



Entrepreneurship, Innovation, and Economic Development in Nigeria: A Macroeconomic Perspective

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Abstract

Entrepreneurship, innovation, and economic performance in Nigeria are shaped by a mix of long-standing structural challenges and emerging trends. Understanding both helps explain why growth is uneven and what opportunities exist. It is against this backdrop that this study seeks to investigate the impact of entrepreneurship, innovation, and economic development in Nigeria, using secondary annual time series data from 1990 to 2024 from the Central Bank of Nigeria Statistical Bulletin and data from World Development Indicators (WDI). The dependent variable is the human development index (HDI), while self-employment rate (SEMP), access to credit to the private sector (CPS), technology export or digital economy indicator (TECH), ICT adoption (ICT), government expenditure (GOVEXP), trade openness (TOP), and inflation rate (INFL) were the independent and control variables, respectively. The test mechanism adopted was the unit root test, cointegration test, and autoregressive distributed lag (ARDL) technique. Findings revealed that there is a positive and significant relationship between access to credit to the private sector (CPS), technology export or digital economy indicators (TECH), ICT adoption (ICT), government expenditure

(GOVEXP), inflation rate (INFL), and economic development in Nigeria during the period under review. However, a negative shock relationship exists between self-employment rates (SEMP), trade openness (TOP), and economic development in Nigeria. Therefore, for policy, the study recommended that government and stakeholders should focus on policies of transforming low-productivity self-employment into formal, innovative, and high-value entrepreneurship. Trade policy should be complemented with capacity-building, technology adoption, and value-added export promotion to enhance domestic competitiveness. Short-run strategies should focus on credit access, skill development, and market integration, while long-run strategies should strengthen innovation ecosystems, industrial capacity, and global market linkages for sustainable economic development.

Keywords: Entrepreneurship, Innovation, Technology, Inflation, Employment

1.1 Introduction

Economic development remains a central objective for developing countries like Nigeria, particularly in the face of persistent challenges such as unemployment, poverty, low industrial productivity, and overdependence on oil revenue. Over the years, attention has increasingly shifted toward entrepreneurship and innovation as critical drivers of sustainable economic growth and structural transformation. These factors are widely recognized in economic theory, especially within the Schumpeterian framework, which emphasizes innovation as a key force behind economic progress and productivity improvements (Acs et al., 2017).

In Nigeria, entrepreneurship has gained prominence as a mechanism for job creation, wealth generation, and poverty reduction. Empirical evidence suggests that entrepreneurial activities contribute significantly to employment opportunities and economic expansion, particularly through the development of small and medium-sized enterprises (SMEs) (Adenutsi, 2020). Similarly, studies have shown that entrepreneurship enhances economic development by improving living standards and stimulating productive activities across sectors, although its impact may vary between the short and long run (NBS, 2023). Despite these contributions, the full potential of entrepreneurship in Nigeria is often constrained by challenges such as limited access to finance, weak infrastructure, and regulatory bottlenecks.

Innovation, on the other hand, plays a complementary role by driving technological advancement and improving efficiency in production processes. It facilitates the creation of new products, services, and markets, thereby enhancing competitiveness and economic performance. Empirical studies on Nigeria indicate that innovation proxied by technological inputs and capital imports has a positive and significant impact on economic growth (World

Bank, 2023). Furthermore, innovation within enterprises promotes the emergence of new businesses and stimulates economic activities that increase overall output and productivity (CBN, 2022). In modern economies, innovation is also closely linked to digital transformation and the expansion of information and communication technologies (ICT), which are essential for long-term economic sustainability.

From a macroeconomic perspective, the interaction between entrepreneurship and innovation is crucial for achieving inclusive and sustained economic development. Entrepreneurship provides the platform for implementing innovative ideas, while innovation enhances the efficiency and scalability of entrepreneurial ventures. However, Nigeria's macroeconomic environment, characterized by policy instability, inflationary pressures, and inadequate institutional support, often limits the effectiveness of these drivers (OECD, 2022). This underscores the need for a holistic understanding of how entrepreneurship and innovation jointly influence economic outcomes at the national level.

The relationship between entrepreneurship, innovation, and economic development has received significant attention in both theoretical and empirical literature. Entrepreneurship is widely regarded as the process of creating, organizing, and managing new business ventures with the aim of making profit while bearing associated risks. It plays a crucial role in job creation, income generation, and poverty reduction, particularly in developing economies. Studies show that entrepreneurship enhances economic activity by fostering the establishment of small and medium-sized enterprises (SMEs), which are vital engines of growth (Ajibike & Fagbemi, 2022). Innovation, on the other hand, refers to the introduction of new products, processes, technologies, or ideas that improve efficiency and productivity. It is a key driver of competitiveness and long-term economic growth. Innovation enables firms to create value, expand markets, and improve production systems, thereby contributing to overall economic performance. Economic development encompasses sustained improvements in living standards, income levels, and structural transformation of the economy. In modern growth discourse, it is increasingly linked to knowledge, technology, and entrepreneurial activities rather than mere capital accumulation.

Given these dynamics, there is a growing need for empirical investigation into the combined effects of entrepreneurship and innovation on Nigeria's economic development using macroeconomic indicators. Such an analysis is essential for informing policy decisions aimed at fostering a conducive environment for business creation, technological advancement, and sustainable economic growth.

1.2 Statement of the Problem

Nigeria's pursuit of sustained economic development has remained a critical policy objective despite decades of reform efforts and abundant human and natural resources. Stylized macroeconomic evidence reveals a persistent disconnect between the country's growth



potential and actual economic outcomes. Although Nigeria recorded periods of positive GDP growth in the past decade, this growth has been largely volatile and insufficiently inclusive, with real GDP growth averaging about 2–3% in recent years, barely above population growth rates of approximately 2.5–3% (World Bank, 2023). Consequently, gains in output have not translated into significant improvements in living standards, as GDP per capita has stagnated or declined in real terms.

One of the most pressing development challenges is unemployment and underemployment. Recent data from the National Bureau of Statistics indicate that youth unemployment and underemployment remain high, with millions of young people entering the labor force annually without corresponding job opportunities. This situation underscores structural weaknesses in the economy, particularly its limited capacity to generate productive employment. While entrepreneurship is often promoted as a solution to this challenge, a large proportion of entrepreneurial activities in Nigeria are necessity-driven rather than opportunity-driven, resulting in low productivity and limited scalability.

Furthermore, Nigeria's entrepreneurial ecosystem is constrained by inadequate access to finance, poor infrastructure, and an unstable macroeconomic environment. Credit to the private sector as a percentage of GDP remains relatively low compared to emerging economies, limiting the ability of small and medium-sized enterprises (SMEs) to expand and innovate. According to the Central Bank of Nigeria, lending rates to small businesses are often high, discouraging investment and business growth. As a result, many enterprises operate below optimal capacity, contributing marginally to overall economic productivity.

Innovation, which is a critical driver of modern economic growth, is also underdeveloped in Nigeria. Empirical indicators show that spending on research and development (R&D) is less than 0.3% of GDP, significantly below the global average of about 2% (OECD, 2022). Similarly, technological adoption and patent activity remain low, reflecting weak linkages between research institutions and industry. Although the rise of digital platforms and fin tech innovations has created new opportunities, the broader economy has yet to fully harness innovation as a catalyst for structural transformation and competitiveness.

Another stylized fact is Nigeria's continued dependence on crude oil exports, which account for a substantial share of government revenue and foreign exchange earnings. This overreliance exposes the economy to external shocks, as seen during global oil price fluctuations and economic downturns. Despite policy emphasis on diversification, non-oil sectors such as where entrepreneurial and innovative activities are expected to thrive, have not grown sufficiently to drive broad-based development.

The interaction between entrepreneurship and innovation at the macroeconomic level therefore remains weak and underexplored. While entrepreneurship provides a platform for job creation and income generation, its impact is limited without strong innovation that

enhances productivity and competitiveness. Conversely, innovation without effective entrepreneurial commercialization fails to translate into economic value. In Nigeria, the lack of synergy between these two drivers has contributed to slow structural transformation, low industrial output, and persistent poverty levels.

Given these challenges, there is a clear need for a comprehensive macroeconomic analysis of how entrepreneurship and innovation jointly influence economic development in Nigeria. Existing studies often examine these factors in isolation, thereby overlooking their combined effects on growth, employment, and productivity. This gap creates uncertainty for policymakers seeking to design effective strategies for economic transformation. Therefore, this study aims to address this problem by empirically investigating the extent to which entrepreneurship and innovation contribute to Nigeria's economic development, with a view to providing policy-relevant insights for sustainable growth.

1.3 Objective of the Study

The main objective of this study is to examine the impact of entrepreneurship and innovation on economic development in Nigeria from a macroeconomic perspective. The specific objectives are

- i. To examine the joint effect of entrepreneurship and innovation on economic development in Nigeria.

1.4 Research Question

This study will attempt to answer the following questions:

- i. What is the combined impact of entrepreneurship and innovation on Nigeria's economic development?

1.5 Research Hypothesis

The following are the research hypothesis for this study stated in null form:

- i. Entrepreneurship and innovation have no joint significant effect on economic development in Nigeria.

1.5 Significance of the study

The findings of this study are quite necessary considering the drive for entrepreneurial and innovational advancement pursued by majorly the developing nations of the world; therefore, the findings of this study will guide institutions such as the Central Bank of Nigeria and the National Bureau of Statistics in designing policies that promote entrepreneurship and innovation for economic growth. Second, it will also provide insights for developing

strategies aimed at reducing unemployment, promoting SMEs, and enhancing technological advancement. Third, the study will help entrepreneurs understand the role of innovation in improving business performance and competitiveness, and finally, it will contribute to existing literature by providing empirical evidence on the combined role of entrepreneurship and innovation in Nigeria's economic development and will serve as a reference material for future research in economics, development studies, and entrepreneurship.

2.0 Literature Review

2.1 Conceptual Issues

2.1.1 The Concept of Economic Development:

Economic development encompasses sustained improvements in living standards, income levels, and structural transformation of the economy. In modern growth discourse, it is increasingly linked to knowledge, technology, and entrepreneurial activities rather than mere capital accumulation.

Empirical studies on Nigeria and other developing economies provide mixed but largely positive evidence on the relationship between entrepreneurship, innovation, and economic development. For instance, Ajibike and Fagbemi (2022) found that entrepreneurship and innovation significantly contribute to economic growth in Nigeria. Their study revealed that entrepreneurial activities stimulate production, create employment opportunities, and enhance economic performance. The study also emphasized that innovation fosters the creation of new products and markets, thereby increasing.

2.1.2 The Concept of Entrepreneurship

Entrepreneurship is widely regarded as the process of creating, organizing, and managing new business ventures with the aim of making profit while bearing associated risks. It plays a crucial role in job creation, income generation, and poverty reduction, particularly in developing economies. Studies show that entrepreneurship enhances economic activity by fostering the establishment of small and medium-sized enterprises (SMEs), which are vital engines of growth. The relationship between entrepreneurship, innovation, and economic development has received significant attention in both theoretical and empirical literature. This section reviews key conceptual, theoretical, and empirical contributions relevant to the Nigerian economy.

2.1.3 The Concept of Innovation

Innovation refers to the introduction of new products, processes, technologies, or ideas that improve efficiency and productivity. It is a key driver of competitiveness and long-term economic growth. Innovation enables firms to create value, expand markets, and improve production systems, thereby contributing to overall economic performance.

2.2 Theoretical Framework

The following are the theories that give credence to this study: Schumpeterian Theory of Innovation, Endogenous Growth Theory, Theory of the Firm (Entrepreneurship Theory, Innovation Diffusion Theory).

2.2.1 Schumpeterian Theory of Innovation

The Schumpeterian Theory of Innovation was propounded by Joseph Alois Schumpeter in 1934. The Schumpeterian theory argued that economic development is driven by innovation, not just by accumulation of capital or labor. This theory emphasizes that innovation is the engine of economic development. Schumpeter argued that entrepreneurs introduce “new combinations” (new products, processes, and markets), leading to creative destruction, where old industries are replaced by new ones. This theory supports the role of innovation and entrepreneurship as key drivers of economic growth in Nigeria. It also explains how innovative entrepreneurs can transform sectors like fintech, agriculture, and manufacturing and justifies including innovation variables (R&D, ICT) and entrepreneurship indicators (SMEs) in your model. Schumpeterian theory teaches that innovation not just resource drives growth, entrepreneurs are central to development, and economic progress comes through continuous disruption and renewal. Therefore, for Nigeria, the theory gives credence to moving from a resource-based to an innovation-driven economy, empowering entrepreneurs to create transformative solutions and building systems that allow new ideas to replace inefficient old structures.

2.2.2 Endogenous Growth Theory

The endogenous growth theory was propounded by Paul Romer and Robert Lucas in 1986–1990. The theory states that economic growth is driven by internal factors such as human capital, innovation, and knowledge, rather than external forces. Investment in education, research, and technology leads to sustained long-run growth. The implication of this theory is to highlight the importance of innovation, knowledge, and human capital in Nigeria’s development. It therefore suggests that policies promoting education, technology, and entrepreneurship can enhance growth. The theory supports inclusion of human capital and innovation variables in your analysis. According to endogenous growth theorists, technological progress is not exogenous but generated within the economy through deliberate investment in research and development and human capital (Ajibike & Fagbemi, 2022). Schumpeter’s innovation theory further emphasizes the role of entrepreneurs as agents of “creative destruction,” introducing innovations that disrupt existing markets and create new economic opportunities. This theoretical perspective provides a strong link between entrepreneurship, innovation, and economic transformation.

2.2.3 Theory of the Firm (Entrepreneurship Theory)

This theory was propounded by Frank H. Knight in 1921. The theory states that entrepreneurs are risk-bearers who make decisions under uncertainty and drive economic activity by organizing production and resources. The theory therefore explains the role of entrepreneurs in resource allocation and job creation in Nigeria and justifies studying how entrepreneurial activities influence economic development. It highlights challenges like risk, uncertainty, and access to finance faced by Nigerian entrepreneurs. This theory emphasizes that firms exist because entrepreneurs identify and exploit opportunities, profit is a reward for bearing uncertainty, and that entrepreneurs drive innovation and efficient resource use. For Nigeria, the theory helps to ensure a shift from survival to opportunity-driven entrepreneurship, strengthen entrepreneurs' capacity to manage firms, reduce environmental uncertainty, and build firms that are innovative, productive, and globally competitive.

2.3 Empirical Review

Recent empirical studies continue to affirm that entrepreneurship plays a critical role in Nigeria's economic development. For instance, Onwuka et al. (2025) found that entrepreneurship significantly contributes to job creation, wealth generation, and innovation, thereby enhancing economic development in Nigeria. Their study emphasizes that a vibrant entrepreneurial sector increases productivity and reduces unemployment, especially among youths.

Similarly, Medeatagi and Usman (2024) examined the impact of entrepreneurship education on economic growth and found a positive relationship between entrepreneurial skills development and GDP growth. The study concluded that entrepreneurship education improves human capital and stimulates business formation, which in turn promotes economic development.

At the firm level, evidence from SMEs suggests that entrepreneurial characteristics such as innovativeness, risk-taking, and proactiveness significantly improve firm performance. Okoli and Okoli (2024) showed that entrepreneurial traits positively influence the competitiveness and productivity of SMEs in Nigeria, reinforcing the importance of entrepreneurship in driving micro- and macroeconomic outcomes.

On the other hand, innovation has also been widely recognized as a key determinant of economic growth. Odeyemi (2024) highlights that technological entrepreneurship and innovations are critical drivers of employment generation, competitiveness, and sustainable economic growth in Nigeria. The study further notes that innovation enhances efficiency and supports structural transformation of the economy.

In a related study, Okoli et al. (2024) found that innovation practices significantly improve the performance of SMEs in Nigeria by enhancing productivity, market expansion,

and operational efficiency. This implies that innovation not only affects firm-level outcomes but also contributes to broader economic performance.

Furthermore, Ijeh et al. (2025) Assessed the role of innovation and entrepreneurship in driving economic performance: A focus on Nigeria and established that innovation and entrepreneurship jointly stimulate economic performance by increasing production, creating new markets, and fostering industrial development. Their findings suggest that innovation acts as a catalyst that enhances the effectiveness of entrepreneurial activities in driving economic growth.

More so, Dada, Adegbuyi, and Ogbari, (2023). Examined Entrepreneurial culture and venture creation in Nigeria Sustainability and found that entrepreneurship and innovation significantly contribute to economic growth in Nigeria. Their study revealed that entrepreneurial activities stimulate production, create employment opportunities, and enhance economic performance. The study also emphasized that innovation fosters the creation of new products and markets, thereby increasing national output.

Further, Udemadu et al. (2023) examined entrepreneurship innovation for sustainable development in the era of disruption in Nigeria, using descriptive analysis and anchored on the theory of diffusion of innovation propounded by Everett Rogers. Findings showed that entrepreneurship and innovation are essential drivers for sustainable development, helping society adapt to disruptions while addressing environmental, social, and economic challenges. Entrepreneurship holds the potential to shape a more sustainable and resilient future for the global world. It was recommended that the government should make policies that will favor small, medium, and large-scale businesses in order to reduce the unemployment rate and increase the Gross Domestic Product. The government should also create a conducive industrial environment by providing the rural and urban sectors with basic infrastructures such as industrial zones; affordable, steady, and reliable electricity; water supply; education; health services; and security.

Also, Sanusi (2023) investigated the effect of entrepreneurship on economic growth and development in Nigeria using the narrative-textual case study (NTCS) method. The findings show that Nigeria's economy has continued to decrease over the last few years with the real GDP growth rate hovering around 3.10% in 2022 compared with 3.40% a year earlier. It was also found that entrepreneurship can enhance economic growth and development primarily by generating employment and fostering the growth of micro, small, and medium enterprises in Nigeria. For policy, the study recommended that there should be proper policy coordination and policy stability; reforms in the educational curriculum to prepare students for self-reliance; and fixing the power sector which is Nigeria's basic infrastructure. When we have flourishing micro, small, and medium enterprises (MSMEs), gainful employment will be created, wealth created will be distributed evenly, and the economy will be developed.

Afolabi (2015) examined the effect of entrepreneurship on economic growth and development in Nigeria using the narrative-textual case study (NTCS) method and interviews to collate data and simple percentages to analyze. The findings revealed that Nigeria's economy has continued to grow over the last decade, with the real GDP growth rate hovering around 7%. It was also found that entrepreneurship can enhance economic growth and development primarily by generating employment and fostering the growth of micro, small, and medium enterprises in Nigeria. For policy recommendations, there should be proper policy coordination and policy stability; reforms in the educational curriculum to prepare students for self-reliance; and fixing the power sector.

The interaction between entrepreneurship and innovation is shaped by the broader economic environment. Baba et al. (2025) examined Nigeria's entrepreneurial ecosystem and identified key constraints such as poor infrastructure, limited access to finance, weak institutional support, and inadequate policy coordination. These challenges hinder the scalability of startups and reduce the overall contribution of entrepreneurship to economic development.

Similarly, studies on Nigeria's innovation system indicate that weak linkages between universities, industries, and government institutions limit the commercialization of research outputs. Oyinlola et al. (2024) found that although Nigerian universities are increasingly involved in innovation activities, structural and institutional barriers continue to restrict their impact on economic development.

To further buttress Oyinlola et al.'s (2024) view, Iyoboyi and Na-Allah (2014) examined the relationship between innovation and economic growth in Nigeria using patent applications as a proxy for innovation. The findings indicate that innovation has a positive and statistically significant impact on GDP growth, suggesting that technological advancement is essential for economic progress.

Furthermore, Udo and Okon (2025) highlighted the importance of financial development in promoting entrepreneurship growth in Nigeria. The study found that access to finance significantly enhances the performance of SMEs, leading to increased employment and economic growth. With the rise of the digital economy, technology-driven innovation has become increasingly important. Studies show that ICT adoption, digital platforms, and fintech innovations are transforming business operations and creating new economic opportunities in Nigeria.

For instance, research carried out by Agbeyangi et al. (2024) on digital transformation indicates that ICT plays a significant role in enhancing productivity, improving market access, and supporting entrepreneurship. Emerging technologies such as artificial intelligence, blockchain, and the Internet of Things are expected to further accelerate economic growth and innovation in Nigeria's economy.

Additionally, global evidence suggests that technological innovation strengthens sustainability and entrepreneurial development by improving efficiency and enabling new business models. This highlights the importance of digital innovation as a key component of modern economic growth. Lawal and Anthony (2024) investigated entrepreneurship and innovation, several macroeconomic variables that influence economic development in Nigeria, and found that foreign direct investment (FDI) and private sector credit have significant positive effects on Nigeria's GDP growth, indicating the importance of financial development in supporting entrepreneurial and innovative activities.

3.0 Research Methodology

This section outlines the empirical strategy employed to examine the impact of entrepreneurship and innovation on economic development in Nigeria. The design adopted in this study is an ex post facto (after the fact) design. The choice of this design is made because the researcher has no control of the independent variables, and inferences about the relationship among the variables are made without the current interaction among the regressand and the regressors (Ndiyo, 2005).

This study used information and data from secondary sources, and therefore time series data sourced from various publications of the Central Bank of Nigeria Statistical Bulletin and World Development Indicators (WDI) were used. The models for this study were estimated using data on some economic development and macroeconomic indicators, such as the human development index (HDI) as the dependent variable and the number of self-employment rates (SEMP), access to credit to the private sector (CPS), ICT adoption (ICT), technology export or digital economy indicators (TECH), inflation rate (INFL), government expenditure (GOVEXP), and trade openness (TOP) for the period 1990-2024. A multiple regression analysis was used, predicated on various data diagnostics, including Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests, as well as the autoregressive distributed lag technique (ARDL), which was employed in this study to determine the relationship between macroeconomic instability and economic development within the specified time frame.

3.1 Model Specification

The model specified for this study is based on Schumpeter's innovation theory which further emphasizes the role of entrepreneurs as agents of "creative destruction," introducing innovations that disrupt existing markets and create new economic opportunities. This theoretical perspective provides a strong link between entrepreneurship, innovation, and economic transformation. Therefore, the model is as specified as follows:

3.1.1 Entrepreneurship, Innovation and Economic Development Equation:

The functional form of the model for entrepreneurship, innovation and economic development equation for this study is given as:

$$\text{HDI} = F(\text{SEMP}, \text{CPS}, \text{TECH}, \text{ICT}, \text{TOP}, \text{GOVEXP}, \text{INFL.}) \dots\dots\dots (1)$$

The econometric form of the model is given as:

$$\text{HDI}_t = a_0 + a_1\text{SEMP}_t + a_2\text{CPS}_t + a_3\text{TECH}_t + a_4\text{ICT}_t + a_5\text{TOP}_t + a_6\text{GOVEXP}_t + a_7\text{INFL}_t + U_t \dots\dots\dots (2)$$

HDI_t – Human Development Index in time t

SEMP_t – Self Employment Rate in time t

CPS_t – Access to credit to Private Sector (% of GDP) in time t

TECH_t – Technology Export s or digital economy indicators in time t

ICT_t – ICT Adoption (e.g. internet penetration) in time t

INFL_t – Inflation Rate in time t

GOVEXP_t – Government Expenditure in time t

TOP_t – Trade Openness in time t

U_t – Error term

a_0 to a_7 are the parameter to be estimated

A priori Expectation shows that $a_1 > 0$, $a_2 > 0$, $a_3 > 0$, $a_4 > 0$, $a_5 > 0$, $a_6 > 0$, and $a_7 < 0$.

Table 1: Data Description and Sources

S/N	Variables	Description of Data	Expected Source
1	HDI	This is the summary measure of average achievement in key dimensions of human development; along healthy life, being knowledgeable and having a decent standard of living. It is a statistic composite index of life expectancy, education and per capita income indicator, which is used to measure economic development. It is proxied for economic development and is used as a dependent variable in the model. a priori expectation (+)	CBN Statistical Bulletin (2024)
2	SEMP	This is self-employment rate. This reflects the proportion of labour force that is self-employed. It is used as proxy for entrepreneurial activities and it act as an explanatory variable in the model. A priori expectation: positive (+)	WDI (2024)
3	CPS	This is access to credit to private sector (% of GDP) which measures the availability of financial resources such as loans, credit lines etc. provided by financial institutions to private businesses and individuals (excluding government borrowing). It is used as a proxy	CBN Statistical Bulletin (2024)

		for entrepreneurship and serves as an explanatory variable for the model. A priori expectation: positive (+)	
4	TECH	Technology exports refer to the export of goods and services that are intensive in technology or knowledge. It used as proxy for innovation and serves as explanatory variable for the model. A priori expectation: positive (+)	WDI (2024)
5	INFL	Inflation rate is the persistent rise in the general price level. It serves as a control variable for the model. A priori expectation: negative (-)	CBN Statistical Bulletin (2024)
6	ICT	ICT adoption refers to the degree of usage and integration of digital technologies. It is used as a proxy for innovation and serves as explanatory variable for the model. A priori expectation: positive (+)	World Bank Indicator (2024)
7	GOVEXP	Government expenditure refers to the total spending by the government on goods, services, and public investments within an economy. It reflects the role of government in supporting economic activity, infrastructure, innovation systems. It served as control variable and an explanatory variable for the model. A priori expectation: positive (+)	World Bank Indicator (2024)
8	TOP	Trade Openness is the rate of import plus export divided by the GDP. It serves as explanatory variable for the model. A priori expectation: positive (+)	World Bank Indicator (2024)

4.0 Data Presentation, Analysis and Discussion of Findings

4.1 Descriptive statistics and matrix of correlations

Table 4.1: Descriptive Statistics

	HDI	SEMP	CPS	TECH	ICT	GOVEXP	TOP	INFL
Mean	0.51	82.70	6.18	4.59	6.38	409.83	0.38	19.31
Median	0.46	82.71	0.99	3.82	1.77	245.09	0.35	12.90
Maximum	1.82	85.03	27.04	12.46	27.04	291.62	1.19	72.80
Minimum	0.39	79.27	0.095	2.42	0.09	60.27	0.18	5.40
Std. Dev.	0.25	1.90	8.02	2.24	7.91	560.15	0.17	16.66
Skewness	4.44	-0.08	1.16	1.79	1.15	2.94	2.97	1.87
Kurtosis	22.69	1.53	3.15	6.08	3.18	13.04	14.28	5.44

Jarque-Bera	680.78	3.19	7.84	32.68	7.76	197.59	237.15	29.02
Probability	0.00	0.20	0.02	0.00	0.02	0.00	0.00	0.00
Sum	17.89	289.47	216.45	160.55	223.16	143.44	13.42	675.75
Sum Sq. Dev.	2.16	123.38	218.47	170.97	212.99	1.07	1.04	943.96
Observations	35	35	35	35	35	35	35	35

Researchers Computation (2026)

The descriptive statistics of the variables are presented in Table 4.1 above. This table highlights key trends in Nigeria's entrepreneurship, innovation, and economic development indicators during the review period. The data reveal a high level of self-employment (SEMP), government expenditure (GOVEXP), and inflation rate (INFL). For self-employment (SEMP), the mean, median, and maximum values are 82.70, 82.71, and 85.03, respectively. For government expenditure (GOVEXP), the mean, median, and maximum values are 409.83, 245.09, and 291.62. Inflation rate (INFL) values are 19.31 (mean), 12.90 (median), and a maximum value of 72.80, respectively.

In contrast, the human development index (HDI), access to credit to the private sector (CPS), technology export or digital economy indicators (TECH), ICT adoption (ICT), and trade openness (TOP) made relatively low contributions to entrepreneurship, innovation, and economic development, with statistics of 0.51 (mean), 0.46 (median), and 1.82 (maximum) for HDI; 6.18 (mean), 0.99 (median), and 27.04 (maximum) for access to credit to the private sector; 4.59 (mean), 3.82 (median), and 12.46 (maximum) for technology export or digital economy indicator; 6.38 (mean), 1.77 (median), and 27.04 (maximum) for ICT adoption; and 0.38 (mean), 0.35 (median), and 1.19 (maximum) for trade openness, respectively.

The response of government expenditure (GOV) and inflation rate (INFL) to entrepreneurship, innovation, and economic development has been volatile, showing fluctuations during the period. Government expenditure (GOV) statistics include a mean of 409.83, a median of 245.09, and a maximum of 291.62 with a standard deviation of 560.15. Inflation Rate (INFL) statistics reveal a mean of 19.31, a median of 12.90, a maximum of 72.80, and a standard deviation of 16.66, respectively.

Skewness and Kurtosis Analysis:

The skewness results indicate that only one variable is positively skewed, suggesting right-tailed distributions. The kurtosis results show that the human development index (HDI), access to credit to the private sector (CPS), technology export or digital economy indicators (TECH), ICT adoption (ICT), government expenditure (GOCEXP), trade openness (TOP),

and inflation rate (INFL) are leptokurtic (kurtosis > 3), indicating peaked distributions. Conversely, only the self-employment rate (SEMP) is platykurtic (kurtosis < 3), reflecting flatter distributions.

Normality and Variability:

The Jarque-Bera test confirms that all variables are normally distributed over the analysis period. The standard deviation values highlight the extent of variation in the data, with most variables showing significant deviations from their true values. Exception of the human development index (HDI), self-employment rate (SEMP), and trade openness (TOP), which have relatively small deviations of 0.25, 1.90, and 0.17.

Table 4.2: Correlation Matrix

	HDI	SEMP	CPS	TECH	ICT	GOVEXP	TOP	INFL
HDI	1							
SEMP	0.33	1						
CPS	-0.02	0.08	1					
TECH	0.19	-0.33	-0.00	1				
ICT	-0.13	-0.15	0.84	-0.13	1			
GOVEXP	0.96	0.39	-0.05	0.13	-0.24	1		
TOP	0.67	0.49	-0.31	-0.12	-0.48	0.68	1	
INFL	0.28	0.46	0.43	-0.38	0.34	0.38	0.34	1

Researchers Computation (2026)

The correlation matrix of the variables is as shown in Table 4.2 above. The correlation matrix is a statistical tool that measures the relationship between multiple variables. It provides a table of correlation coefficients, which describe the strength and direction of the linear relationships between each pair of variables. From the table above, therefore, HDI has a positive correlation coefficient with SEMP, TECH, GOVEXP, TOP, and INFL. This therefore indicates that the variables tend to move in the same direction. Meanwhile, CPS and ICT have a weak negative correlation (-0.02 and -0.13), indicating that as HDI increases, CPS and ICT tend to decrease. Also, from the table, there exists a positive correlation coefficient between SEMP and CPS, GOVEXP, TOP, and INFL; CPS and ICT, INFL; TECH and GOVEXP; ICT and INFL; and GOVEXP and TOP, INFL; and TOP and INFL, while there is a weak negative correlation between SEMP and TECH, ICT; CPS and TECH, GOVEXP, and TOP; and TECH and ICT, TOP, and INFL, as well as ICT and GOVEXP, TOP, respectively.

4.2 Unit Root Test

The Augmented Dickey-Fuller and the Phillips-Perron unit root tests were conducted to examine the stationarity condition of the variables. As indicated in Table 4.3 below, CPS, TECH, ICT, and INF were stationary at level in ADF, and PP, while HDI, SEMP, GOVEXP, and TOP were stationary after first differencing in both ADF and PP. In other words, the variables are integrated of order zero and one (i.e., I(0) and I(1)).

Where some of the variables are I(0) while others are I(1), one suggests the problem of unit root in the equations. It becomes imperative to perform co-integration tests to determine the presence of an equilibrium relationship amongst the variables in each equation. The study adopts the ARDL bound testing technique for co-integration, as the variables are integrated of diverse orders (i.e., order zero and order one).

Table 4.3: ADF and Philip-Perron Unit Root Test Results

Variables	ADF Level	1 st Difference	Order of integration	Level	PP 1 st Difference	Order of integration
HDI	1.432930	3.631570	I(1)	-	-	I(1)
SEMP	-0.401649	-7.032456	I(1)	-	-	I(1)
CPS	-6.856040	-	I(0)	-	-	I(0)
TECH	-4.361385	-	I(0)	-	-	I(0)
ICT			I(0)	-	-	I(0)
GOVEX	-5.465991	-	I(1)	-	-	I(1)
P	2.480131	3.929025				
TOP	0.050424	-3.540925	I(1)	-	-	I(1)
INFL	-3.253812	-	I(0)	-	-	I(0)

Source: Researcher's computation (2026), using E-Views 9.

Note: Mackinnon critical values for ADF at 1, 5 and 10% levels are -3.60, -2.93 and -2.60 respectively, and for PP are 3.605, 2.936 and 2.606, respectively. ** means significant at 5% level.

4.3 Lag Length Selection

Table 4.4: Lag Length Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-626.6135	NA	6979962.	38.46142	38.82421	38.58349
1	-436.6151	276.3613	3772.263	30.82516	34.09026	31.92377
2	-313.6125	119.2752*	225.7156*	27.24924*	33.41667*	29.32439*

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

Source: Researcher's computation (2026), using E-Views 9.

The efficiency and validity of an error correction model depend on the lag structure. The study used VAR lag order selection criteria to determine the lag lengths. The study employed the Akaike Information Criterion (AIC) and Schwarz Criterion (SC), and the result shows four optimal lag lengths in the inclusive growth index and fiscal deficit models as shown in Table 4.5 above. In order to reduce the possibilities of underestimation whilst maximizing the likelihood of recovering the true lag (Venus, 2004), the study used three and four as the maximum lag lengths, respectively.

4.4 Co-integration Test Results

From the bound testing result reported in Table 4.5 below, a long-run relationship exists amongst the variables in all the estimated equations, given that the values of the F-statistic are greater than the critical values at the five percent level in both the upper and the lower bounds. Therefore, the null hypothesis of absence of co-integration is rejected, while the study proceeds to estimate the long-run coefficient of each of the equations.

Table 4.5: Co-Integration Test Results

5% critical value					
Equations	K	F-Stat	I (0)	I (1)	Outcome
HDI (SEMP, CPS, TECH, ICT, GOVEXP, TOP, INFL)	7	5.97	2.32	3.5	Co-integration

Note: K =number of parameters

Source: Researcher's computation (2026), using E-Views 9.

Results

4.5 Findings, Presentation and Analysis of Econometric Results of the Long run coefficients of Entrepreneurship, Innovation and Economic Development Equation

Table 4.6: Dependent variable: HDI

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SEMP	-0.146692	0.069393	-2.113933	0.0544

CPS	0.047652	0.025874	1.841687	0.0884
TECH	-0.051839	0.024825	-2.088169	0.0570
ICT	-0.074921	0.037368	-2.004967	0.0662
GOVEXP	-0.000135	0.000066	-2.052756	0.0608
TOP	-0.592771	0.471282	-1.257784	0.2306
INFL	0.006756	0.003396	1.989326	0.0681
C	13.480119	6.109149	2.206546	0.0459

Source: Researcher's computation (2025), using E-Views 9.

Long Run coefficients of Entrepreneurship, Innovation and Economic Development Equation

The long-run relationship between economic development and entrepreneurship and innovation variables is presented in Table 4.6 above. Based on the ARDL long-run estimates, the findings reveal the following insights:

The coefficient for SEMP is negative and statistically significant, indicating that a unit increase in SEMP results in a -14.66% decrease in HDI. This finding deviates from a priori expectation in the long run, suggesting that in Nigeria, self-employment is largely necessity-driven and concentrated in low-productivity informal activities, which reduces overall economic efficiency and constrains long-run economic development.

Conversely, the coefficient for CPS is positive and statistically insignificant, indicating that a unit rise in CPS will result in a 47.65% increase in HDI. This result conforms to an a priori expectation, indicating that while access to credit to the private sector has the potential to promote economic development in Nigeria, its impact is weak and not statistically reliable, likely due to inefficient allocation, structural constraints, and limited support for productive and innovative activities.

More so, TECH exhibits a negative and statistically significant relationship with HDI. Therefore, a one-unit increase in TECH is associated with a -51.83% decrease in HDI. This result deviates from a priori expectations, implying that in Nigeria, technology exports and digital economy indicators do not yet translate into economic development, as innovation and digital entrepreneurship remain weakly integrated with productive sectors, characterized by low value addition, import dependence, and limited spillover effects.

The coefficient for ICT is negative and statistically significant, indicating that a one-unit increase in ICT will lead to a -74.92% decrease in HDI. This finding is not in line with theoretical expectation, reflecting that in Nigeria, ICT adoption has not yet translated into economic development. Despite increased usage, ICT is largely underutilized in productive sectors, constrained by skill gaps, infrastructure deficits, and weak integration with innovation and high-value entrepreneurial activities.

The coefficient of GOVEXP is negative and statistically significant, indicating that a one-unit rise in GOVEXP will lead to a -13.5% decrease in HDI. This result is not in line with a priori expectation, suggesting that in Nigeria, government expenditure in its current form does not promote economic development. Misallocation, inefficiency, and crowding out of private-sector entrepreneurship and innovation likely reduce the long-run growth impact of public spending.

Furthermore, the coefficient for TOP is negative and statistically insignificant, indicating that a one-unit increase in TOP will result in a -59.27% decrease in HDI. This result is not consistent with an a priori expectation, implying that trade openness in Nigeria has no meaningful long-run effect on economic development. Structural constraints, low value-added exports, limited innovation integration, and weak domestic entrepreneurship prevent trade liberalization from translating into sustainable growth.

Finally, the coefficient for INFL is positive and statistically insignificant, showing that a unit rise in INFL will lead to 67.56% decreases in HDI. This result deviates from a priori expectation, indicating that inflation has a weak, statistically unreliable effect on economic development in Nigeria. While moderate inflation may slightly stimulate entrepreneurial activity, its impact is overshadowed by structural constraints, limiting its role in long-run growth.

In summary, the long-run analysis highlights the complex interplay between entrepreneurship, innovation variables, and economic development in Nigeria. While certain factors such as access to credit to the private sector (CPS) and the inflation rate (INFL) positively influenced entrepreneurship, innovations, and economic development in Nigeria, others, like the self-employment rate (SEMP), technology exports or digital economy indicators (TECH), ICT adoption (ICT), government expenditure (GOVEXP), and trade openness (TOP), posed significant challenges. These findings underscore the need for targeted policy interventions to focus on a shift from necessity-driven self-employment to opportunity-driven, high-productivity entrepreneurship; from ICT adoption/digital activity to productivity-enhancing digital integration; from government spending to strategy, catalytic investments, and from trade openness to value-added exports and innovation-linked trade.

4.6 Findings, Presentation and Analysis of Econometric Results of the Short run coefficients of Entrepreneurship, Innovation and Economic Development Equation Results

Table 4.7: Dependent variable: HDI

Variable	Coefficient	Std. Error	t-Statistic	Prob.
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D(SEMP)	0.009825	0.005837	1.683185	0.1162
D(SEMP(-1))	-0.031652	0.005079	-6.231726	0.0000
D(CPS)	-0.006976	0.002400	-2.906305	0.0123
D(TECH)	0.003136	0.001158	2.709429	0.0179
D(TECH(-1))	-0.002487	0.001385	-1.795841	0.0958
D(ICT)	0.016089	0.002179	7.384078	0.0000
D(GOVEXP)	0.000046	0.000002	23.002831	0.0000
D(GOVEXP(-1))	-0.000035	0.000005	-7.517185	0.0000
D(TOP)	0.182474	0.035114	5.196591	0.0002
D(TOP(-1))	-0.132135	0.042372	-3.118423	0.0082
D(INFL)	-0.001981	0.000414	-4.781873	0.0004
D(INFL(-1))	0.001275	0.000329	3.871380	0.0019
CointEq(-1)	0.214748	0.097805	2.195670	0.0469

R-squared	0.899503	Mean dependent var
Adjusted R-squared	0.888776	S.D. dependent var
S.E. of regression	0.009020	Akaike info criterion
Sum squared resid	0.001058	Schwarz criterion
Log likelihood	123.9212	Hannan-Quinn criter.
F-statistic	1375.549	Durbin-Watson stat
Prob(F-statistic)	0.000000	

Researchers Computation (2026)

The short-run dynamics of the relationship between the Entrepreneurship, Innovation, and Economic Development Equation Results, as presented in Table 4.7, reveal several significant findings.

In the current period, SEMP exhibits a positive and insignificant relationship with HDI but becomes negative and significant at a period lag. Specifically, a 1% increase in SEMP will lead to a 98.25% increase in HDI in the current period and a -31.65% decrease in HDI after a period lag in the short run. The result of the current period is in line with a priori expectations, while the result of the first period lag does not conform to theoretical expectations, suggesting that in the short run, self-employment in Nigeria has a weakly positive but insignificant effect on economic development initially, likely due to temporary consumption or income effects. However, after a period, it negatively and significantly affects development, reflecting the delayed impact of low-productivity, informal, and

necessity-driven entrepreneurship that fails to contribute meaningfully to growth and innovation.

Conversely, in the current period of the short run, CPS exhibits a negative and significant relationship with HDI. Therefore, a unit rise in CPS will lead to -69.76% decreases in HDI in the short run. This result deviates from a priori expectation, suggesting that misallocation of funds, high borrowing costs, and limited absorption of credit by innovative, high-productivity enterprises will result in temporary financial stress and minimal contribution to short-term economic growth.

TECH shows a positive and significant relationship with HDI in the current period and a negative but insignificant relationship with HDI after a period lag of the short run. Specifically, a unit rise in TECH will lead to 31.36% increases in HDI in the current period and -24.87% decreases after a period lag. The result of the current period is in line with a priori expectation, while the results of the first period lag deviate from theoretical expectation, implying immediate gains from tech-driven entrepreneurial activity. However, after a short period, the effect becomes negative but insignificant, indicating that initial benefits are not sustained due to limited domestic integration, low value addition, and structural constraints in the economy.

The coefficient of ICT is positive and statistically significant in the short run. Therefore, a unit rise in ICT will lead to 16.08% increases in HDI. This result is in line with an a priori expectation, reflecting the immediate productivity, efficiency, and market-access gains that digital tools provide to entrepreneurs and innovative enterprises.

The coefficient of GOVEXP is positive and significant in the current period and negative but significant after a period lag of the short run. Therefore, a unit rise in GOVEXP will lead to 4.6% increases in HDI in the current period and -3.5% decreases in HDI in the first period lag. The result of the current period is in line with a priori expectation, while the results of the first period lag deviate from a priori expectation, suggesting that in the short run, government expenditure in Nigeria initially has a positive and significant impact on economic development, reflecting immediate fiscal stimulus effects that benefit entrepreneurship and innovation. However, after a short period, the effect becomes negative and significant, highlighting crowding-out, inefficiencies, and structural constraints that reduce the long-run effectiveness of public spending in promoting economic growth.

TOP exhibited a positive and significant relationship with HDI in the current period and a negative but significant relationship after a period lag of the short run, indicating that a one-unit increase in TOP will lead to an 18.24% increase in HDI in the current period and a -13.21% decrease in HDI in the first period. The result of the current period is in line with theoretical expectation, while the result of the first period lags and deviates from a priori expectation, showing immediate gains from market expansion and export opportunities. However, after a short period, the effect becomes negative and significant, highlighting the

structural weaknesses of domestic industries, low-value exports, and limited capacity of entrepreneurs to compete internationally, which offset the initial benefits of trade liberalization.

Finally, the coefficient of INFL exhibits a negative and significant relationship with HDI in the current period and a positive but significant one in the first period. Therefore, a unit rise in INFL will lead to -19.81% decreases in HDI and 12.75% decreases after a period lag. The result of the current period lag is in line with an a priori expectation, while after a period lag deviates from the theoretical expectation, suggesting that in the short run, inflation in Nigeria has a negative and significant impact on economic development in the current period due to rising costs and uncertainty, which hinder entrepreneurship and innovation. However, after a short lag, the effect becomes positive and significant, reflecting adaptive entrepreneurial responses, reduced real debt burdens, and delayed productivity gains that partially offset the initial contractionary effects.

The ECM coefficient (0.214748) is correctly signed and statistically significant, indicating that approximately 21% of short-run disequilibria adjust to the long-run equilibrium within a year. The t-statistic (2.195670) confirms the significance of the ECM at the 5% level.

The R-squared value (0.899503) and adjusted R-squared (0.888776) demonstrate that approximately 89% of the variation in HDI is explained by the included variables (both current and lagged), with 11% attributable to factors outside the model. The F-statistic (13.75) confirms the joint significance of the model's variables, ensuring a good overall fit. Additionally, the Durbin-Watson statistic (2.46) indicates no autocorrelation, affirming the reliability of the results for forecasting and policy formulation.

The stability test using the cumulative sum (CUSUM) test in figure 4.1 below further shows that the variables included in the Human Development Index equation were stable within the period of the study. This is evidenced by the swing of the trends within the CUSUM bound at the $\pm$ five percent significance level. The study, therefore, infers that the equation is stable and consistent to be adopted for economic policies and forecasts.

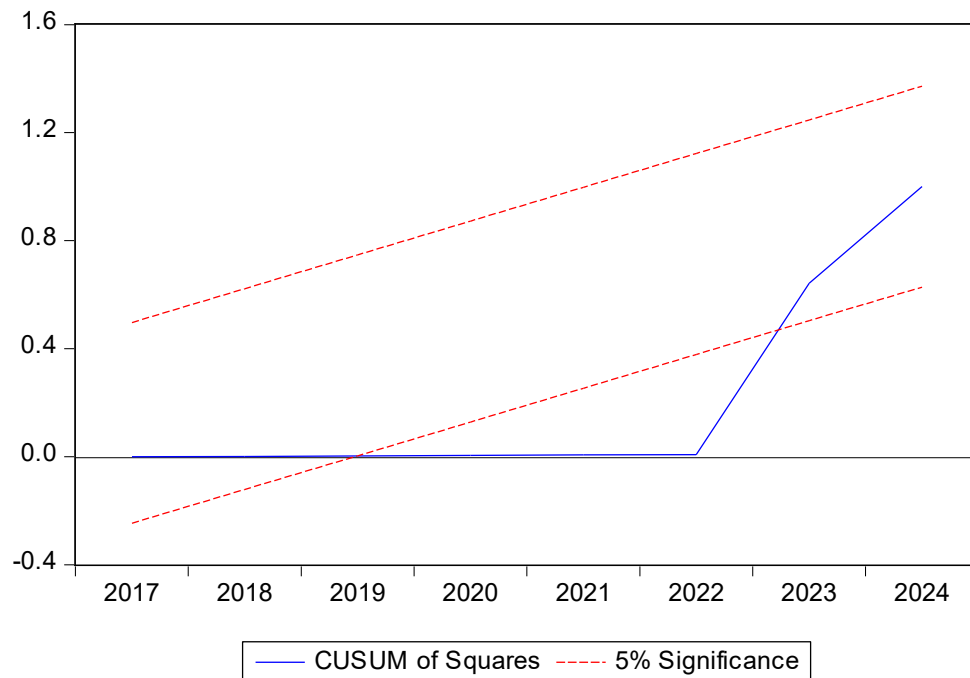


Figure 4.1: Entrepreneurship, Innovation and Economic Development equation CUSUM.

Source: Researcher's Computation (2026).

4.7 Discussion of Findings

The short-run and the long-run ARDL dynamics show an intriguing insight, as the regression result offers a positive and significant relationship between the five key variables of entrepreneurship and innovation: access to credit to the private sector (CPS), technology export or digital economy indicators (TECH), ICT adoption (ICT), government expenditure (GOVEXP), and inflation rate (INFL), which interacted with the dependent variable HDI. The results suggest that increases in the underlisted variables in essence will lead to corresponding increases in economic development in Nigeria, which are major tools that enhance entrepreneurial and innovative spirit. This result suggests that in the short run, they provide immediate liquidity, efficiency, and productivity gains, while in the long run, they foster structural transformation, innovation-driven growth, and sustainable economic development through entrepreneurship. This finding is in line with the views of Agbeyangi et al. (2024), Lawal and Anthony (2024), and Odeyemi (2024), who opined that ICT adoption, digital platforms, access to credit or finance, expenditure on innovation and entrepreneurship, and fintech innovations are transforming business operations and creating new economic opportunities in Nigeria.

However, self-employment rate (SEMP) and trade openness (TOP) showed a negative and insignificant relationship with economic development in both the long and short run periods under review, reflecting that when these variables increase, economic development tends to decrease. The negative relationship of both self-employment and trade openness in the short and long run periods indicates low productivity, informal survival-oriented businesses, and domestic firms' inability to compete with imports. In the long run, persistent structural constraints such as low innovation capacity, weak value addition, and limited formal entrepreneurship prevent these variables from contributing positively to economic growth, highlighting the need for policies that transform self-employment into productive, innovative enterprises and link trade openness to domestic industrial and entrepreneurial development.

5.1 Conclusion

The study investigates the impact of entrepreneurship and innovation on economic development in Nigeria, using data from 1990 to 2024 and adopting the autoregressive distributive lag model. The study observed that changes in the ratios of access to credit to the private sector, technology export or digital economy indicators, ICT adoption, and government expenditure affect economic development in the entrepreneurship and innovation framework of Nigeria during the period under review. In addition, the study revealed a negative relationship between self-employment and trade openness, implying that the ratios of these variables inhibit economic development in Nigeria. It means that the continuous decline in self-employment and trade openness will worsen the achievement of an effective entrepreneurial and innovation framework and therefore undermine sustainable economic development in Nigeria.

5.2 Recommendation

Therefore, we recommend that:

- i. Government and policymakers should focus on policies of transforming low-productivity self-employment into formal, innovative, and high-value entrepreneurship.
- ii. Trade policy should be complemented with capacity-building, technology adoption, and value-added export promotion to enhance domestic competitiveness.
- iii. Short-run strategies should focus on credit access, skill development, and market integration, while long-run strategies should strengthen innovation ecosystems, industrial capacity, and global market linkages for sustainable economic development.



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