The Role of Human Capital Development and Financial Deepening in Nigeria's Industrial Output

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Abstract: Nigeria's industrial sector and financial deepening are critical components that have underperformed in driving the country's required industrialization process. This study examines the role of Human Capital Development and Financial Deepening on Nigeria's Industrial Output. The study investigates whether the advancements in human education and skills have synergized with the advances in the financial sector's depth and access to transform industrial productivity in the country. The analysis draws on annual time series data spanning 33 observations from 1989 to 2022. The data for the study is sourced from the World Bank Development Indicators (2022) and the Central Bank of Nigeria's annual statistical reports. The variables adopted in the study include human capital development, financial deepening, industrial output, trade openness, gross fixed capital formation and interest rate. The Autoregressive Distributed Lag (ARDL) approach was utilized to analyze the variables. The findings reveal that human capital development and financial deepening have negative and significant impacts on industrial output both in the short run and long run. However, the interactive effect of human capital development and financial deepening on industrial output showed a positive and significant impact in the short run and long run. The study recommends that the government should put measures in place to enhance the availability and accessibility of credit facilities for industrial enterprises and improve workers' education and skills in healthcare. Also, more concrete measures are required to promote investment and enhance entrepreneurship, innovation and creativity as the critical measures to boost industrial productivity in Nigeria.

Keywords: Human Capital Development, Financial Deepening, Industrials Output, Interest Rate, Trade Openness.

JEL Classification: O15; E51; L60; C50.

I. INTRODUCTION

Nigeria is a richly blessed nation with an abundance of natural and human resources. Over the years, the country has been faced with problems with the adequate exploitation of human and natural resources for developmental purposes. The presence of an abundant natural endowment makes it necessary for the country to invest in human capital development (HCD) in an effort to efficiently exploit and harness the available natural resources for the nation's development. In recent times, considerable investment has been made to improve the quality of human capital development in the country (Keji, 2021; Awogbeni, 2023). HCD entails the conscious improvement of the mental and intellectual capacity of the human labour workforce and encapsulates human-related features like skills, emotional intelligence, knowledge, experience, management and human relations.

Development theories and empirical studies have established a strong link between human capital development and industrial development (Saka & Olanipekun, 2021; Ihensekhien & Soriwei, 2023; Enilolobo, & Sodeinde, 2019). HCD has contributed immensely to the famous historical industrial revolution in advanced countries (Nguyen Ngoc et al., 2022). Also, some authors argued that the knowledge acquired through experience, skills acquisition or education by a regular work staff improves productivity, which in

sequence would foster industrial productivity and output (Aliu & Alenoghena, 2023; Mohammed et al., 2022). Human capital development and productivity theories have corroborated mainly the role of science and entrepreneurship in the process of skills acquisition and distribution. A more precise understanding of the link between human capital development and industrial development is paramount for the economic development process. More importantly, human capital development provides the channel through which the expansion of people's capabilities might provide opportunities for economic empowerment, leading to an increase in social welfare (Mohammed et al., 2022).

The paradox of low levels of human capital development becomes rampant and injurious to the nation's productivity fabric at some point. Low-quality decisions in the management of corporate organizations often need better-quality human capital development. When the level of human capital development is low in a nation, there is evidence of a high level of illiteracy, poor state of healthcare delivery, poor access to credit facilities, low innovations and little or complete absence of research. Also, poor quality human capital development in a nation fosters social inequality and exacerbates undesirable social changes like industrial disputes, cultism, brain drain, rent-seeking, sorting, sexual harassment, and other social vices in the nation's economic, social and religious lives (Uduh & Beredict, 2017).

Aside from human capital development, financial deepening is also necessary to enhance the country's industrialization process. Depending on the quality of available human resources in a country, the impact of financial deepening on the economy may vary for different countries. Countries with high-quality human capital stock will benefit more from the financial sector. With the abundance of scientists, lawyers, engineers, researchers, accountants, doctors, and financial analysts in various works of life in these countries, there is a propensity to make efficient and effective decisions among alternative financial possibilities.

Financial deepening denotes the development and enhancement of a country's financial sector, which entails the availability, stability, efficiency, and accessibility of financial institutions' products and services. Financial deepening indicates a developing financial sector that provides more comprehensive access to credit facilities, investment opportunities, improvement in savings, risk management tools and lower cost of financial information for individuals, businesses, and governments (Saka & Olanipekun, 2021). Therefore, financial deepening is the process of developing and enhancing the financial systems by improving the available financial products, efficiency, liquidity, depth, and the volumes of available financial markets and institutions. Also, financial deepening entails extending access to banking and other financial services as well as the diversification of domestic sources of finance (Megnigang, 2024).

Nigeria faces several challenges with the deepening of the level of poor financials in various areas. For instance, the level of literacy is generally low in several regions of the country (Olabanji, 2023). Also, the financial depth in the country could be better as interest rates for loans are high and available credit facilities in banking institutions are generally short in supply and more short-term. In addition, the extension of credit facilities to industrial ventures could have been better as the gestation period for the return on investment is regarded as long-term and risky (Oranefo, 2022). The low level of infrastructural facilities and poor business environment in the country creates an impression that businesses in the sector hardly succeed and, hence, make it difficult for them to access credit facilities.

Nigeria's investment in human capital development over the years is far from being impressive. For instance, in 2022, the education sector got a meagre budgetary allocation of N1.29 trillion, which is 7.9% of the total budget of N16.39 trillion, which has, therefore, been a recurrent problem over the years. In the same vein, in the 2021 budget, the education sector also got N671.07 billion (6.7%) of the total budget of N10.33 trillion. In addition, it got N771.5 billion (5.7%) out of N13.58 trillion of the total budget in 2020. Nigeria's average spending on education (6.7%) during the period compares very unfavourably with South Africa having 19.3%. Hence, Nigeria has faced several human capital development challenges that hinder the development of the industrial sector. Aside from the poor funding for the education sector, the country has faced low levels of vocational training, brain drain and ding of education, and there needs to be a better match between the education curricula and industrial needs (Rosina et al., 2021).

While there are existing empirical studies on the relationship between human capital development and industrial output (Saka & Olanipekun, 2021; Taiwo et al., 2021; Ihensekhien & Soriwei, 2023; Ewane & Ewane, 2024), there are also empirical studies on the relationship between financial deepening and industrial output (Egbetunde et al., 2019; Saka & Olanipekun, 2021; Oranefo, 2022). However, the literature linking human capital development and financial deepening with industrial output needs to be more detailed. The study, therefore, seeks to investigate the effect of human capital development and financial deepening on industrial sector growth in Nigeria from 1986 to 2022. This paper differs explicitly from previous studies on this subject in Nigeria as it seeks to establish the role of financial deepening in the link between HCD and industrial sector growth in Nigeria. This research study is organized as follows: Apart from section one, which is the introduction, section two considers empirical literature. Section three stipulates the methodology; section four is the analysis and discussion of results, while section five is the conclusion and recommendation.

II. REVIEW OF EMPIRICAL LITERATURE

The review of empirical literature has been conducted in line with the interrelationships among the variables of study. First, the relationship between human capital development and industrial output. Second, the relationship between financial deepening and industrial production; and third, the relationship between human capital development and

financial deepening. The final strand of the literature review is the effect of financial deepening and human capital development on industrial output.

The first strand of empirical literature concerns the effect of human capital development on industrial output. The submission of authors in this section can be categorized into two. The first set of authors believes that human capital development has a positive relationship with industrial growth (Saka & Olanipekun, 2021; Taiwo et al., 2021; Ihensekhien & Soriwei, 2023; Wirajing et al., 2023; Ewane & Ewane, 2024). The authors argue that the growth in skills acknowledged as occasioned by human capital development will stimulate more visible and positive contributions by the workforce to the industrial sector. The authors in this section argue in favour of the application of the human capital development theory. On the other hand, some authors have argued that HCD has not positively contributed to the development of the industrial sector. The authors posit that a negative relationship exists between HCD and industrial growth (Okumoko, 2017; Okoh et al., 2022; Dauda, 2021).

The second set of strands of empirical literature reviewed focuses on the relationship between financial deepening and industrial output. The first set of empirical studies in this section argues that a positive relationship exists between financial deepening and industrial output (Egbetunde et al., 2019; Oranefo, 2022; Zhang et al., 2022; Alenoghena et al., 2023). The proponents of this position argue that financial access provides more financial support for industrial firms and enhances their productivity. Conversely, another set of authors found that the relationship between financial deepening and industrial output is negative (Ahad et al., 2019; Mesagan et al., 2018; Nwosu et al., 2021; Seyfullayev, 2023; Yan & Chen, 2023). The authors in this category opine that there may be poor financial access by the industrial sector entrepreneurs on the grounds of weak financial depth and limited product offerings by the financial sector. Also, investment in the industrial sector usually has a long gestation period and is riskier than the other sectors of the economy, making the financial sector reluctant to offer credit facilities to the sector.

The third strand of empirical findings reviewed concerns the relationship between human capital development and financial deepening. The only set of empirical findings in this segment submits in favour of a positive relationship between financial deepening and human capital development (Kilic & Ozcan, 2018; Arif & khan, 2019; Hong et al., 2021; Sarwar et al., 2021; Akpa et al., 2024). The proponents of a positive relationship between the variables contend that improved levels of education, health, and enhancement of the workers' skills will position them to harness the gains of financial deepening favourably through improved access to credit and financial decisions.

The final segment of the literature review concerns the analysis of the synergistic relationship between financial deepening, human capital development and industrial development. This area is novel as there is scanty evidence of empirical analysis on the effect of human capital

development and financial deepening on industrial output. The lacuna in this section of the empirical literature is the focus of this research study. However, it is worthy of mention that human capital development and financial deepening are interdependent and can jointly influence industrial output in several ways (Chugunot et al., 2022). For instance, a skilled workforce is a pre-requisite for industries to operate efficiently and apply innovative technologies. Also, the access to affordable financing options will position industries to invest in capital equipment, telecommunication, infrastructure and workforce development. Together, the synergy of human capital development and financial deepening complement each other to create a competitive industrial environment that improves productivity and economic growth.

III. THEORETICAL FRAMEWORK AND METHODOLOGY

➤ Theoretical Framework

This study adopts two theories to articulate the relationship between human capital development, financial deepening and industrial output.

• The Human Capital Theory

Theodore Schultz and Gary Becker mainly developed the human capital theory in the 1950s and early 1960s. The theory places significant emphasis on investing in people in terms of education and health, which no doubt leads to gains in individual productivity and, subsequently, economic development. Adamu et al. (2022) suggest that education boosts workers' abilities, making them more productive and inventive. In the context of Nigeria, where educational attainment and health outcomes are crucial for economic success, human capital theory underlines the relevance of human capital development in enhancing industrial production. One of the most astonishing concepts of an economist is to conceive of the set of marketable talents of workers in which people make a variety of investments. This concept assists in the comprehension of investment viewpoints, incentives, and the structure of salaries and earnings. Human capital relates to any bank of information or traits the worker possesses, which includes inherent or learnt traits that boost their productivity (Aliu et al., 2024)

There are several perspectives on how human capital directly enhances productivity within the production process. First, it increases a worker's efficiency across all job types, although its impact may vary depending on specific tasks, organizations, and circumstances. Also, human capital is multidimensional and encompasses various kinds of talents. A simplified version of this perspective highlights the distinction between cognitive and physical abilities as separate competencies. In addition, human capital can function within organizations and follow directives, reflecting an adaptation to life in a hierarchical, capitalist society. Finally, human capital, such as educational qualifications, serve more as signals of ability rather than directly contributing to productivity. These signals are used to indicate potential rather than actual skills in the production process.

- *Financial Intermediation Theory*

Allen and Santomero developed the theory of financial intermediation in 1996 (Allen & Santomero, 1997). The theory of financial intermediation is founded on the premise that financial institutions offer services that lessen transaction costs and reduce informational asymmetries. Financial intermediaries, like commercial banks, specialized banks (Microfinance), insurance companies, and investment institutions (merchant banks and discount houses). The banks channel funds from the surplus members of the public (like households and firms) to those that need the funds for investment (like firms and government). Therefore, financial intermediaries act as middlemen to improve the market efficiency, pool the risks, assist investors with market information and lower the cost of doing business. Accordingly, Merton (1989) observed that a crucial characteristic of the intermediary is franchising, which involves the unbundling and bundling of risks (Allen & Santomero, 1997).

Thus, by trading in financial assets, financial intermediaries are, by their core function, involved in the financial risk business. Specifically, since financial intermediaries often initiate, trade, or service financial assets hence, they manage and trade financial risk. However, some authors have argued that the financial intermediation theory does not assist with an adequate understanding of the main reason for the existence of financial intermediary institutions (Konstantakopoulou, 2023). Also, some recent theories of financial intermediation have tried to reconcile the recent developments in the market by emphasizing their role in risk trading and participation costs. They opine that the

advancements in information technology, the deepening of the financial markets, and market deregulation have reduced the intermediation function of the financial intermediaries.

The effort to improve financial deepening can affect industrial output in several ways. First, financial deepening can improve access to capital for industrial investment. The improvement in credit products of various characteristics and textures will be beneficial to investors in the industrial sector. Also, a more profound growing financial sector indicates efficiency and stability, which serve to attract the inflow of FDI into the industrial sector of the economy. The inflow of FDI is usually not only capital but also forms of expertise and technology. Additionally, financial deepening also serves to enhance the provision of long-term financing, which is required for the development of industrial infrastructure like industrial parks, power plants and transport infrastructure, which are critical for boosting industrial productivity.

> *Model Specification*

The baseline model for this study is adapted from Chugunov et al. (2021). The human capital theory proposes an improvement of the contribution of the human factor to the production process in several sectors of the economy to cover financial deepening and the industrial sector. While the contribution can be felt directly in the industrial sector, the human factor also indirectly improves the role of financial deepening in enhancing industrial output. Therefore, the relationship between human capital development, financial deepening and industrial production can be illustrated in the model as shown in equation (1). The model expresses industrial output (IPI) as a function of human capital development(HCD) and financial deepening(FD).

$$IPI = f(HCD, FD, INTR, GFCF, TOP) \tag{1}$$

The functional form of the model can further be expressed in equation (2)

$$IPI_t = \beta_0 + \beta_1 HCD_{1t} + \beta_2 FD_{2t} + \beta_3 INTR_{3t} + \beta_4 GFCF_{4t} + \beta_5 TOP_{5t} + \varepsilon_t \tag{2}$$

Model two is designed to examine the effects of Human capital development and financial deepening on industrial output.

$$IPI_t = \beta_0 + \beta_1 HCD_{1t} + \beta_2 FD_{2t} + \beta_3 HCD * FD_{3t} + \beta_4 INTR_{4t} + \beta_5 GFCF_{5t} + \beta_6 TOP_{6t} + \varepsilon_t \tag{3}$$

Model three is designed to investigate the combine/interacted effect of human capital development and financial deepening on industrial output.

Where $\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5 \& \beta_6$ are the coefficients to be estimated in equations (2) and (3) and ε_t is the stochastic error term. In addition, the apriori expected signs of the coefficients are $\beta_1 > 0, \beta_2 > 0, \beta_3 < 0, \beta_4 > 0 \& \beta_5 > 0$ for Equation (2). For equation (3), the apriori expected signs are $\beta_1 > 0, \beta_2 > 0, \beta_3 > 0, \beta_4 < 0, \beta_5 > 0 \& \beta_6 > 0$. For both equations, the parameter $\beta_{rs} > 0$ implies a positive relationship between the dependent and independent variables. Also, $\beta_{r3} < 0$ means a negative relationship between the dependent and independent variables.

> *Methodology*

- *Analytical Framework*

This study deploys the Autoregressive Distributed Lag (ARDL) analytical technique to estimate the regression analysis of the variables. Pesaran et al. (2001) demonstrated that the least squares estimators of the short-run parameters using this technique are consistent. Also, the ARDL-created estimators of the long-run coefficients for the method are super-consistent in cases of small sample sizes. Hence, once the standard errors are adjusted, the normal asymptotic theory assists in making valid implications on the long-run parameters. The main area of strength is that the ARDL approach produces consistent and asymptotic average results for the long-run coefficients, whether the variables are I(0) or I(1). Therefore, the method permits the specification of the combination of non-stationary and stationary variables. In

addition, the ARDL model produces robust estimates for both the short-run and long-run relationships simultaneously without compromising the efficiency of the estimates.

Since some of the variables included in this study are found to be non-stationary from the unit root test conducted, this may ordinarily have resulted in a spurious regression output. However, deploying the ARDL bound cointegration testing procedure will correct for the spurious regression output and generate consistent and reliable estimates.

In estimating the ARDL model, the variables would be specified in order to express the long-run and the short-run relationship as shown in equation (4) as follows:

$$\Delta \text{IPI}_t = \beta_0 + \beta_1 HCD_{t-1} + \beta_2 FD_{t-1} + \beta_3 INTR_{t-1} + \beta_4 GFCF_{t-1} + \beta_5 TOP_{t-1} + \sum_{i=1}^{p} \alpha_1 \Delta IPI_{t-1} + \sum_{i=1}^{p} \alpha_2 \Delta HCD_{t-1} + \sum_{i=0}^{p} \alpha_3 \Delta FD + \sum_{i=0}^{p} \alpha_4 \Delta INTR + \sum_{i=0}^{p} \alpha_5 \Delta GFCF_{t-1} + \sum_{i=0}^{p} \alpha_6 \Delta TOP + \varepsilon_t \tag{4}$$

Where Δ is the difference operator and β_0 represent the drift component. The coefficients $(\beta_1 - \beta_5)$ expresses the long-run relationship. At the same time, the part with the summation sign $\alpha_1 - \alpha 6)$ shows the short-run dynamics of the model, and $\mathcal{E}_t$ is the serially uncorrelated disturbance term with zero mean and constant variance.

➢ *Estimation Procedure*
The estimation procedure for this study involves five steps. The first step entails the unit root test, involving the estimation of the order of integration utilizing the ADF - Fisher Chi-square statistic. The second step is the cointegration test adopting the ARDL cointegration bound test approach. The third step involves an estimation of the regression analysis using the ARDL model and segmented into the long run and short-run parts covering the sample period of 1989 to 2022. The final step entails the model diagnostics tests to check for autocorrelation, heteroscedasticity, normality and stability.

➢ *Sources of Data*
All the data for this study is secured from the World Development Index (WDI) 2022.

Table 1 Description and Measurement of Variables

Variable	Description and Measurement	Source
IPI	Industrial productivity index. Refers to value added is the net output of Industrial sectors after adding up all outputs and subtracting intermediate inputs.	WDI
HCD	The Human Capital Index estimates the contributions of education and health to the productivity of the worker. The index score ranges from zero to one giving an indication of the productivity contribution of an ideal worker in full health and complete education.	WDI
FD	Financial Development. Uses domestic credit to private sector as proxy. Refers to funds provided to the private sector by financial institutions, such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable (Estimated as share of GDP).	WDI
INTR	Lending rate is the bank rate that usually meets the short- and medium-term financing needs of government and the private sector (Lending rate/Monetary Policy Rate).	WDI
GFCF	Gross fixed capital formation refers to land improvements (fences, ditches, drains, and so on); equipment purchases, plant, machinery; and the construction of railways, roads, and the like, including schools, offices, hospitals and the like. (Estimated as share of GDP)	WDI
TOP	Trade Openness, measured as imports plus exports divided by GDP	WDI

IV. EMPIRICAL RESULTS AND DISCUSSION

➢ *Trend Analysis*
The first diagram of Figure 1 shows the trend of industrial output and human capital development over the period 1989 to 2022. The trend of data on industrial output (although swinging) generally declined between 1989 and 2016. During this period, human capital development maintained a steady rise. The last segment of the first figure indicates a sharp rise in industrial output between 2016 and 2021. During the same period, human capital development remained the same. During the period of analysis, industrial production and human capital development moved in opposite directions.

The opposite movements in industrial performance and financial deepening are more apparent in the second diagram of Figure 1. Between 1989 and 2009, although the trends in the variables were swinging, the general direction showed that while industrial production was dropping, financial deepening was rising. From 2009, the opposite movement in the variables continued till the end of the data in 2022.
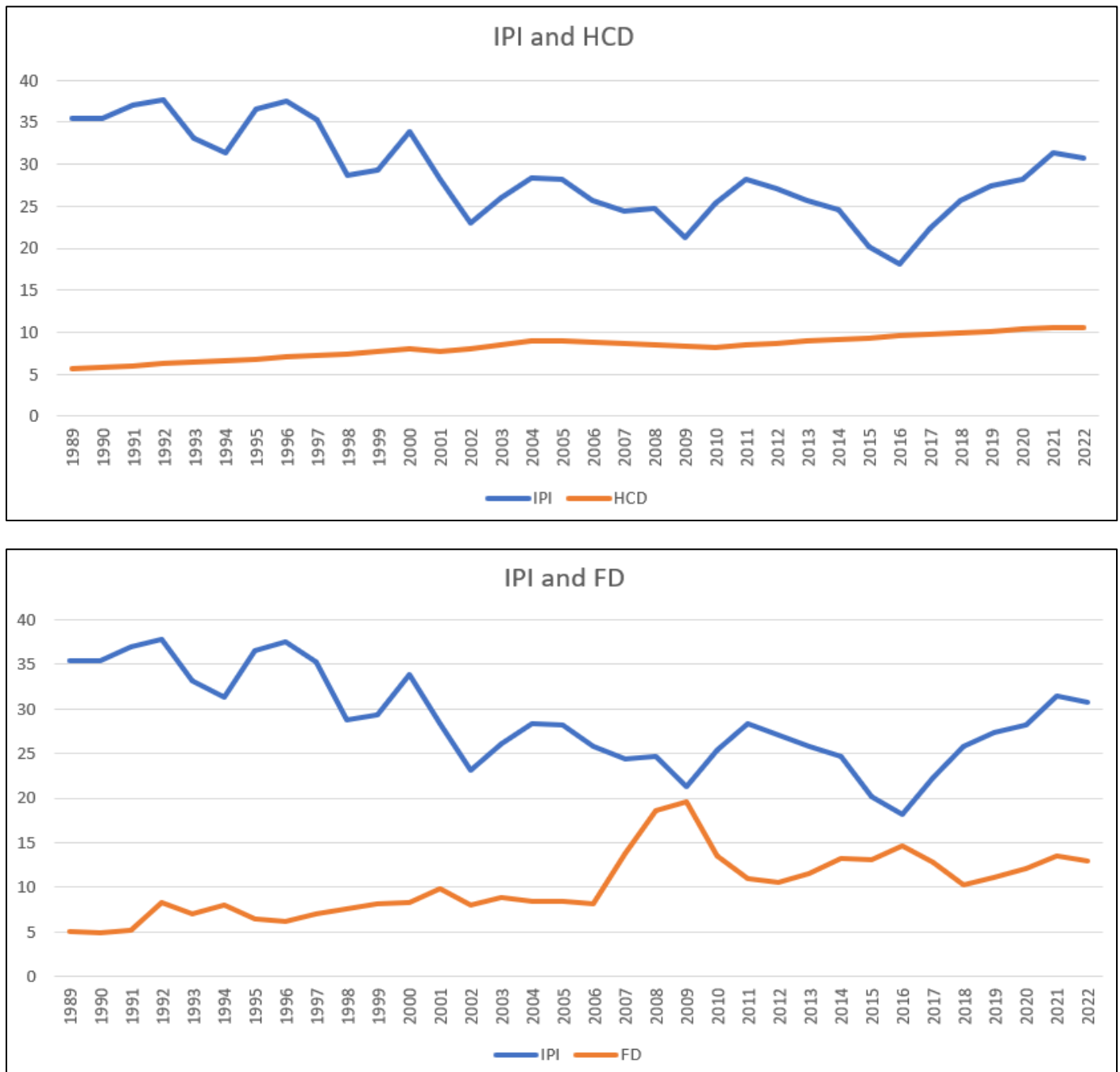
Fig 1 The Trend effects of Human Capital Development and Financial Deepening with Industrial Output
Authors' Compilation from WDI Statistics 2022

> *Descriptive Statistics*

Table 1 shows the descriptive statistics results of the Human capital development, financial deepening and Industrial output. The values of the mean and median shed light on the data's core trend. In this case, the skewness value of 0.121 is consistent with a slight right skew, as indicated by the mean IPI of 28.71, which is slightly higher than the median of 28.25.

Table 2 Descriptive Statistics

	IPI	**INTR**	**HCD**	**GFCF**	**FD**	**TOP**
Mean	28.714	18.793	8.253	28.960	10.198	36.100
Median	28.248	17.872	8.471	26.744	9.395	36.059
Maximum	37.710	31.650	10.514	53.122	19.626	53.278
Minimum	18.173	11.483	5.691	14.169	4.958	16.352
Std. Dev.	5.220	3.947	1.377	11.973	3.574	9.252
Skewness	0.121	0.997	-0.203	0.424	0.731	-0.140
Kurtosis	2.213	4.891	2.164	2.049	3.230	2.531

Jarque-Bera	0.960	10.695	1.222	2.231	3.102	0.410
Probability	0.619	0.005	0.543	0.328	0.212	0.815
Sum	976.275	638.978	280.612	955.665	346.718	1191.308
Sum Sq. Dev.	899.150	514.038	62.569	4586.998	421.620	2739.433
Observations	34	34	34	33	34	33

Source: Author`s Computation (2024)

Comparably, the mean of INTR is 18.79, which is higher than the median of 17.87, suggesting that outliers with higher interest rates may impact the average. The median of 8.47 in HCD, on the other hand, is higher than the mean of 8.25, indicating a left skew (lower values). The range between the maximum and least values gives the variability's context. The Industrial Production Index (IPI) exhibits significant swings in industrial output, ranging from a minimum of 18.17 to a maximum of 37.71. A rather large fluctuation in interest rates over the given time is implied by the INTR, which spans 11.48 to 31.65. The dataset's normality hypothesis is evaluated using the Jarque-Bera statistic. The probability of the larger number of variables denotes that the data set is normal, with a probability greater than 0.05. Only one variable has a Jarque-Bera probability value of less than 0.05 (INTR). Therefore, we cannot reject the null hypothesis of normality (probabilities above 0.05) for the data set of this study.

➢ *Correlation Matrix of Regressors*

Table 2 shows the correlation Matrix results of the interaction between the dependent variable and independent variables. There is an inverse negative relationship (-0.699) between IPI and HCD. This shows an inverse relationship between lower industrial output and higher levels of human capital development. This unexpected outcome might point to structural problems in the economy or a mismatch between the demands of industry and human resources. It is implied that there is no positive association between financial deepening and industrial growth based on the significant negative correlation (-0.741) found between IPI and FD. This could suggest that the finance sector should allocate more money to profitable manufacturing sectors.

Table 3 Correlation Matrix

	IPI	INTR	HCD	GFCF	FD	TOP
IPI	1					
INTR	0.3943	1				
HCD	-0.6988	-0.7217	1			
GFCF	0.5314	0.5716	-0.7937	1		
FD	-0.7412	-0.5346	0.6362	-0.7436	1	
TOP	0.2405	0.2256	-0.3233	0.0546	-0.2117	1

Source: Author`s Computation (2024)

➢ *Analysis of Unit Root Test*

The unit root test was performed to ascertain the stationarity of the time series data in the study to avoid running a spurious regression, and the result is presented in Table 3. The Augmented Dickey-Fuller (ADF) approach was adopted in the analysis. The assessment of the unit root results is performed based on the critical values and the associated probabilities. The ADF unit root test results show that FD and INTR are stationary at level [I(0)]. On the other hand, the remaining variables IPI, HCD, GFCF, GOVEXP and TOP all have a unit root at level but become stationary at first difference [I(1)]. Therefore, the variables in the study have varying levels of stationarity. The results indicate that some variables are stationary at the level of analysis, while others are stationary at the first difference. For this reason, ARDL is adopted as a technique to analyze the data in this study.

Table 4 Augmented Dickey Fuller Unit Root Test Results

	LEVEL			FIRST DIFFERENCE			
Variables	T-Stat	Critical Values 5%	P-Values	T-Stat	Critical Values 5%	P-Values	Order of Integration
IPI	1.7983	2.9604	0.3743	6.5331	2.9604	0.0000	I(1)
HCD	1.0558	2.9571	*0.7207*	3.7331	2.9571	0.0082	I(1)
FD	3.7336	3.5578	0.0343	-	-	-	I(0)
INTR	4.3857	3.5530	0.0074	-	-	-	I(0)
GFCF	2.2579	2.9604	0.1913	3.3475	2.9604	0.0211	I(1)
TOP	-2.8251	2.9571	0.0660	5.5081	2.9640	0.0001	I(1)

Source: Author`s Computation (2024)

➢ *Lag Order Selection*

The lag order selection process shows the procedure for choosing the lag that is most recommended by the various criteria. The results of the lag selection tests for this study are presented in Table 4. The results show that the third lag is the most recommended based on the various statistical assessments (LR, FPE, AIC, SC, and HQ). Therefore, this study adopts the third lag across multiple estimation processes.

Table 5 Lag Selection for the Model

VAR Lag Order Selection Criteria						
Endogenous variables: IPI HCD FINDEV INTR GFCF GOVEXP TOP						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-533.4076	NA	3269090	34.86501	35.18881	34.97056
1	-380.86	226.3609	4460.197	28.18452	30.77495	29.02893
2	-317.8458	65.04698	3082.231	27.28037	32.13743	28.86365
3	-178.3973	80.97009*	57.73336*	21.44499*	28.56867*	23.76713*

➤ *ARDL Cointegration and Bound Test on the Effects of Human Capital Development and Financial Deepening on Industrial Output*

The result of the bound co-integration test (Table 5) verified the existence of an equilibrium long-run relationship between the independent variables—Human Capital Development, Financial Deepening, Interest Rate, Gross Fixed Capital Formation and Trade Openness—and the dependent variable, Industrial Production, because the F-statistic for the equation is greater than the I(0) and I(1) bounds. An overview of the estimated boundaries and F-statistic results is also given in Table 4. The data-driven F-statistic value of 31.69585 suggests that the dependent variable, Industrial Production, and other independent variables have a clear co-integration connection. At the 5% significance level, it exceeds the upper and lower bound critical values of 2.27 and 3.28, respectively.

Table 6 ARDL Cointegration and Bound Test

Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	31.6959	10%	1.99	2.94
K	6	5%	2.27	3.28
		2.5%	2.55	3.61
		1%	2.88	3.99

Source: Author`s Computation (2024)

➤ *ARDL Long-Run Analysis of the Effect of Human Capital Development and Financial Deepening on Industrial Output*

Table 6 presents the long-term ARDL results of the analysis assessing the effects of government spending, interest rates, gross fixed capital formation, financial deepening, and trade openness on industrial production in Nigeria. Industrial production is the dependent variable, and the explanatory variables are HCD, FD, INTR, GFCF and TOP.

In the long term, the effect of HCD on IPI is negative and significant. Again, the impact of FD on IPI is negative but not significant. Also, INTR has a negative and significant effect on IPI in the long run, while the impact of GFCF is positive and significant. An analysis of the effect of HCD and FD on IPI indicates that the investment in human education and skills, as well as the development of the financial sector, have yet to start to yield positive effects on industrial production in the country. Furthermore, the effect of interest rate on industrial production has been counter-productive to the investment in the sector.

Table 7 ARDL Long-Run Analysis of the Effect of Human Capital Development and Financial Deepening on Industrial Output

Dependent Variable: IPI				
Variable *	Coefficient	Std. Error	t-Statistic	Prob.
HCD(-1)	-1.6131	0.4970	-3.2455	0.0032
FINDEV(-1)	-0.4243	0.3675	-1.1547	0.2587
INTR(-1)	-0.5137	0.1585	-3.2413	0.0033
GFCF(-1)	0.3233	0.0615	5.2594	0.0000
TOP(-1)	-0.0827	0.0539	-1.5349	0.1369

Source: Author`s Computation (2024)

$$IPI = IPI(-1) - (-1.613082*HCD(-1) - 0.424337*FINDEV(-1) - 0.513690*INTR(-1) + 0.323323*GFCF(-1) - 0.082724*TOP(-1))$$

➤ *ARDL Short-Run Analysis (and ECT) of the Effect of Human Capital Development and Financial Deepening on Industrial Output*

The short-run ARDL results of the analysis evaluating the effects of Human Capital Development, Financial Deepening, Interest Rate, Gross Fixed Capital Formation and Trade Openness on Industrial Production in Nigeria are displayed in Table 7. An analysis of the impact of HCD on IPI indicates that although it is negative and significant in the first lag on application. Similarly, FD has a negative impact on IPI, but it is not significant.

Table 8 ARDL Short-Run and ECT Analyses on the Effect of Human Capital Development and Financial Deepening on Industrial Output.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Dependent Variable: D(IPI)				
Method: ARDL				
ECT(-1)*	-0.6955	0.2379	-2.9234	0.0035
HCD(-1)	-1.8137	0.7348	-2.4682	0.0296
FD(-1)	-0.4771	0.4141	-1.1522	0.2717
INTR(-1)	-0.5776	0.2019	-2.8609	0.0143
GFCF(-1)	0.3635	0.0925	3.9301	0.0020
TOP(-1)	-0.0930	0.0578	-1.6079	0.1338
D(IPI(-1))	0.9542	0.1771	5.3888	0.0002
D(HCD)	1.0147	2.3355	0.4344	0.6717
D(HCD(-1))	-3.7212	2.2363	-1.6640	0.1220
D(HCD(-2))	-5.0632	3.1590	-1.6028	0.1350
D(FD)	-0.4522	0.2869	-1.5765	0.1409
D(FD(-1))	0.1125	0.2459	0.4575	0.6555
D(FD(-2))	-0.4579	0.2249	-2.0366	0.0644
D(INTR)	-0.3888	0.1315	-2.9561	0.0120
D(INTR(-1))	0.2061	0.1326	1.5542	0.1461
D(GFCF)	-0.0032	0.1482	-0.0216	0.9831
D(TOP)	-0.0055	0.0556	-0.0999	0.9221
D(TOP(-1))	-0.1390	0.0472	-2.9477	0.0122
C	5.7305	1.5561	3.6825	0.0031
R-squared	0.9252	Mean dependent var		-0.1997
Adjusted R-squared	0.8130	S.D. dependent var		3.2095
F-statistic	8.2458	Durbin-Watson stat		2.0223
Prob(F-statistic)	0.0003			
Diagnostics				
Heteroskedasticity	F-Stat	1.2486	Prob.	0.3537
Serial Correlation	F-Stat	0.6265	Prob.	0.5396

Source: Author`s Computation (2024)

While the effect of INTR on IPI is negative and significant, GFCF has a positive and significant impact on IPI. Also, the error correction term (ECT) is negative, less than one and significant. Therefore, when industrial output is in disequilibrium, the speed of adjustment back to equilibrium is 69.6% per annum. The Adjusted R-squared for the model shows that the independent variables in the model explain 81% of the total variation in industrial output. The value of the F-Statistic (8.2458) with probability of (0.0003) shows that the entire model is a good fit for the variable relationship. Also, the Durbin-Watson statistic (2.0223) and the Breusch-Godfrey Serial Correlation Test [with F-statistic (0.6265) and probability (0.5396)] indicate that the null hypothesis of no serial correlation cannot be rejected. Also, the Breusch-Pagan-Godfrey test [with F-statistic (1.2486)

and probability (0.3537)] shows that the model is free from heteroskedasticity.

➢ *ARDL Cointegration and Bound Test Analysis on the Interacted Effect of Human Capital Development and Financial Deepening on Industrial Output*

The value of the F-statistic (6.03151) is greater than the I(0) and I(1) bounds; the result of the bound co-integration test confirm the existence of an equilibrium long-run relationship between the independent variables, human capital development, financial deepening, human capital development*financial deepening, interest rate, gross fixed capital formation, trade openness and the dependent variable, industrial production (Table 8). The result of the cointegration test shows that the study can proceed to estimate the error correction model and the long-run model.

Table 9 Cointegration and Bound Test

Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	6.03151	10%	1.92	2.89
K	7	5%	2.17	3.21
		2.50%	2.43	3.51

Source: Author`s Computation (2024)

➤ *ARDL Long-Run Analysis on the Interacted Effect of Human Capital Development and Financial Deepening on Industrial Output.*

The long-run ARDL results of the analysis evaluating the interacted effects of Human Capital Development and Financial Deepening on Industrial production in Nigeria are shown in Table 9.

Table 10 ARDL Long-Run Interacted Effect of Human Capital Development and Financial Deepening on Industrial Output.

Dependent Variable: IPI				
Variable *	Coefficient	Std. Error	t-Statistic	Prob.
HCD(-1)	-1.0450	0.1553	-6.7290	0.0000
FINDEV(-1)	-0.8412	0. 1443	-5.8280	0.0000
FINDEV(-1)*HCD(-1)	0.9208	0.1657	5.5571	0.0000
INTR(-1)	-0.1565	0.0940	-1.6645	0.1085
GFCF(-1)	0.1254	0.0458	2.7407	0.0112
TOP(-1)	0.2324	0.0588	3.9532	0.0006

Source: Author`s Computation (2024)

$$IPI = IPI(-1) - (-10.450000*HCD(-1) - 8.412095*FINDEV(-1) + 0.920785*FINDEV(-1)*HCD(-1) - 0.156538*INTR(-1) + 0.125386*GFCF(-1) + 0.232392*TOP(-1))$$

The value of the test result on the moderated effect of human capital development and financial deepening on industrial production is positive and significant at 0.92. A 1% change in the moderated effect of human capital development and financial development will induce a 0.92% change in industrial production in the same direction. This indicates that the interaction between human capital development and financial deepening goes a long way to defining the direction of the dependent variable in the long run.

➤ *Short-Run Analysis on the Interacted Effect of Human Capital Development and Financial Deepening on Industrial Output.*

The individual effects of the short-run coefficient estimates of human capital development and financial deepening on industrial output are both adverse and significant (Table 8). However, the effect of the interacted components of human capital development and financial deepening on industrial production is again positive and significant, with a coefficient of 1.7725. Additionally, the error correction term (ECT) is negative, less than one and significant. Therefore, when industrial output is in disequilibrium, the speed of adjustment back to equilibrium is 40.9% per annum. The model's Adjusted R-squared indicates that the independent variables explain 80.7% of the total variation in industrial production. The value of the F-Statistic (12.9322) with probability of (0.0004) confirms that the entire model is a good fit for the variable relationship. Also, the Durbin-Watson statistic (1.9082) and the Breusch-Godfrey Serial Correlation Test [with F-statistic (2.27997) and probability (0.1969)] indicate that the model is free from serial correlation. In addition, the Breusch-Pagan-Godfrey test [with F-statistic (0.28656) and probability (0.9905)] shows that the model is free from heteroskedasticity.

Table 11 ARDL Short-Run Analysis on the Interacted Effect of Human Capital Development and Financial Deepening on Industrial Output.

Dependent Variable: D(IPI)				
Method: ARDL				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECT(-1)*	-0.4098	0.1344	-3.0490	0.0048
HCD(-1)	-2.0116	0.5163	-3.8958	0.0046
FD(-1)	-1.6193	0.4413	-3.6694	0.0063
FD(-1)*HCD(-1)	1.7725	0.4997	3.5470	0.0075
INTR(-1)	-0.3013	0.1742	-1.7294	0.1220
GFCF(-1)	0.2414	0.0866	2.7883	0.0236
TOP(-1)	0.4473	0.1595	2.8045	0.0230
D(IPI(-1))	1.7287	0.2483	6.9613	0.0001
D(HCD)	-18.1051	5.9466	-3.0446	0.0160
D(HCD(-1))	-9.0789	2.3293	-3.8977	0.0046
D(HCD(-2))	-3.0012	2.5055	-1.1979	0.2653
D(FD)	-10.2346	3.0108	-3.3993	0.0094
D(FD(-1))	0.3962	0.2076	1.9089	0.0927
D(FD(-2))	-0.2360	0.1977	-1.1933	0.2670
D(FD*HCD)	1.1277	0.3485	3.2359	0.0120
D(INTR)	-0.2897	0.1101	-2.6320	0.0301
D(INTR(-1))	0.2047	0.1002	2.0422	0.0754
D(GFCF)	0.0575	0.1277	0.4501	0.6646

D(GFCF(-1))	0.5967	0.1894	3.1502	0.0136
D(TOP)	0.1185	0.0537	2.2089	0.0582
D(TOP(-1))	-0.4552	0.0974	-4.6721	0.0016
D(TOP(-2))	-0.0714	0.0394	-1.8137	0.1073
C	2.1895	0.4663	4.6953	0.0016
R-squared	0.9727	Mean dependent var		-0.1997
Adjusted R-squared	0.8974	S.D. dependent var		3.2095
F-statistic	12.9322	Durbin-Watson stat		1.9082
Prob(F-statistic)	0.0004			
Diagnostics				
Serial Correlation	F-Stat	2.27997	Prob.	0.1969
Heteroskedasticity	F-Stat	0.28656	Prob.	0.9905

Source: Author`s Computation (2024)

➤ *CUSUM Stability Test and CUSUM Squared Test for Financial Deepening, Human Capital Development and industrial Output.*

Figures 1 and 2 display the results of the CUSUM Stability Test and CUSUM squared test on the recursive estimates for Financial Deepening, Human Capital Development, and Industrial Output. The test results show that the CUSUM stability tests and CUSUM squared tests confirm the stability of the models at 0.05 significance.
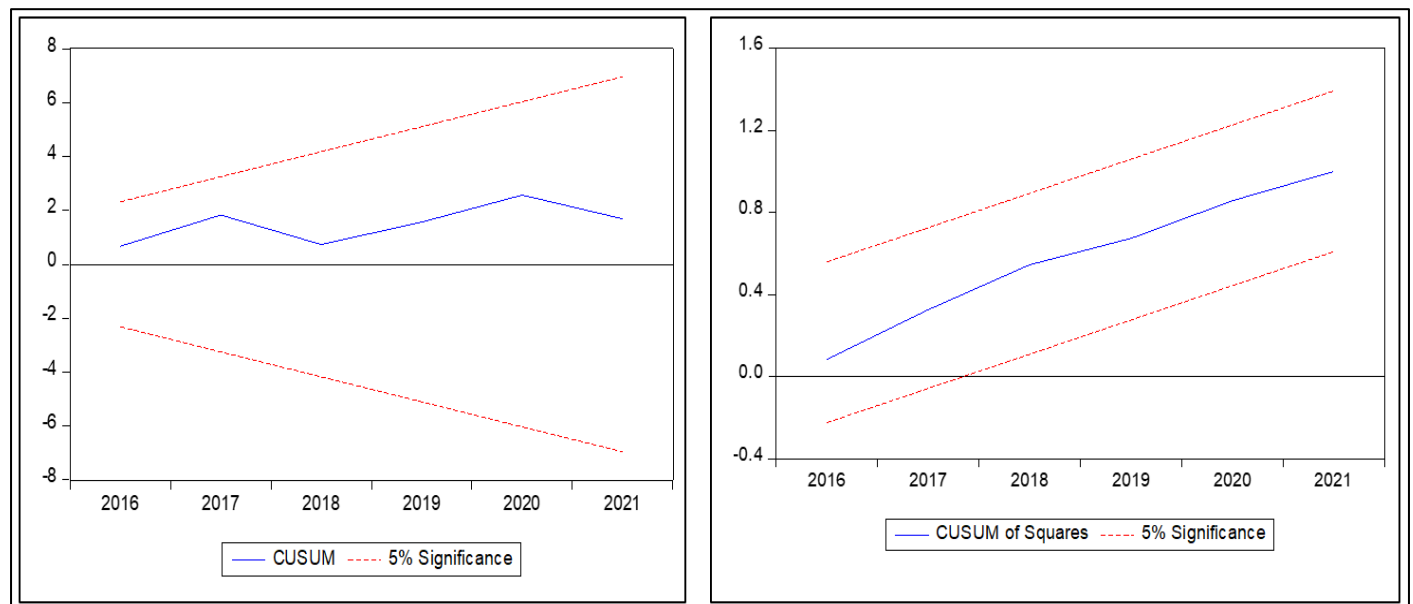

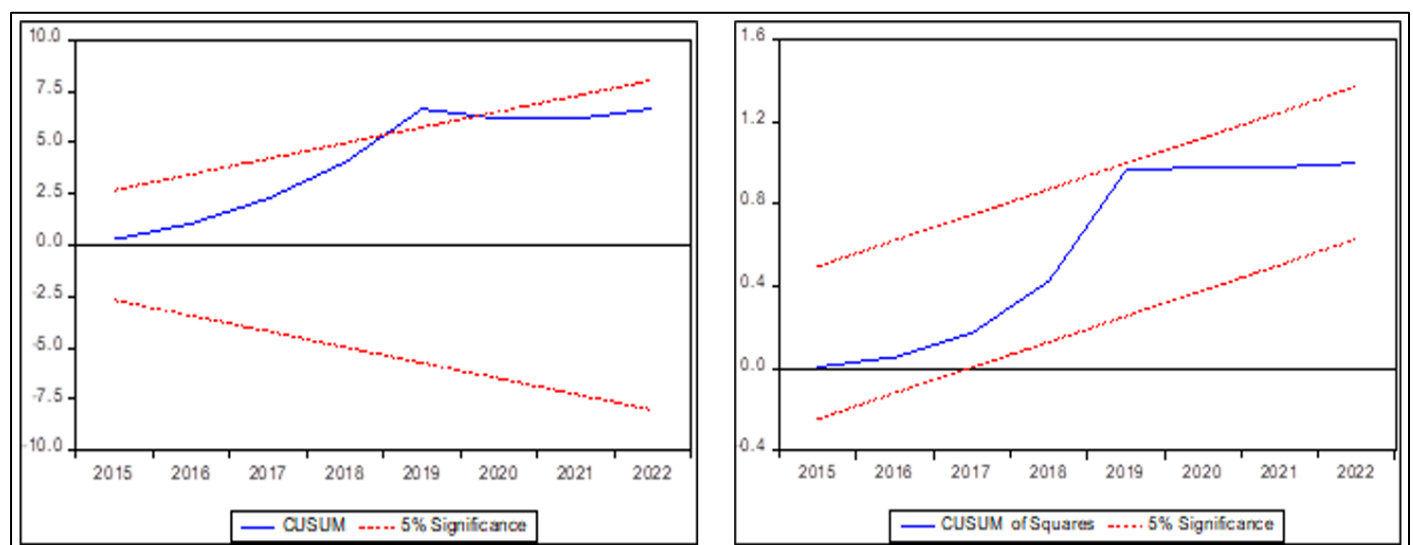Fig 2 CUSUM Stability Test and CUSUM Squared Test for Model 3

Fig 3 CUSUM Stability Test and CUSUM Squared Test for Model 4

V. CONCLUSION AND RECOMMENDATIONS

This study investigates the effects of the development of human capital and financial deepening on industrial output in Nigeria while also taking into account other closely related exogenous variables such as interest rates, trade openness and gross fixed capital formation. The study specifically explored the interactive effect of human capital development and financial deepening on industrial production in Nigeria. The ARDL approach was adopted for the analysis of the variables under study covering the period from 1987 to 2022. Based on the analysis conducted using the ARDL approach, the study arrived at some critical findings. The signs and magnitude of the coefficients from the analyses form the basis on which the study findings and conclusions are based.

The first finding concerns the relationship between human capital development and industrial output. The findings of the short-run and long-run analyses confirm a negative and significant effect of human capital development on industrial output in Nigeria. There are some existing empirical studies that support the negative impact of human capital development on industrial output (Okumoko, 2017; Okoh et al., 2022; Dauda, 2021). The negative impact of human capital development on industrial output indicates that the level of education, healthcare, and skills acquisition in the country has not benefitted the productivity in the country's industrial sector.

The second finding focuses on the effect of financial deepening on industrial productivity in Nigeria. The study records that both the short-run and the long-run effects of financial deepening on industrial output are negative and significant. There are existing empirical studies that are in consonance with the negative effect of financial deepening on industrial output (Mesagan et al., 2018; Oranefo, 2022; Seyfullayev, 2023). The indication shows that the level of financial depth and access have not benefitted the development of the industrial sector in Nigeria.

The third finding concludes that human capital development positively impacts financial deepening. There are existing empirical findings in support of the positive effect of human capital development on financial deepening (Arif & khan, 2019; Hong et al., 2021; Sarwar et al., 2021). The proponents of a positive relationship between human capital development and financial deepening contend that improved levels of education, health, and the enhancement of workers' skills will position them to harness the gains of financial deepening favourably through improved access to credit and financial decisions. Some essential factors that militate against the support of the financial sector in favour of the industrial sector include the perception that investment in the industrial sector has long gestation periods and the general level of lending rates for loans in Nigeria is high. The high costs of borrowing from the financial sector discourage industrial borrowers as it increases production costs.

The last finding concerns the interactive effect of human capital development and financial deepening on industrial production in Nigeria. Both the short-run and long-run effects

of the moderated human capital development and financial deepening on industrial output are positive and significant. Therefore, the study concludes that the moderated effects of human capital development and financial deepening have positive and significant effects on industrial output in Nigeria. The conclusion underscores that the positive sides of both financial deepening and human capital development on industrial development in Nigeria can go hand in hand because industrial growth is best accomplished when both variables are present. This study contends further that the industrialization strategy for Nigeria requires significant financial sector reforms, focusing mainly on the improvements in the delivery of credit facilities at affordable rates for industrial development initiatives and the provision of education and career training that boosts human capital.

Consequently, the policy recommendations in this study are based on the analysis and findings. First and foremost, it is essential to improve the financial sector's provision of credit facilities to the country's industrial sector. Enhancing the availability and accessibility of financial services, such as credit and loans, is a necessity for the industrial sector's development. An essential component of the industrial sector development is the enhancement, promotion and active development of the small and medium scale enterprises (SME). The businesses in the industrial sector should be able to access the credit facilities required for investment in capital assets, technology, and operations.

Second, the government should improve the country's education programmes and create avenues for upscaling vocational training to aid the performance of workers in the industrial sector. An essential component in this area is the investment in technology centres and the alignment of the school curricula with industrial requirements. Technology innovation is at the heart of industrial productivity, and the government must take concrete steps to improve the level of innovation and creativity while emphasizing the application of new technology in the country.

REFERENCES

[1]. Adamu, M. N., Danjuma, M., & Gana, J. (2022). The impact of training and development on employee productivity in the 21st century. *African Journal of Management and Business Research,* 3(5).

[2]. Ahad, M., Dar, A. A., & Imran, M. (2019). Does financial development promote industrial production in Pakistan? Evidence from combined cointegration and causality approach. *Global Business Review, 20*(2), 297-312.

[3]. Akpa, A.F., Degbedji, D.F., & Chabossou, A.F. (2024). Assessing the effect of financial inclusion on human capital in West Africa: An heterogeneous analysis based on income level. *SN Bus Econ* 4, 13. https://doi.org/10.1007/s43546-023-00605-2

[4]. Alenoghena, R. O., Aghughu, A. A., & Odior, E. S. (2023). Domestic borrowing and the Nigerian economy: A Bayesian VAR analysis. *The Journal of Developing Areas*, 57(3), 65-77.

[5]. Aliu, F. O., & Alenoghena, R. O. (2023). Employee training and organisational performance of selected deposit money banks in Lagos State, Nigeria. *International Journal of Research and Innovation in Social Science,* 7(2), 129-140.

[6]. Aliu, F. O., Alenoghena, R. O., Osanebi, C., & Ayoola, O. J. (2024). Impact of executive staff benefits on organisational performance of deposit money banks in Nigeria: A Conceptual and Theoretical Analysis. *International Journal of Interdisciplinary Research and Innovations*, 12(4), 1-11

[7]. Allen, F., & Santomero, A. M. (1997). The theory of financial intermediation. *Journal of banking & finance*, 21(11-12), 1461-1485.

[8]. Arif, I., & Khan, L. (2019). The role of financial development in human capital development: an evidence from Pakistan. *Pakistan Journal of Commerce and Social Sciences (PJCSS),* 13(4), 1029-1040.

[9]. Awogbemi, T. O. (2023). Human capital development and Nigeria's economic growth. *Journal of Public Administration, Finance and Law,* 27, 67-76.

[10]. Central Bank of Nigeria (2019). Central Bank of Nigeria (CBN): [CBN Website] (https://www.cbn.gov.ng).

[11]. Chugunov, I., Makohon, V., Kaneva, T., & Adamenko, I. (2022). Influence of financial support of human capital development on economic growth. *Problems and Perspectives in Management*, 20(2), 269-280.

[12]. Dauda, R. S. (2021). Human capital development and utilization: The panaceas for industrial development in Nigeria. *Ilorin Journal of Economic Policy*, 8(1).

[13]. Egbetunde, T., Simon-Oke, O., & Odeleye, A. (2019). Financial development and industrial output in Nigeria. *Department of Economics Journal, Nnamdi Azikiwe University, Akwa, Nigeria*, 16(1), 19-38.

[14]. Enilolobo, O. S., & Sodeinde, O. (2019). Human capital development, infrastructural development and industrial sector productivity in Nigeria. *Archives of Business Research,* 7(1).

[15]. Ewane, E. B., & Ewane, E. I. (2024). Human capital development and industrial sector growth in Sub Saharan African countries. An augmented pooled mean group estimator. *Arab Economic and Business Journal*, 16(2), 2.

[16]. Hong Vo, D., Tran, N. P., & Nguyen, H. M. (2021). Does financial development improve human capital accumulation in the Southeast Asian countries?. *Cogent Business & Management, 8(*1), 1932245.

[17]. Ihensekhien, O. A., & Soriwei, E. (2023). Human capital development and industrial sector growth in Nigeria, *Nigerian Journal of Management Sciences*, 24(2b), 266.

[18]. Ihensekhien, O. A., & Soriwei, E. (2023). Human capital development and industrial sector growth in Nigeria. *Nigerian Journal of Management Sciences Vol*, 24(2b).

[19]. Keji, S.A. (2021). Human capital and economic growth in Nigeria. *Future Business Journal,* 7(49) https://doi.org/10.1186/s43093-021-00095-4

[20]. Kilic, C., & Ozcan, B. (2018). The Impact of Financial Development on Human Capital: Evidence from Emerging Market Economies. *International Journal of Economics and Financial Issues,* 8(1), 258-267.

[21]. Konstantakopoulou, I. (2023). Financial intermediation, economic growth, and business cycles. *Journal of Risk and Financial Management*, 16(12), 514.

[22]. Megnigang, D. (2024). Financial system development and economic growth: A critical analysis of the literature. *Journal of World Economic Research.* 13. 1-10. 10.11648/j.jwer.20241301.11.

[23]. Mesagan, E., Olunkwa, N., & Yusuf, I. (2018). Financial development and manufacturing performance: The Nigerian case. *Studies in Business and Economics*, 13(1), 97-111.

[24]. Mohammed, N. A., Mohammed, D., & Gana, J. (2022). The impact of training and development on employee productivity in the 21st century. *African Journal of Management and Business Research,* 3(1), 41-58.

[25]. National Bureau of Statistics. (2020). Research and development statistics from http://www.nigerianstat.gov.ng/pdfuploads/RESEARCH%20AND%20DEVELOPMEN.pdd

[26]. Nguyen Ngoc, H., Lasa, G., & Iriarte, I. (2022). Human-centred design in industry 4.0: case study review and opportunities for future research. *Journ Intell Manuf*, 33, 35–76 https://doi.org/10.1007/s10845-021-01796-x

[27]. Nigerian Economic Summit Group. (2020). Economic Recovery and Growth Plan. Abuja: NESG.

[28]. Nwosu, C. P., Itodo, I. A., & Ogbonnaya-Orji, N. (2021). Financial deepening, financial system fragility and economic growth in Nigeria. *Central Bank of Nigeria Economic and Financial Review,* 59(1).

[29]. Okoh, J. I., Akinloye, O. O., Adamu, M. A., & Agbadua, O. B. (2023). Human capital development and manufacturing sector performance in Nigeria, *International Accounting and Taxation Research Group,* 7(1), 1-11.

[30]. Okumoko, P. C. (2017). The dynamics of human capital development and industrial growth in Nigeria, *International Journal of Developing Societies*, 7(1).

[31]. Olabanji, K. T. (2023). Interventions to improve health literacy in nigeria: Systematic review of effectiveness and policy recommendations. *Nigerian Health Journal,* 23(3), 707-716.

[32]. Oranefo, P. C. 2022). Effect of financial development on industrial production in Nigeria (1986-2020). *International Journal of Research in Education and Sustainable Development,* 2(12).

[33]. Pesaran, M. H., Shin, Y. & Smith, R. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics 16* (3), 289–326. https://doi:10.1002/jae.616.

[34]. Rosina, H., Virgantina, V., Ayyash, Y., Dwiyanti, V., & Boonsong, S. (2021). Vocational education

curriculum: Between vocational education and industrial needs. *ASEAN Journal of Science and Engineering Education*, *1*(2), 105-110.

[35]. Saka, J., & Olanipekun, D. B. (2021). Human capital development and industrialization in nigeria: implication for economic growth. *Religación: Revista de Ciencias Sociales y Humanidades*, *6*(27), 280-295.

[36]. Sarwar, A., Khan, M. A., Sarwar, Z., & Khan, W. (2021). Financial development, human capital and its impact on economic growth of emerging countries. *Asian Journal of Economics and Banking, 5*(1), 86-100.

[37]. Seyfullayev, I. (2023). The impact of financial development on the manufacturing industry in resource-rich countries: Empirical evidence from Azerbaijan, *Journal of Eastern European and Central Asian Research*, 10(3).

[38]. Taiwo, A., Adebayo, A. R., & Oluwaseun, O. M. (2021). The Impact of Human Capital on Industrial Development in Sub-Saharan Africa. *Nigerian Studies in Economics and Management Sciences*, *4*(2), 28-36.

[39]. Uduh, D. M., & Beredict, C. (2017). The human capital development and economic growth in Nigeria: The role at nomadic education. *International Journal of Asian Social Science, 7*(11), 931-941..

[40]. Wirajing, M. A. K., Nchofoung, T. N., & Etape, F. M. (2023). Revisiting the human capital–economic growth nexus in Africa. *SN Business & Economics*, *3*(7), 115.

[41]. World Bank. (2022). World Development Indicators. Washington, DC: World Bank.

[42]. Yan, G., & Chen, Y. (2023). The Impact of Financial Development on Industrial Upgrading Based on the Analysis of Intermediation Effect and Threshold Effect. *Sustainability, 15*(10), 8364.

[43]. Zhang, X., Li, X., Ding, L., & Zhang, X. (2019). The impact of financial development on manufacturing structural upgrading: Quantity or quality. *American Journal of Industrial and Business Management*, *9*(12), 2112.