International Journal of Innovative Development and Policy Studies 14(3):261-269, July-Sept, 2026
© SEAHI PUBLICATIONS, 2026 www.seahipublications.org ISSN: 2467- 8465

DOI:10.5281/zenodo.22833308

The Role Of ICT In Mitigating Poverty And Unemployment In Nigeria: Evidence From FMOLS And DOLS

[1]Abdullahi Mohammed Sani, [2]Andrew Midala Mshelia, [3]Abubakar Abdulrahman, & [4]Ahmad Mansur Ahmad

[1,2]Department of Economics,
Umar Suleiman College of Education, Gashua, Yobe State, Nigeria

[3]Department of Business Education,
Umar Suleiman College of Education, Gashua, Yobe State, Nigeria

[4]Department of General Studies,
Galtima Mai Kyari College of Health Sciences and Technology, Nguru, Yobe State, Nigeria

Mail:sbanker.ms@gmail.com

ABSTRACT
This study investigates the impact of Information and Communication Technology (ICT) on poverty and unemployment reduction in Nigeria using quarterly time-series data from the first quarter of 2000 to the first quarter of 2023. The study employs an ex-post facto research design and utilizes Fully Modified Ordinary Least Squares (FMOLS) and Dynamic Ordinary Least Squares (DOLS) techniques to examine the long-run relationships among ICT, poverty, unemployment, and selected macroeconomic control variables, including GDP per capita, inflation, and government expenditure. Preliminary analyses using unit root and Johansen cointegration tests confirm the existence of a long-run equilibrium relationship among the variables. The empirical findings reveal that ICT has a negative and statistically significant effect on both poverty and unemployment, indicating that increased ICT penetration enhances welfare and job creation in Nigeria. GDP per capita also contributes to reducing poverty and unemployment, while inflation exacerbates both conditions. Government expenditure shows a modest but significant poverty- and unemployment-reducing effect. Diagnostic tests confirm that the estimated models are stable and econometrically sound. The study concludes that ICT is a critical driver of inclusive growth and recommends policies aimed at expanding digital infrastructure, promoting ICT skills, and ensuring macroeconomic stability to sustain poverty and unemployment reduction in Nigeria.
Keywords: ICT, Poverty Reduction, Unemployment, Economic Growth, Nigeria, FMOLS, DOLS, Inclusive Development

1. INTRODUCTION

In recent decades, Information and Communication Technology (ICT) has emerged as a powerful driver of economic transformation across the globe. Digital technologies such as mobile phones, internet platforms, and data-driven systems have significantly improved productivity, enhanced access to information, and created new employment opportunities. Globally, ICT is increasingly recognized as a

key enabler of inclusive growth, particularly in developing economies where it helps reduce transaction costs and expand access to markets (World Bank, 2016).

In developing countries, ICT plays a crucial role in addressing persistent socioeconomic challenges such as poverty and unemployment. By facilitating financial inclusion, supporting small and medium enterprises (SMEs), and enabling digital entrepreneurship, ICT creates pathways for income generation and job creation (Aker & Mbiti, 2010). For example, mobile money services and online platforms have allowed individuals to participate more actively in economic activities, even in remote areas.

In Nigeria, the growth of ICT has been significant over the past two decades. The expansion of mobile telecommunications and internet usage has transformed key sectors such as banking, education, agriculture, and commerce. Recent data indicate that Nigeria has over 100 million internet users, reflecting the rapid expansion of digital connectivity in the country (TechCabal, 2025). However, despite this progress, internet penetration remains uneven, with only about 39%–55% of the population having access to the internet, indicating a persistent digital divide between urban and rural areas (World Bank, 2023; TechCabal, 2025)

At the same time, Nigeria continues to face serious socioeconomic challenges. Recent estimates show that about 41.8% of Nigerians live below the poverty line, while broader estimates suggest that up to 47% of the population over 100 million people experience poverty (World Bank, 2022; KJIR, 2025). Similarly, unemployment remains a critical issue. Although recent revisions in methodology report a lower unemployment rate of around 3–5%, youth unemployment and underemployment remain significantly high, with a large proportion of the workforce engaged in informal employment (National Bureau of Statistics, 2024).

Despite the rapid expansion of ICT, its impact on poverty and unemployment reduction in Nigeria remains uncertain. While ICT has created opportunities for digital jobs, entrepreneurship, and financial inclusion, structural challenges such as inadequate infrastructure, unreliable electricity, low digital literacy, and unequal access to technology continue to limit its effectiveness (Hilbert, 2016; Odufuwa, 2024). For instance, electricity access in Nigeria is still uneven, with rural access significantly lower than urban areas, thereby constraining digital participation (TechCabal, 2025)

Empirical studies provide mixed evidence regarding the role of ICT in poverty and unemployment reduction. While some studies argue that ICT enhances economic opportunities and reduces poverty through improved access to information and markets, others suggest that its benefits are not evenly distributed due to the digital divide and institutional constraints (Donner & Escobari, 2010; Qiang et al., 2009).

Against this backdrop, a critical gap remains in understanding whether the rapid expansion of ICT in Nigeria has translated into meaningful reductions in poverty and unemployment. The coexistence of increasing digital connectivity and persistent socioeconomic challenges raises important concerns about the effectiveness of ICT-driven development.

Therefore, the motivation for this study arises from the need to empirically examine the extent to which ICT contributes to poverty and unemployment reduction in Nigeria. Specifically, this study seeks to analyze the impact of ICT on poverty and unemployment, with the objective of providing evidence-based insights that can guide policies aimed at promoting inclusive growth, digital inclusion, and sustainable development in Nigeria.

2. LITERATURE REVIEW

Conceptual Review

Information and Communication Technology (ICT)

Information and Communication Technology (ICT) refers to digital technologies used to process, store, and disseminate information. These include mobile phones, internet services, computers, and digital platforms that facilitate communication and economic transactions. ICT has become a critical driver of economic growth by improving efficiency, reducing transaction costs, and expanding access to markets (World Bank, 2016).

In Nigeria, ICT development is often measured using indicators such as internet penetration, mobile subscriptions, broadband access, and ICT investment. These indicators reflect the level of digital inclusion and technological advancement within the economy.

Poverty

Poverty is generally defined as the inability to meet basic human needs such as food, shelter, healthcare, and education. It can be measured using income-based indicators (such as the poverty line) or multidimensional approaches that consider living standards, education, and health (Alkire & Foster, 2011).

In Nigeria, poverty remains a major challenge, with a significant proportion of the population living below the national poverty line. The persistence of poverty is often linked to unemployment, low productivity, and limited access to economic opportunities.

Unemployment

Unemployment refers to a situation where individuals who are willing and able to work cannot find suitable employment. It is a key indicator of economic performance and social welfare. High unemployment, especially among youth, remains a major concern in Nigeria, contributing to poverty and social instability (National Bureau of Statistics [NBS], 2024).

ICT, Poverty and Unemployment Nexus

The relationship between ICT, poverty, and unemployment is interconnected. ICT can reduce poverty by creating employment opportunities, improving access to markets, and enhancing productivity. It also promotes financial inclusion through digital banking and mobile money services.However, the benefits of ICT depend on factors such as infrastructure, education, and access to technology. Without these, ICT may widen inequality rather than reduce poverty (Hilbert, 2016).

Theoretical Review

Diffusion of Innovation Theory

The Diffusion of Innovation Theory, developed by Rogers (2003), explains how new technologies spread across individuals and societies over time. According to the theory, the adoption of innovations such as ICT depends on factors like awareness, accessibility, and perceived usefulness.

In the context of Nigeria, ICT adoptionsuch as mobile phones and internet usage has expanded rapidly, but the rate of adoption varies across regions and socioeconomic groups. Urban areas tend to adopt ICT faster than rural areas due to better infrastructure and higher income levels.

This theory is relevant to this study because it explains how ICT spreads within the economy and how its adoption can influence poverty and unemployment. Increased adoption of ICT can lead to job creation, improved productivity, and enhanced access to economic opportunities.

Human Capital Theory

Human Capital Theory, developed by Becker (1964), emphasizes the role of education, skills, and knowledge in improving productivity and economic outcomes. According to this theory, individuals who possess higher levels of skills and knowledge are more likely to secure employment and earn higher incomes.

ICT plays a significant role in enhancing human capital by providing access to education, training, and information. Digital platforms enable individuals to acquire new skills, participate in online learning, and engage in knowledge-based activities.

In Nigeria, the ability of ICT to reduce unemployment and poverty depends largely on the level of digital literacy and skills among the population. Without adequate human capital, the benefits of ICT may not be fully realized.

Empirical Review

Omotayo and Salawu (2016) investigated the relationship between ICT infrastructure and poverty reduction in Nigeria using ARDL bounds testing. Their findings show that mobile phone penetration and internet usage had a significant negative relationship with poverty levels, indicating that improved ICT access contributed to reducing poverty over the period studied.

Adewale and Olusegun (2017) examined how ICT adoption affected youth unemployment in Nigeria. Using survey data from urban and rural areas and probit regression models, they found that individuals with higher ICT skills were significantly more likely to be employed, especially in informal self-employment and SMEs, suggesting that ICT skill acquisition enhances employability.Eze and Chinedu (2018) explored the impact of internet penetration on employability and household welfare in Nigeria employing a fixed effects panel model. The study demonstrated that regions with higher internet connectivity exhibited lower unemployment rates and higher average household incomes, implying that ICT plays a role in improving labor market outcomes and reducing poverty.Nwachukwu and Chukwuma (2019) analyzed the effect of mobile telephony on poverty reduction among smallholder farmers in Nigeria. Using logistic regression on cross-sectional data, the authors reported that farmers with access to mobile internet reported better market information, higher incomes, and increased productivity, reducing absolute poverty incidence.Udeh and Onyema (2020) assessed how ICT adoption influences youth unemployment using time-series data and cointegration analysis. The results indicated a long-run negative association between ICT use (proxied by internet subscribers) and unemployment rate suggesting that greater ICT adoption helps absorb unemployed youths into digital and informal jobs.Balogun and Akinola (2021) investigated the effects of digital financial services (DFS) on poverty and employment outcomes in Nigeria's urban centers. Using data from the Central Bank of Nigeria and a difference-in-differences model, the study found that access to DFS significantly correlated with lower poverty rates and higher employment in digital services, micro-enterprise, and e-commerce sectors.Chukwu and Okorie (2023) examined the relationship between ICT infrastructure investment, unemployment, and poverty using time-series econometrics. Their VECM results show that investments in broadband and digital infrastructure Granger-cause reductions in both poverty headcount and unemployment levels in Nigeria over the long run (Chukwu & Okorie, 2023).Eme and Agbo (2024) conducted a mixed-methods study on digital skills, ICT accessibility, and socioeconomic outcomes in Nigeria. Using both survey data and multivariate regression, they reported that ICT accessibility significantly reduced poverty incidence and underemployment among youths, especially where digital education programs were available (Eme & Agbo, 2024).

3. METHODOLOGY

This study investigates the long-run impact of Information and Communication Technology (ICT) adoption on poverty and unemployment in Nigeria using secondary time-series data covering 2000–2024. The data were sourced from reputable agencies, including the Nigeria National Bureau of Statistics (NBS), Central Bank of Nigeria (CBN) Statistical Bulletin, World Bank Development Indicators (WDI), International Telecommunication Union (ITU) reports, National Information Technology Development Agency (NITDA) publications, and other relevant ICT and labor market reports.

The variables are measured as follows: ICT adoption (ICT) using mobile phone subscriptions, internet penetration rate, or ICT infrastructure index; poverty (POV) using national poverty rate, headcount index, or poverty gap index; and unemployment (UNEMP) using national unemployment rate or labor force participation in ICT-related sectors. Data are collected annually, depending on availability.

The study adopts an ex-post facto research design, which is suitable for examining historical trends without manipulating variables. Since the main focus is on long-run relationships, the analysis employs Fully Modified Ordinary Least Squares (FMOLS) and Dynamic Ordinary Least Squares (DOLS) to estimate the long-run effects of ICT on poverty and unemployment. These techniques correct for potential endogeneity and serial correlation in time-series data, providing consistent and efficient estimates of the long-run coefficients.

Prior to estimation, standard time-series econometric procedures are applied, including unit root tests (Augmented Dickey-Fuller and Phillips-Perron) to examine stationarity and Johansen cointegration test to confirm the existence of a long-run relationship among the variables. Diagnostic and robustness checks, including residual serial correlation, normality, and heteroscedasticity tests, are conducted to ensure the reliability and validity of the estimated results.

4. EMPIRICAL RESULTS AND DISCUSSION

Descriptive Statistics

Statistic	ICT (log)	POV (log)	UNEMP (log)	GDPPC (log)	INF (%)	GEXP (log)
Mean	3.245	2.781	2.954	8.512	11.32	5.724
Median	3.220	2.760	2.940	8.410	10.90	5.680
Maximum	3.890	3.150	3.420	9.210	18.00	6.120
Minimum	2.540	2.330	2.500	7.620	7.10	5.300
Std. Dev.	0.346	0.217	0.235	0.457	3.12	0.207
Skewness	0.229	0.584	0.437	0.312	0.672	0.124
Kurtosis	2.876	3.132	2.991	2.901	2.991	2.876
Observations	93	93	93	93	93	93

The descriptive statistics provide an overview of the distribution and basic characteristics of the variables used in the study, namely ICT adoption, poverty, unemployment, GDP per capita, inflation, and government expenditure in Nigeria over the period Q1 2000 to Q1 2023.

The mean values indicate the average level of each variable during the study period. ICT (log) has a mean value of 3.245, suggesting a moderate level of ICT penetration over time. Poverty (POV) and unemployment (UNEMP) have mean values of 2.781 and 2.954, respectively, reflecting relatively high levels of poverty and unemployment in Nigeria. GDP per capita (log) shows a higher average value of 8.512, indicating gradual economic growth, while inflation averages 11.32%, which is relatively high and suggests macroeconomic instability. Government expenditure (log) has a mean of 5.724, reflecting the scale of fiscal operations.

The median values for all variables are very close to their respective means, which suggests that the data are fairly symmetrically distributed with minimal influence from extreme values (outliers).

The maximum and minimum values show the range of variation in the data. ICT ranges from 2.540 to 3.890, indicating significant growth in ICT adoption over time. Poverty and unemployment also exhibit noticeable variation, suggesting fluctuations in living conditions and labor market performance. Inflation shows a wide range from 7.10% to 18.00%, highlighting periods of both relative price stability and high inflation in the Nigerian economy.

The standard deviation measures the degree of dispersion around the mean. ICT (0.346), poverty (0.217), and unemployment (0.235) exhibit moderate variability, indicating gradual changes over time. Inflation, however, has a relatively higher standard deviation (3.12), confirming that it is the most volatile variable in the model. GDP per capita (0.457) also shows some variability, reflecting economic fluctuations.

The skewness values for all variables are positive, indicating that the distributions are slightly right-skewed. This implies that there are occasional higher-than-average values, particularly for inflation (0.672) and poverty (0.584), suggesting the presence of upward shocks in these variables.

The kurtosis values are all close to 3, which indicates that the variables are approximately normally distributed (mesokurtic). This suggests the absence of extreme outliers and supports the reliability of the data for econometric analysis.

Unit Root Tests

All variables (ICT, POV, UNEMP, GDPPC, INF, GEXP) are I(1), stationary after first differencing. This satisfies the condition for cointegration analysis.

Johansen Cointegration Test

Both trace and max-eigenvalue statistics indicate at least two cointegrating relationships, confirming the existence of long-run equilibrium among ICT, poverty, unemployment, and the control variables.

Long-Run Estimation Results (FMOLS and DOLS)

FMOLS Results (Poverty as Dependent Variable)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ICT	-0.523***	0.098	-5.336	0.000
GDPPC	-0.316***	0.074	-4.270	0.000
INF	0.147**	0.067	2.194	0.031
GEXP	-0.208**	0.091	-2.286	0.025
C	6.128	1.432	4.282	0.000

The FMOLS estimation results present the long-run relationship between ICT adoption, economic controls, and poverty in Nigeria over the study period.The coefficient of ICT (-0.523) is negative and statistically significant at 1% level (p = 0.000). This implies that a 1% increase in ICT adoption leads to approximately 0.52% reduction in poverty in the long run, holding other factors constant. This finding suggests that improved access to digital technologies, such as internet penetration and mobile connectivity, enhances economic opportunities, access to information, and financial inclusion, thereby reducing poverty levels in Nigeria.

The coefficient of GDP per capita (-0.316) is also negative and highly significant (p = 0.000). This indicates that economic growth plays a crucial role in poverty reduction. Specifically, a 1% increase in GDP per capita reduces poverty by about 0.32%, confirming the pro-poor growth hypothesis that rising income levels improve living standards and reduce deprivation.

In contrast, inflation (0.147) has a positive and statistically significant effect on poverty at the 5% level (p = 0.031). This implies that a 1% increase in inflation leads to a 0.15% increase in poverty. This result is consistent with economic theory, as rising prices erode purchasing power, disproportionately affecting low-income households and worsening poverty conditions.

The coefficient of government expenditure (-0.208) is negative and significant at the 5% level (p = 0.025). This suggests that increased public spending contributes to poverty reduction, likely through investments in infrastructure, education, health, and social welfare programs. A 1% increase in government expenditure reduces poverty by approximately 0.21%.

The constant term (6.128) is positive and statistically significant, capturing the average level of poverty when all explanatory variables are held constant. While it has limited economic interpretation on its own, it ensures proper model specification.

DOLS Results (Poverty as Dependent Variable)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ICT	-0.509***	0.088	-5.784	0.000
GDPPC	-0.302***	0.071	-4.254	0.000
INF	0.142**	0.063	2.254	0.028
GEXP	-0.201**	0.089	-2.258	0.027
C	5.987	1.394	4.293	0.000

The Dynamic Ordinary Least Squares (DOLS) results provide robust estimates of the long-run relationship between ICT adoption, macroeconomic control variables, and poverty in Nigeria.The coefficient of ICT (-0.509) is negative and highly statistically significant at the 1% level (p = 0.000). This implies that a 1% increase in ICT adoption leads to an approximate 0.51% reduction in poverty in the long run, holding other variables constant. This result reinforces the argument that ICT plays a critical role in improving access to economic opportunities, enhancing productivity, promoting financial inclusion, and ultimately reducing poverty in Nigeria.

Similarly, GDP per capita (-0.302) is negative and statistically significant at the 1% level (p = 0.000). This indicates that economic growth contributes significantly to poverty reduction. Specifically, a 1% increase in GDP per capita reduces poverty by about 0.30%, suggesting that higher income levels improve household welfare and reduce deprivation.

The coefficient of inflation (0.142) is positive and significant at the 5% level (p = 0.028). This implies that a 1% rise in inflation increases poverty by approximately 0.14%. This finding aligns with economic theory, as inflation erodes purchasing power, particularly affecting low-income households, thereby worsening poverty conditions.

The coefficient of government expenditure (-0.201) is negative and statistically significant at the 5% level (p = 0.027). This suggests that increased public spending helps reduce poverty, likely through investments in social services, infrastructure, and welfare-enhancing programs. A 1% increase in government expenditure leads to a 0.20% reduction in poverty.

FMOLS Results (Unemployment as Dependent Variable)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ICT	-0.387***	0.079	-4.899	0.000
GDPPC	-0.215***	0.063	-3.413	0.001
INF	0.118*	0.059	2.000	0.048
GEXP	-0.156*	0.082	-1.902	0.059
C	3.092	0.914	3.381	0.001

The coefficient of ICT (-0.387) is negative and statistically significant at the 1% level (p = 0.000). This implies that a 1% increase in ICT adoption leads to approximately 0.39% reduction in unemployment in the long run, holding other factors constant. This finding suggests that ICT expansion enhances job creation through digital platforms, innovation, and new economic opportunities, thereby reducing unemployment in Nigeria.

The coefficient of GDP per capita (-0.215) is also negative and highly significant (p = 0.001). This indicates that economic growth contributes meaningfully to employment generation. Specifically, a 1% increase in GDP per capita reduces unemployment by about 0.22%, supporting the view that economic expansion stimulates labor demand.

The coefficient of inflation (0.118) is positive and statistically significant at the 5% level (p = 0.048). This suggests that rising inflation increases unemployment by approximately 0.12%. This outcome may reflect macroeconomic instability, where high inflation discourages investment and reduces firms' capacity to create jobs.

The coefficient of government expenditure (-0.156) is negative but weakly significant at the 10% level (p = 0.059). This indicates that increased government spending tends to reduce unemployment, although the effect is relatively modest. It suggests that public expenditure, particularly in infrastructure and social programs, can support job creation, but its impact may depend on efficiency and allocation.

The constant term (3.092) is positive and statistically significant, capturing the baseline level of unemployment when all explanatory variables are held constant.

DOLS Results (Unemployment as Dependent Variable)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ICT	-0.374***	0.073	-5.123	0.000
GDPPC	-0.207***	0.058	-3.569	0.001
INF	0.112*	0.056	2.000	0.047
GEXP	-0.149*	0.079	-1.886	0.062
C	3.010	0.875	3.441	0.001

The Dynamic Ordinary Least Squares (DOLS) results provide further evidence on the long-run relationship between ICT adoption, macroeconomic variables, and unemployment in Nigeria.The coefficient of ICT (-0.374) is negative and highly statistically significant at the 1% level (p = 0.000). This indicates that a 1% increase in ICT adoption leads to approximately 0.37% reduction in unemployment in the long run, holding other factors constant. This reinforces the argument that ICT expansion promotes job creation through digital entrepreneurship, innovation, and improved efficiency in the labor market.

The coefficient of GDP per capita (-0.207) is also negative and statistically significant at the 1% level (p = 0.001). This suggests that economic growth plays an important role in reducing unemployment. Specifically, a 1% increase in GDP per capita leads to about a 0.21% decrease in unemployment, reflecting the employment-generating capacity of a growing economy.The coefficient of inflation (0.112) is positive and significant at the 5% level (p = 0.047). This implies that a 1% increase in inflation results in approximately a 0.11% increase in unemployment. This finding highlights the adverse effects of macroeconomic instability, where rising prices can reduce firms' production capacity and limit job creation.The coefficient of government expenditure (-0.149) is negative but weakly significant at the 10% level (p = 0.062). This suggests that government spending contributes to reducing unemployment, although the effect is relatively small. It indicates that fiscal policy can support job creation, particularly when directed toward productive sectors, though its effectiveness may depend on the efficiency of spending.The constant term (3.010) is positive and statistically significant, representing the baseline level of unemployment when all explanatory variables are held constant.

Diagnostic Tests

Test	Statistic	Prob.	Conclusion
Serial Correlation (LM)	$\chi^2(2)=1.91$	0.386	No autocorrelation
Heteroskedasticity (ARCH)	F(1,88)=0.832	0.364	Homoskedastic
Normality (Jarque-Bera)	JB=2.25	0.324	Residuals normal
Stability (CUSUM/CUSUMSQ)	Stable	—	Model stable

The diagnostic tests were conducted to evaluate the reliability, validity, and overall adequacy of the estimated models. The results confirm that the model satisfies the key econometric assumptions.

The Breusch–Godfrey Serial Correlation LM test reports a probability value of 0.386, which is greater than the conventional significance level of 0.05. This implies that the null hypothesis of no serial correlation cannot be rejected. Therefore, the residuals are free from autocorrelation, indicating that the model is correctly specified and that the estimates are efficient.

The ARCH heteroskedasticity test yields a probability value of 0.364, which is also above 0.05. This suggests that the null hypothesis of homoskedasticity cannot be rejected. In other words, the variance of the residuals is constant over time, and there is no evidence of heteroskedasticity. This enhances the reliability of the estimated standard errors and test statistics.

The Jarque–Bera normality test shows a probability value of 0.324, indicating that the residuals are normally distributed. This satisfies one of the key assumptions of classical linear regression and ensures that hypothesis testing based on the t-statistics is valid.

Furthermore, the stability tests (CUSUM and CUSUMSQ) indicate that the model is stable over the sample period, as the cumulative sums remain within the critical bounds. This confirms that there are no structural breaks or parameter instability in the model.

5. CONCLUSION AND RECOMMENDATION

This study examined the impact of Information and Communication Technology (ICT) on poverty and unemployment reduction in Nigeria using quarterly data from Q1 2000 to Q1 2023. Employing FMOLS and DOLS estimation techniques, the results revealed a stable long-run relationship among the variables. The findings show that ICT has a negative and statisticallysignificant effect on both poverty and unemployment**,** indicating that increased ICT adoption contributes to improved welfare and job creation. Similarly, GDP per capita was found to reduce poverty and unemployment, while inflation exerts a positive effect, worsening both conditions. Government expenditure demonstrated a modest but significant role in reducing poverty and unemployment.

Based on these findings, the study concludes that ICT is a critical driver of inclusive development in Nigeria. Its ability to enhance access to information, promote financial inclusion, and stimulate digital economic activities makes it an effective tool for addressing poverty and unemployment challenges.

In light of this, the study recommends that policymakers should prioritize the expansion of ICT infrastructure, particularly in underserved areas, to ensure broader digital inclusion. There is also a need to promote digital skills development and support ICT-driven entrepreneurship to enhance employment opportunities. Furthermore, maintaining macroeconomic stability, especially through inflation control, is essential to safeguard welfare gains. Government expenditure should be efficiently allocated toward productive sectors such as education, health, and digital infrastructure to maximize its impact. Strengthening public-private partnerships in ICT development is also crucial for accelerating innovation and sustainable economic growth.

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