

## Catalysing Nigeria's Economic Recovery Through Human Capital, Innovation, and Governance for Sustainable Global Ascent

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### ABSTRACT

Despite vast resources, Nigeria continues to underperform, education spending dropped to 0.35% of GDP in 2022 (global average: 4.15%), Research & Development investment remains low at 0.28%, and Nigeria scores just 17.1 on the Global Innovation Index, well below the world average of 31.57. Its Fragile States Index rating of 96.6 (2024) signals deep institutional weaknesses. This study analyses how integrating quality human capital development, innovation capacity, and governance can drive economic recovery and global competitiveness. The research questions are: What are the drivers and barriers to sustainable transformation in Nigeria. Is there any relationship between human capital, innovation, governance, and other macro-economic indicators. Using a quantitative cross-sectional design, the study examined secondary data from 1990–2024 sourced from the World Development Indicator and synthesized reviews. Key variables include GDP per capita, education, health and R&D expenditure, and governance data. Regression analyses reveal a positive correlation between increased education/R&D spending and GDP growth, higher investments in human capital, particularly education and healthcare, innovation, quality governance are key drivers to experience more inclusive growth and productivity gains, while systemic barriers in governance, security, and infrastructure, institutional reforms inhibit sustainable transformation. Also exist relationship between human capital, innovation, governance, and other macroeconomic indicators in shaping developmental outcomes in Nigeria. This implies that Nigeria's economic recovery hinges not on isolated investments, but on an integrated, systemic approach that synchronizes human capital development, innovation ecosystems, and governance reform, offering policymakers a data-driven blueprint to transition from extractive dependency to a knowledge-driven, inclusive economy.

**Keywords** : Innovation, Education, GDP, Governance, R&D.

**JEL Codes**: O15, O31, O43, O47, I25, I15, H11.

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## 1. INTRODUCTION

Nigeria presents a developmental paradox, having abundant demographic and natural endowments that coexist with structural deficits in innovation, governance, and inclusive economic growth. Despite abundant human and natural resources, the country faces persistent structural challenges, entrenched poverty, weak human capital, insecurity, poor innovation outputs, and fragile governance institutions. In an era where global competition is increasingly knowledge-driven, Nigeria risks deeper marginalization unless systemic reforms are urgently deployed.

Human capital, innovative ecosystems, and governance structures are globally recognized as the cornerstones of modern economic transformation. Countries that successfully integrate these pillars achieve more sustainable, inclusive growth and global competitiveness. Therefore, it is important to reposition Nigeria's economy demands through a strategic convergence of investments in education, innovation-driven entrepreneurship, research and development, and institutional strengthening to propel the nation toward sustainable development goals and global relevance.

Nigeria's economy, the largest in Africa by GDP, has shown resilience but remains heavily dependent on oil exports, accounting for about 90% of export earnings and over 50% of government revenue (World Bank, 2023). Despite periods of growth, socio-economic disparities, a 33% unemployment rate (NBS, 2023), governance challenges, and limited industrial transformation persist. With 70% of the population under 30 years old (UNDP, 2023). Nigeria's paradoxical situation, vast potential yet persistent underperformance, underscores deep systemic dysfunctions. The country's innovation performance remains low, with a Global Innovation Index (GII) score of 17.1 points in 2024, significantly below the world average of 31.57 points. Research and Development (R&D) expenditure stands at 0.0% of GDP, compared to a global average of 1.11%, highlighting the chronic underinvestment in knowledge production and technology development. Since the 115.11% surge in 2019, from 0.1 % in 2007 to 0.3 % in 2019; R&D expenditure as a share of GDP remained constant by 0.00% till date.

Furthermore, governance challenges remain acute. Nigeria's Fragile State Index was 96.6 points in 2024 against world average of 64.56, indicating heightened vulnerability to conflict and weak institutional resilience. Education spending, a key indicator of human capital investment, plummeted to 0.35% of GDP in 2022, against a world average of 4.15%, undermining Nigeria's capacity to compete in a knowledge-based economy. Nigeria's Human Development Index (HDI) reached only 0.548 in 2022, trailing behind the global average of 0.727. Meanwhile, citizen wellbeing continues to decline, as reflected in the fall of the Happiness Index to 4.88 in 2024 from 5.26 in 2019. Moreover, Nigeria's high-technology exports fell dramatically to \$76.5 million in 2022, a fraction of the global average of \$21 billion, from \$495.1 million in 2015; further evidencing the limited industrial depth and technological complexity needed for competitiveness.

Beyond innovation, broader socio-economic indicators reveal entrenched structural weaknesses. High unemployment, rising inflation, uneven economic development, demographic pressures, and declining happiness indices further complicate the national development landscape. These data-driven insights illustrate a systemic gap in Nigeria's ability

to translate its potential into equitable development and national transformation, reinforcing the urgent need for integrated and innovative policy reforms. Though, dearth of time series data on R&D expenditure and other innovation indicators in Nigeria is a limitation to this study.

### 1.2 Objective of the Study

The primary goal of the study is to explore how simultaneous investments in human capital, innovation ecosystems, and governance reforms can drive Nigeria's economic transformation and social inclusion. Specific objectives include:

- Identify key drivers and barriers to sustainable transformation in Nigeria.
- Analyse the relationship between human capital, innovation, governance, and other macro-economic indicators.
- Provide policy recommendations for integrated development strategies.

### 1.3 Research Hypothesis

H<sub>0</sub>: There is no significant relationship between human capital, innovation, governance, and economic growth in Nigeria.

## 2. REVIEW OF LITERATURES

### 2.1 Conceptual Review

Expenditures for research and development are current and capital expenditures (both public and private) on creative work undertaken systematically to increase knowledge, including knowledge of humanity, culture, and society, and the use of knowledge for new applications. R&D covers basic research, applied research, and experimental development. High technological export statistics underscore the country's limited capacity to foster technological advancement, industrial competitiveness, and long-term productivity growth. High-technology exports (% of manufactured exports) in Nigeria was reported at 3.5 % in 2023, according to the World Bank collection of development indicators. While certain sectors, particularly digital technology, show promising growth, the broader innovation landscape is contending with macroeconomic pressures, including elevated interest rates and geopolitical uncertainties.

Current Status of *Innovation* in Nigeria:

The Nigerian economy has faced persistent inflationary pressures, leading the Central Bank of Nigeria to implement a series of interest rate hikes. According to Nigerian Economic summit Group report in 2024, the Monetary Policy Rate was increased for the sixth consecutive time, aiming to curb inflation but inadvertently raising the cost of borrowing. This monetary tightening has made financing more expensive for businesses, particularly startups and SMEs that are crucial drivers of innovation.

Geopolitical tensions, such as the Russia-Ukraine conflict and regional instabilities, have also impacted Nigeria's innovation landscape. These conflicts have disrupted global supply chains and increased energy prices, leading to higher operational costs for Nigerian businesses. Additionally, the uncertainty has dampened investor confidence, making it more challenging for innovative ventures to secure funding.

Despite these challenges, Nigeria has demonstrated resilience through various adaptive strategies:

- The government has initiated reforms to improve the business environment, such as the Nigeria Startup Act, which aims to provide regulatory support and incentives for startups.
- There is a concerted effort to digitize public services and promote e-governance, enhancing efficiency and transparency.
- Innovative financing models, including venture capital, crowdfunding, and public-private partnerships, are being explored to support startups and innovation-driven enterprises as alternative financing.
- Investments in education and skill development programs are being made to cultivate a workforce capable of sustaining and advancing innovation.

Whereas Nigeria continued efforts and commits to fostering conducive environment for innovations, invest in digital infrastructure, supportive policies, and human capital development to sustain and accelerate innovation. Yet, the innovation landscape in the country faces headwinds from macroeconomic and geopolitical factors.

## 2.2. Theoretical Review

This study is anchored on two core economic development theories - Endogenous Growth Theory and Institutional Theory. These theories provide a robust analytical lens for understanding how innovation, human capital, and governance structures drive or constrain Nigeria's journey toward economic recovery and global relevance.

Endogenous Growth Theory:

Paul Romer (1986) explained that long-run growth is driven by knowledge, innovation, and human capital. This theory posits that economic growth is primarily driven by internal factors, rather than exogenous shocks or natural resource endowments. In this model, knowledge generation, innovation, human capital accumulation, and technology advancement are not merely by-products of growth, they are its central engines. Applied to Nigeria's economic context, the theory suggests that deliberate investments in research and development (R&D), education, and innovation systems can stimulate long-term productivity and structural transformation. For instance, low public expenditure on R&D (only 0.28% of GDP in 2019 compared to the global average of 1.11%) and poor innovation performance (Global Innovation Index score of 17.1 in 2024) reflect the country's underutilization of innovation as a growth lever. According to Romer, the spillover effects of knowledge creation, such as through tech hubs, academic institutions, and collaborative research, have the potential to create cumulative improvements in productivity and competitiveness.

Therefore, this theory underscores the urgent need for Nigeria to internalize innovation as a policy tool, integrate it across sectors (agriculture, health, manufacturing, education), and develop institutional pathways that nurture talent and generate locally driven solutions. Innovation becomes not just a growth output but an input, fueling industrialization, employment, and inclusive economic recovery.

### Institutional Theory:

In 1990, Douglas North emphasized that institutional quality fundamentally shapes economic performance and citizen well-being. This means that formal rules (laws, policies, governance frameworks) and informal norms (cultural practices, social contracts) critically shape economic performance. Institutions determine the efficiency and predictability of markets, reduce uncertainty, and influence the incentives for innovation, investment, and human capital development. In the Nigerian context, weak institutions, evidenced by high Fragile States Index scores (96.6 in 2024), low transparency (Corruption Perception Index score of 22/100), and policy instability, contribute to poor innovation absorption, resource misallocation, and socio-economic inequality. Poor institutional environments discourage entrepreneurs and limit foreign direct investment, while also constraining effective implementation of pro-innovation policies and reforms. North's theory implies that innovation cannot thrive in a vacuum. It must be nurtured in an environment where rules are clear, enforcement is consistent, corruption is minimized, and public trust is strengthened. For Nigeria to successfully transform its economy, institutional reforms must be integrated with innovation strategies, particularly in sectors like digital economy, renewable energy, and health technologies.

Ultimately, the synergy between strong institutions and innovation ecosystems is critical. Institutional quality not only influences the pace of innovation adoption but also shapes who benefits from it, thus determining whether economic growth is inclusive and sustainable. For Nigeria to harness innovation in catalyzing economic transformation and recovery, both knowledge production and institutional capability must be strengthened. This dual approach will enable Nigeria to transition from a resource-dependent economy to a knowledge-based and innovation-driven economy capable of competing globally.

### 2.3 Empirical Review

This section examines existing empirical studies and provides a comprehensive understanding of the crucial drivers to economic transformation.

Firstly, Okonjo-Iweala (2021) emphasizes governance and social investment as vital for Nigeria's prosperity. World Bank (2022) notes Nigeria's lag in human capital development (ranked 152 out of 157 countries). African Development Bank (2022) and United Nation Development Programme (2023) stress the need for innovation and sustainable governance models.

The significance of human capital in driving economic growth is well-established in economic literatures (Romer, 1990; Lucas, 1988). Investments in education, health, and skills development enhance productivity, foster innovation, and improve overall economic performance (Becker, 1964). These studies highlight that a skilled and healthy workforce is crucial for increasing productivity and driving economic expansion. Several studies have explored the relationship between human capital development and economic growth in Nigeria; indicating a positive and significant relationship between human capital development indicators such as education expenditure, school enrollment, and health expenditure and economic growth (Olayiwola, 2021). The authors concluded that expanding health insurance coverage to more Nigerians could inject much-needed resources into the health sector. This increased investment may, in turn, help healthcare spending significantly boost Nigeria's economic growth.

This suggests the need for efficient allocation and utilization of resources within the human capital development sectors. Despite the recognized importance of human capital development, Nigeria's Human Capital Index (HCI) remains low at 36%, falling below the 56% standard (World Bank). This indicates a significant gap in realizing the full potential of human capital for economic growth. Factors such as inadequate funding, corruption in training approvals, tribalism, and ethnicity hinder effective human capital development in Nigeria (Okoh, 2019). Addressing these constraints is essential to unlock the positive impact of human capital on economic recovery.

More so, innovation, encompassing new products, services, processes, and business models, is a critical engine for economic growth and competitiveness (Schumpeter, 1934). It drives productivity gains, creates new markets, and enhances the overall efficiency of the economy.

The relationship between innovation and economic growth in Nigeria has been explored in some studies. A study by Ezenwakwelu et al (2024) found that patents, trademarks, industrial designs, and research and development expenditures did not have a significant effect on economic growth in Nigeria between 2013 and 2022. This suggests potential challenges in translating innovative activities into tangible economic outcomes. Digital innovation is recognized as having a significant impact on economic growth in Nigeria by fostering entrepreneurship, creating job opportunities, and improving efficiency across various sectors (Echegu, 2024). The growth of the startup scene in cities like Lagos, Abuja, and Port Harcourt exemplifies this potential. However, disparities in access to digital technology between urban and rural areas pose a threat to the sustainability of innovation-driven growth (Echegu, 2024). Bridging this digital gap is crucial for inclusive economic development.

Continuing, Barro (1992) emphasizes the critical role of human capital in driving economic growth, highlighting the need for substantial investment in education and health sectors. The Worldwide Governance indicators developed by Kaufmann et al. (2010) provide a framework for assessing governance quality, which is essential for sustainable economic transformation.

According to the IMF (2023), Nigeria's tax revenue to GDP ratio stood at 9.4% in 2023, one of the lowest globally, indicating limited fiscal space for development spending. Also, IMF (2024) reports that debt servicing consumes 56% of Nigeria's tax revenue, constraining resources available for infrastructure and human capital development. The World Bank (2021) notes that Nigeria's digital economy presents significant opportunities for innovation-driven growth, yet challenges such as inadequate infrastructure persist. Adenikinju (2005) analyzes the economic impact of infrastructure failures in Nigeria's electricity sector, underscoring the need for reliable power supply to support industrialization. Ogundipe and Oluwatobi (2013) find that targeted government spending in key sectors can stimulate economic growth, highlighting the importance of efficient fiscal policies. Ibrahim Foundation (2024) reports a decline in governance and security across Africa, including Nigeria, which hampers economic progress and development efforts

## **2.4 Gaps in Literature**

While the existing literature provides valuable insights into the individual and collective roles of human capital, innovation, and governance in Nigeria's economic development, several critical gaps and areas for improvement emerge upon closer examination. Addressing these gaps through future research can contribute to a more nuanced and actionable understanding of how to catalyze Nigeria's economic recovery and sustainable global ascent.

#### Limited Granularity and Disaggregation of Human Capital:

Much of the existing empirical work on human capital in Nigeria relies on aggregate measures such as overall education expenditure or gross enrollment rates. This overlooks the significant heterogeneity within the Nigerian population and the varying impacts of different types and levels of human capital investment. This study delve into more granular analyses, disaggregating human capital by education, health indicator, to see their impact on economic growth.

#### *Under-Exploration of the Innovation Ecosystem:*

While some studies touch upon innovation in Nigeria, there is a relative lack of in-depth empirical investigation into the dynamics of the Nigerian innovation ecosystem. This includes understanding the interactions between various actors (e.g., universities, research institutions, startups, established businesses, government agencies), the flow of knowledge and technology, and the barriers to innovation diffusion. This study Identifies key actors, their relationships, the enabling and hindering factors within the Nigerian context. Investigating the processes through which new technologies and practices are adopted and spread across different sectors and regions. Assess the effectiveness of government initiatives aimed at promoting research and development, supporting startups, and fostering technological advancements. Explore indigenous innovative platforms by recognizing and analyzing the role of local knowledge and grassroots innovation in addressing Nigeria's specific challenges.

#### *Insufficient Nuance in Governance Analysis:*

Studies on governance and economic growth in Nigeria often focus on broad indicators of corruption and institutional quality. There is a need for more nuanced analyses that unpack the specific mechanisms through which different aspects of governance impact economic outcomes. This study examines the distinct effects of specific aspects of governance, such as the fragility of state, control of corruption etc, on different facets of economic activity. Investigate how governance structures and processes affect firm-level macroeconomic variables.

#### *Limited Examination of the Interconnectedness and Synergies:*

While the literature acknowledges the importance of human capital, innovation, and governance, there is a relative scarcity of empirical studies that rigorously examine the complex interrelationships and synergistic effects between these three drivers in the Nigerian context. This study reviews the feedback loops and long-term impacts of policies targeting human capital, innovation, and governance for better understanding and test the hypothesized causal pathways and the strength of the relationships between these variables.

#### *Weakness in Longitudinal Analysis and Causal Inference:*

Many existing studies rely on cross-sectional data or short-term time series, making it difficult to establish clear causal relationships and account for the long-term impacts of human

capital development, innovation, and governance reforms. This research utilizes longer time series data to analyze the dynamic effects of these factors over time. Identify and analyze exogenous shocks or policy changes that can help to isolate the causal impacts of specific interventions.

Addressing these gaps and pursuing the suggested areas for improvement will lead to a more robust and nuanced understanding of the critical drivers of Nigeria's economic recovery and sustainable global ascent. This, in turn, will equip policymakers with more effective evidence-based strategies to unlock Nigeria's full potential.

### 3. METHODOLOGY

A mixed-methods approach is employed for the study. Regression models using existing datasets from the World Development Indicators (WDI), for quantitative analysis. The data spans from 1990 to 2024 with data for 2024 extrapolated. Whereas, already published articles will be synthesized for qualitative analysis. Variables for analysis are Economic growth proxied by GDP per capita growth as dependent variable, Human Capital Development, Health, R&D expenditure, Control of corruption, fragility of states, inflation, exchange rate, interest rate, unemployment, government debt and high technology export are the independent variables.

### 4. RESULTS AND DISCUSSION

#### 4.1 Objectives 1: Identify key drivers and barriers to sustainable transformation in Nigeria.

Main Findings (Objectives 1: Identify key drivers and barriers to sustainable transformation in Nigeria)

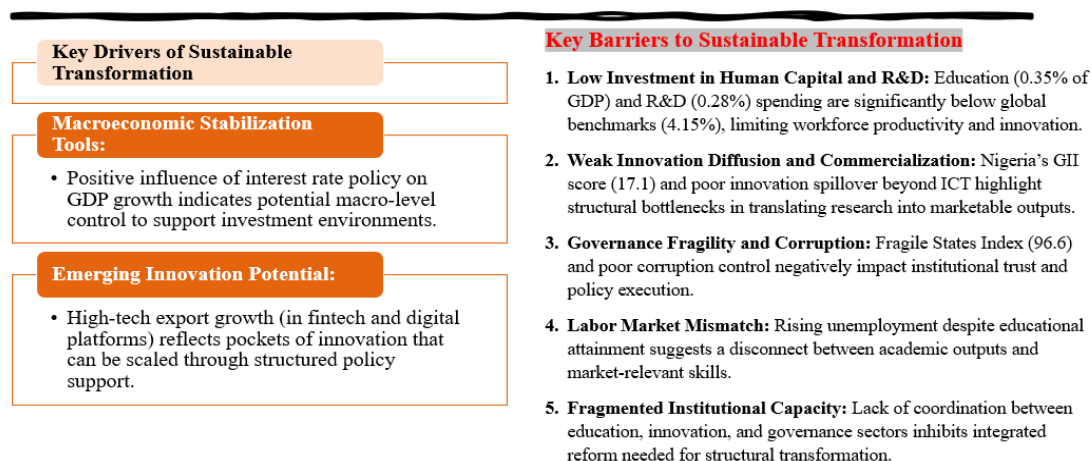


Figure 1. Drivers and Barriers of Sustainable Transformation

The implication of these results from empirical studies presents a nuanced picture of Nigeria’s economic transformation. While significant potential exists in human capital and innovation, systemic barriers in governance, security, and infrastructure must be addressed. The duality of promise and peril necessitates a hybrid policy approach that combines strategic investment with institutional reform. Complementarity across drivers is essential. Human capital without innovation yields limited transformation; innovation without governance leads to inefficiency. Cross-sectoral reforms are more effective than isolated interventions. For

example, aligning educational curriculum with tech and industrial needs could multiply transformation effects.

**4.2 Objective 2:** Analyse the relationship between human capital, innovation, governance, and other macro-economic indicators.

Regression Statistics								
Multiple R	0.69704							
R Square	0.48587							
Adjusted R Square	0.32767							
Standard Error	2.99129							
Observations	35							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	8	219.853	27.4816	3.07132	0.0142			
Residual	26	232.643	8.9478					
Total	34	452.495						
	Coefficient	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-7.15	4.34846	-1.6443	0.11216	-16.088	1.78837	-16.088	1.78837
Unem	0.02103	0.09318	0.22569	0.82321	-0.1705	0.21257	-0.1705	0.21257
Control of Corruption: Estimate	-3.1844	1.52408	-2.0894	0.0466	-6.3172	-0.0516	-6.3172	-0.0516
GHexp%GDP	2.79338	2.06222	1.35455	0.18722	-1.4456	7.03232	-1.4456	7.03232
GEDEX% GDP	-2.3848	2.96763	-0.8036	0.42891	-8.4848	3.71527	-8.4848	3.71527
High-technology exports (% of manufactured exports)	-0.4254	0.26569	-1.601	0.12146	-0.9715	0.12077	-0.9715	0.12077
Interest Rate	0.47189	0.2239	2.10761	0.04486	0.01166	0.93212	0.01166	0.93212
Exchange Rate	-0.0009	0.0035	-0.2661	0.79225	-0.0081	0.00626	-0.0081	0.00626
InflRate%GDP	0.26017	0.15846	1.64188	0.11266	-0.0655	0.58588	-0.0655	0.58588

**Table 1.** Regression Analysis

R Square of 0.48587 means that about 49% of the variance in the dependent variable is explained by the independent variables. However, about 33% of the variance is explained when adjusted for the number of predictors, Adjusted R Square (0.32767). This indicates a moderate model fit. Moreover, the overall model is statistically significant at the 5% level, suggesting that the predictors jointly influence the outcome variable, where F-statistics = 3.07132, P-value = 0.0142.

This implies the relationship between human capital, innovation, governance, and other macroeconomic indicators in shaping developmental outcomes in Nigeria. The regression model explained approximately 46% of the variance in the dependent variable, with an adjusted R<sup>2</sup> of 0.33, indicating moderate explanatory power. The overall model was statistically significant (p = 0.014), suggesting that, collectively, the independent variables influence economic growth in Nigeria. Specifically, other variables are interpreted thus.

The control of corruption was statistically significant (p = 0.047), yet its negative coefficient was unexpected. This suggests that increased anti-corruption efforts are associated with a decline in the dependent variable. This contradicts previous findings that emphasize the positive role of corruption control in enhancing development outcomes (Mauro, 1995; Tanzi & Davoodi, 1997). A possible explanation is the disruptive nature of initial reform efforts, where systemic changes may temporarily slow economic activity or institutional performance before benefits are realized (Kaufmann & Kraay, 2002). Recent reports indicate that Nigeria's Economic and Financial Crimes Commission (EFCC) recovered nearly \$500 million in proceeds of crime in 2024, marking its most successful year since inception. Despite these efforts, Nigeria remains ranked 140 out of 180 on Transparency International's Corruption

Perception Index, suggesting that anti-corruption measures may not yet be translating into improved governance perceptions or economic outcomes.

Human capital variables, including government expenditure on education/health and the unemployment rate, were statistically insignificant. Government Education Expenditure (% of GDP) has a Coefficient of -2.3842 and p-value of 0.42891, a negative relationship which is not statistically significant. This shows no clear evidence that education spending affects economic growth in Nigeria, increased financial allocations do not automatically translate into improved developmental outcomes. This contrasts with Barro (2001) and Hanushek & Woessmann (2008), who reported positive relationships between educational investments and economic growth. Government Health Expenditure (% of GDP) with coefficient of 2.7938, p-value (0.18722), not statistically significant. While the direction is positive, it doesn't show strong evidence of impact. This weakens the argument of studies like Anyanwu & Erhijakpor (2009) which found that health investment positively influences health and economic outcomes in African countries.

Similarly, Unemployment Rate with coefficient of 0.02103 and p-value of 0.82321 suggests that unemployment rate does not have a significant direct impact on economic growth. This means that a percentage increase in unemployment leads to a 2% increase in economic growth. This result disagrees with Okun's Law (1962) which posits a lagged relationship between unemployment and economic performance, often moderated by other factors. Quality of data for these indicators might have contributed to the unalignment of the result with the theory.

High-technology Exports (% of manufactured exports), a proxy to innovation has a coefficient of -0.4254 with p-value of 0.89452. This indicates no direct and significant influence from high-tech exports to economic growth, challenges the notion that technological sophistication drives growth in developing countries. This contrasts with findings from Coe & Helpman (1995) and Grossman & Helpman (1991), who argue that technology-intensive trade boosts growth and productivity. While theory posits that innovation-led exports enhance productivity and competitiveness (Grossman & Helpman, 1991), the Nigerian context may lack the requisite infrastructure, skilled labor, and supportive innovation ecosystem to realize such gains. As a result, the current export structure may not support value-added transformation. Despite a 23% increase in exports in Q4 2023, the composition of Nigeria's exports remains heavily reliant on primary commodities, with limited high-technology content

Furthermore, Interest Rate (coefficient = 0.47189, p = 0.04486) suggests that higher interest rates are associated with an increase in economic growth. This is contrary to other studies that posit that higher interest rates typically dampen investment. However, it may reflect capital inflows or inflation control mechanisms positively impacting macroeconomic stability. This aligns with Taylor's monetary policy targeting rule (1993) that prescribes a relatively high interest rate when actual inflation is higher than the inflation target, affecting economic growth indirectly through higher inflation. Interest rate was the only other statistically significant predictor (p = 0.045), positively associated with the economic growth. While typically, higher interest rates are expected to dampen economic activity, in some contexts, they can signal strong monetary control, attract foreign investment, or reflect macroeconomic stability (Taylor, 1993). However, Nigeria's high interest rate spread, which increased from an average of 6% to a record

high of 19% between 2023 and 2025, has been identified as a drag on the economy, potentially reducing GDP by up to 30%. This suggests that while interest rates may have a positive association with certain economic indicators, excessively high spreads can hinder overall economic growth.

Exchange Rate (Coefficient = -0.00001, p = 0.79225) and Inflation Rate% GDP (Coefficient = 0.26017, p = 0.06641), both are statistically insignificant, though inflation is close to significance at the 10% level. These results resonate with Fischer (1993), who noted that only very high inflation levels consistently disrupt growth; moderate inflation’s impact is often ambiguous.

The model moderately explains the variance in the dependent variable with governance (corruption control) and interest rate being the only statistically significant predictors. However, the direction of the corruption variable contradicts widely held evidence and warrants further investigation. Many traditionally impactful variables (education, health spending, high-tech exports) did not show statistical significance, possibly due to data limitations.

	GDP per capita growth (annual %)	Unem	Control of Corruption: Estimate	GHexp%GDP	GEEdEx% GDP	High-technology exports (% of manufactured exports)	Exchange Rate	Interest Rate	InflRate%GDP	
	1									
GDP per capita growth (annual %)	-0.0645202	1								
Unem	0.756683908	-0.23611943	1							
Control of Corruption: Estimate	-0.63232904	-0.37278969	-0.25990503	1						
GHexp%GDP	0.480544582	0.417737827	0.119806871	-0.64056669	1					
GEEdEx% GDP	0.669862176	-0.06564874	0.316180415	-0.4241936	0.142032323	1				
High-technology exports (% of manufactured exports)	0.554111153	-0.2385212	0.484310392	-0.25744432	0.127168211	0.454610878	1			
Exchange Rate	0.699913094	-0.08559015	0.78998097	-0.30659915	0.239185618	0.231268745	0.214385983	1		
Interest Rate	0.29447308	0.338907382	0.031841557	-0.29577277	0.240290878	0.341696821	0.225581489	0.061224621	1	
InflRate%GDP	-0.51030562	-0.27569053	-0.23462461	0.455786183	-0.35078464	-0.42803457	-0.3091303	-0.23814429	-0.94460986	1

**Table 1.** Correlation Analysis

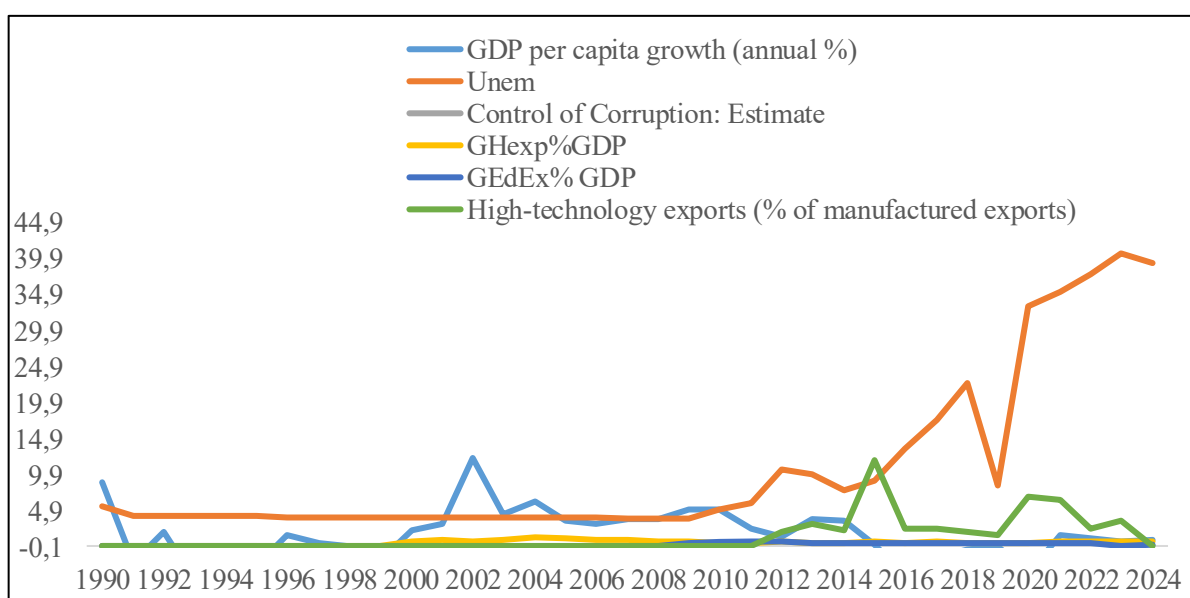
This table represents a correlation matrix between dependent and independent variables, assessing the strength and direction of relationships among them. Correlation coefficients range from -1 to +1: +1 (Perfect positive correlation), -1 (Perfect negative correlation) and 0 (No linear relationship).

Economic growth is negatively correlated with governance (control of corruption, -0.63): As corruption control improves, GDP growth slightly declines, this could suggest short-term reform trade-offs. Inflation Rate (% of GDP) (-0.51) means that high inflation negatively affects economic growth. This result is in line with Mauro (1995) and Tanzi & Davoodi (1997) that provide strong empirical evidence that corruption reduces public investment efficiency and economic performance. North (1990) and Kaufmann et al. (2010) argue that weak institutions hinder private sector growth and macro stability.

Positive correlated with Government Health Expenditure (%GDP) (0.48), suggests investment in health boosts growth; while Government Education Expenditure (%GDP) (0.67) has Stronger positive link, indicating human capital investment benefits economic growth. This is supported by the work of Barro (1992) and Lucas (1988) argue that education enhances labor productivity and long-term growth, Hanushek & Woessmann (2008) emphasize that cognitive

skills (driven by quality education) are more predictive of GDP growth than school enrollment alone. Ogundipe & Oluwatobi (2013) also find a positive relationship between disaggregated public education expenditure and GDP in Nigeria.

High-tech Exports of 0.55 coefficient means that innovation and technology are growth-enhancing. Exchange Rate (0.70), surprisingly positive, could be due to oil export-related currency effects. This is in line with Romer (1990) and Grossman & Helpman (1991). Unemployment has strong positive correlation with Exchange Rate (0.79) and High-tech Exports (0.48), indicating its depreciation linked to job losses in import-dependent sectors and reflect structural mismatch with non-labor-intensive export sector, respectively.



**Figure 2.** Trend Analysis of selected Macroeconomic variables

The graph illustrates that while Nigeria's unemployment rate surged sharply after 2016, key growth drivers such as GDP per capita, education and health expenditure, corruption control, and high-technology exports remained relatively stagnant or erratic, highlighting a decoupling between labor market distress and investment in critical sectors necessary for sustained economic transformation.

The study’s results reveal that Nigeria’s pathway to sustained economic recovery lies in addressing institutional fragilities and closing systemic human capital gaps; this confirms the relevance of Endogenous Growth and Institutional theories in practice, while urging a coordinated policy shift from extractive-led growth toward innovation-driven, governance-enabled development. Hence, reinforces and advances the Endogenous Growth and Institutional theories by empirically demonstrating that Nigeria’s economic recovery hinges not on isolated investments, but on an integrated, systemic approach that synchronizes human capital development, innovation ecosystems, and governance reform, offering policymakers a data-driven blueprint to transition from extractive dependency to a knowledge-driven, inclusive economy.

## CONCLUSION

Nigeria's sustainable transformation hinges on unlocking synergies between human capital, innovation, and governance. Empirical evidence affirms the potential of each pillar while underscoring that transformation is impeded by chronic structural weaknesses. Only through integrated, data-informed, and participatory approaches can Nigeria catalyze its recovery and realize sustainable scaling in the global order. This confluence of weak innovation, fragile governance, low human capital investment, and economic stagnation demands urgent, coordinated action. Building resilience across these domains is critical for ensuring Nigeria's participation in the Fourth Industrial Revolution, enhancing social cohesion, and fostering sustainable growth. Addressing these structural bottlenecks is not merely desirable but essential for achieving Nigeria's medium to long-term development aspirations in line with the African Union's Agenda 2063 and the United Nations Sustainable Development Goals (SDGs).

Without integrated action to build strong human capital, foster innovation, and reform governance institutions, Nigeria's economic prospects will continue to weaken in the face of global shifts toward technology-driven and innovation-led growth.

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