



Influence of infrastructure development on central banks' money supply in Nigeria.

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Abstract

This research work evaluates the influence of Infrastructure Development indicators on money supply. The Problem of the study presides on the difficult of Central Bank of Nigeria to achieve the goal of monetary policy without adequate infrastructure system in Nigeria. This work was anchored on The Keynesian theory which believes that increase in government spending should promote economic growth and development. Being an ex-post facto research, data were obtained through secondary sources. The annual data were sourced and collected for the period of 1988-2022 from the CBN Statistical Bulletin (2023), International Financial Statistics, International Monetary Fund (IMF) database and World Bank database. The data were analysed using E-views version 8 and SPSS version. The findings revealed that Infrastructure development indicators had significant effect on Money Supply in Nigeria. The government through the Central Bank of Nigeria and the Ministry of Finance should promote sound monetary and fiscal policies management that will stabilize money supply in Nigeria.

Keywords: Infrastructural development indicators, money supply, Nigeria.

1.1 Introduction

A Central Bank is a well-organized financial institution owned by the government of a nation, run by Board of Directors, chaired by a Governor appointed by the Federal Government and specifically charged with the responsibility of managing the expansion and contraction of the volume, costs and availability of money in the economy in the interest of public welfare and is a non-profit making institution(CBN,2021). Extensively, The Central Bank uses Monetary Policy to influence the quantity, cost and availability of

money supply in order to achieve desired macroeconomic objectives of internal and external balances (CBN, 2011). The main target of monetary policy is how to control money supply, the monetarists believe that the Central Bank has the responsibility of controlling money stock. Also, It is worthy to note that the goals of monetary policy: Is to maintain a high and stable level of employment, Secure continuous real economic growth, Maintain a healthy balance of payments equilibrium and also keep inflation to a low level(Umeora,2016).Central bank



are saddled with the duty of using monetary policy to grow their economies, since it has become real that the role of monetary policy in influencing macroeconomic objectives like economic growth, price stability, equilibrium in balance of payments and host of others cannot be overlooked. Apparently, it will be very difficult for the Central Bank of Nigeria to achieve the goals of monetary policy without adequate infrastructure development in Nigeria. Effective and adequate infrastructure in Nigeria will facilitate the goals of monetary policy and without that the goals of monetary policy will remain a dream in Nigeria.

The condition of infrastructure in Nigeria has been a great concern, to both the local and international investors. The nations full potentials have not been achieved as a result of decay in infrastructure system in Nigeria. The National Integrated Infrastructure Master Plan (2020) ranked Nigeria 24th out of 26 African countries rated. The index for Nigeria from 2014 to 2020 was at an average of 21.62. It is also good to note that 2019 Global Competitiveness Index Report showed that Nigeria scored 48.33 points out of 100 and ranked 130th of 141 countries surveyed for the overall quality of infrastructure, well behind Egypt (52nd), South Africa (69th), and Algeria (82nd). The 2020 Africa Infrastructure Development Index (AIDI) produced by the African Development Bank to monitor and evaluate the status and progress of infrastructure development across the continent, also placed Nigeria (with an index of 23.27 in 2020) at the bottom of the pyramid. Nigeria lack absolute capacity to talk in the comity of Nations because of deep decay in her infrastructure system that is obviously caused

by corruption. The development of infrastructural facilities will go a long way in facilitating the sensitive goals of monetary policy in Nigeria.

The Nigeria's population is expected to be about 264 million by 2030. This calls for future demand for infrastructure expansion to reduce unemployment, congestion and strain on existing networks. The Central Bank monetary policy cannot be able to achieve the goal of increasing employment without adequate infrastructural system in Nigeria. Without consistent improvements in infrastructure, the prospects for economic growth and development will never come to reality (NIIM, 2020). Realizing the fact that infrastructural development is the pillar of economic growth and development in Nigeria, and which without that, many things cannot work. The government through the Central Bank must seek for a way of solving the infrastructural deficit in Nigeria. The general question is: What percentage of consideration has Central Bank given to infrastructural development in Nigeria? Does the Central Bank of Nigeria tighten monetary policy at the expense of infrastructure development in Nigeria? Can infrastructure development in Nigeria affect the vision of monetary policy negatively?

1.2 Objective of the Study

The objective of this study is to:

1. Evaluate the infrastructure development indicators that influence money supply.

1.3 Research Questions

1. How has Infrastructure development indicators influenced Money supply?

1.4 Hypotheses of the Study



H₀₁: Infrastructure development indicators have no significant effect on Money Supply in Nigeria.

2.1 Review of current Literature

2.1.1 Infrastructure development

Infrastructures are necessary facilities that facilitate economic growth and development. Infrastructure is a great enhancer of economic development. The development of a country's infrastructure is vital to the growth of its sectors and the overall economy. The infrastructure sector primarily comprises of electricity, roads, telecommunications, railways, irrigation, water supply and sanitation, ports and airports, storing facilities, and oil and gas pipelines etc (Babatunde, 2018). Investing in infrastructure development will help Nigeria so much.

2.1.2 Monetary Policy

Monetary policy is an action of the Federal Government of Nigeria through the Central Bank to influence the quantity, cost and availability of money supply in order to achieve some desired macroeconomic objectives(CBN,2011). Money policy can either be expansionary or contractionary, depending on what it intends to achieve. It is expansionary when the policy adopted increase money supply in the economy. It is contractionary when it reduces the volume of money supply in the economy.

It is important to note that the Central Bank of Nigeria operates the monetary policy through the monetary policy committee (MPC). This committee has the statutory responsibility for the conduct of the monetary policy of the bank. They use the instruments

of monetary policy to effect changes in the liquidity of deposit money banks to affect the money supply. Umeora,2016).

2.1.3 Money Supply

Money supply is the quantity of cash that is accessible for use in an economy throughout a specific time period (Batu,2015). There are three perspectives on money supply; the first view, M₁ means money held by general society as well as demand deposit with commercial banks. It can likewise be called high powered money or narrow money. The subsequent view is alluded to as (M₂) and is otherwise called broad money. It is related with modern quantity theorist headed by Friedman and M₂ comprise of M₁ plus time and saving deposits. The third view is the broadest and is related with M₃. It incorporates M₂ plus deposits of building societies, deposits of other credit and financial institutions, savings bank and loan associations. (According to United Nations, 2015), Increase in money supply can trigger inflation. Inflation is a continuous and persistent ascent in the general level of prices of goods and services in an economy. Fedderke(2006) refers to inflation as a consistent rise in the overall price level of goods and services throughout a given timeframe. Inflation is portrayed by a decline in value or purchasing power of money and loss in the worth of some other financial resources.

2.2 Theoretical Review

Keynesian theory

The Keynesian theory viewed government expenditure as regards to economic growth, which has its ideology rooted in saying that public expenditure



could be manipulated to affect the level of national income, an increase in public expenditure leading to an increase in national output. In theory, Keynes regards fiscal arrangements of public disbursements as an inspiring element which can be employed to stimulate economic growth. From the Keynesian thought, public spending could be used to affect the growth of an economy positively. Since expansion in the level of government expenditures will probably lead to an upturn in the rate of employment, cost-effectiveness, and venture utilizing multiplier effects on increasing demand. As a result, government disbursement supplements the aggregate demand, which aggravates an increased output depending on disbursement multipliers (Obiamaka *et al.*, 2016).

The essence of economic modelling is to represent the phenomenon under investigation in such a way to enable the researcher to attribute numerical values to the concept (Howard & Gary, 1984). The Keynesian model believes that increase in government spending should promote economic growth. The model specification is stated as follows:

$$Y = C + I + G + NX(X-M)$$

Where:

Y = Economic Growth (proxy by GDP)

C = Consumption (which is constant)

I = National Investment = Savings

G = Government Expenditures

NX = Net Export

X = Export

M = Import

2.3 Review of Empirical Literature

Okerekeoti, (2022) conducted a study to examined the effect of government expenditure on education on economic

growth of Nigeria. Data for the analysis were extracted from annual series of the selected relevant macroeconomic variables from 1999 to 2020. Data for government expenditure on education were used as public expenditure variable while real gross domestic product was used as economic growth variable. Regression analysis was used to test the hypothesis, the findings of this study upholds that there is a positive and significant effect between government expenditure on education and RGDP at 5% level of significance. Based on finding of the study, the study recommended that there should be an increase in the reallocation of public spending towards education in order to raise income in the long run which would cause an improvement in the well-being of the citizenry.

Chandana, Adamu and Abdu, (2021) conducted a study to investigate the impact of Nigerian government expenditure (disaggregated into capital and recurrent) on economic growth using time series data for the period 1970-2019. The paper employs Autoregressive Distributed Lag (ARDL) model. To ensure robustness of results, the study accounts for structural breaks in the unit root test and the co-integration analysis. The key findings of the study are that capital expenditure has positive and significant impact on economic growth both in the short run and long run while recurrent expenditure does not have significant impact on economic growth both in the short run and long run. The study recommends that government should increase the share of the capital expenditure especially on meaningful projects that have direct bearing on the citizen's welfare. Government should also improve the



spending patterns of recurrent expenditure through careful reallocation of resources toward productive activities that would enhance human development in the country.

Yusuf (2018) conducted a study that empirically examined the relationship between government health expenditure on economic growth in Nigeria, using Gross Domestic Product (GDP) as a proxy to economic growth which is the dependent variable and the independent variables are Capital Expenditure on Health (CAPEXP) and Recurrent Expenditure on Health (RECEXP). The Error Correction Mechanism results shows the system corrects to equilibrium at a speed of 43.40%. The study also employed the OLS regression analysis to estimate the model and the R² showed a 94% significant relationship between government health expenditure and economic growth. The regression analysis results showed that the dependent variable (GDP) has; a positive and significant relationship with all the independent variables; every 1% unit increase in CAPEXP and RECEXP will increase economic growth by 140.1217 units and 190.7144 units respectively. Good public health is vital in any country, not only to maintain a healthy populace but also as a matter of national security. Given these findings, to ensure sustainable economic growth, it is recommended that there is the need for the Nigerian government to double its budgetary allocation to the health sector.

Udeorah, Obayori, Joseph and Onuchuku, (2018) conducted a study to examine the impact of health care expenditure on economic growth in Nigeria for the period of 1980 to 2016. The data used

in the study were sourced from Central Bank of Nigeria (CBN) statistical bulletin. The study adopted ex post facto research method. The study used Real Gross Domestic Product (RGDP) as proxy for economic growth as the dependent variable; health care expenditure (HE) as the major independent variable while education expenditure (EE) as a check regressor to enhance the explanatory power of the model. The study used descriptive statistics and Generalized Method of Moments (GMM) test as the estimation techniques of data analysis. The GMM result revealed that the coefficient of health care expenditure with positive sign which conformed to economics theory is not statistically significant at 5% level. The coefficient of education expenditure conformed to economics theory (i.e., positive) and statistically significant at 5% level. The study concluded that health care expenditure had no significant impact on economic growth while education expenditure had positive significant impact on economic growth in Nigeria during the period of study. The study recommended that the government should redesign her policy toward health care expenditure in particular and human capital development in general and put in place machineries for implementing and monitoring this policy for effective implementation.

Ogunjimi, and Adebayo, (2018) conducted a study that examined the relationship among health expenditure, health outcomes and economic growth in Nigeria for the period between 1981 and 2017. This study adopted the Toda-Yamamoto causality framework to examine these relationships. The Augmented Dickey



Fuller unit root test and Autoregressive Distributed Lag (ARDL) Bounds test approach was used for data analysis. The results of the Toda-Yamamoto causality tests showed a unidirectional causality running from health expenditure to infant mortality while there is no causality between real GDP and infant mortality; a unidirectional causal relationship running from health expenditure and real GDP to life expectancy and maternal mortality; and a unidirectional causal relationship running from real GDP to health expenditure. This study therefore recommended that the Nigerian government should make concerted efforts geared towards increasing the health expenditure at least to meet up with the WHO's recommendation that all countries should allocate at least 13 per cent of their annual budget to the health sector for effective funding.

3.1 Nature and Sources of Data

Being an *ex-post facto* research, data were obtained through secondary sources. The annual data were sourced and collected for the period of 1988-2022 from the CBN Statistical Bulletin (2023), International Financial Statistics, International Monetary Fund (IMF) database and World Bank database.

3.2 Model Specification and validity

This research adapted the model of Siyeofori, (2022). In the model, the researcher expressed infrastructure and foreign direct investment model as:

$$FDI_t = \beta_0 + \beta_1 TI_t + \beta_2 EI_t + \beta_3 CI_t + \beta_4 WI_t + \beta_5 EG_t + \beta_6 TO_t + \varepsilon_t \text{ ----- (1)}$$

Where:

FDI = Foreign Direct Investment Inflow Index

TI = Transport Infrastructure Index
 EI = Energy Infrastructure Index
 CI = Communication Infrastructure Index
 WI = Water Infrastructure (Access to good drinking water) Index
 EG = Economic Growth
 TO = Trade Openness (Real Trade Share (Import + Export) per real GDP)
 E = Regression Error Term
 T = the year.
 β_0 = Constant coefficient
 $\beta_1 - \beta_6$ = Coefficients of the various estimated independent variables parameters

This study adapted the model to evaluate the influence of Infrastructure development indicators on money supply. The following `stochastic models were estimated.

$$MS = f(IFDEV) \text{ ----- (2)}$$

Where:

IFDEV = Infrastructure development indicators represented by TI, EI, WI, ICT, and SI

TI = Transportation Infrastructure
 EI = Energy Infrastructure
 WI = Water Infrastructure
 ICT = Information Communication Technology Infrastructure
 SI = Social Infrastructure
 MS = Money supply
 u_t = Error term

To obtain the coefficients of the elasticity of the variables, given varying forms of the variables and reducing the possible impact that any outlier may have, the models were represented in a log-linear econometric format as follows:

Model :



$$\log MS = \beta_0 + \beta_1 \log TI + \beta_2 \log EI + \beta_3 \log WI + \beta_4 \log ICT + \beta_5 \log SI + \varepsilon_t \quad \text{----- (3)}$$

$\beta_1 - \beta_6$ = Coefficients of the various estimated independent variables parameters
 \log = logarithm forms of the variables
 t = time trend

Where:

β_0 = Constant coefficient

Table 4.1 Descriptive statistics of Infrastructure development indicators

	EID	ICTID	SID	TID	WID
Mean	83.69591	58445233	2.26E+11	31452.46	83.16871
Median	83.90800	18587000	9.20E+10	16851.00	82.04100
Maximum	87.10000	1.73E+08	8.76E+11	77482.00	90.00100
Minimum	73.90000	9017.000	4.20E+08	5600.000	67.00500
Std. Dev.	2.429691	66639551	2.57E+11	25574.17	4.599189
Skewness	-2.043773	0.515504	0.951231	0.572710	-0.913311
Kurtosis	9.046314	1.528852	2.686515	1.536327	5.397087
Jarque-Bera Probability	77.67950 0.000000	4.706415 0.095064	5.421552 0.066485	5.037554 0.080558	13.24542 0.001330
Sum	2929.357	2.05E+09	7.92E+12	1100836.	2910.905
Sum Sq. Dev.	200.7155	1.51E+17	2.24E+24	2.22E+10	719.1862
Observations	35	35	35	35	35

Source: E-Views Version 8 Output Data, 2023

Tables 4.1 showed the results of the descriptive statistics of variables used in the estimation and analysis. The statistics covered are the mean, median, maximum value, minimum value, standard deviation, skewness, kurtosis, Jarque-Bera, sum of these variables and their square deviations. The table 4.1 revealed that for the total observations of 34 years, transportation infrastructure average is 31452.46 and varies from 5600 to 77482 with a standard deviation of 25574. Energy infrastructure average is

83.6959 and varies from 73.90 to 87.10 with a standard deviation of 2.42969. Water infrastructure average is 83.1687 and varies from 67.01 to 90.00 with a standard deviation of 4.59919. ICT infrastructure average is 58445233.2571 and varies from 9017.00 to 172330603.00 with a standard deviation of 66639551.0. Social infrastructure average is 226263263483.8286 and varies from 87593 to 92000 with a standard deviation of 256638903143.8.



Table 4.2 Descriptive statistics of Nigeria’s economy

	MS
Mean	1.17E+13
Median	2.61E+12
Maximum	5.22E+13
Minimum	3.84E+10
Std. Dev.	1.49E+13
Skewness	1.174288
Kurtosis	3.265814
Jarque-Bera Probability	8.146923 0.017018
Sum	4.10E+14
Sum Sq. Dev.	7.54E+27
Observations	35

Source: E-view Output Data, 2023

From Table 4.2, Money supply average is 11720019343446.8850 and varies from 384058 to 521950 with a standard deviation of 148909122.

Correlation analysis on Model one:

The Pearson correlation coefficients of MS and the infrastructure development assets class were shown in Table 4.3

Table 4.3: Pearson Correlation Coefficients of Money Supply and the Infrastructure Development Indicators

		MS	TID	EID
Pearson Correlation	Money Supply (Broad Money) (MS)	1.000	.850	-.234
	Transport Infrastructure Development (TID)	.850	1.000	-.026
	Energy Infrastructure Development (EID)	-.234	-.026	1.000
	Water Infrastructure Development (WID)	.162	.492	.704
	ICT Infrastructure Development (ICTID)	.929	.939	-.024
	Social Infrastructure Development (SID)	.988	.880	-.192
Sig. (1-tailed)	Money Supply (Broad Money) (MS)	.	.000	.088
	Transport Infrastructure Development (TID)	.000	.	.441
	Energy Infrastructure Development (EID)	.088	.441	.
	Water Infrastructure Development (WID)	.177	.001	.000
	ICT Infrastructure Development (ICTID)	.000	.000	.446
	Social Infrastructure Development (SID)	.000	.000	.135
N	Money Supply (Broad Money)	35	35	35
	Transport Infrastructure Development (TID)	35	35	35
	Energy Infrastructure Development (EID)	35	35	35
	Water Infrastructure Development (WID)	35	35	35
	ICT Infrastructure Development (ICTID)	35	35	35

Source: SPSS Output Data, 2023



From Table 4.3, the relationship between MS and Infrastructure development variable (as measured by TID, EID, WID, ICTID, and SID) was investigated using Pearson product-moment correlation coefficient. The coefficient of relationship, *rho* for the MS and the Infrastructure Development assets class (as measured by TID, EID, WID, ICTID, and SID) were as indicated: 0.850, -0.234, 0.162, 0.929, and 0.988 respectively. The level of significance was 0.000, 0.088, 0.177, 0.000 and 0.000 respectively. Thus, there are strong positive significant

relationship between MS and IFDAC (as measured by TID, ICTID, and SID); there are poor negative but statistical significant relationship between MS and IFDAC (as measured by EID); and poor positive but statistically insignificant relationship between MS and IFDAC (as measured by WID).

However, the independent variables of TID and ICTID in the model five had rho of 0.939 and the coefficient is significant. Thus, multicollinearity exists between the two independent variables.

Regression analysis of the model

4.4 Model one diagnostic tests

Table 4.4 showed the beta coefficients and their significant values on model four.

Table 4.4: Beta coefficients and significant values on model one

Model	Beta	t	Sig.	Ranking
(Constant)		2.536	.017	
Transport Infrastructure Development (TID)	-.053	-.861	.397	5th
Energy Infrastructure Development (EID)	.085	2.129	.042	4th
Water Infrastructure Development (WID)	-.287	-4.296	.000	3rd
ICT Infrastructure Development (ICTID)	.603	4.222	.000	1 st
Social Infrastructure Development (SID)	.545	4.587	.000	2 nd

From Table 4.4, it was clear that WID, SID, ICTID and EID made statistical significance contribution to the changes in Nigeria's Money Supply (MS). The p values were 0.000, 0.000, 0.000 and 0.042 respectively which were below the significant level of

0.05. The coefficients of relationship between the dependent variable (MS) and independent variables (TID and WID) were negatives. However, ICTID made the largest contribution to MS, followed by SID, WID, EID, and TID. From the Table 4.5, the model



summary R₂ value of 0.994 obtained indicated that strong positive relationship exists between the dependent and independent variables. The R-Square of 0.988 showed that the 98.8% change in MS was explained by changes in the independent

variables. The adjusted R-Square was 0.986. Thus, optimistically 98.6% changes in MS were explained by changes in the independent variables.

Table 4.5: Model summary of R- square and adjusted R-square of model five

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics		
					R Square Change	F Change	df1
5	.994 ^a	.988	.986	1758614542 060.66870	.988	481.740	5

Model Summary^b

Model	Change Statistics		Durbin-Watson
	df2	Sig. F Change	
5	29 ^a	.000	1.403

a. Predictors: (Constant), Social Infrastructure Development (SID), Energy Infrastructure Development (EID), Water Infrastructure Development (WID), Transport Infrastructure Development (TID), ICT Infrastructure Development (ICTID)

b. Dependent Variable: Money Supply (Broad Money)

Source: SPSS output data, 2023

Hypotheses Testing:

H₀₁: Infrastructure development indicators have no significant effect on Money Supply in Nigeria.

H_{a1}: Infrastructure development indicators have significant effect on Money Supply in Nigeria.

Table 4.6: ANOVA^a on Hypothesis one (Money Supply)

ANOVA^a



Model	Sum of Squares	df	Mean Square	F	Sig.
4 Regression	744944612195778400000000 00000.000	5	14898892243915570 00000000000.000	481.740	.000 ^b
Residual	896890281188704000000000 000.000	29	30927251075472553 00000000.000		
Total	753913515007665500000000 00000.000	34			

a. Dependent Variable: Nigerian Money Supply (Broad Money)

b. Predictors: (Constant), Social Infrastructure Development (SID), Energy Infrastructure Development (EID), Water Infrastructure Development (WID), Transport Infrastructure Development (TID), ICT Infrastructure Development (ICTID)

Source: SPSS output data, 2023

The ANOVA table 4.6 showed a p-value of 0.000 which is below the .05 acceptable level of significance. We have statistical reason to accept the null hypothesis that: Infrastructure development indicators have no significant effect on Money Supply in Nigeria.

Decision: We conclude that Infrastructure development indicators had significant effect on Money Supply in Nigeria.

Discussion

Infrastructure Development indicators and Money Supply

The study also showed that Infrastructure development indicators had significant effect on Money Supply in Nigeria. But, WID, SID, ICTID and EID made statistical significance contribution to the changes in Nigeria’s Money Supply (MS). The coefficients of relationship between the dependent variable (MS) and independent variables (TID and WID) were negatives. However, ICTID made the largest contribution to MS, followed by SID, WID,

EID, and TID. The MS had negative relationship with the WID and TID contra to expectations. It presupposed that the investments in WID and TID were not progressive in relation to growing quantity of money supply. This implied inadequate attention to Water and transportation infrastructure assets class. This may not be unconnected to inadequate economic and monetary planning. However, the NIIMP aimed prioritizing investments in water supply and irrigation. Of course, any development of the agriculture sector will require investments in staple crop processing zones, agro-industrial parks, as well as agricultural processing facilities.

Theoretically, the quantity theory of money proposes that the quantity of money in an economy influences the level of economic activity. Thus, if money supply grows at a faster rate than the economy’s ability to produce goods and services, then inflation will result. Conversely, if money supply does not grow fast enough, production will decrease, and unemployment may likely increase. The investments in infrastructure can be triggered through sustainable



monetary and fiscal policies management especially promoting green finance. Basically, investors (public and private) can invest indirectly in infrastructure indicators through equity and debt instruments. In either case it could be indirect or direct. Indirect equity channels include investing in Infrastructure equity funds, and Stocks of infrastructure firms. The direct equity channels include investing in individual project sponsors. The direct debt channels include being lenders to individual projects as in case of syndicated debt. The Indirect

debt channels include investing in infrastructure bonds and Infrastructure debt fund. The unfriendly business environment in Nigeria seems to favour indirect channels of investment in infrastructure indicators especially the Water and Transportation assets. It was also noted that the ICTID among the studied indicators made highest contribution to MS even though the contribution was low. The NIIMP projected to expand mobile network capacity and the broadband fibre-optic network. This inferred obvious deficits in digital access in Nigeria.

5.1 Findings

1, That Infrastructure development indicators had significant effect on Money Supply in Nigeria. But, WID, SID, ICTID and EID made statistical significance contribution to the changes in Nigeria's Money Supply (MS). The p values were 0.000, 0.000, 0.000 and 0.042 respectively which were below the significant level of 0.05. The coefficients of relationship between the dependent variable (MS) and independent variables (TID and WID) were negatives. However, ICTID made the largest contribution to MS, followed by SID, WID, EID, and TID.

5.2 Recommendations

1, MS: The government through the Central Bank of Nigeria and the Ministry of Finance should promote sound monetary and fiscal policies management that will stabilize money supply in Nigeria. The government should also invest in ICT infrastructure development to facilitate financial investment

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