

RESEARCH ARTICLE

The Role of Information in Economic Planning: A Pathway to Sustainable Growth

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Abstract

The study examines the role of information in strategic economic planning as a pathway to sustainable growth in Nigeria. Annual data on GDP growth, the Human Development Index (HDI), internet access rates (serving as a proxy for information accessibility), interest rate spread (as a measure of fiscal policy efficiency), institutional quality, foreign direct investment (FDI), and inflation were obtained from reputable sources such as the World Bank and CBN for the period 1990 to 2023. The study employs the Autoregressive Distributed Lag (ARDL) model to analyze both short-run and long-run relationships among these variables. The Bounds Test for Cointegration was applied to confirm the existence of a long-run equilibrium, and an Error Correction Model (ECM) was used to assess the speed of adjustment toward this equilibrium. The findings revealed that improved information accessibility, evidenced by increased internet penetration significantly boosts GDP growth, underscoring the importance of digital infrastructure in enhancing economic productivity. Fiscal policy effectiveness, as measured by the interest rate spread, and robust institutional quality further contribute to positive economic outcomes, while high inflation rates are found to erode the real value of investments, ultimately hampering sustainable growth. Additionally, although FDI exhibits short-run challenges, its long-run impact is positive, suggesting that foreign capital inflows play a vital role in supporting long-term economic expansion and human development. Based on these results, the study recommends that policymakers prioritize expanding digital connectivity, strengthening institutional frameworks, and adopting robust monetary and fiscal policies to control inflation. Such integrated policy measures are essential to optimize strategic economic planning, ensuring that Nigeria achieves sustainable growth and improved human development outcomes.

Keywords: Information Accessibility, Strategic Economic Planning, Sustainable Economic Growth, GDP, HDI, ARDL, FDI, Inflation, Nigeria.

1. Introduction

In modern time, information is most important and valuable part of everything (Sarmistha, 2022). Information can be defined as processed data that is meaningful and useful to the recipient (Rafael & Birger, 2005; Adeniran, Jadah & Mohammed, 2020). Data, in its raw essence, comprises unprocessed facts, figures, and symbols and it is the bits and pieces of information waiting to be interpreted. On the other hand, knowledge emerges from the synthesis, organization, and contextualization of data (Yasin 2024).

In a democracy, information empowers the people being the real sovereign to act more meaningfully, be more vigilant and therefore, democracy is bound to become more vibrant.

The topic on information has been addressed by many scholars in different fields like technology (ICT), mass communication and many others. This interesting topic or issue prompted economists to express their views, it is refer to as information economics or economics of information. 'Information Economics' refers to the study of how information,

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knowledge, and power impact economic decisions and behavior, emphasizing the value and role of information in shaping economic outcomes. The Right to Information lays the very foundation to build the good governance, transparency, accountability, participation and to eliminate the concept of the corruption, simultaneously it is considered a very basic to any democracy. Corruption will happen where there is little or no information.

Planning has got through so many evolution, revolution and transformation. The story of planning starts with the Spatial planning. Spatial planning began in Germany before the First World War. Spatial planning was to bring relief and succour to people after seeing the negative effect of industrialization and urbanization affecting people settlement. Spatial Planning was actually created to control the massive space being occupied by industrialization and urbanization which was seriously affecting settlement of people. (Blotevogel and Schelhaas, 2011).

The truth is planning theory is so vast and highly controversial from one country to another country; one disciple to the other, one school of thought to the another (Akinloye, 2024a; Akinloye, 2024b; Akinloye, 2025). Unlike the spatial planning who planned activities of industrializations and other through available space, to rational planning model who handles planning rationally, that is, considering many others options and select the best for action, to communicative planning approach who believes that all rational actions should be communicated first and appropriate tools should be used in actualizing it. Since the 1990s, the need for a methodical, integrated approach in planning practice was revisited and this led to more robust and comprehensive planning called strategic planning theory. Empirical studies reveal that strategic planning leads to effective planning practices (Wiechmann, 2018)

This paper explores the pivotal role of information including ICT, in economic planning, highlighting its potential to drive sustainable growth, enhance efficiency, and foster innovation. By examining the intersection of information, technology and economic planning. The study aims to provide insights into the strategies and best practices that can help Nigeria harness the power of information to achieve her economic growth and development.

2. Literature Review

Out of many theories, the most suitable theory was reviewed to support this research work

2.1 Cyber-socialist' model

Unlike 'negotiated coordination' approach or planning and 'participatory economics' approach, 'cyber-socialist' model has been suggested by Paul Cockshott and Allin Cottrell (1993), who argue for computerized central planning. Digitally connected workplaces communicate required inputs and production capacities to a central planning agency, which uses this information to optimize economic production via linear programming and thus produce options for economy-wide plans.

2.2 Empirical

Evidence of economy with several difficulties in promoting social and economic development with the use of planning approach was examined by Abel Lopez Dadero, (2010). The result revealed that poor planning approach led to problems in social and economic development. The paper concludes that planning requires a full understanding of the context where improvement or appropriate strategies are implemented because developing countries possess social and economic characteristics that are considerably different than those found in developed countries where rational planning was first introduced.

3. Methodology

This study employs a quantitative research design using an ex-post facto approach (Adeniran, Asifat et al., 2024; Adeniran & Tayo-Ladega, 2024) to examine the role of information in strategic economic planning and its impact on sustainable growth. The ex-post facto design is appropriate as it relies on historical data to assess the relationship between information availability, economic planning, and growth outcomes without direct manipulation of variables (Adeniran & Tayo-Ladega, 2024). The population consists of macroeconomic data on information dissemination, economic planning indicators, and growth metrics in Nigeria from 1990 to 2023. This period captures the evolving role of information systems, economic reforms, and globalization in shaping strategic planning. Secondary data is sourced from reputable institutions such as the World Bank, International Monetary Fund (IMF), United Nations Development Programme (UNDP), and national statistical agencies to ensure accuracy and reliability and this period, Nigeria has data for the variables used in the research work.

The dependent variable; sustainable economic growth (SGR) is measured using Gross Domestic Product

(RGDP) growth rate and the Human Development Index(HDI).Thekeyindependentvariable,information accessibility (INFO), is proxied by internet access rates. Economic planning effectiveness (PLAN) is assessed through fiscal policy efficiency (interest rate spread), and institutional quality indicators. Control variables include FDI and inflation (INF) as these factors influence economic outcomes.

3.1 Model Specification

The Autoregressive Distributed Lag (ARDL) model is employed to estimate the short-run and long-run relationships between information availability, strategic economic planning, and sustainable growth. The ARDL framework is suitable due to its ability to analyze both stationary and non-stationary time series data while accommodating heterogeneous dynamics across economies (Adeniran & Fakunle, 2025). The study follows Pesaran, Shin, and Smith (2001) in estimating long-run elasticities and speed of adjustment using the Error Correction Model (ECM). These variables and methodologies align with prior research on economic planning and growth dynamics (Solow, 1956; Barro & Sala-i-Martin, 2004; Acemoglu & Robinson, 2012), ensuring robustness and empirical relevance in analyzing the role of information in fostering sustainable development. Two econometric models were employed to analyze the relationships between the variables. The baseline models for economic development and government expenditure become thus.

$$GDPgr_t = \beta_0 + \alpha_1 GDPgr_{t-i} + \beta_1 INACC_t + \beta_2 INQ_t + \beta_3 INFR_t + \beta_4 INTRSP_t + \beta_5 FDI_t + \mu_t \text{ eqn 1}$$

In Equation 1, GDP growth measures economic development and modeled as a function of several key macroeconomic and institutional quality factors, including Internet access rate(INACC) Institutional

quality (INQ), Inflation rate (INFR_t), Interest rate spread(INTRSP) AND Foreign Direct Investment (FDI).

$$HDI_t = \beta_0 + \alpha_1 HDI_{t-i} + \beta_1 INACC_t + \beta_2 INQ_t + \beta_3 INFR_t + \beta_4 INTRSP_t + \beta_5 FDI_t + \mu_t \text{ eqn 2}$$

In Equation 2, HDI represents human development and is modeled as a function of several key fiscal and institutional factors, Internet access rate (INACC) Institutional quality (INQ), Inflation rate (INFR_t), Interest rate spread (INTRSP) and Foreign Direct Investment (FDI). μ_t is the error term, which accounts for unobserved factors that may influence sustainable development but are not explicitly included in the model. t is the Time period while β_0, β_1 to β_4 are the constant term and the coefficients respectively.

The long run Error correction model specification becomes;

$$\Delta \ln GDPgr_t = \beta_0 + \sum_{i=1}^p \beta_{1i} \Delta \ln GDPgr_{t-i} + \sum_{i=1}^q \beta_{2i} \Delta \ln INACC_{t-i} + \sum_{i=1}^q \beta_{3i} \Delta \ln INQ_{t-i} + \sum_{i=1}^q \beta_{4i} \Delta \ln INFR_{t-i} + \sum_{i=1}^q \beta_{5i} \Delta \ln INTRSP_{t-i} + \sum_{i=1}^q \beta_{6i} \Delta \ln FDI_{t-i} + \gamma ECT_{t-1} + e_t \text{ eqn 3}$$

$$\Delta \ln HDI_t = \beta_0 + \sum_{i=1}^p \beta_{1i} \Delta \ln HDI_{t-i} + \sum_{i=1}^q \beta_{2i} \Delta \ln INACC_{t-i} + \sum_{i=1}^q \beta_{3i} \Delta \ln INQ_{t-i} + \sum_{i=1}^q \beta_{4i} \Delta \ln INFR_{t-i} + \sum_{i=1}^q \beta_{5i} \Delta \ln INTRSP_{t-i} + \sum_{i=1}^q \beta_{6i} \Delta \ln FDI_{t-i} + \gamma ECT_{t-1} + e_t \text{ eqn 4}$$

In equation 3 and 4. Δ is the change Operator while $\gamma = (1 - \sum_{i=1}^p \delta_i)$ is the speed of adjustment parameters with a negative sign while ECT ($\ln RGDP - \theta X_t$) represent the error correction term. β_i represent the long run parameter α $\beta_{1i}, \beta_{2i}, \beta_{3i} =$ Estimation Parameters that represent the short run dynamic coefficient of the models adjustment long run equilibrium.

3.2 Empirical Finding

Descriptive Statistics

Table 1. Descriptive Statistics

	HDI	RGDP	INQ	GDPGR	INTRSP	INACC	FDI	INFR
Mean	0.4721	45229.70	18.1045	4.2458	7.4855	11.2780	2.9509	18.2780
Median	0.4770	42044.78	16.9048	4.2130	7.3340	6.1575	1.9809	12.9417
Maximum	0.5480	76684.94	30.9078	15.3292	11.0642	36.7931	8.8409	72.8355
Minimum	0.4040	21462.73	8.4577	-2.0351	3.2683	0.0010	-1.8708	5.3880
Std. Dev.	0.0466	20491.60	5.1693	3.9055	1.6227	12.7746	2.5909	15.9020
Skewness	0.0761	0.1624	0.5977	0.5005	0.0666	0.6822	0.9162	2.1803
Kurtosis	1.6054	1.3892	2.8372	3.4865	3.4194	1.9552	2.6926	6.8550
Jarque-Bera	2.7883	3.8251	2.0619	1.7546	0.2743	4.1840	4.8907	47.9940

Probability	0.2480	0.1477	0.3567	0.4159	0.8718	0.1234	0.0866	0.0000
Sum	16.0510	1537810.0	615.5535	144.3556	254.5074	383.4517	1.0011	621.4536
Sum Sq. Dev.	0.0717	13898000	881.8317	503.3586	86.8967	5385.2700	2.22E+20	8344.851
Observations	34	34	34	34	34	34	34	34

Source: Authors Computation, 2025

The descriptive statistics analysis reveals significant variations in Nigeria’s sustainable economic growth (SGR) measured through GDP growth rate (GDPGR) and the Human Development Index (HDI) exhibits moderate progress but faces structural challenges. The average GDP growth rate (4.25%) indicates fluctuations between economic contraction (-2.04%) and rapid expansion (15.33%), with Jarque-Bera statistics (1.75, $p = 0.42$) confirming normality. Similarly, HDI (0.472) highlights gaps in human capital development, with Jarque-Bera (2.79, $p = 0.25$) supporting normal distribution. These findings suggest the need for economic diversification, investments in education and healthcare, and policies enhancing job creation to drive long-term, inclusive development.

Information accessibility (INFO), proxied by internet access rates (INTACC), shows low penetration (11.28%) and high disparities ($\sigma = 12.77\%$), with Jarque-Bera (4.18, $p = 0.12$) indicating no deviations from normality. The weak digital infrastructure limits access to financial services, e-commerce, and knowledge-based economies, necessitating policies that expand broadband networks, reduce internet costs, and enhance digital literacy. Meanwhile,

3.3 Correlation Analysis

Table 2. Correlation Matrix

	GDPGR	INACC	INFR	INQ	INTRSP	FDI
GDPGR	1.0000					
INACC	0.4691	1.0000				
INFR	-0.5601	-0.4641	1.0000			
INQ	0.1562	0.2644	-0.1924	1.0000		
INTRSP	-0.0678	0.0506	-0.0612	0.3363	1.0000	
FDI	0.2698	0.7347	-0.2901	0.4472	-0.0176	1.0000
	HDI	INACC	INFR	INQ	INTRSP	FDI
HDI	1.0000					
INACC	0.9482	1.0000				
INFR	-0.3145	-0.4497	1.0000			
INQ	0.1724	0.2179	-0.1859	1.0000		
INTRSP	0.1332	0.1071	-0.0581	0.2893	1.0000	
FDI	0.6263	0.7305	-0.2867	0.4306	0.0062	1.0000

Source: Authors Computation, 2025

Table 2 presents the correlation results between Sustainable economic growth (SGR), represented by GDP growth rate (GDPGR) and Human Development Index (HDI), is influenced by multiple economic factors. The correlation analysis reveals a moderate

economic planning effectiveness (PLAN) measured through interest rate spread (7.49%) and institutional quality (18.10) reveals moderate financial sector efficiency (Jarque-Bera, $p = 0.87$) but governance weaknesses (Jarque-Bera, $p = 0.36$). Institutional reforms, anti-corruption policies, and enhanced regulatory frameworks are crucial to fostering investor confidence and economic stability.

Control variables such as foreign direct investment (FDI) and inflation (INF) further shape economic outcomes. FDI inflows (₦2.95 billion) show volatility (Jarque-Bera, $p = 0.09$), emphasizing investor uncertainty linked to governance and infrastructure gaps. Meanwhile, inflation (18.28%) exhibits extreme fluctuations (5.39% to 72.84%), with Jarque-Bera (47.99, $p = 0.000$) indicating severe deviations from normality, highlighting macroeconomic instability. Addressing these challenges requires monetary policy stability, exchange rate management, and improved economic competitiveness. Strengthening institutional frameworks, fostering financial inclusion, and leveraging technology-driven economic policies will be critical to achieving long-term sustainable economic growth in Nigeria.

the detrimental impact of price instability on economic expansion. Institutional quality (INQ) shows a weak positive association with GDPGR ($r = 0.1562$), indicating that governance improvements alone may not directly drive short-term growth. Interest rate spread (INTRSP), a measure of fiscal policy efficiency, has a negligible correlation with GDPGR ($r = -0.0678$), suggesting potential inefficiencies in monetary transmission mechanisms. The positive correlation between foreign direct investment (FDI) and GDPGR ($r = 0.2698$) highlights the role of capital inflows in stimulating economic activity, albeit with moderate influence.

Information accessibility (INFO), proxied by internet access (INACC), strongly correlates with HDI ($r = 0.9482$), underscoring the critical role of digital inclusion in improving human development outcomes. This suggests that increasing internet penetration can enhance access to education, healthcare, and financial services, thereby improving overall well-being. Conversely, inflation (INFR) negatively correlates with HDI ($r = -0.3145$), indicating that macroeconomic instability erodes living standards. Institutional quality (INQ) exhibits a weak positive correlation with HDI ($r = 0.1724$), implying that governance reforms alone may not substantially improve human development without complementary investments in

infrastructure and social services. The interest rate spread (INTRSP) shows a limited impact on HDI ($r = 0.1332$), reinforcing concerns about the efficiency of monetary policies in fostering socio-economic welfare. Notably, FDI strongly correlates with both INACC ($r = 0.7305$) and HDI ($r = 0.6263$), suggesting that foreign investments enhance digital infrastructure and improve human capital development.

From a policy perspective, these findings highlight the urgent need for Nigeria to prioritize digital expansion, inflation control, and institutional reforms to foster sustainable economic growth. Expanding internet access can serve as a catalyst for economic transformation, enhancing productivity, job creation, and overall well-being. Moreover, stabilizing inflation and ensuring financial sector efficiency will create an enabling environment for long-term economic planning. The moderate correlation between institutional quality and economic growth suggests that policy efforts should extend beyond governance reforms to include targeted fiscal and digital policies. Finally, strengthening FDI inflows through improved regulatory frameworks can bolster both economic growth and human development, ensuring a more sustainable and inclusive economic future for Nigeria.

Table 3. Stationary Test Result

Variables	Levels		First Differenced		
	ADF Statistics	P Value	ADF Statistics	P Value	Remarks
GDPgr	-1.466358	0.5283	-3.802850	0.0089	I(1)
HDI	-197.689	0.0000	-201.535	0.0000	I(0)
INACC	-3.579522	0.0139	-1.005074	0.7361	I(1)
INFR	-2.424780	0.1430	-4.745267	0.0006	I(1)
INQ	-2.953141	0.0501	-6.987971	0.0000	I(0)
INTRSP	-3.971339	0.0044	-6.554356	0.0000	I(0)
FDI	-1.844248	0.3531	-6.802460	0.0000	I(1)

Source: Authors Computation, 2025

The results in Table 3 indicate that the unit root test results in Table 3 indicate the stationarity properties of the variables using the Augmented Dickey-Fuller (ADF) test. The results show that HDI, INQ, and INTRSP are stationary at levels, meaning they are integrated of order zero, I(0), as their ADF statistics are more negative than the critical values at the 5% significance level, with p-values below 0.05. In contrast, GDPgr, INACC, INFR, and FDI are non-stationary at levels but become stationary after first differencing, indicating they are integrated of order one, I(1). This suggests that while some variables

exhibit mean-reverting behavior in their original form, others require differencing to achieve stationarity, which is crucial for ensuring valid econometric modeling and avoiding spurious regression results.

3.4 Co-integration Test

Following the findings above that the variables of interest are I(1) and I(0) series, it therefore suggests test for co-integration among these variables since they contain unit root. The study employs the ARDL Bounds test. The result of the test is presented in Table 4.

Table 4. ARDL F Bounds Cointegration Test Result

	Test Statistic		Value			
	F-statistic		11.686927			
	10%		5%		1%	
Sample Size	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
			F-Statistic			
30	2.578	3.858	3.125	4.608	4.537	6.370
Asymptotic	2.260	3.350	2.620	3.790	3.410	4.680

Source: $I(0)$ and $I(1)$ are respectively the stationary and non-stationary bounds.

The cointegration test is necessary because after the unit root was proven to exist, the long-term connection between the variables became crucial. Since the series are integrated at levels and at the first difference, the study used the Bounds test. The result of the test is presented in table 4.

The results presented in Table 4 indicate that the ARDL bounds test yields an F-statistic of 11.686927. This value significantly exceeds the 1% upper bound critical value of 6.370 for a sample size of 35. Since the test statistic surpasses both the lower and upper bounds at the 1% significance level, we reject the null hypothesis of no cointegration. This confirms

the existence of a long-run cointegrating relationship among the variables, implying that they move together over time despite short-term fluctuations.

3.5 Lag length determination

The VAR lag length criteria were used to establish the lag length for the analysis. By showing that estimates of a VAR whose lag length differs from the actual lag length, as well as the impulse response functions and variance decompositions that are derived from the estimated VAR, are inconsistent, Braun and Mittnik (1993) provide evidence that highlights the importance of lag length determination. This highlights the importance of determining lag duration.

Table 5. VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-21.11780	NA	3.53e-07	2.169424	2.461954	2.250559
1	70.46091	131.8733	4.53e-09	-2.276873	-0.229162	-1.708925
2	133.9005	60.90205*	9.05e-10*	-4.472044*	-0.669151*	-3.417283*

Source: Authors computation, (2022).

From the lag length criteria examined in table 4.5, the maximum lag length is selected by Information Criteria. Most of the information criteria depict an optimal lag length of 2. Since the AIC was used

for lag selection of the unit root, therefore Akaike Information Criterion (AIC) prediction was adopted for the purpose of our estimation hence, lag length 2 was selected.

3.6 Series Plot of Government expenditure and economic development Components

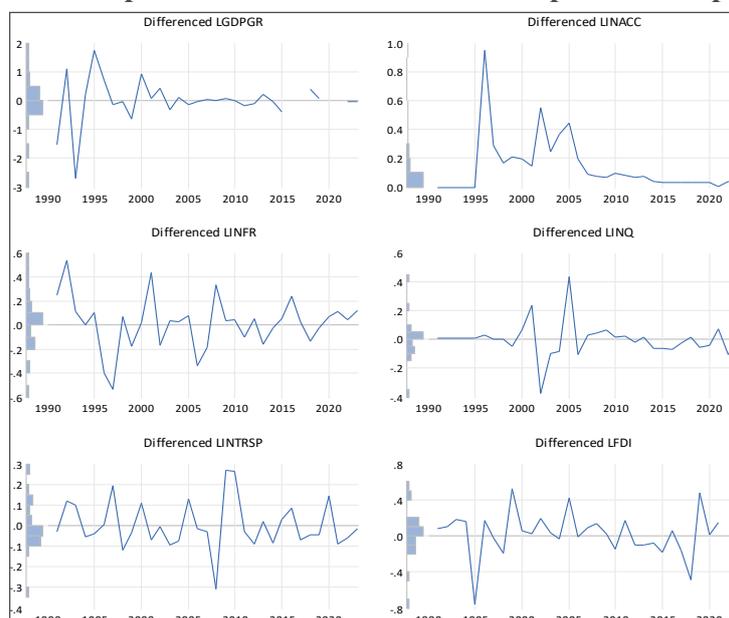


Figure 1. showing series plots of the Sustainable development and information planning indicators

3.7 Short run and Long run Autoregressive Distributed Lag Estimation (ARDL)

The long-term relationships between real GDP, government spending indicators, inflation, and the interplay between inflation and government spending on economic development were all investigated in this study using the Autoregressive Distributed Lag (ARDL) bounds testing technique introduced by Pesaran, Shin, and Smith in 2001. Because it

can handle variables that are integrated of different orders (I(0) and I(1)) and tackle problems like serial correlation and endogeneity by incorporating suitable lag structures, the ARDL framework is especially helpful in this situation. This enables the simultaneous estimation of both short- and long-run dynamics. The Table 5 displays the test findings and projected long-run coefficients that support the cointegrating relationships.

Table 6. ARDL Estimate. DV: GDP Growth & HDI

Variable	GDP Growth Model	Human Development Index Model
Short run Estimates		
ECM (-1)*	-1.4743***	-0.0396***
D(LINACC)	2.7335***	-0.0023
D(LINACC (-1))	2.4293***	0.0026
D(LINFR)	1.3576***	0.0016
D(LINFR (-1))		-0.0035
D(LINQ)	-1.7807***	-0.0228***
D(LINQ (-1))	1.1049**	0.0222***
D(LINTRSP)	1.8209***	0.0193***
D(LINTRSP (-1))		-0.0142***
D(LFDI)	-0.6316**	0.0024
D(LFDI (-1))	-1.7736***	-0.0128***
C	-7.7895***	-0.0952***
Long run Estimates		
LINACC (-1)	0.0048	-0.0313
LINFR (-1)	-1.5575***	-0.1515
LINQ (-1)	-0.4605	-1.1896
LINTRSP (-1)	0.1095	0.7720
LFDI (-1)	0.8014*	0.3399
R-squared	0.9016	0.7146
Adjusted R-squared	0.8462	0.5403
S.E. of regression	0.2937	0.0019
Sum squared resid	1.3807	7.0805
Log likelihood	1.2683	151.7761
F-statistic	16.294	4.0986
Prob(F-statistic)	0.0000	0.0040
Durbin-Watson stat	2.6382	2.2694

Source: Author's computation, 2025

The ARDL estimation results in Table 6 provide insights into the short-run and long-run determinants of sustainable economic growth in Nigeria, measured by GDP growth rate and the Human Development Index (HDI). The error correction term (ECM (-1)) is highly negative and statistically significant for both models (GDP growth: $\beta = -1.4743$, $p < 0.01$; HDI: $\beta = -0.0396$, $p < 0.01$), indicating a fast adjustment to long-run equilibrium. However, the ECM coefficient exceeding -1 in the GDP growth model suggests a

possible overcorrection or instability in the system, meaning that economic shocks may trigger excessive fluctuations rather than gradual convergence. This underscores the need for policy consistency and macroeconomic stability to prevent economic volatility.

In the short run, information accessibility, inflation, institutional quality, interest rate spread, and FDI exhibit significant effects on GDP growth and HDI. A 1% increase in information accessibility

(D(LINACC)) boosts GDP growth by 2.73% ($p < 0.01$), confirming that digital expansion accelerates economic productivity. A 1% rise in interest rate spread (D(LINTRSP)) leads to a 1.82% increase in GDP growth ($p < 0.01$), but its lagged effect reduces HDI by 0.014% ($p < 0.01$), highlighting a potential trade-off between financial sector efficiency and human welfare. Inflation exhibits a dual effect: while moderate inflation increases GDP growth in the short run ($\beta = 1.36, p < 0.01$), its long-run impact is negative ($\beta = -1.56, p < 0.01$), emphasizing the necessity for inflation-targeting policies to maintain price stability.

The long-run estimates indicate that FDI positively influences GDP growth in the long run ($\beta = 0.80, p < 0.1$), despite its negative short-run impact, suggesting that foreign investments require time to yield economic benefits. However, institutional quality and inflation have adverse long-run effects, with a 1% increase in inflation reducing GDP growth by 1.56%, reinforcing concerns about inflationary pressures eroding economic stability. The R-squared values (GDP: 0.9016; HDI: 0.7146) confirm that the models explain a significant proportion of variations in growth and human development, and the F-statistics ($p < 0.01$) validate the overall robustness of the estimations.

These findings highlight critical policy implications for Nigeria’s sustainable economic growth. First, excessive short-run adjustments due to an explosive ECM signal the need for stable macroeconomic policies to prevent cyclical disruptions. Second, while information accessibility and financial sector efficiency drive economic expansion, inflation control is necessary to sustain long-run growth. Third, institutional reforms require a structured approach to avoid short-term economic shocks. Lastly, FDI inflows should be optimized through improved governance and investment-friendly policies to maximize long-term developmental benefits. A 1% increase in interest rate spread leads to a 1.82% rise in GDP growth on average, but its adverse effects on HDI require careful regulation to balance economic efficiency with human welfare. These insights are crucial for policymakers aiming to enhance Nigeria’s long-term economic resilience and sustainable growth.

3.8 Post Estimate Test

To determine the suitability of the estimated model and to be sure of its overall significance and stability, a post-estimation evaluation was conducted. The autocorrelation Test, Heteroscedasticity test, and stability test (CUMSUM square) tests were evaluated. The results are presented in table 9 and figure 1.

The diagnostic test results in Table 4.9 for serial correlation in GDP growth model indicate that the F-statistic (0.6397, $p = 0.4469$) fails to reject the null hypothesis of no serial correlation, suggesting that autocorrelation is not a significant issue in the model. Similarly, the Obs*R-squared statistic (1.9251, $p = 0.1653$) further supports this conclusion, as its p-value is above the conventional significance levels. This implies that the residuals are not significantly correlated over time, reinforcing the reliability of the model’s estimations. For HDO model, the serial correlation test results indicate that the F-statistic (0.5519, $p = 0.4718$) does not reject the null hypothesis of no serial correlation, implying that the model’s residuals are not significantly autocorrelated. Additionally, the Obs*R-squared statistic (1.3190, $p = 0.2508$) further confirms this, as its p-value exceeds conventional significance thresholds. These results suggest that serial correlation is not a major concern, enhancing the robustness of the model’s estimations.

As regards the heteroskedasticity test in Table 4.9 reports an high p-values for the F-statistic (0.6758) and Obs*R-squared (0.5314), indicating that the null hypothesis of homoskedasticity is rejected. Additionally, the Scaled Explained SS test ($p = 0.9993$) further confirms that heteroskedasticity is not present. This suggests that the model’s residuals have a constant variance, ensuring the reliability of standard errors. Similarly, Table 10b shows an The heteroskedasticity test results indicate that the F-statistic ($p = 0.6833$) and Obs*R-squared ($p = 0.5456$) are not statistically significant, meaning we fail to reject the null hypothesis of homoskedasticity. Additionally, the Scaled Explained SS test ($p = 0.9999$) further confirms the absence of heteroskedasticity. This suggests that the model’s residuals have a constant variance, ensuring the validity of statistical inferences.

Table 7. Diagnostic Test Results for GDP Growth and HDI Models

Diagnostic Test	Model	Test Statistic	Degrees of Freedom	Probability
Serial Correlation (Breusch-Godfrey LM Test)	GDP Growth	F-statistic: 0.6397	(1, 8)	0.4469
		Obs*R-squared: 1.9251	(1)	0.1653
	HDI	F-statistic: 0.5519	(1, 12)	0.4718
		Obs*R-squared: 1.3190	(1)	0.2508

Heteroskedasticity (Breusch-Pagan-Godfrey Test)	GDP Growth	F-statistic: 0.7782	(14, 11)	0.6758
		Obs*R-squared: 12.9379	(14)	0.5314
		Scaled Explained SS: 2.8748	(14)	0.9993
	HDI	F-statistic: 0.7822	(16, 13)	0.6833
		Obs*R-squared: 14.7154	(16)	0.5456
		Scaled Explained SS: 2.9313	(16)	0.9999

3.9 Model Stability Test

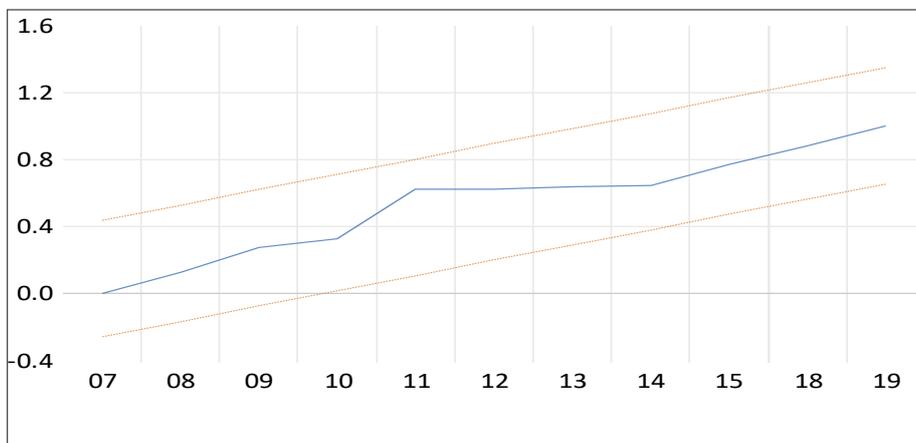


Figure 2. Stability Test Results

Figure 1 shows the result of the CUSUM Squared test. From CUSUM Square results in Figure 4.1, the blue lines stay between the 5% red lines in the figure. This shows that the model is stable over time.

3.10 Normality Test

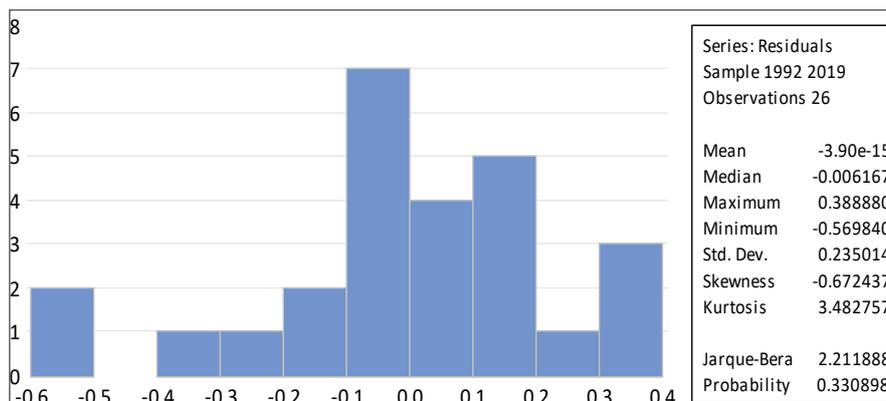


Figure 3. Normality Test Results

The results of the Jarque-Bera normality test indicate that the null hypothesis of normally distributed residuals cannot be rejected, since the test statistic is 2.211888 and the p-value is 0.330898, which is well above the 0.05 significance level. This suggests that the residuals in the model are normally distributed. Additionally, the reported mean is 3.9015, and the median is very close to zero (0.006167), further supporting the likelihood of symmetrical residuals around the mean. Thus, the normality assumption of the error terms appears to be satisfied.

4. Discussion of Findings

The study examined The Role of Information in Economic Planning: A Pathway to Sustainable Growth. The study applied pre-estimation checks to ensure reliability of the results.. The parameters estimate and

the estimated regression were also done to meet the assumptions of Both short run and long run ARDL tests. The model was found to be statistically stable with a joint significance of the explanatory variables.

The ARDL estimation results indicate that sustainable economic growth (SGR) in Nigeria is significantly influenced by information accessibility. The findings indicate that improvements in internet access, in other words, information accessibility, is strongly associated with higher GDP growth. This result is consistent with Aker and Mbiti’s (2010) work, which documented that enhanced digital connectivity contributes to greater economic performance in African economies, as well as with the World Bank’s (2020) findings on the transformative effects of digital infrastructure in emerging markets.

Fiscal policy effectiveness, assessed through the interest rate spread, also plays a critical role in driving economic growth. On average, a 1% increase in the interest rate spread leads to a 1.82% increase in GDP growth in the short run, highlighting the positive impact of efficient financial intermediation on economic output. However, the lagged effects of interest rate spread reveal a more complex relationship with human development; while promoting short-term growth, excessive spreads may hinder HDI improvements, possibly due to reduced resource allocation for social investments. This dual effect underscores the need for balanced monetary policies, as supported by the International Monetary Fund (IMF, 2022), which emphasizes that maintaining financial stability is key to long-term economic progress.

In the long run, inflation and foreign direct investment (FDI) emerge as significant determinants of sustainable growth. Although moderate inflation can stimulate economic activity in the short term by lowering real borrowing costs, persistent high inflation ultimately reduces GDP growth by eroding purchasing power—a phenomenon well-documented by Blanchard (2006). Conversely, FDI shows a negative impact in the short run, likely due to adjustment costs and market uncertainties, but its long-run effect turns positive, indicating that stable inflows of foreign capital contribute to sustained economic expansion. This finding aligns with empirical evidence from the OECD (2019), which highlights the importance of FDI in supporting long-term economic stability.

Overall, these results underscore the importance of a multi-faceted policy approach for achieving sustainable economic growth in Nigeria. Enhancing digital infrastructure and expanding internet access can significantly boost productivity and GDP growth, while carefully calibrated fiscal and monetary policies are essential to managing inflation and optimizing the benefits of FDI. Moreover, improving institutional quality and ensuring effective resource allocation will further support human development. Together, these measures can create a balanced framework that promotes both economic expansion and long-term social well-being in Nigeria.

5. Conclusion

This study has demonstrated that sustainable economic growth in Nigeria—measured by GDP growth and the Human Development Index—is significantly influenced by multiple factors, including information accessibility, economic planning effectiveness, FDI, and inflation. Our ARDL estimates reveal that

improvements in digital connectivity (proxied by internet access rates) are associated with enhanced economic performance, reinforcing the findings of Aker and Mbiti (2010) on the transformative impact of mobile and internet technologies in Africa. Moreover, the analysis indicates that fiscal policy efficiency, as reflected in interest rate spreads, plays a dual role by positively affecting GDP growth in the short run, yet potentially hampering human development if not balanced by effective social policies.

The results also highlight that while short-run dynamics show positive contributions from variables such as information accessibility and efficient financial intermediation, persistent inflation and suboptimal foreign direct investment absorption pose significant challenges to long-run economic stability. These findings echo the concerns raised by Blanchard and Johnson (2013) and the International Monetary Fund (2022), underscoring the need for robust monetary policies and comprehensive institutional reforms. Enhancing digital infrastructure and ensuring fiscal discipline are critical for fostering an environment conducive to both economic expansion and inclusive human development.

In sum, the study underscores the importance of an integrated policy framework that simultaneously promotes digital connectivity, stabilizes inflation, and strengthens institutional quality to achieve sustainable economic growth in Nigeria. The evidence supports the view that targeted improvements in these areas can drive significant long-term benefits. Future research should focus on further disaggregating these relationships across different regions within Nigeria and exploring the potential moderating effects of additional socio-economic variables..

5.1 Recommendations

Based on the findings, it is recommended that Nigeria prioritize the expansion of its digital infrastructure to enhance information accessibility, as improved internet penetration has been shown to significantly boost GDP growth. Policymakers should invest in broadband networks and digital literacy initiatives to ensure that increased connectivity translates into tangible economic benefits. Simultaneously, monetary and fiscal authorities must adopt measures to stabilize inflation, given its adverse long-run effects on growth, while also maintaining a balanced interest rate spread to support efficient financial intermediation. Furthermore, institutional reforms aimed at enhancing governance and reducing bureaucratic inefficiencies are critical, as improved institutional quality can

ultimately lead to more effective economic planning. Finally, optimizing foreign direct investment through streamlined regulations and a stable business environment will help maximize its long-run benefits. These integrated policy approaches, supported by empirical evidence from studies such as Aker and Mbiti (2010), Onifade et al. (2020), and the International Monetary Fund (2022), are essential for fostering a sustainable and inclusive growth trajectory in Nigeria.

5.2 Contribution to knowledge

This study uniquely contributes to the literature by integrating measures of digital connectivity proxied by internet access rates with traditional macroeconomic and institutional indicators (GDP growth, HDI, interest rate spread, and FDI) to assess sustainable economic growth in Nigeria. Unlike previous research that typically examines these factors in isolation, our approach employs a panel ARDL framework to capture both short-run and long-run dynamics, providing robust empirical evidence on how enhanced information accessibility and effective economic planning interact to drive growth and human development. This comprehensive analysis not only deepens our understanding of the digital economy's role in emerging markets but also offers actionable insights for policymakers aiming to leverage digital infrastructure and institutional reforms for sustainable development.

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