. On the other hand, when the lending rate is too high, like observes today in Nigeria, investor will be scared to borrow money, due to cost of fund, and investment especially in the industrial sector will be negatively impacted.

For the purpose of numerical accuracy, and proportionate interpretation of the estimated parameters, equation 2 was rescaled to obtain the model in log form:

$$Log(GIV)_t = \beta_0 + \beta_1 \log(HX)_t + \beta_2 \log(EX)_t + \beta_3 \log(DCP)_t + \beta_4 \log(IRS)_t + \mu_t \ ….. (3)$$

In estimating equation 3, a special attention is paid to variables that are in percentage or those having their value(s) equal to zero or less than zero, since log cannot be applied to such variables.

Literature has shown that most macroeconomics variables are not mean reversing as a result of their time sensitiveness (Pindyck & Rubinfeld, 1998) hence they are not stationary at their level form that is not integrated to order zero. Therefore, they shall be subject to unit roots stationary test using Augmented Dickey-Fuller (ADF) test. Following the test, equation (2) transforms to

$$\Delta^{Z0}\log(GIV)_t = \beta_0 + \beta_1 \Delta^{Z1}\log(HX)_{t-1} + \beta_2 \Delta^{Z1}\log(EX)_{t-1} + \ldots + \beta_4 \Delta^{Z1}\log(IRS)_{t-1} + \mu_t ……... (4)$$

Where:

Δ = first order deference,

If they is evidence of co integration, equation 4 be transform into Error Correction Model (ECM) in the form:

$$\Delta^{Z0}logGIV_t = \beta_0 + \beta_1(\Delta^{Z1}logHX_{t-1}) + \beta_2(\Delta^{Z1}logEX_{t-1}) + \ldots + (\Delta^{Z3}logIRS_{t-1}) + \rho ECM_{t-1} + \mu_t \quad (5)$$

Where

ECM_{t-1} = a year lag parameter of an error correction mechanism, which also account for the speed of adjustment to equilibrium. With the above specifications, the study empirically determines the extent human capital investments (investment in education and health with other controlled variables) have affected industrial sector performance in Nigeria for the period 1981-2022. The data for the empirical analysis were obtained from the Statistical Bulletin published by the Central Bank of Nigeria (2022 version) and the World Bank economic indicators for Nigeria (2022 version) respectively.

RESULTS

The result presentation starts with the descriptive statistic. The result sows that the entire variables in the model have a uniform observation of 41, with total expenditure in education having the largest standard deviation of 112.7, followed by total expenditure in health sector with 66.3 value of standard deviation respectively.

Table 1: Descriptive Statistics

	DCP	EX	GIV	HX	IRS
Mean	16.36065	77.92265	2.728584	43.53882	6.047435
Median	14.12604	14.22000	2.043572	4.315000	6.709583
Maximum	38.48581	390.4200	22.11891	231.8000	11.06417
Minimum	8.709660	0.160000	-13.09095	0.040000	0.316667
Std. Dev.	6.656516	112.7772	7.059636	66.34415	2.851980
Skewness	1.617492	1.604488	0.700655	1.627745	-0.398708
Kurtosis	5.727420	4.437218	4.340051	4.481293	2.424512
Jarque-Bera	25.36391	17.51442	5.325830	18.12263	1.370002
Probability	0.000003	0.000157	0.069745	0.000116	0.504090
Sum	556.2622	2649.370	92.77185	1480.320	205.6128
Sum Sq. Dev.	1462.204	419716.7	1644.669	145251.0	268.4151
Observations	41	41	41	41	41

The Jarque-Bera and probability value indicates that there are shocks in the structure of the variable over the periods under investigation. These were clearly shown in the trend analysis presented in its graphical format below.
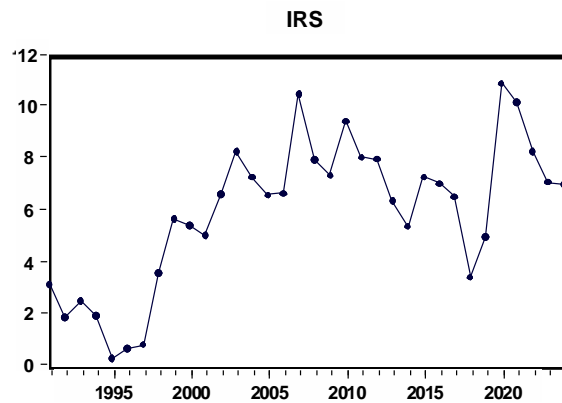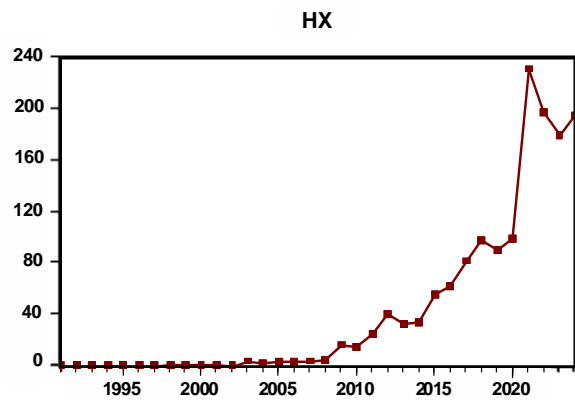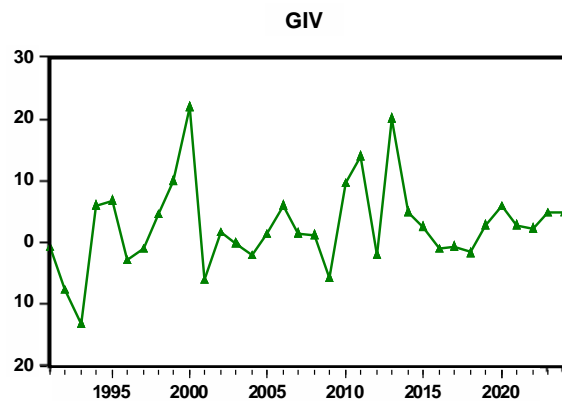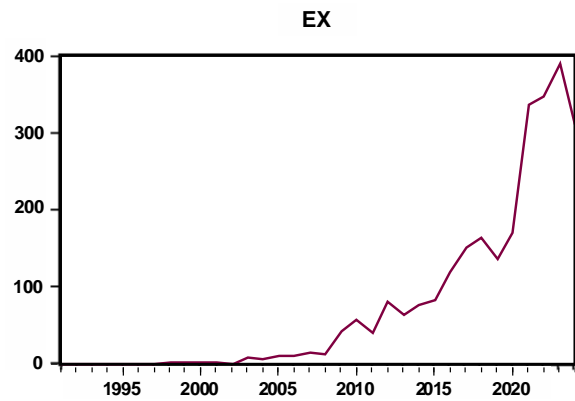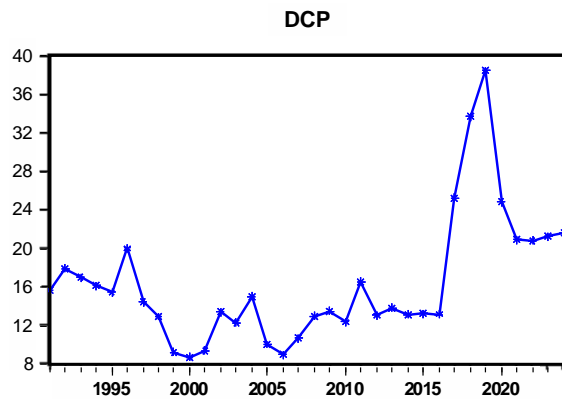
The above graph shows that the variables included in the model are all trending over the period of study with fluctuations, indicating shocks that could be drifting over the time. Evidence like this calls for unit root check in the variables. Therefore, the next analysis liked at unit root and co-integration feature of the variables in the model.

Tables 2: Abridged Result of ADF Unit Root test

Variable	ADF Level (Prob.)	ADF Difference (Prob.)	Deterministic Trend & Drift	Order of integration
GIV	-4.567722 (0.0000)	-6.862428 (0.0000)	No	$\Delta = 0$
EX	4.285715 (1.0000)	-5.640154 (0.0004)	No	$\Delta = 1$
HX	4.321630 (1.0000)	1.033948 (0.9998)	Det. Trend & Drift	$\Delta > 1$
DCP	-2.926936 (0.1679)	-4.748818 (0.0031)	No	$\Delta = 1$
IRS	-2.553035 (0.3026)	-5.861884 (0.0002)	No	$\Delta = 1$

The unit root test result indicates that all the variables, except the dependent variable (annual % growth of Industry value added), are integrated. Particularly, total health expenditure (HX), which captured the amount of investment in health sector, indicates to exhibit deterministic trend with drift. By implication, the health variable is distorted by time influence and other factors unaccounted for, imposing a serious policy issue concerning the actual investment trend in health sector. Nevertheless, the integrating orders presented in table 2 suggest that there is no co-integration or long-run linear combination between human capital investment and industrial sector performances. This is because; industrial sector performance variable is not integrated, while the human capital investment variables are integrated. A typical indication that long-run linear combination is not present in the model, thus the model was estimated in its original format. Note that the model was estimated in its lag order in order to account for possible spill-over effect. That is, impact of past experiences on the present set (see table 3)

R-squared = 0.852608; Adjusted R-squared = 0.849477; Durbin-Watson stat = 2.081669; F-statistic = 33.70553				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
GIV(-1)	-0.265595	0.088048	-3.121873	0.0002
EX	0.294323	0.095183	3.091480	0.0016
EX(-1)	0.065110	0.072130	0.902688	0.3757
HX	0.044786	0.059833	0.748521	0.4614
HX(-1)	0.116794	0.125939	0.927389	0.3630
DCP	0.209598	0.080706	2.596039	0.0187
DCP(-1)	-0.290279	0.313630	-0.925544	0.3639
IRS	-0.294334	0.062272	-4.726647	0.7000
C	6.539116	7.173791	0.911529	0.3711

The evidence from the result indicated that, though, human capital investment positively relate to industrial sector performance, only investment in education in the current set significantly impacts in the growth and performance of the industrial sector in Nigeria. The result indicates positive but insignificant impacts of health investment to industry value added. Another important outcome in the result is that there is negative spillover effects of poor performance of the industrial sector on it's the current set. It tells that a point change in the past performance of the industrial sector, other factors kept fixed will reduces the current performance in the sector by 26%.

Other variables in the model that shows significant impact on the industrial sector performances are domestic credit to private sector (% of GDP) and interest rate spread (lending rate minus deposit rate, %). It shows that while domestic credit to private sector in the current set positively and significantly influence industrial sector performances, interest rate spread also in the current set, negatively influences it.

Conclusion and Recommendations

Conclusion

There is a broad assumption that human capital has positive effect on firm performance the notion of performance for human capital remain largely indisputable. In response to current global market changes, most firms have embraced the notion of human capital as a good competitive advantage that will enhance higher performance. Human capital development becomes a part of an overall effort to achieve cost effective and firm performance. Hence, firms need to understand human capital that would enhance employees' satisfaction and improve performance. However, based on the empirical findings that emanated from this study, there exist a clear-cut and obvious relationship between human capital investment (education investment) industrial sector performances but the contribution of human capital to industrial performance has been less than satisfactory in Nigeria, since health investment has shown to be insignificant. This clearly suggest that even though human capital has been widely accepted to impact positively on industrial performances, our empirical findings, thus, revealed that industrial sector in Nigeria is yet to benefit fully from it. Therefore, government should increase not just the amount of expenditure on education and health sector but the percentage of its total expenditure accorded these sectors needs urgent improvement, especially now that the over dependent on oil revenue is rapidly failing the country.

The constantly changing business environment requires firm to strive for superior competitive advantages via dynamic business plan which incorporate creativity and innovativeness. This is essentially important for their long term sustainability. Undoubtedly, human resources input play a significant role in enhancing firm's competitiveness (Barney, 1995). At a glance, substantial studies were carried out on human capital and their implications on firm's performance on widely basis and obviously, human capital enhancement will result in greater competitiveness and performance (Sanusi, 2003).

Recommendations

The recommendation made flow from the finding of the study and constitute the research's advice to manufacturing sector for improving their operational performance. They are.

i. It was recommended that government should increase not just the amount of expenditure on education and health sector but the percentage of its total expenditure accorded to these sectors needs urgent improvement, especially now that the over dependent on oil revenue is rapidly failing the country.

ii. Firms should strive for superior competitive advantages via dynamic business plan which incorporate creativity and innovativeness.

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