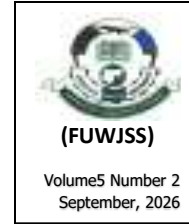


HUMAN CAPITAL, EMPLOYMENT AND SUSTAINABLE DEVELOPMENT IN NIGERIA

Oladimeji Abeeb Olaniyi¹, Adewale Mathew Adekanmbi², Tajudeen Adewale Olanrewaju³, Margaret Abidemi Olomola⁴ & Oluwasanmi Oyedeji⁵



^{1,4}Department of Economics, University of Ilesha, Nigeria.

Email: oladimeji_olaniyi@unilesa.edu.ng;

margaret_olomola@unilesa.edu.ng

³Department of Economics, Dominion University, Ibadan, Nigeria

Email: adekbi@yahoo.com

³Osun State University, Osogbo, Nigeria

Email: olanrewajutajudeen40@gmail.com

⁵Department of Liberal Studies, Economics Unit, The Federal Polytechnic, Ado-Ekiti.

Email: oyedejioluwasanmi@yahoo.com.

Corresponding Email: oladimeji_olaniyi@unilesa.edu.ng

Abstract

This study investigates the short-run and long-run relationship between human capital development, employment and sustainable development in Nigeria from 1990 to 2024 using the Johansen Cointegration and Vector Error Correction Model (VECM). The results reveal that human capital development and employment have significant positive impacts on sustainable development in both the short and long run, implying that investment in education, skills and health enhances productivity and improves welfare. However, labour force growth exhibits a negative effect, suggesting that rapid labour expansion without adequate job creation can impede human development progress. Inflation shows an insignificant effect, indicating that macroeconomic instability weakly influences sustainable development outcomes. The study concludes that human capital formation and productive employment are critical drivers of sustainable development in Nigeria. The study recommends increased investment in education, healthcare and technical training, alongside policies that promote job creation, macroeconomic stability and innovation-driven growth in achieving sustainable development.

Keywords: Human capital, employment, VECM, sustainable development

JEL Codes: I25, J21, Q01, O15, O55

Introduction

Human capital development, employment, and sustainable development are three critical pillars in the architecture of modern economic and social

improvement. At the universal level, human capital development through education, healthcare, and skill acquisition are widely recognized as a central driver of national productivity and inclusive growth. According to the World Bank (2020), countries with high levels of investment in human capital, such as Finland, South Korea, and Singapore, has successfully transitioned from low-income to high-income economies within decades. These transitions were powered by quality education systems, a healthy workforce, and strategic policies that linked labour market needs to sustainable development priorities.

From a continental perspective, Africa presents a contrasting situation. Although it boasts one of the youngest and fastest-growing populations globally, the continent struggles to translate this demographic asset into economic growth and development. The African Development Bank (2022) noted that over 60% of Africa's unemployed are young people. This inconsistency rising education rates with persistent unemployment suggests that human capital development is often misaligned with labour market demands. Across the continent, insufficient investment in technical and vocational education, weak healthcare systems, and limited access to innovation and technology undermine the realization of decent employment and sustainable development.

In the West African sub-region, and particularly in Nigeria, the disconnect is even more pronounced. Nigeria has the largest population in Africa, with a youth demographic constituting over 60% of the total population. Despite this, youth unemployment rate is more than 40%, with a significant proportion of the workforce engaged in low-productivity, informal sector activities (National Bureau of Statistics, 2023). The disconnect between educational output and labour market requirements results in an oversupply of unskilled and semi-skilled graduates in an economy lacking the absorptive capacity for meaningful employment. Consequently, Nigeria's vast human capital potential remains largely untapped, and progress toward sustainable development remains slow.

Human capital development encompasses investments in education, health, skills training, and capacity building inputs essential for raising labor productivity and economic competitiveness. Employment, meanwhile, reflects the extent to which a country can translate these investments into productive economic engagement. Sustainable development aims to balance economic growth with social inclusion and environmental responsibility. The interaction of these variables is critical for realizing long-term prosperity. When they are harmonized, a nation can foster inclusive growth, promote innovation, and ensure intergenerational equity.

In many developed economies, the synergy between human capital and employment has been key to achieving high standards of living, low poverty

rates, and technological advancement. However, in Nigeria, the lack of strategic coherence between human capital investment and job creation has stalled national development. For instance, while Nigeria produces over 500,000 university graduates annually, a significant proportion are unable to find employment within their field or remain unemployed altogether. This trend indicates structural inefficiencies in the education system and a failure to tailor learning outcomes to labor market demands (Olowookere et al., 2022).

Moreover, the high rate of informal employment, where workers lack job security, social protection, and access to formal training further weakens the link between human capital development and sustainable development. Informality not only limits earnings and productivity but also impedes access to healthcare and lifelong learning, both of which are essential for adaptive and resilient workforces. The consequence is a labor market that cannot support a sustainable economic model or lift large segments of the population out of poverty (Ugege et al., 2024).

Despite Nigeria's substantial demographic potential and years of public sector reform in education and healthcare, the country continues to suffer from high unemployment, skills mismatch, and slow progress toward sustainable development. While the youth population continues to expand, job creation has not kept pace. The Nigerian education system often fails to equip graduates with practical or technical skills demanded by the labor market, and there is insufficient investment in vocational and informal sector training.

Empirical studies reinforce this disconnect. Olowookere et al. (2022) found that public investment in health and education had a statistically significant impact on poverty reduction, but the effect was limited by policy implementation gaps and weak coordination between sectors. Similarly, Ogbeide-Osaretin et al. (2024) showed a strong feedback effect between human capital and income inequality. Their findings revealed that while education spending reduces inequality in the long run, its short-term impact is often undermined by inadequate employment creation, especially in underserved communities.

The persistent lack of synergy between human capital development and employment policy is also evident in Nigeria's failure to fully harness emerging sectors such as renewable energy, green construction, and the digital economy. These sectors offer high employment potential but require new skill sets that the existing educational system does not adequately address. As a result, sustainable development remains elusive, and poverty levels remain stubbornly high despite economic growth in select sectors. This study is therefore necessary to examine the extent to which human capital development influences employment and contributes to sustainable

development in Nigeria, drawing on recent empirical evidence to inform practical, evidence-based policy interventions.

Human Capital Development and Employment Generation in Post-Colonial Nigeria

The concepts of human capital development, employment, and sustainable development are interconnected but distinct. Human capital refers to the stock of knowledge, skills, competencies, and attributes embodied in individuals that facilitate the creation of personal, social, and economic well-being (OECD, 2001). Schultz (1961) introduced the term to highlight the importance of investing in people through education, healthcare, and training as a means to improve productivity and national wealth.

Employment encompasses the engagement of individuals in productive economic activities that yield income and contribute to societal development. It is a vital outcome of human capital investment and a necessary factor for sustainable economic growth. According to the International Labour Organization (ILO, 2019), decent employment is a critical pathway out of poverty and inequality.

Sustainable development, as defined by the Brundtland Commission (1987), is “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” It involves economic growth that is inclusive, environmentally sound, and socially equitable. The integration of human capital development and employment within a sustainability framework ensures that economic development is not only achieved but also maintained over the long term. In the Nigerian context, these three concepts are central to the nation's development agenda. However, challenges such as poor-quality education, high youth unemployment, inadequate vocational training, and environmental degradation have hindered their synergy and full realization.

Empirical Review

Numerous empirical studies have explored the relationships between human capital development, employment, and sustainable development, both globally and within Nigeria. The findings are summarized below. Adebayo and Ogunsakin (2015) conducted a study using time-series data to examine the relationship between educational attainment and employment rates in Nigeria. Their findings revealed that higher education positively correlates with employment, but that the quality and relevance of education are critical factors. The mismatch between graduates' skills and labor market needs was identified as a major cause of graduate unemployment.

Also, Okwu et al. (2013) conducted a cross-sectional study on vocational and technical education's impact on employability. Their results indicated that skill acquisition significantly enhances employment chances among youths, suggesting that technical and vocational education and training (TVET) programmes could be effective strategies for addressing youth unemployment. More also, Oladeji and Oladipo (2021) analyzed panel data across Nigerian states and found that investments in both education and healthcare not only improve employment rates but also increase labor productivity, indicating the multi-dimensional role of human capital in employment creation. This is consistent with the findings of Okuneye et al., (2023).

Furthermore, Okafor (2011) used qualitative analysis to investigate the implications of youth unemployment for democratic stability in Nigeria. His findings linked high youth unemployment rates to increased crime, social unrest, and threats to national security, emphasizing that employment is not just an economic issue but also a political and social stability concern.

In the same vein, Akinyemi et al. (2017) employed econometric models to demonstrate that employment generation in agriculture and manufacturing significantly reduces poverty and fosters inclusive growth, thus contributing directly to sustainable development indicators such as improved health, education, and social stability.

The recent work by Eze and Okonkwo (2022) used SDG indicators and employment data to empirically establish that Nigerian regions with higher employment rates outperform others on health, education, and poverty reduction metrics, suggesting a direct link between employment and sustainable development outcomes. More also, Ogundari and Awokuse (2018) analyzed Sub-Saharan African data, including Nigeria, and confirmed that both education and health significantly influence sustainable development outcomes such as GDP growth, poverty reduction, and life expectancy. They emphasized that quality investments in education and healthcare can create a virtuous cycle of development.

Also, Yusuf and Omoniyi (2020) studied the impact of government spending on education and health using time-series data for Nigeria. Their findings showed that increased public expenditure on human capital development leads to substantial improvements in economic and social development indicators, reinforcing the importance of governance and efficient resource allocation. A very recent study by Bello and Ibrahim (2023), using structural equation modeling (SEM), provided evidence that poor human capital development is one of the greatest threats to Nigeria's achievement of the SDGs. They advocate for comprehensive reforms in educational quality, teacher training, healthcare infrastructure, and

institutional accountability as prerequisites for long-term sustainable development.

The literature overwhelmingly supports the importance of human capital development and employment in driving sustainable development in Nigeria. However, several gaps remain: Most studies examine isolated aspects of the problem rather than the dynamic and simultaneous interaction among human capital development, employment, and sustainable development also there is a lack of longitudinal studies that explore long-term effects and causality. Few studies employ advanced econometric models capable of capturing complex interdependencies and there is limited attention has been given to regional disparities within Nigeria, despite wide variations in human capital investment, employment rates, and development outcomes across states.

Human Capital Theory, largely credited to Schultz (1961) and Becker (1964), posits that individuals, groups and nations can enhance their productivity and income through investments in education, health, and training. According to this theory, the knowledge, skills, competencies, and health status of a population directly contribute to economic growth, innovation, and competitiveness. Education improves cognitive abilities, while health enables individuals to participate actively in the labor market, thereby enhancing national productivity (Becker, 1993).

In the Nigerian context, the Human Capital Theory suggests that the country's abundant population can be a source of competitive advantage if investments are made to develop their capabilities (Okojie, 2011; Ogunade, 2011). Unfortunately, widespread underinvestment in education and healthcare continues to limit the full realization of Nigeria's human capital potential (World Bank, 2023). The theory highlights why nations with higher human capital stocks tend to experience faster and more inclusive economic growth.

Limitations of the theory include its strong focus on individual returns to education and health without adequately considering structural labor market conditions, institutional weaknesses, or income inequality, all of which are highly relevant in Nigeria. Keynesian theory, as advanced by Keynes (1936), argues that employment levels are driven primarily by aggregate demand. In situations of insufficient demand, such as economic recessions, government interventions through fiscal and monetary policy are necessary to stimulate demand and create employment opportunities. Public investments in infrastructure, public works, and social programs are considered effective mechanisms for generating employment (Akanbi, 2015). For Nigeria, Keynesian theory provides a useful explanation for persistent unemployment and underemployment, even when human capital is available. Despite the growing number of educated graduates, demand-

side deficiencies such as low industrial capacity, weak infrastructure, and lack of private sector investment limit job opportunities (Adebayo, 2014; NBS, 2023). Keynesian solutions would call for proactive government spending to boost demand and create jobs, particularly in sectors such as agriculture, manufacturing, ICT, and green energy.

Endogenous Growth Theory, popularized by Romer (1986) and Lucas (1988), builds upon Human Capital Theory by integrating knowledge accumulation and innovation as engines of long-term growth. Unlike exogenous models that attribute growth to external factors, endogenous growth emphasizes that investments in human capital, R&D, and technology create self-sustaining growth cycles.

In Nigeria, endogenous growth theory suggests that policies focusing on knowledge-intensive sectors, innovation ecosystems, and research institutions can yield long-run dividends in employment and sustainable development (Eboh, 2011). Universities, research centers, and private sector partnerships thus become critical components of a nation's growth infrastructure. Sustainable Development Theory, advanced by Barbier (1987) and Pearce et al. (1989), emphasizes a holistic approach that integrates economic growth, social inclusion, and environmental sustainability. It suggests that true development must be ecologically viable, socially equitable, and economically prosperous. In Nigeria, sustainable development theory advocates for balanced investments in human capital, job creation, poverty reduction, and environmental stewardship. Oil-dependent economic growth, which has dominated Nigeria's development for decades, has led to environmental degradation and social inequities. The theory supports diversification efforts into sectors such as renewable energy, green agriculture, eco-tourism, and sustainable manufacturing (Olomola, 2014; UNDP, 2023).

Theoretical Framework

The Human Capital Theory, propounded by Schultz (1961) and Becker (1964), serves as the foundation of this study, emphasizing that investments in education, health, and skills enhance individual productivity and contribute to national economic growth. The theory posits that when a nation channels resources into human development, it builds a more skilled, innovative, and productive workforce capable of driving employment and sustainable development. In Nigeria's context, the theory explains that inadequate investment in human capital leads to low labor productivity, high unemployment, and slow progress toward sustainable development. Thus, strengthening education, healthcare, and vocational training is essential for transforming Nigeria's large population into a productive asset that promotes inclusive growth and long-term sustainability.

Research Methodology

The theoretical foundation of Human Capital Theory suggests that investment in human capital enhances productivity and economic growth through better employment outcomes. Building on this, the study models sustainable development which was proxy by Human development index (HDI) as a function of human capital development (HCI), employment (EMP), and Labour and control variables (Inflation)

The functional relationship is expressed as:

$$HDI = f(HCI_t, EMP_t, LABO, INF_t) \dots \dots \dots (1)$$

The econometric form of the model is:

$$HDI = \beta_0 + \beta_1 HCI_t + \beta_2 EMP_t + \beta_3 LABO + \beta_4 INF_t + \mu_t \dots \dots \dots (2)$$

Where:

- HDI = Human Development Index
- HCI_t = Human Capital Index
- EMP_t = Employment rate
- $LABO$ = Labour
- INF_t = Inflation rate
- μ_t = Error term

The coefficients β_1 and β_2 are expected to be positive, implying that higher human capital development and increased employment promote sustainable development.

Results and Discussions

Unit Root Test

Unit root test was carried out on all the variables of interest in the study using augmented Dickey-Fuller (ADF) to determine the stationarity of the dataset used for this study. Unit root test is based on the standard regression;

$$\Delta X_t = \alpha + \beta X_{t-1} \sum_{j=1}^p \gamma_j \Delta X_{t-j} + \mu_t \dots \dots \dots (3)$$

Where; Δ is the difference operator, X consists of each of the five variables in the model, $t = 1, \dots$, is an index of time; ΔX_{t-j} is the lagged first differences to accommodate serial correlation in errors; and μ_t is the error term.

The table below shows the results of the Augmented Dickey Fuller (ADF) unit root test for each time series at the level and first difference. The null hypothesis $H_0: \sigma = 0$ indicates that the variable is non-stationary, while the alternate hypothesis $H_1: \sigma = 0$ means that the variable is stationary.

Table 1: Augmented Dickey Fuller (ADF) Unit Root Test

AUGMENTED DICKEY FULLER (ADF)			
Variable	T-Statistics	Critical Value	Order
HDI	-6.3195	-2.9571	I(1)
HCI	-4.4878	-2.9571	I(1)
EMP	-3.9823	-2.9604	I(1)
LABO	-3.4133	-2.9763	I(1)
INF	-4.6452	-2.9571	I(1)

Source: Author's Computation 2026

The Augmented Dickey-Fuller (ADF) unit root test results presented in the table above reveal that all the variables Human Development Index (HDI), Human Capital Index (HCI), Employment (EMP), Labour Force (LABO), and Inflation (INF) are stationary at their first differences, as their respective t-statistics exceed the 5% critical values in absolute terms. This indicates that the null hypothesis of non-stationarity is rejected for all series after first differencing, confirming that each variable is integrated of order one, I(1).

Johansen Cointegration Test Results

The Johansen cointegration test results reveal the existence of a long-run relationship among the variables under study, HDI, HCI, EMP, LABO, and INF. The trace test indicates two cointegrating equations, while the maximum eigenvalue test confirms one at the 5% significance level, as their respective statistics exceed the critical values with p-values below 0.05. This suggests that the variables move together over time, implying a stable long-term equilibrium relationship.

Table 2: Johansen Cointegration Test Results

Test Type	Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.	Max-Eigen Statistic	0.05 Critical Value	Prob.
Trace Test	None *	0.668770	84.61940	69.81889	0.0021	36.46314	33.87687	0.0240
	At most 1 *	0.442175	48.15626	47.85613	0.0468	19.26243	27.58434	0.3945
	At most 2	0.390632	28.89383	29.79707	0.0635	16.34599	21.13162	0.2053
	At most 3	0.263262	12.54785	15.49471	0.1325	10.08224	14.26460	0.2066
	At most 4	0.071992	2.465605	3.841465	0.1164	2.465605	3.841465	0.1164

Source: Author's Computation 2026

Correlation Matrix

The correlation results in the table below reveal a strong positive association between HDI and HCI ($r = 0.9874$), indicating that human capital improvements significantly enhance human development in Nigeria. Conversely, EMP shows a negative correlation with both HDI and HCI, suggesting that employment growth may not always translate into higher

human development, possibly due to job informality or low wages. LABO has a moderate positive relationship with HDI and HCI, implying that labor participation supports development outcomes, while INF demonstrates a weak negative correlation with development indicators, showing that inflation can dampen human welfare gains.

Table 3: Correlation Matrix Results

Variables	HDI	HCI	EMP	LABO	INF
HDI	1.0000	0.9874	-0.6156	0.4445	-0.3375
HCI	0.9874	1.0000	-0.6165	0.3530	-0.3755
EMP	-0.6156	-0.6165	1.0000	-0.0917	0.2465
LABO	0.4445	0.3530	-0.0917	1.0000	0.0193
INF	-0.3375	-0.3755	0.2465	0.0193	1.0000

Source: Author's Computation 2026

Vector Error Correction Model (VECM) Results

The Vector Error Correction Model (VECM) results reveal that human capital development, employment, labour force growth, and inflation exert varying effects on sustainable development in Nigeria. The error correction term (ECT) is positive and statistically significant with a coefficient value of 0.12310 and a t-statistic of 7.51627. This indicates the existence of a long-run equilibrium relationship among the variables. The significance of the ECT confirms that deviations from long-run equilibrium are corrected over time at a speed of approximately 12.3% annually. This implies that whenever disequilibrium occurs in the system, the variables gradually adjust toward long-run stability.

The coefficient of human capital development (HCI) is positive (0.14011) and statistically significant with a t-statistic of 3.66527. This result implies that improvements in education, healthcare, and skill acquisition significantly enhance sustainable development in Nigeria. Specifically, a unit increase in human capital development leads to an increase in human development outcomes. The result suggests that investments in education and health improve labour productivity, innovation, income generation, and social welfare, thereby strengthening sustainable development. The finding aligns with the argument that countries with stronger human capital accumulation tend to experience better economic and social outcomes because productive and skilled individuals contribute more effectively to national growth and welfare improvement.

Employment (EMP) also exhibits a positive and significant relationship with sustainable development, with a coefficient value of 3.37978 and a t-

statistic of 2.06744. This indicates that increased employment opportunities significantly improve human development in Nigeria. The result implies that productive employment enhances income generation, reduces poverty, improves living standards, and promotes social inclusion. Employment serves as a major channel through which human capital contributes to development because educated and skilled individuals require productive jobs to utilize their capabilities effectively. Therefore, the finding demonstrates that sustainable development depends not only on human capital formation but also on the economy's capacity to absorb labour into productive sectors.

However, labour force growth (LABO) shows a negative and statistically significant coefficient of -1.52655 with a t-statistic of -4.42515. This indicates that rapid labour force expansion without corresponding employment opportunities negatively affects sustainable development in Nigeria. The result suggests that increasing population and labour supply may become a developmental burden when the economy fails to generate adequate jobs. Rising labour force participation without productive engagement can increase unemployment, underemployment, dependency ratio, poverty, and social instability. This finding reflects the structural realities of the Nigerian economy where labour market expansion has not been matched by sufficient industrial growth and job creation.

Inflation (INF) carries a negative coefficient of -14.66495 but remains statistically insignificant with a t-statistic of -0.51014. This implies that inflation exerts a weak negative influence on sustainable development during the study period. Although rising prices may reduce purchasing power and weaken welfare conditions, the insignificant result suggests that inflation was not a major determinant of sustainable development compared to human capital and employment variables. The finding may indicate that structural economic challenges such as unemployment, poor human capital investment, and labour market inefficiencies exert stronger influences on development outcomes in Nigeria than inflation alone.

The overall goodness of fit of the model is high, as indicated by the R-squared value of 0.9592 and adjusted R-squared value of 0.9356. This means that approximately 95.9% of the variations in sustainable development are explained by the explanatory variables included in the model. The result confirms that human capital development, employment, labour force growth, and inflation collectively play substantial roles in explaining sustainable development outcomes in Nigeria. The Akaike Information Criterion (AIC) and Schwarz Criterion (SC) values further indicate that the model is statistically stable and appropriate for analysis.

These findings therefore suggest that sustainable development in Nigeria is largely driven by effective human capital investment and

productive employment generation, while uncontrolled labour force expansion without adequate job opportunities undermines development progress.

Table 4: Vector Error Correction Model (VECM) Results

Variables	Coefficient	Standard Error	t-Statistic	Remarks
Error Correction Term (CoinEq1)	0.12310	0.00164	7.51627	Significant
D(HCI)	0.14011	0.03823	3.66527	Significant
D(EMP)	3.37978	1.63481	2.06744	Significant
D(LABO)	-1.52655	0.34525	-4.42515	Significant
D(INF)	-14.66495	28.7470	-0.51014	Not Significant
Constant (C)	-7.631013			
R-squared	0.9592			
Adj. R-squared	0.9356			
AIC	-10.4338			
SC	-9.7320			

Source: Author's Computation 2026

Conclusion and Recommendations

The study investigated the relationship between human capital development, employment, and sustainable development in Nigeria using time-series data from 1990 to 2024. The results revealed that human capital development and employment have significant positive effects on sustainable development, indicating that investments in education, healthcare, and skill acquisition enhance productivity and improve overall human welfare. However, the study found that rapid labour force growth without corresponding job opportunities negatively affects sustainable development, as it leads to unemployment and underemployment. Inflation, though negative, was statistically insignificant, implying a weak influence on development outcomes.

In conclusion, the study establishes that sustainable development in Nigeria depends largely on the nation's ability to effectively harness its human capital and generate productive employment. It recommends increased investment in quality education, healthcare, and vocational training to strengthen human capacity, as well as policies that promote innovation, entrepreneurship, and decent job creation in key economic sectors. Furthermore, maintaining macroeconomic stability through effective inflation control and integrating human capital development strategies into national planning frameworks are vital to ensuring inclusive and long-term economic growth. By aligning human capital investment with employment generation and sustainable policies, Nigeria can transform its

growing population into a productive force for enduring national development.

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