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Industrial Sector Performance, Human Capital Development and Economic Growth in Nigeria

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ABSTRACT

This study examines the relationship between industrial sector performance (ISP), human capital development (HCD), and economic growth (EG) in Nigeria. Data used in this study was obtained from World Development Indicators (WDI) and Penn World from 1981 to 2020 on GDP/capita, human capital index, and industrial output. The augmented Dickey-Fuller (ADF) test was applied to obtain the stationarity conditions of the variables before performing the autoregressive distributed lag test to determine the short- and long-run relationships among the variables. The study reveals no long-run relationship among the variables; however, a negligible impact on human capital and industrial output in the short term exists, highlighting the need for government intervention. This is the first study to examine the tripartite relationship between industrial sector performance, human capital development, and economic growth in the Nigerian context, providing insight into the dynamics of the relationships in developing countries.

Kata Kunci:
Pertumbuhan ekonomi,
Modal Manusia,
Luaran Industrial,
Autoregressive distributed,
Performansi Sektor Industri.

SARI PATI

Studi ini menguji hubungan antara kinerja sektor industri, pengembangan modal manusia, dan pertumbuhan ekonomi di Nigeria. Data yang digunakan dalam penelitian ini diperoleh dari World Development Indicators (WDI) dan Penn World dari tahun 1981 hingga 2020 mengenai GDP per kapita, indeks modal manusia, dan produksi industri. Uji Augmented *Dickey-Fuller (ADF) diterapkan untuk mendapatkan kondisi* stationarity *variabel sebelum melakukan uji* autoregressive distributed lag *untuk menentukan hubungan jangka pendek dan jangka panjang antara variabel-variabel tersebut. Studi ini mengungkapkan tidak adanya hubungan jangka panjang antara variabel-variabel tersebut; namun, dampak yang kecil terhadap modal manusia dan produksi industri dalam jangka pendek ada, menyoroti perlunya intervensi pemerintah. Ini merupakan studi pertama yang menguji hubungan tiga pihak antara kinerja sektor industri, pengembangan modal manusia, dan pertumbuhan ekonomi dalam konteks Nigeria, memberikan wawasan tentang dinamika hubungan di negara-negara berkembang.*

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INTRODUCTION

The relevance of the industrial sector remains crucial in any economy, considering its effectiveness in driving innovation, promoting economic growth and development, and alleviating poverty (Morris et al., 2018). Specifically, the industrial sector generates employment, improves trade performance, increases income level, and enhances the export competitiveness of an economy in the international flora (Bernard, 2021). The role of the industrial sector is more pronounced through the enhancement and steady transition of many developing economies from traditional productions and sectors such as agriculture to the curtain-edge manufacturing sector driven by technology and innovation (United Nations Industrial Development Organization [UNIDO], 2020). Empirical evidence has affirmed that the industrial sector maximizes a nation's factor endowments, thereby minimizing its dependence on the external sector for sustained growth and survival (Dauda & Odior, 2016).

Theoretical propositions have argued in favor of the vital role of industrialization in the preconditions for takeoff towards fully sustained economic growth advanced in the second stage of Rostow's stages of development. According to this assumption, the transition of an economy from agrarian to self-sustained growth must pass through a well-developed and sturdy industrial era to enhance persistent trade and other commercial activities in the global marketplace (Karagiannis et al., 2021). The active involvement of the industrial sector is needed to enhance the commercialization and mechanization of agricultural production. The above narratives suggest the vital role the industrial sector plays not only in the growth process of any economy but also in its sustainability, whether as a developed or developing nation. Empirically, the significant nature of a well-functioning industrial sector has been debated extensively. Among many other roles, industries enhance the generation of employment, trade, and income as substantial drivers of poverty alleviation and shared prosperity (Bernard, 2021).

This work adopts a macroeconomic perspective to analyze industrial sector performance and explores theoretical frameworks such as neoclassical economics, Solow growth theory, and new growth theory (endogenous) to understand the factors influencing productivity. Neoclassical economics attribute productivity to capital, labor, and technology, while Solow growth theory emphasizes the role of capital accumulation, and the new growth theory highlights the significance of knowledge and human capital in fostering long-term economic growth (Cvetanović et al., 2019). Furthermore, Kaldorian theories, developed by economist Nicholas Kaldor, provide insights into the relationship between industrial sector performance, human capital development, and economic growth. These theories focus on industrialization dynamics and the role of demand-driven growth in driving economic development (Arjun et al., 2020). The concept of cumulative causation is central to Kaldorian theories. They suggest that economic growth is driven by positive feedback loops, in which initial advantages in specific sectors or regions lead to further growth and development. In the context of industrial sector performance, this theory emphasizes that the growth of industrial sectors can generate positive externalities, such as knowledge spillovers, economies of scale, and linkages to other sectors. This can lead to sustained economic growth.

Human capital plays a vital role in the initiation, expansion, and sustainability of the industrial sector as a critical factor of production, which includes the entrepreneur and labor (Temiz et al., 2019). This is underscored by economic theory, leading scholars, and sustainable development goals. Alluding to this view, Hassan et al. (2019) opine that enhancing industrial sector growth and economic development requires human capital development. Conceptually, the knowledge, skills, talents, and experience within every worker denote their human capital (Subramony et al., 2018). These aforementioned traits provide stimulus for economic growth and development

(Ali et al., 2018). A crucial factor of human capital is enhanced by education. The significance of education as a fundamental factor of human capital can never be overemphasized. For instance, education improves labor efficiency and promotes competitiveness among the workforce, promoting a value chain beyond manual tasks or simple production processes (World Economic Forum, 2016).

According to the World Bank (2019), Nigeria's population is above 200 million and the seventh largest population in the world. Nigeria is well endowed with natural and mineral resources with which the nation can drive substantial growth, making the economy among the largest in the world's emerging nations. Despite the consistent increase in the country's population growth, the country's economic growth rate has been less than impressive. Nigeria is no longer classified as an emerging economy and has been downgraded to a frontier economy. For instance, economic growth rates in Nigeria from 2015 to 2020 have declined, recording -3.66%, -4.27%, 2.42%, 1.12%, 0.29%, and 4.0% for this period (Babalola, 2021). By implication, a growing population not accompanied by correspondingly increasing growth rates poses unpredictable threats to the populace's well-being. The occurrence of the 2014 global oil shocks further compounded the country's economic woes, and the majority of economic policies implemented failed to yield desirable outcomes.

The decreasing level of Nigeria's industrial output and low agricultural and infrastructural development level is a concern. Also, the high cost of production, lack of strategies for development and growth (SMEDAN, 2017), and worsening unemployment all represent disturbing indices contributing to the dismal performance of the GDP. The industrial sector output does not reflect that capacity building is appropriate to enhance the industrial sector performance economic growth linkages. This gives the human resources in Nigeria a description of quantity without quality. As Nigeria aligns itself with the global pursuit of achieving sustainable growth by 2030 and the African growth agenda by 2063, it becomes crucial to examine the combined effects of industrialization and human capital development on economic growth in the country, considering their interconnectedness.

This study is urgent, as it addresses the declining industrial sector output, low levels of development, and economic challenges in Nigeria. It highlights the need to understand the linkages between industrial sector performance, human capital development, and economic growth for informed policy decisions and strategies to promote sustainable development and improve the well-being of the populace. Like any developing nation, the industrial sector is strategic in the Nigerian economy due to its potential to promote trade, create employment, and facilitate growth. It also has ripple effects on other sectors of the economy, including the informal sector. The disappointing performances of the industrial sector have spurred research interests in how the industry can deliver on the role of stimulating the growth of the Nigerian economy. Human capital development plays a critical role in the initiation, expansion, and sustainability of the industrial sector as a key factor of production, including entrepreneurship and labor (Temiz Dinc & Gökmen, 2019). The broad objective of this paper is to examine the relationship between industrial sector performance and economic growth in Nigeria as well as the relationship between human capital development and economic growth.

Literature Review

Two basic models exist in economic growth theory: the endogenous growth model and the neoclassical model (Cvetanović et al., 2019). The latter focuses on accumulating physical capital, which enhances short-run growth, while technological improvements mainly determine long-run growth. On the other hand, the endogenous growth model focuses on knowledge capital or human capital development as a tool to promote economic growth. Mankiw, Romer, and

Weil (1992) created a human capital-augmented version of the Solow–Swan model that can explain the failure of international investment to flow to poor countries. This model shows that output and the marginal product of capital (K) are lower in poor countries because they have less human capital than rich countries. The Mankiw-Romer-Weil version is an important framework that determines the different output levels of growth (Pasha, 2021). The model facilitates the incorporation of human capital into the Solow growth model, bringing the convergence equation that output increment to investment done on physical and human capital (Breton, 2013; Guerrini, 2010). Also, with this addition, the model explains variations in revenue across countries to accurately represent income rate convergence due to the variations in capital investment rates. This shows that the Solow growth model is consistent in its predictions with valid empirical proofs. However, the adverse implications of the population growth and saving rates are upwardly biased, since human capital is among the explanatory variables (Oyinlola & Adedeji, 2019). According to this basic neoclassical growth theory, technological progress is the only cause of continuing economic growth. Intuitively, any increases in the state of technical knowledge raise the rate of return to capital, thereby offsetting the diminishing returns to capital that would otherwise apply a break to growth. The original models did not explain how improvements in technology arose. They are assumed to happen exogenously, so these models are said to have exogenous technological change. This approach leads to mainstream growth theory focusing on the primary inputs, particularly capital and labor.

The incentive to devote resources to innovation comes from the prospect of temporary monopoly profits for successful innovations. Schumpeterian growth models are the third class of endogenous technology models (Aghion & Howitt, 1998) that explicitly model this incentive structure. Firms invest in R&D to receive monopoly profits. Innovations appear stochastically and are embodied in new generations of capital goods, and there is imperfect competition in the capital goods industry. The average growth rate may be too high or too low to maximize welfare, as positive and negative externalities exist. There are positive externalities to consumers who benefit from innovation and to future researchers who benefit from past ideas. Negative externalities due to innovations make obsolete the old vintages of capital. Both capital accumulation and innovation determine the long-run growth rate. Capital accumulation raises the returns for innovation activity. However, if there are diminishing returns in the innovation sector as technology becomes more complex, the economy can grow constantly (Aghion & Howitt, 1998). Also, if the overriding development objective is to maximize the rate of GNP growth, these approaches could be the right ones. However, it is equally essential to create jobs, and policies focusing on promoting labor-intensive industries such as small-scale agriculture and manufacturing could bring greater improvement.

The dual-sector model focuses on the structural transformation of an economy from a traditional agricultural sector to a modern industrial sector (McMillan et al., 2014). The theory suggests that shifting labor and resources from the agricultural sector to the industrial sector leads to productivity gains and economic growth (Rodrik et al., 2016). In the case of Nigeria, promoting industrial sector performance can drive the economy's structural transformation, generate employment opportunities, and contribute to overall economic growth. Productivity and efficiency theories highlight the importance of improving productivity levels in both the industrial sector and human capital. Higher productivity levels can lead to increased output, economic efficiency, and ultimately economic growth (Hamid, 2013). Policies that enhance efficiency and productivity in the industrial sector, such as improving infrastructure, technology adoption, and innovation, can boost economic growth. Similarly, investments in human capital, including education and skills development, can improve labor productivity and contribute to overall economic growth.

The Schumpeterian growth theory, named after economist Joseph Schumpeter, emphasizes the role of innovation and entrepreneurship in driving economic growth. This theory posits that innovation creates new products, processes, and technologies, generating economic growth. It highlights the importance of dynamic, innovative firms and the creative destruction of old technologies and industries as drivers of long-term economic development (Tang et al., 2022). New Keynesian economics focuses on aggregate demand and market imperfections in influencing economic growth. According to this theory, monetary and fiscal policies are crucial in stabilizing the economy and promoting long-run growth (Arestis & Sawyer, 2002). It emphasizes the importance of effective demand management, price and wage rigidities, and the role of government interventions in sustaining economic growth.

Institutional economics examine the role of institutions, including laws, regulations, property rights, and governance structures, in shaping economic outcomes (North, 2018). Institutions are seen as crucial determinants of economic growth, as they provide the necessary framework for markets to function effectively, promote investment, and foster economic development. Institutional theory emphasizes the importance of good governance, the rule of law, and property rights protection for sustained economic growth. Real business cycle theory focuses on fluctuations in productivity and technology shocks in driving business cycles and economic growth. This theory suggests that changes in productivity levels, driven by technological advancements and other factors, lead to fluctuations in economic activity (Dosi et al., 2019). This theory highlights the importance of understanding the sources and impact of productivity shocks on economic growth.

Kaldor argued that demand, particularly aggregate demand, is significant in driving economic growth (Palumbo, 2009). He emphasized the importance of expanding domestic demand, both private and public, as a means to stimulate investment, industrial production, and employment. In the context of industrial sector performance, robust domestic demand can create a favorable environment for industrial growth, as increased consumption and investment drive the expansion of industries and the creation of jobs (Chen et al., 2021). Kaldorian theories emphasize the manufacturing sector as a driver of economic growth. According to Kaldor, manufacturing industries have higher productivity levels, generate more employment opportunities, and offer more significant potential for technological progress compared to other sectors (Chang & Andreoni, 2020). Therefore, promoting industrial sector performance, particularly manufacturing, can contribute to economic growth and development. Kaldor recognized the importance of human capital in industrial development and economic growth. A skilled and educated workforce is essential for industrial sectors to thrive and innovate. Human capital development, through investments in education, training, and skill development, can enhance the productivity and efficiency of industrial sectors (Rana & Sharma, 2019). This contributes to industrial sector performance and overall economic growth. In the context of Nigeria, Kaldorian theories provide insights into the importance of promoting industrialization, expanding domestic demand, and investing in human capital development for sustained economic growth (Saba & Ngepah, 2022). These theories highlight the need for policies that foster industrial sector development, such as promoting manufacturing industries, creating linkages between sectors, and ensuring a supportive business environment. Additionally, they emphasize the role of robust domestic demand and investments in human capital as drivers of industrial performance and economic growth in Nigeria.

Empirical Review

The concept of human capital varies among different individuals and stakeholders. The Human Development Index (HDI) comprises health, education, and standard of living, which determines how countries perform regarding a healthy life, access to knowledge, and a decent standard of living (World Bank, 2021). Significant investments

in these three areas enable humans to achieve their full potential. Human resources are vital to all countries' economic growth and productivity. The success of the latest technology and equipment are all products of human imagination and innovation (Chattell, 2016). Human beings are the most promising and vital source of economic growth for any productive engagement (Clube & Tennant, 2020). Generally, human capital is the totality of human resources' human skills and abilities. It is the total economic view of human talent, knowledge, skills, intelligence, experience, and most importantly health.

According to Olayemi (2012) and Hadir and Lahrech (2015), efficiency in human capital development is pivotal if any economic growth occurs as an investment in education is termed an individual's potential economic value in terms of knowledge, skills, talents, abilities, etc. For education to be funded effectively in developing countries, UNESCO suggested 26% of these countries' annual budgets, which is yet to be realized in Nigeria (Adelakun, 2021). Over the years, Nigeria's planned budget and expenditures have always ranged from 5% to 7% (Dieleman et al., 2018), which explains the nation's troubling human capital development. Investment in health has been identified as one of the fundamental factors in any nation's economic growth and development. It is regarded as a critical factor of economic growth at the macro and micro levels and a component of people's well-being that increases or improves their strengths (McGregor & Pouw, 2017). Health is indeed one of the forms of human capital (Grossman, 2017). In addition, many works have argued that population quality is the critical factor of production and emphasize the merits of investing in education and health (Agbedahin, 2019).

Industrialization is one of the major players in economic growth and development (Rahman et al., 2021). Industrialization plays a significant role in the modern economy. Its benefits include increasing the country's productive capacity and export base, creating jobs, reducing poverty, and stemming rural-urban drift (Rodríguez–Pose & Griffiths, 2021). As the production capacity of a nation increases due to the mass production of goods and services with the use of advanced technologies and suitable raw materials, there is an increase in capital formation, which directly improves the economic growth of such a nation (Fernades et al., 2021). This directly attracts foreign investors, which directly reduces the unemployment rate in the country and improves the foreign earnings of such countries.

Industrial development brings about dynamic and competitive economic performance that generates income, creates employment, boosts resource efficiency, and facilitates international trade. Thus, it is an efficient tool for poverty alleviation and distributive prosperity (UNIDO 2020). Before 2015, the industrial sector growth in Nigeria's real GDP favorably competed with that of some peer countries such as Pakistan, Malaysia, and Indonesia, and it was significantly higher when compared with the growth rate in countries like Cameroon, the Republic of Benin, Chad, and Niger (World Bank, 2017). The growth in the Nigerian economy, at an average of 6% from 2013 to 2014, fell to 2.7% in 2015 and 1.6% in 2016, which enabled Nigeria to experience its first full year of economic recession in 25 years (World Bank, 2017). Despite the 2021 recovery during the second quarter, the country's growth in GDP has yet to match up with its peers. The government assistance to the industrial sector failed to significantly counteract the effects that led to insecurity, poor infrastructure, destruction of road networks, disrupted economic activities, and poor economic performance through economic growth.

Saka and Olanipekun (2021) examined the relationship between industrialization and economic growth in Nigeria using Simultaneous Equation Models. The study showed that the industrialization process is germane for economic growth; likewise, male literacy rates can

complement the industrial process to improve growth. Also, stable growth facilitates the process of industrialization, while human capital variables also play a relevant role in the same process. Fasoye et al. (2021) investigated the nexus between domestic industrial production (output) and economic growth in the Nigerian economy using the autoregressive distributed lag (ARDL) model procedure employed for data analysis. The findings reveal that domestic industrial output and savings can drive sustainable economic growth in Nigeria. In other words, a significant rise in domestic industrial production leads to substantial economic growth. This potential remains inefficiently tapped due to the poor performance of the industrial sector in Nigeria.

Yusuf et al. (2021) evaluate the connection between public health expenditure and economic growth in Nigeria within the context of Wagner's theory of ever-increasing State activities. They pointed out that there is no causal relationship between public health expenditure and GDP; however, public health expenditure and GDP still provide evidence of a long-run connection in Nigeria. Therefore, increasing public health expenditure is expected to improve human capital's health condition, improving GDP over the years. Akinsokeji and Akinlo (2019) also determine the connection between human capital and economic growth using an error correction model but present conflicting results with previous researchers' conventional findings. The result revealed that human capital does not significantly enhance economic growth in Nigeria. Afolayan (2017) investigated both the short- and long-run relationships between human capital investment and economic growth in Nigeria using the ARDL. Findings showed mixed relationships between human capital development and economic growth.

Udah and Bassey (2017) examined the importance of infrastructure and human capital in industrialization. The result also showed that investment in gross domestic, electricity, and trade openness is required to speed up the industrialization pace in Nigeria. Also, the literature has determined that the inter-relationship between human capital development and industrial sector performance has a large effect on the positivity of economic growth of any country (Tsiapa, 2022). For countries with low economic growth, greater consistency in these two areas can enhance and transform economic growth. The availability of physical capital, new technologies, and higher human capital intensity are essential factors that move countries into greater productivity growth strength and reduce their relative size of per capita real income gaps, which separate them from those leading economies.

According to McKee-Ryan (2021), sustaining a good percentage level of educational attainments and a corresponding investment rate in the remaining areas of human capital like occupational mobility, health, internal, and spatial always stand as a stable force to reckon with in terms of human capital development and economic growth increase. Empirically, previous studies primarily focused on the relationship between the industrial sector and economic growth (Olanipekun & Saka, 2021; Okuneye, 2019). Meanwhile, other studies examined the nexus between human capital development and economic growth (Baily et al., 2021; Dauda & Odior, 2016). Studies on the tripartite nexuses among industrialization, human capital development, and economic growth are scarce globally and specifically in Nigeria. This makes the present study the first strand of empirical focus on this subject matter in the Nigerian context.

The available studies on tripartite factors have been limited to foreign aid, human capital, and economic growth nexus (Fashina et al., 2018). Others examine government expenditure on human capital development and implications for economic growth in Nigeria (Oluwatobi & Ogunrinola, 2011); human capital, technology, and economic growth (Sulaiman et al., 2015); electricity consumption, human capital development, and economic growth (Mathew et

al., 2018); financial development, human capital development, and economic growth (Orji et al., 2019); human capital, structural change, and economic growth (Lawanson & Evans, 2019); and natural resources, human capital, and economic development (Akpan & Chukwu, 2014). Based on the above, it is apparent that the mediating role of human capital in the industrial sector-economic growth nexus remains an area yet to be investigated. Several studies have examined the link between human capital development and industrial sector performance, but their findings have remained inconclusive due to the variations in their result. For instance, while some observed that human capital development has a positive impact on industrial sector performance (see Saka & Olanipekun, 2021; Akinsokeji & Akinlo, 2019), some reported negative effects (Mottaleb & Sonobe, 2011). These factors necessitate the research hypotheses for this study.

METHODS

This study will focus on empirical analysis of industrialization, human capital development, and economic growth in Nigeria using secondary data. Data for the analysis spanned the period of 1981-2019. This period was chosen because of data availability for the relevant variables. The data will be obtained from various sources, including the National Bureau of Statistics (NBS), Central Bank of Nigeria (CBN), World Development Indicators (WDI, 2021), and Penn World Table (2021). Regarding the anticipated relationship between the dependent and independent variables, the industrial sector is expected to drive an increase in the economy's growth rate (Afolabi et al., 2019). Consequently, a positive (+) sign is anticipated. For convenient calculation and analysis, we define the variables for the model as follows: 1) GDP/capita: The real GDP is a macroeconomic measure of the value of economic output adjusted for price changes. 2) Industrial Output: Industrial sector performance proxy is determined by industrial output percent of GDP. Hence, in line with Kaldor's first theory (Palumbo, 2009), it is expected that industrial growth positively impacts economic growth in Nigeria. 3) Human capital: An investment in human capital is captured by human development index (HDI). Over the past three decades, the issue of human capital has been widely discussed in the literature, and it spurs technology and innovation to improve investment (Wadho & Chaudhry, 2018; Danquah & Amankwah-Amoah, 2017). Several theories have analyzed the importance of human capital in the growth nexus. Hence, in line with the growth theory preposition, it is expected that human capital will positively impact economic growth.

Autoregressive distributed lag (ARDL) is used for this study. The ARDL technique is a suitable choice for studies due to its ability to address endogeneity and causality issues, accommodate both stationary and non-stationary variables, perform well with small sample sizes, provide valid statistical inference, and offer a simple modeling framework. The ARDL allows researchers to analyze the dynamic relationships between variables without pre-testing for stationarity and has been widely used in various fields, making it a robust and flexible approach for examining long-run and short-run relationships in time series analysis (Pesaran et al., 2001). The ARDL test was developed by Pesaran, Shin, and Smith (2001) to investigate the causal relationship among variables whenever they are integrated into different orders. It is mostly applied when conventional co-integration techniques like the Johansen co-integration test cannot be applied to ascertain the relationship among variables. The ARDL technique involves two major steps including running a diagnostic check to determine whether a long-run relationship exists among variables. The second step includes estimating the short-run relationship and the long-run relationship if the long-run exists among the variables which indicates co-integration presence. Determining the absence or presence of a long-run relationship from our concerned variables, the ARDL model below is evaluated:

$$\Delta GDP_t = \beta_0 GDP + \sum_{p=1}^{a} \delta_p GDP\Delta GDP_{t-p} + \sum_{q=1}^{b} \delta_q GDP\Delta HC_{t-q} + \sum_{r=1}^{c} \delta_r GDP\Delta IO_{t-r} + \rho_1 GDPGDP_{t-1} + \rho_2 GDPHC_{t-1} + \rho_3 GDPIO_{t-1} + \varepsilon_t$$

(1)

Where Δ represents the change in the model, $\beta_0 GDP$ denotes the drift component, δ denotes the coefficient of short-run, ρ is the component of the long run in the ARDL model, and ε_t is the error term. Equation (1) above has a null hypothesis of no co-integration, which is always tested using the F-statistic value. Also, we determine the short-run and long-run causality from the error correction model below:

$$\Delta GDP_t = \gamma_0 + \sum_{j=1}^{p} \gamma_1 GDP_j \Delta GDP_{t-j} + \sum_{j=0}^{q} \gamma_2 GDP_j \Delta HC_{t-j} + \sum_{j=0}^{r} \gamma_3 GDP_j \Delta IO_{t-j} + \mu GDPECM_{t-1} + \varepsilon_t$$

(2)

Where the adjustment speed is μGDP and the error correction model is ECM_{t-1}.

RESULTS AND DISCUSSION

Result

Table 1: Unit Root Test

Variables	T- Statistic	P- Value	Differencing Order
GDP/Capita	-4.0012	0.0171	I(0)
Industrial Output	-3.9204	0.0210	I(0)
Human Capital	-6.0343	0.0001	I(2)

It is necessary to determine the variable's order of integration before proceeding to the suitable tests that suit the model. When variables are stationary of different orders, a suitable and common test for such variables is the ARDL, since it is not compulsory that variables must be stationary of the same order. Table 1 shows that GDP/capita and industrial output are stationary at order (0), while human capital is stationary at I (2).

Having determined that an ARDL model is suitable for these variables, it is necessary to determine the suitable lag length for this model before determining whether there exists a co-integrating relationship or not. Table 2 below indicates that Lag 1 is the optimal lag length for this study.

Table 2: Optimal Lag Selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-97.62044	NA	15.68233	5.590024	5.721984	5.636082
1	-95.05391	4.562713*	14.38289	5.502995	5.678942*	5.564405*
2	-93.98143	1.847052	14.33778*	5.498968*	5.718901	5.575731
3	-93.84691	0.224193	15.06407	5.547051	5.810971	5.639166

Table 3: Short-run Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
GDP_C(-1)	0.369415	0.181210	2.038601	0.0514
HC	-287.8671	198.0521	-1.453492	0.1576
HC(-1)	693.7219	421.8425	1.644504	0.1117
HC(-2)	-829.0504	428.2187	-1.936044	0.0634
HC(-3)	768.9820	388.6284	1.978708	0.0581
HC(-4)	-351.7268	181.8859	-1.933777	0.0637
IND	-0.157900	0.218626	-0.722237	0.4764
C	13.87267	12.47311	1.112207	0.2759

It is evident that a long-run relationship model cannot be ascertained using a bound test co-integration technique, since one of the variables is integrated in order (2), which shows that only a short-run relationship can be validated from the model. Table 3 displays the short-run model and clearly shows that, although human capital development (HC) has always had effects on economic growth (GD/C) in past years, the contributory effects have not been significant for these past years. Table 3 also reveals that industrial output (the study's second independent variable) does not significantly impact economic growth. This is proof of the poor growth of the industry that has promoted the importation of almost everything that is being used in the country.

Table 5 shows the two tests used to test the validity of this research model. The Breusch-Godfrey LM test is always used to determine whether there exist serial correlations in a model. Since the P-value for this test is above 0.05, we fail to reject our null hypothesis and conclude that there is no serial correlation in the model. The Jarque-Bera test is used to determine whether the model is normal or not. A p-value of 0.5641 reveals that the null hypothesis will also not be rejected, and we conclude that the model is normal.

Discussion

Based on the set hypothesis for this research work, we determine from the findings that there exist no long-run relationships between the two independent variables (industrial sector performance and human capital development) and the dependent variable (economic growth). The relationships existing in a short-run relationship were equally insignificant. This shows that the government must work to improve on different factors that form human capital development in the country such as expenditure on health and education for them to have significant short-run and long-run impacts on the country's economic growth. Although some authors (Abubakar et.al, 2020; Akaakohol and Ijirshar, 2018) equally agree that human capital development has an insignificant effect on Nigeria's economic growth in the short run, there exists a long-run relationship between the two variables.

Table 4: Error Correction Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.156854	1.480879	0.781194	0.4404
D(GDP_C(-1))	-0.313470	0.157990	-1.984111	0.0559
D(HC(-1))	-28.20134	65.98419	-0.427395	0.6720
D(IND(-1))	0.159418	0.212684	0.749554	0.4590
ECM(-1)	-0.424493	0.162080	-2.619033	0.0134

Table 4 shows the error correction model, which is being used to determine the adjustment speed and the dynamics of the short-run model. The probabilities of the coefficients of the used explanatory variables in this error correction model also signify insignificant effects of both human capital and industrial output on the country's economic growth, which further affirm the results shown in Table 3. The result for the error correction model satisfies the negative coefficient condition of -0.424493, and it must be statistically significant with a p-value of 0.0134. This simply implies, in case there is any deviation, that the equilibrium is adjusted slowly at 42.4 percent.

Table 5: Model Diagnosis

Test	t- Statistic	Probability Value
Breusch- Godfrey LM test	0.038748	0.8452
Jarque-Bera	1.1451	0.5641

The direct effects of human capital development result in the expansion of citizens' knowledge and skills, which are instrumental to economic growth. It is also evident from this study that the contributory effect of this variable (HC) from past years to today remains insignificant, with p-values above 0.05. This could be a result of the annual population increase within the country records every year, thereby preventing the minute expenditures of the Nigerian government on human capital development from being felt on the population itself and the country's economic growth. Regarding the insignificant contribution of industrial sector performance on economic growth in the short run, Saka and Olanipekun (2018) reveal that only stable growth is capable of enhancing the performance of any country's industrial sector.

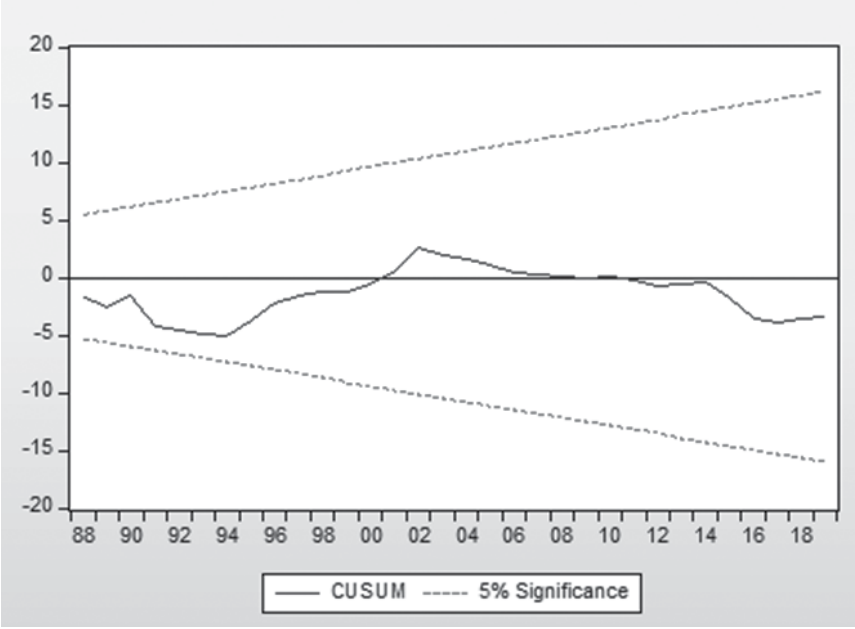

Figure 1: Stability Curve

MANAGERIAL IMPLICATIONS

Policy Implication

The study highlights the need for policymakers and the Nigerian government to prioritize human capital development. This can be achieved through qualitative restructuring of the health and educational sectors, promoting training and retraining programs, and ensuring the overall well-being of the workforce (Fraboni et al., 2023). By strengthening human capital development and improving the quality of the workforce, Nigeria can positively impact economic growth in the long run (Luqman and Soytas, 2023). Also, the extant research indicates that industrial output has not been contributing significantly to economic growth. Therefore, there is a need for a comprehensive revamp of the entire industrial sector. Policymakers should focus on reducing imports of common products by promoting domestic production. This can be achieved through the implementation of policies that support local industries, encourage innovation, and provide incentives for investment in the industrial sector. The study further suggests that policies aimed at promoting employee productivity should be adopted. This can include measures such as providing incentives for high performance, creating a conducive work environment, and improving the overall welfare of employees. By enhancing productivity, Nigeria can stimulate economic growth and competitiveness.

Theoretical And Practical Implications

The research highlights the absence of a long-run equation that empirically demonstrates the need for human capital and industrial development to positively impact economic growth in the long run.

This contributes to the existing economic theory by emphasizing the importance of sustained investments in human capital and industries for sustainable economic growth. The study reveals that, while human capital had a significant impact on economic growth in the past, its impact has currently become insignificant. This finding contributes to the understanding of the relationship between human capital and economic growth, indicating the need for further research and policy focus on improving the current state of human capital in Nigeria. The research findings suggest that industrial output has not been contributing significantly to economic growth. This study contributes to the existing literature by highlighting the need for industrial sector revitalization and reducing dependence on imported goods and emphasizes the importance of promoting domestic production to enhance economic growth and reduce trade imbalances.

Limitation of the Study

The current study has limitations in that it only focused on human capital development and industrial output as explanatory variables for economic growth. Other relevant factors such as infrastructure development, technological innovation, and institutional factors were not considered. This limitation restricts the comprehensive understanding of the factors influencing economic growth in Nigeria. In terms of causality and direction of relationships, the study utilized econometric techniques to explore the relationships between variables, but it may be challenging to establish a clear causal relationship and determine the direction of causality. There is a possibility of reverse causality, in which economic growth could also impact human capital development and industrial output.

Suggestion for Further Research

This study recommends expanding future research by considering additional variables related to human resources and their impacts on economic growth, conducting sector-specific analyses to understand the contributions of different sectors, and conducting a longer-term time-series analysis to identify trends and assess the persistence of relationships. Furthermore, future research should address reverse causality and evaluate the effectiveness of specific policies aimed at promoting human capital development and industrial growth in Nigeria to determine the most effective strategies for driving economic growth.

CONCLUSION

This research investigated the impact of human capital development and industrial output on Nigeria's economic growth to determine the economic wellness of these two variables on the country's economic growth both in the short and the long run. The ADF test and ARDL model were used to determine the stationarity and relationships among variables. The study reveals the absence of a long-run equation that empirically and strategically shows the need for the country's human capital and industry to impact economic growth gainfully or positively in the long run. Although human capital significantly impacted the country's economic growth previously in the short run, it has an insignificant impact on our concerned dependent variable (economic growth) currently. It is also evident from the study that industrial output has not contributed to economic growth. For Nigeria to witness continuous and efficient economic growth, every stakeholder must centrally combine efforts toward improving the country's industry that will gear all-around production and equally commit tangible resources toward human capital development. It becomes imperative for policymakers and the Nigerian government to improve their workforce quality through qualitative restructuring of the health and educational sectors by promoting training, retraining the country's entire workforce, and equally promoting the good health of all employees to swiftly reverse the non-significant of human capital on economic growth. Also, a total revamp of the entire industrial sector will rapidly reduce the importation of common products into the country, thereby significantly contributing to the country's economic growth. Also, leaders could adopt motivating policies that

will promote employee productivity. Employing more human resource variables to empirically determine their impacts on economic growth will be our suggestion for future studies, as this study only focuses on the human capital index and industrial output as explanatory variables.

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