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Enhancing manufacturing productivity through strategic human capital investment in Nigeria

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Abstract

This paper investigates the nexus between strategic investment in human capital and - productivity in the manufacturing sector. By manufacturing productivity, we refer to the potential of human capital investment to enhance productivity and drive competitiveness in the manufacturing sector. The paper examined how Investments in Education (INED) and Investments in Health (INHE), which are human capital investments, impact Manufacturing Capacity Utilization (MCUT). The findings showed no significant relationship between the dependent and independent variables (INED, INHE and MCUT) contrary to *apriori* expectation in manufacturing productivity. On the other hand, the study reveals existing significant barriers to developing the human capital required to stimulate manufacturing productivity in Nigeria. We argue that proactive measures constitute strategic instruments for enhancing Nigeria's manufacturing competitiveness through the development of advanced infrastructure and the deliberate promotion of sustainable, long-term education and healthcare

systems capable of competing globally.

Keywords: Manufacturing productivity, Human capital, Strategic investment, Employment, Capacity

Introduction

Economic prosperity and the functioning of economies depend on natural resources, physical capital, and human capital (Anowor et al., 2023). Physical capital and natural resources have traditionally been the focus of economic research (Onodugo et al., 2013). However, factors affecting the development of human skills, vitality, and talent are increasingly privileged in social and behavioural sciences research (Mohapatra & Ratha, 2010). In general terms, human capital represents the investment people make in themselves that enhances their economic productivity. The framework that is mostly responsible for the wholesome enhancement of education and healthcare as development policies is popularly referred to as human capital theory (Anowor et al., 2020; Etuk & Ibuot, 2024; Anowor et al, 2025). The twenty-first century paradigm shift toward prioritizing education, healthcare, skills, and knowledge expansion reflects the growing recognition by states of the close linkage between human capital accumulation and their broader economic development strategies (Anowor et al., 2023). The increased faith in human capital as an agent of change in many developing countries has led to remarkable investments in the area (Nwonye et al., 2023). Apart from acting as an important tool for achieving equitable income distribution, human capital is also an important means of addressing the problem of poverty (Odior, 2014). Consequently, human capital investment is an engine of growth and a key to development in every society, depending on the quality and quantity of the investment (Acemoglu et al., 2014; ILO, 2019). This implies that an enhanced human capital, both in quality and quantity, is required to make a significant contribution to economic growth and development of an economy.

The above stance constitutes the motivation for this study, to examine the relationship between human capital investment and manufacturing productivity. The centrality of manufacturing advancement as a pivot of economic growth and development remains indispensable in developing countries such as Nigeria with a large population and labour force (Anowor et al., 2023). It is, therefore, anticipated that the excess labour resources in the country could only be absorbed through a commensurate positive development in the industrial sector. Meanwhile, a well-developed human capital base could engender manufacturing advancement necessary for sustainable development even in developing economies. Expectantly, the higher the degree of education, healthcare, skills, training, and other human capital components, the higher the output in labour force of a country, which in turn influences the overall economic development of the country. Neoclassical works such as Solow (1956), Swan (1956) and Becker (1962), reveal that increase in output is a function of increase in capital input, improvements in technology, and enhancement in the quality of labour (human capital). With particular reference to manufacturing development, most of the industries in developing countries have performed poorly when compared to their counterparts in developed countries (Mottaleb, 2011; Benhabib & Spigel, 1994). This cannot be strongly attributed to the scarcity of natural resources because Sub-Saharan African economies as observed by Anowor et al. (2014) are endowed with abundant natural resources. Similarly, there are significant upsurge in the inflow of foreign direct investment into Sub-Saharan Africa since the beginning of the Twenty-first century (Agbarakwe et al., 2018). This has filled the shortfalls in physical capital; hence, physical capital cannot be the reason for the poor economic performances in the developing countries in Africa. Instead, the poor performances could be attributed to insufficient human capital development.

The endogenous growth models of Romer (1986), Lucas (1988), Barro (1991), Aghion and Howitt (1997), posit that for any economy to experience meaningful growth, the forces within it such as human capital must be effective and improved in quality in order to achieve efficiency in production. The ways in which human capital influences output growth have attracted modest inquiry in human developmental studies. The political rhetoric surrounding the topic is quite long. In Nigeria, enhancement of human capital development through scientific investigations is quite scarce. This is one of the motivations behind this study. Successive governments in Nigeria since independence embarked on several programmes to transform the economy through the manufacturing process. For instance: the attempt to use agriculture to boost the manufacturing transformation process in the 1960s (Onodugo et al, 2019); the windfall gains from crude oil price explosions in 1970s; the Structural Adjustment Programme (SAP) introduced in the 1980s to reduce government interference in price distortions and allow for free inter-actions between market operations; vision 2000 in the 1990s; the National Economic Empowerment and Development Strategy (NEEDS) of 2000s aimed at forging stronger links between educational institutions and industry to stimulate rapid manufacturing growth and efficient exploitation of resources; Vision 2020 in the 2010s, which projected Nigeria to be among the top 20 economies in the world by 2020; Nigeria's current national development plan (Economic Recovery and Growth Plan), formulated against the backdrop of several subsisting development challenges in the country to meet global vision of Sustainable Development Goals (SDGs) by 2030. Regrettably, the overall contribution of the manufacturing sector to Nigeria's GDP has not really been felt despite these programmes, and the large population and labour force in Nigeria.

The aforementioned, regarding the performance of Nigeria's manufacturing sector, shaped the questions this study seeks to answer, about the factors influencing manufacturing productivity in Nigeria. The questions include: What is the current state of investment in human capital in Nigeria's manufacturing sector? Specifically, this question focuses on training programmes and employee development initiatives, and human capital investment impact on the efficiency and productivity of micro and large-sized enterprises in the manufacturing sector. The next question is: how does human capital investment impact manufacturing productivity? That is, the extent investment in employee training and development programmes impact labour productivity in the manufacturing sector. Lastly, what specific human capital investments (e.g., education, health) have greater impact on manufacturing output in Nigeria? That is, the relative impact of investments in education and health sectors on the manufacturing output of industries in Nigeria.

Literature Review

The manufacturing sector is crucial for economic growth, employment, and innovation. Human capital investment is essential for improving manufacturing productivity, as skilled workers can adapt to new technologies, processes, and market demands. Studies have shown that human capital investment leads to increased productivity, improved product quality, enhanced innovation, and better adaptation to technological change. Studies by Schultz (1961), Becker (1964), and Barro (2001) showed that human capital is a key driver of productivity growth; they underscore the importance of investments in education, health, skills, and training to productivity. Workers with higher levels of education and skills are more efficient and innovative, contributing to increased output and productivity (Mincer, 1974). Furthermore, human capital has been found to positively impact productivity through improved technological adoption and innovation (Bartel & Lichtenberg, 1987), enhanced organizational efficiency and effective management (Ichniowski & Shaw, 1999), increased entrepreneurship and firm creation (Van der Sluis et al., 2005; Onodugo et al., 2019). The extant literature also highlights the importance of human capital in driving economic growth and competitiveness (Lucas, 1988; Romer, 1990).

The Resource-Based View of Barney (1991) posits that organizations' internal resources and capabilities, including human capital, can be a source of sustainable competitive advantage, enabling firms and countries to outperform rivals and achieve strategic objectives through effective resource utilization. High-Performance Work Systems theory of Huselid (1995) highlights the significance of strategic human resource practices, such as training, performance management, and employee involvement, in driving organizational performance, improving productivity, and fostering a competitive advantage through enhanced employee skills, motivation, and commitment. Productivity theory of Syverson (2011) examines factors influencing productivity, including human capital, technology, and management practices, highlighting the complex interplay between these elements in driving output and efficiency, and informing strategies to enhance productivity in various contexts. Institutional theory by DiMaggio and Powell (1983) explores how external institutional factors, such as government policies and cultural norms, shape organizational practices, structures, and performance, emphasizing the role of legitimacy and conformity in influencing organizational behavior and outcomes.

Furthermore, studies have shown the importance of human capital in driving product quality, competitiveness, and firm performance. For instance, it is argued that: enhanced human capital leads to improved product quality through enhanced problem-solving and decision-making skills (Bartel, 1994; Fitriana et al., 2024); skilled workers contribute to higher quality products through better workmanship and attention to detail (Mincer, 1974); experience and expertise lead to improved product design, development, and testing (Hatch & Dyer, 2004); human capital investments in research and development (R&D) drive innovation and quality improvement (Griliches, 1986); high-performance work systems, reliant on skilled and motivated workers, lead to superior product quality (Appelbaum et al., 2000; Anowor et al, 2022). In addition, human capital has been found to positively impact product quality through improved supply chain management and procurement (Kahn & Lim., 2002); enhanced customer service and feedback mechanisms (Verhoef & Donkers, 2004); increased employee involvement and empowerment (Lawler, 1986). These findings unequivocally support the notion that human capital is a key driver of improved product quality, underscoring the importance of investments in education, training, and skill development.

Human capital, encompassing the knowledge, skills, vitality and experience possessed by an individual worker, plays a pivotal role in driving innovation. Studies have consistently demonstrated that there is direct correlation between human capital and innovation. Education and training enhance innovative capacity by developing cognitive skills, creativity, and problem-solving abilities (Becker, 1964; Schultz, 1961). Skilled workers contribute to innovation through expertise, knowledge sharing, and collaboration (Mincer, 1974; Cohen & Levinthal, 1990; AL-Takhayneh, 2023; Anowor, Chibuzo, Anigbo, & Ukpere). R&D investments, driven by human capital, lead to increased innovation and patenting activity (Griliches, 1986; Hausman, 2002). Also, diversity and international experience among employees foster innovative thinking and creativity (Stahl et al., 2017; Bouncken & Wiedmann., 2015); human capital investments in entrepreneurship education and training programmes enhance startup success and innovation (Baumol, 1993; Shane, 2003), while human capital facilitates knowledge spillovers, innovation networks, organizational learning and entrepreneurial activity (Argote & Ingram, 2000; Onodugo, Anowor & Ofoegbu, 2018).

Senker and Brady (1989) argued how important it is for firms to complement their processes of technological development with appropriate human capital development strategies. Similarly, for Aoki (1990), the prerequisite for the functioning of an integrated structure within the firm involve not only a technical dimension, but particularly qualification and more precisely the learning and adaptive capabilities of human resource. In a deeper analysis of the human capital technology issue Lall and Wignaraja (1997) found that technologically competent firms are larger, pay better, represent much higher levels of education for the entrepreneur and production managers, and employ more technical personnel. According to these authors, firms have reached such large sizes because they are competent i.e., they invested in technological capabilities development both early and to a greater extent or more effectively than other firms.

An analysis of the relationships between human capital and GDP growth in Croatia by Škare and Lacmanović (2015) highlighted human capital as a vital driver of economic progress, influencing productivity and technological advancements. Moreover, studies on job mobility during the pandemic in Australia by Black and Chow (2022) and the implications of the labor market on economic growth by Lim (2021) shed light on the dynamic nature of industrial sectors amidst crises. In developing economies, notable economic theories like Kaldor's growth model and Lewis' theory of unlimited labor supplies have influenced the discourse on human capital's role in driving economic growth. Furthermore, investigations into the impact of human capital on economic performance in countries like Malaysia by Jajri and Ismail (2012) and Iran by Akbari et al. (2012) have emphasized the positive correlation between human capital investments and economic productivity. Ihensekhien (2023) evaluated the influence of human capital on economic growth in Nigeria from 1986 to 2020. The study employed the Autoregressive Distributed Lag co-integration method of estimation in an empirical analysis to determine the influence of human capital variables on industrial sector growth. The empirical observations revealed that government's recurrent investment in education had significant negative short-run impact on growth while in the long run, there was a significant positive influence.

Material and Method

There are a number of ways in which the change in total factor productivity can be rendered endogenous. Lucas (1988), for example, assumes that, in addition to the stock of physical capital, there is a metaphysical variable called human capital (h). The average level of human capital in the economy determines the level of total factor productivity (Anowor et al, 2020). The endogenous growth literature which emerged in the mid-1980s, by stressing the role of investment decisions and public policies on long-run growth, has shed lights on the relevance of human capital in sustainable development issues. The justification for inclusion of the variable, human capital (h), in Lucas' model is the fact that labour in the production function, due to its possession of vigor, vitality, education and skills is endogenous. Principally, the inclusion of human capital into the production function expedites the suitability and adoption of the endogenous model in modelling the manufacturing sector productivity in Nigeria. The central assumption in the endogenous model is that increase in human capital of workers through investment in education and healthcare improves output. This buttresses the positions of Romer (1986), Lucas (1988), Romer (1990), Rebelo (1991), Mincer (1996), and Barro (2001), on human capital theory which postulates that enhanced education and healthcare of workers lead to greater productivity.

In adapting the augmented manufacturing productivity model to attain the objectives of this study, the model is modified to capture Investment in Education (INED) and Investment in Health (INHE) as human capital variables. Manufacturing Capacity Utilization (MCUT) is introduced into the model as covariate because of its indispensability in determining the outcome of manufacturing productivity (MANQ). Manufacturing capacity utilization (MCUT) measures the extent to which a manufacturing facility uses its available production capacity. MCUT is derived from dividing actual output by maximum capacity, then multiply by hundred. Major determinants of MCUT are technological advancement, availability of labour, and quality of human capital. Higher manufacturing capacity utilization leads to reduced costs of production, improved productivity, increased efficiency, and enhanced competitive advantage (Adeyeye, 2019).

Therefore, the form of the model is specified as follows:

MANQ = f (INED, INHE, MCUT) ... (1)

The econometric form of the model is as follows:

$MANQ = \Psi_1 + \Psi_2 INED + \Psi_3 INHE + \Psi_4 MCUT + \mu_t$ ...... (2)

Where:

MANQ = Manufacturing productivity

INED = Investment in education

INHE = Investment in health

MCUT = Manufacturing capacity utilization

μ = Error Term which takes care of other random disturbance terms and exogenous variables which are not included in the model

Ψ_1 = The intercept variable of the model

Ψ_2, Ψ_3, and Ψ_4 = The parameter estimates of the model.

Annual data from 1985 to 2022 were sourced from the World Development Index (WDI) database for the analysis.

Result and Discussion

Unit Root Test

Unit root test was conducted using the augmented Dickey-Fuller test (ADF) to check whether time-series variables are non-stationary and or otherwise. The result is presented in Table 1

Table 1: ***Unit Root Test Result***

VARIABLES	ADF STAT	5% CRITICAL VALUE	ORDER OF INTEGRATION	ASSESMENT
MANQ	-3.333178	-2.948404	I(1)	STATIONARY
INED	-3.562299	-2.948404	I(1)	STATIONARY
INHE	-3.455060	-2.948404	I(1)	STATIONARY
MCUT	-4.186350	-2.948404	I(1)	STATIONARY

The result contained in the above table showed that MANQ, LINED, LINHE, and MCUT are not stationary at level form but stationary at their first difference. This shows that even though the entire variables are not stationary at level form, the variables may be co- integrated without producing a spurious result.

Co-Integration Test

The co-integration test procedure is conducted to establish a long run relationship between the variables under consideration. According to Gujarati (2004), two variables are said to be co-integrated if they have a long run or an equilibrium relationship between them. Below is the result of the co-integration test:

Table 2: ***Co-Integration Test Result***

VARIABLE	ADF STATISTICS	CRITICAL VALUE (5%)
Residual term	-3.530385	-1.950117

The ADF test statistics reported a result of (-3.530385), which is greater than the critical value at 5% (-1.950117) in absolute terms. This shows that the residual is stationary i.e. the variables are co-integrated or that there is long-run equilibrium/relationship between the regressors and the regressand. This means that the original regression is not spurious.

Error Correction Regression Result Model

Table 3: ***Error Correction Result***

Variables	Coefficients	Standard errors	T statistics	probabilty
C	0.006586	0.026721	0.246473	0.8069
DLOG(MANQ)	-0.146109	0.081055	-3.353812	0.2881
DLOG(INED)	0.724874	0.465004	1.558857	0.1289
DLOG(INHE)	-0.693540	0.463614	-1.495942	0.1445
DLOG (MCUT)	-0.271844	0.135261	-1.080200	0.0021

R^2 = 0.277577; Adjusted R^2 = 0.187274; F-statistics=3.073847; Durbin-Watson statistics = 1.002403

The Error Correction Model (ECM) is a suitable choice for this study on augmenting manufacturing productivity through strategic human capital investment in Nigeria for several reasons including the cointegration of variables, which means that they have a long-run equilibrium relationship. In this study, human capital investment and manufacturing productivity may be cointegrated, and ECM can help identify the short-run and long-run relationships between these variables; the ECM includes an error correction term (ECT) that measures the speed of adjustment towards the long-run equilibrium, this provides valuable insights into how quickly manufacturing productivity adjusts to changes in human capital investment; and 4. ECM can handle non-stationary data, which is common in time series analysis. By using ECM, the study can account for any non-stationarity in the data and provide more accurate estimates. Overall, the ECM provides a robust framework for analyzing the relationship between human capital investment and manufacturing productivity in Nigeria, allowing for a more nuanced understanding of the dynamics at play.

Coefficient of Multiple Determination (R^2 test)

The coefficient of determination tells us to what percentage the variability in the dependent variable is accounted for by the variability in the independent variables. The $R^2 = 0.277577$ shows that the variability in the independent variables account for 28% of the variability in manufacturing output (LOG MANQ).

Table 4: ***t-Test Result***

Variables	**t value**	**t-tabulated**	**Decision**	**Conclusion**
INED	1.558857	2	Do not reject H_0	Statistically Insignificant
INHE	-1.495942	2	Do not reject H_0	Statistically Insignificant
MCUT	-1.080200	2	Do not reject H_0	Statistically Insignificant

Table 5: ***F-Test Result***

F- statistics calculated	F- statistics at critical value 5%	Decision
3.073847	2.53	Null hypothesis rejected

From the result shown above, the F-statistics calculated is 3.073847 and F-statistics at critical level of 5% is 2.53. The result shows that F-Statistics calculated > F-Statistics at 5% critical level of significant, hence we reject the null hypothesis and conclude that the variables under consideration have significant impact on the regress and.

Normality Test (Jarque-Bera Statistics)

This test is required to know if the error term is normally distributed. The null hypothesis is that the error term follows normal distribution. From the result obtained, the Jarque-Bera Statistic is 3.185733 and P value is 0.203342

Skewness	**Kurtosis**	**Jarqueberra**	**Probability**	**Result**
-0.446790	4.114996	3.147626	0.207253	Error term is normally distributed

From the table above the computed value of JB statistics 3.147626 > 0.029948 X^2 distribution

Autocorrelation Test

This is to test whether errors corresponding to different observations are uncorrelated. It checks the randomness of the residuals. The Durbin–Watson test is adopted for this test. Hence, we compare the established lower bound dL and the upper bound d_u of Durbin-Watson based on 5% level of significance and k-degrees of freedom.

d =1.558098

d_l = 1.307

d_u = 1.655

$4-d_u$ = 2.345

Table 7: ***Result of Durbin-Watson Test***

D	d_L	d_u	Test result
1.558098	1.307	1.655	Du<d<4-du No autocorrelation

From the result shown above, we do not reject the null hypothesis of no autocorrelation (negative or positive) indicating that the error terms are not autocorrelated.

Hetroskedasticity Test

This test is conducted to check if errors have constant variance or not. The null hypothesis is that the errors are homoscedastic (no heteroscedasticity). Note that this test follows a chi square distribution. We compare the estimated chi square statistics (observations χ^2) with the critical chi-square statistics. From the result obtained χ^2 Cal = 19.87586 and χ^2critical value is 43.7729 at 5%. χ^2tab is greater than χ^2 Cal which is statistically insignificant, therefore we accept the null hypothesis and conclude that there is no heteroscedasticity.

Discussion

From the results of the tests conducted, it is observed that investment in education has positive but statistically insignificant impact on manufacturing productivity in Nigeria. On the average, a unit increase in investment in education will result to about 0.7% increase in manufacturing output in Nigeria. This finding does not, however, counter or disprove the benefits associated with spending on education, however, there is need to be concerned about its inability to exert significant impact on the manufacturing output. This could be attributed to inadequate investment in education in Nigeria. Onodugo et al. (2013) remarked that average investment in education in Nigeria is within 13% to 15% of annual budget in contrast to 26% recommended by United Nation Education Scientific and Cultural Organization (UNESCO). Hatibu and Hafidh (2021) also reported that the education and training systems in some African countries sometimes do not comply with international standard and global technological changes. A situation where the above subsists, impact of education spending is not likely to be felt in manufacturing productivity.

Investment in health has negative and statistically insignificant impact on manufacturing productivity in Nigeria. On the average, a unit increase in investment in health will result to about -0.7% decrease in manufacturing sector in Nigeria. The implication of the above is that manufacturing productivity declines with increase in healthcare expenditure. This does not conform with theoretical expectation. Expenditure on health leads to sound health and should increase productivity (Anowor et al., 2020; Eme et al., 2014). From the standpoint of theory, this deviation could be as a result of the verity, as reported by Anowor et al. (2020) that 70% of the total cost of healthcare is borne by the private sector thus little is left for the worker to take care of other needs for improving livelihood and building of other human capital components. This also explains the reason for the insignificant impact of healthcare expenditure on manufacturing productivity in Nigeria.

Manufacturing capacity utilization has negative and statistically insignificant impact on manufacturing productivity in Nigeria. On the average, a unit increase in manufacturing capacity utilization will result to about -0.89% decrease in manufacturing output in Nigeria. This does not conform to theoretical expectation. Reasons for statistically insignificant impact of manufacturing capacity utilization on manufacturing productivity in Nigeria could be ascribed to inadequate infrastructure, particularly power supply (Ojo & Oyebanjo, 2017; IMF, 2022), high cost of credit facilities and inadequate funding (Adeniyi et al., 2019), bureaucratic bottlenecks and regulatory challenges (Ogbonna & Oladele, 2018; World Bank, 2022), insecurity, ethnic-sectional conflicts, and political instability (AfDB, 2022), technological backwardness and skills gap (Ojo & Oyebanjo, 2017).

Conclusion and Recommendation

The relevance of manufacturing productivity in the recalibration of economic structures of any country that wants to remain competitive is indubitable. Within the Fourth Industrial Revolution, manufacturing productivity growth in Nigeria has been stagnated. The current study, therefore, investigates the potential of human capital investments to revitalize productivity and drive competitiveness in the sector. The theoretical logic of endogenous growth models emphasizes human capital investment as principal determinant of economic progress. Human capital accumulation, as highlighted in extant literature, is crucial as it enables the development of skills and capacities, empowering individuals and enhancing their prospects for innovative entrepreneurial ventures, securing or creating employment. Empirical studies have demonstrated that investing in human capital accumulation yields significant returns, including improved employability and increased productivity (see: Becker, 1962; Lucas, 1988; Barro, 2001; Acemoglu and Pischke, 2001; Anowor et al., 2023).

This study identifies significant barriers to developing the human capital necessary to stimulate manufacturing productivity in Nigeria. Currently, the fundamental mechanisms for building human capacity are significantly deficient, hindering effective development. Existing human capacity building programmes are severely understaffed, underfunded and inadequately structured. If these issues persist, they will further erode Nigeria's production base, exacerbate unemployment and poverty, and deteriorate the country's macroeconomic outlook. This paper reveals significant discrepancies between theoretical assumptions and empirical evidence regarding the link between manufacturing productivity and human capital investment in Nigeria. Specifically, the findings suggest that human capital investment has a weaker impact on productivity growth than predicted by theory, highlighting the need for targeted policy intervention. Furthermore, the analysis reveals that the specified variables have no statistically significant effect on manufacturing productivity.

To address these issues, proactive measures must be taken to devise a strategy that enhances Nigeria's manufacturing competitiveness through the deliberate promotion of sustainable, long-term education and healthcare systems capable of competing globally. By 2023 estimates, Nigeria's average manufacturing capacity utilization stands at a remarkably low 40-50%. Her manufacturing capacity utilization lags behind global averages (70-80%). To address this, a multifaceted approach is necessary, encompassing measures to upgrade education and healthcare, address infrastructural deficits, bridge technology and skill gaps, improve funding, and alleviate structural rigidities. Nigeria's power sector has been operating at less than 40% of its installed capacity utilization in the last 40 years (AfDB, 2020; World Bank, 2020). Addressing this challenge, along with others mentioned, is crucial for improving manufacturing capacity utilization. Considering all factors, Nigeria requires a comprehensive transformation to optimize input-factor utilization and diversify its production base. To achieve economic diversification, Nigeria should focus on developing its manufacturing sector, which is crucial for sustainable development (UNIDO, 2019). By prioritizing the growth of the manufacturing sector, Nigeria can drive rapid technological changes and knowledge absorption, foster positive externality effects, transfer knowledge to other sectors, and boost overall output.

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References

Acemoglu, D., Gallego, F. A., & Robinson, J. A. (2014). Institutions, human capital, and development. *Annu. Rev. Econ.*, 6(1), 875-912. Acemoglu, D., & Pischke, J. S. (2001). Changes in the wage structure, family income, and children's education. *Journal of Economic Literature*, 39(3), 771-792.

Adeyeye, M. O. (2019). Total productive maintenance and manufacturing performance: Evidence from Nigerian manufacturing firms. *International Journal of Production Research*, 57(11), 3610-3624.

African Development Bank (AfDB). (2020). *Nigeria Country Report*. https://www.afdb.org/en/countries/west-africa/nigeria

African Development Bank. (AfDB). (2022). *Nigeria Economic Outlook*. https://www.afdb.org/en/countries-west-africa-nigeria/nigeria-economic-outlook

Agbarakwe, H. U., Anowor, O. F. & Ikue J. (2018). Foreign resources and economic growth in English speaking ECOWAS countries. *Opción (Universidad del Zulia, Venezuela),* 34 (14), 117–136.

Aghion, P., & Howitt, P. (1997). *Endogenous Growth Theory*. MIT press.

Akbari, M., Moayedfar, R., & Jouzaryan, F. (2012). Analysis of short run and long run effects of human capital on the economic growth in Iran. *Economics and Finance Review*, 1(11), 01–09.

AL-Takhayneh, S. K. (2023). Does Unconscious Bias Affect Psychological Well-being in Ideological and Political Education? Moderating Effects of Self-regulation and Mind Awareness, ***Ikenga International Journal of African Studies*, 25(1), 1-27**

Anowor, O. F., Achukwu I. I. & Ezekwem, O. S. (2014). Sustainable Sources of Energy and the Expected Benefits to Nigerian Economy. *International Journal of Sustainable Energy and Environmental Research (Asian Economic and Social Society – Pak Publishing Group).* 3(2),110-120.

Anowor, O. F., Anigbo, G. C., Chibuzo, A. C., & Ogwuru, H. O. R. (2022) Information and communication technology and quality of products of food manufacturing firms: Case of South-South Nigeria. *Discovery*, 58(317), 453-459.

Anowor, O. F., Chibuzo, A. C., Anigbo, G. C., & Ukpere, W. I. (2025). Expanding the Youth Employability in Nigeria Through Digital Skills Acquisitions as Pathways in Advancing Sustainable Development Goals. *Journal of Lifestyle and SDGs Review*, 5(10), e08136.

Anowor, O. F., Eze, B. N., & Ukpere, W. I. (2025), Sustaining economic growth: the roles of human capital investment, physical capital, and price stability. *Annals of Spiru Haret University. Economic Series*, 25(4), 207–214

Anowor, O. F.; Ichoku, H. E., Onodugo, V. A., Ochinanwata, C. & Uzomba, P. C. (2023). Does investment in education and health impact youth employment outcomes? Evidence from Sub-Saharan Africa, *Cogent Economics & Finance*, 00: 2160128

Anowor, O. F.; Ichoku, H. E. & Onodugo, V. A. (2020), Nexus between healthcare financing and output per capita: Analysis of countries in ECOWAS sub-region, *Cogent Economics & Finance*, 8 (1): 1832729

Anowor, O. F., Ukwueni, N. O., Ezekwem, O. S. & Ibiam, F. O. (2013). Foreign direct investment and manufacturing sector growth in Nigeria. *International Journal of Advanced Scientific and Technical Research.* 3(5),231–254.

Aoki, M. (1990). Toward an economic model of the Japanese firm, *Journal of Economic Literature*, 28(1), 1-27.

Appelbaum, E., Bailey, T., Berg, P., & Kalleberg, A. (2000). *Manufacturing advantage: Why high-performance work systems pay off*. Cornell University Press.

Argote, L., & Ingram, P. (2000). Knowledge transfer: A basis for competitive advantage in firms. *Organizational Behavior and Human Decision Processes*, 82(1), 150-169.

Barney, J. (991). Firm resources and sustained competitive advantage. *Journal of Management*. 17 (1): 99–120.

Barro, R. J. (1991). Economic growth in a cross section of countries. *The Quarterly Journal of Economics*, *106*(2), 407–443.

Barro, R. J. (2001). Human Capital and Growth. *The American Economic Review*, 91(2), 12–17.

Bartel, A. P. (1994). Productivity gains from investments in employee training. *Journal of Labor Economics*, 12(2), 151-172.

Bartel, A. P., & Lichtenberg, F. R. (1987). The comparative advantage of educated workers in implementing new technology. *Review of Economics and Statistics*, 69(1), 1-11.

Baumol, W. J. (1993). *Entrepreneurship, management, and the structure of payoffs*. MIT Press.

Becker, G. S. (1962). Investment in human capital: A theoretical analysis. *Journal of Political Economy*, 70(5), 9-49.

Becker, G. S. (1964). *Human capital: A theoretical and empirical analysis, with special reference to education*. University of Chicago Press.

Benhabib, J., & Spiegel, M. (1994). The Role of Human Capital in Economic Development: Evidence from Aggregate Cross-Country Data. *Journal of Monetary Economics, 34*(1), 143-73.

Black, S., & Chow, E. (2022, June). Job Mobility in Australia during the COVID-19 Pandemic. Reserve Bank of Australia.

Bouncken, R. B., & Wiedmann, K. (2015). The impact of international diversity on innovation. *Journal of International Business Studies*, 46(2), 169-187.

Cohen, W. M., & Levinthal, D. A. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, 35(1), 128-152.

DiMaggio, P.J., & Powell, W.W. (1983) The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *American Sociological Review*, 48, 147-160.

Eme, O. I., Uche, O. A., & Uche, I. B. (2014). Building a Solid Health Care System in Nigeria: Challenges and Prospects. *Academic Journal of Interdisciplinary Studies, 3*(6), 501 - 510.

Etuk, A. R. & Ibuot, E.J. (2024). Coloniality of knowledge: Re-positioning Africa in knowledge production. ***Ikenga International Journal of African Studies*, 25(1), 1-25**

Fitriana, R., Zarkasyi, W., Suharman, H., & Sukmadilaga, C. (2024). Corporate social responsibility (CSR) towards employees, risk management quality and corporate sustainability performance: Mediation of corporate performance. ***Ikenga International Journal of African Studies*, 25(1), 1-34.**

Griliches, Z. (1986). Productivity, R&D, and basic research at the firm level in the 1970s. *American Economic Review*, 76(1), 141-154.

Hausman, J. (2002). Sources of innovation and productivity growth. *Economics of Innovation and New Technology*, 11(2), 117-135.

Hatch, N. W., & Dyer, J. H. (2004). Human capital and learning as a source of sustainable competitive advantage. *Strategic Management Journal*, 25(12), 1155-1178.

Hatibu, S. H., & Hafidh, H. A. (2021). Entrepreneurship Factors Contributing to Youth Employment in the EAC Countries Data and Policy Analysis. *Asian Journal of Economics, Business and Accounting*, *21*(5), 66–83.

Huselid, M. A. (1995). The impact of human resource management practices on turnover, productivity, and corporate financial performance. *Academy of Management Journal*, 38, 635-672.

Ichniowski, C., & Shaw, K. (1999). The effects of human resource management practices on productivity. *American Economic Review*, 89(3), 291-313.

Ihensekhien, O. A. (2023). Human capital development and industrial sector growth in Nigeria*. Nigerian Journal of Management Sciences*, 24(2b).

International Monetary Fund. (2022). *Nigeria: Staff Report for the 2022 Article IV Consultation*. https://www.imf.org/en/publications/cr/issues/2023/02/16/nigeria-2022-article-iv-consultation-press-release-staff-report-and-statement-by-the-529842

International Labour Organization. (2019). *World Employment and Social Outlook: Trends 2019*. https://www.ilo.org/sites/default/files/wcmsp5/groups/public/%40dgreports/%40dcomm/%40publ/documents/publication/wcms_670542.pdfJajri, I., & Ismail, R. (2012). An Analysis of Relationship Between Human Capital and Economic Growth. *Life Science Journal*, 9(4), 3735-3742.

Kahn, J. R., & Lim, J. (2002). Human capital and economic growth in developing countries. *Journal of Economic Development*, 27(1), 1-15.

Lall, S., & Wignaraja, G. (1997). Sri Lanka's industrial development: Achievements and challenges. *World Development*, 25(5), 747-758.

Lawler, E. E. (1986). *High-involvement management: Participative strategies for improving organizational performance.* Jossey-Bass Publishers.

Lim, J. (2021). Labor Market Polarization and the Decline of Routine Jobs. *Journal of Labor Economics*, 39(2), 387-410.

Lucas, R. E. (1988). On the mechanics of economic development. *Journal of Monetary Economics*, 22(1), 3-42.

Mohapatra, S., & Ratha, D. (2010). Impact of remittances on household income, asset building, and savings in Ghana *World Development* 50, 24-40.

Mottaleb, K. A. (2011). Innovation and productivity in developing countries. *Journal of Industrial Economics*, 59(2), 149-166.

Mincer, J. (1974). *Schooling, experience, and earnings*. Columbia University Press.

Mincer, J. (1996). Economic development, growth of human capital, and the dynamics of the wage structure. *Journal of Economic Growth* 1, 29–48.

Nwonye, N. G., Anowor, O. F., Okoh, J. I., Okanya, O. C., Obayi, P. M., Mbah, P. C., Onwumere, J. U. J., Ojeh, A., & Onuselogu, O. C. O. (2023). Government Expenditures, Foreign Aid and Remittances: A Review of Income Inequality in Nigeria, *African Journal of Business and Economic Research (AJBER)*, 18, (3), 187–209.

Odior, E. S. O. (2014). Government expenditure on education and poverty reduction: Implications for achieving the MDGs in Nigeria, a computable general equilibrium micro-simulation analysis. *Asian Economic and Financial Review*, 4(2), 150–172.

Ogbonna, E. O., & Oladele, A. O. (2018). An Empirical Analysis of Manufacturing Capacity Utilization in Nigeria. *International Journal of Production Economics*, 201, 143-153.

Ojo, O. A., & Oyebanjo, O. O. (2017). Assessment of Manufacturing Capacity Utilization in Nigeria. *Journal of Manufacturing Technology Management*, 28(5), 694-709.

Onodugo, V. A., Anowor, O. F., Ifediora, C. & Aliyu, N. (2019). Evaluation of Supply Chain Management Effects on Consumer Preference for Cowpea Quality Features and Price Trend in Niger State. *International Journal of Supply Chain Management*, 8(3), 503 – 516.

Onodugo, V. A., Anowor, O. F., & Ofoegbu, G. N. (2018). The effectiveness of monetary policy in tackling inflation in emerging economy. *Opción (Universidad del Zulia, Venezuela)*, 34(14), 314 – 355

Onodugo, V. A., Kalu, I.. E. & Anowor, O. F. (2013). An Empirical Analysis of the Impact of Investment in Human Capital on Nigerian Economy. *PARIPEX– Indian Journal of Research.* 2 (4), 336 -339.

Onodugo, V. A., Nwonye, N. G., Anowor, O. F., *&* Ofoegbu, G. N. (2019). Attaining Inclusive Growth in a Developing Economy on the Wings of Micro, Small and Medium Scale Enterprises, *Amazonia Investiga*, 8(24), 239 – 252.

Rebelo, S. T. (1991). Long-run policy analysis and long-run growth. *Journal of Political Economy*, *99*, 500–521.

Romer, P. (1986). Increasing returns and long-run growth. *Journal of Political Economy*, *94*(5), 1002-1037.

Romer, P. (1990). Endogenous technological change. *Journal of Political Economy*, *98*(5), 71-102.

Romer, P. M. (1990). Human capital and technology in the raw materials industries. In R. E. Lucas Jr. (Eds.), *Studies in business-cycle theory* (pp. 223-244). MIT Press.

Schultz, T. W. (1961). Investment in human capital. *American Economic Review*, 51(1), 1-17.

Senker, P., & Brady, T. (1989). Industrial relations and technical change. *Journal of Management Studies*, 26(2), 147-164.

Shane, S. (2003). *A general theory of entrepreneurship: The individual-opportunity nexus*. Edward Elgar Publishing.

Škare, M., & Lacmanović, S. (2015). Human capital and economic growth: a review essay. *Amfiteatru Economic*, 17(39), 735-760.

Solow, R. M. (1956). A contribution to the theory of economic growth. *The Quarterly Journal of Economics*, 70(1), 65–94.

Stahl, G. K., Björkman, I., & Morris, S. (2017). The role of human capital in innovation. *Journal of Management*, 43(5), 1331-1353.

Swan, T. W. (1956). Economic growth and capital accumulation. *Economic Record*, 32(2), 334–361.

Syverson, C. (2011). What Determines Productivity? *Journal of Economic Literature* 49 (2): 326–65.

United Nations Industrial Development Organization. (2019). Industrial Development Report 2019. https://www.unido.org/publications/industrial-development-report-seriesVan der Sluis, J., Van Praag, M., & Vijverberg, W. (2005). Entrepreneurship selection and performance: A meta-analysis of the impact of education in developing economies. *World Bank Economic Review*, 19(1), 1-27.

Verhoef, P. C., & Donkers, B. (2004). The impact of customer satisfaction on customer loyalty. *Journal of Service Research*, 6(4), 305–320.

World Bank. (2020). Nigeria Economic Update: Reviving Growth. https://www.worldbank.org/en/country/nigeria/publication/nigeria-economic-update-resilience-through-reforms

World Bank. (2022). Nigeria Overview. https://www.worldbank.org/ext/en/country/nigeria