

Effect of Public Infrastructure Expenditure on Unemployment in Nigeria

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<https://doi.org/10.56201/ijebm.vol.12.no9.2026.pg328.339>

Abstract

This study examines the effect of public infrastructure on unemployment in Nigeria from 1990 to 2024, focusing on the disaggregated public infrastructures such as road and construction, education, health, communication, and security infrastructure expenditures. The study is motivated by Nigeria's persistent unemployment challenge and the importance of infrastructure in improving economic opportunities, productivity, and labour-market outcomes. Annual time-series data were obtained from the World Bank's World Development Indicators (WDI). The study employs the Autoregressive Distributed Lag (ARDL) approach to investigate both the short-run and long-run relationships between the infrastructure expenditure variables and the unemployment rate. The findings indicate that road and construction infrastructure expenditure has a negative and statistically significant effect on unemployment in both the short and long run. Education infrastructure expenditure also exhibits a significant negative relationship with unemployment, while health infrastructure expenditure has a significant negative long-run effect. Communication infrastructure expenditure demonstrates a significant negative long-run effect, although its short-run effect is statistically insignificant. Security infrastructure expenditure does not have a statistically significant effect on unemployment in either the short or long run. The study therefore concludes that targeted investment in road and construction, education, health, and communication infrastructure can contribute to reducing unemployment in Nigeria. It recommends prioritizing infrastructure investments that simultaneously expand economic activity, improve human capital, strengthen labour productivity, and facilitate access to employment opportunities.

Keywords: Public Infrastructure; Unemployment, Road and Construction Infrastructure; Education Infrastructure, Health Infrastructure

1. Introduction

Public infrastructure is widely recognized as a critical foundation for economic activity and labour-market development. By reducing production and transaction costs, improving market accessibility, facilitating the movement of labour and goods, and enhancing firm productivity, infrastructure can influence the capacity of an economy to generate employment. Its effects, however, may differ considerably across infrastructure types. Electricity, for example, affects firms' ability to operate continuously and productively, while roads and railways facilitate the movement of workers and goods. Air transport improves regional and international connectivity, whereas telecommunications reduce information costs and expand access to

economic opportunities. Public infrastructure investment can also create employment directly during construction and indirectly through its effects on private-sector investment and productivity (Moszoro, 2021). The infrastructure–employment relationship is particularly relevant in Nigeria, where infrastructure constraints coexist with persistent labour-market challenges. According to the National Bureau of Statistics (NBS, 2024), Nigeria’s unemployment rate declined to 4.3% in the second quarter of 2024, from 5.3% in the previous quarter. Nevertheless, time-related underemployment remained 9.2%, suggesting that substantial labour underutilisation persists despite the relatively low headline unemployment rate. Infrastructure deficiencies remain an important constraint on economic activity. For instance, only about 61% of Nigeria’s population had access to electricity in 2023 (World Bank, 2024), while unreliable electricity supply imposes significant costs on firms and households. Empirical evidence confirms the relevance of this channel: Tagliapietra et al. (2020) find that electrification has meaningful effects on labour-market outcomes in Nigeria, while Allcott, Collard-Wexler, and O’Connell (2024) show that electricity shortages can reduce employment in African economies by constraining firm activity. Beyond electricity, deficiencies in transportation and communication infrastructure may similarly restrict employment creation. Poor road and rail connectivity can increase commuting and distribution costs, limit access to markets, and reduce the geographical matching of workers with employment opportunities. Air transport can facilitate business connectivity and economic integration, particularly for internationally oriented sectors, while telecommunications infrastructure can improve access to information, markets, and increasingly digital forms of economic activity. Consequently, the employment effects of infrastructure may depend not only on the overall level of infrastructure provision but also on the particular type of infrastructure available.

Despite the importance of these channels, much of the Nigerian literature has examined infrastructure primarily in relation to economic growth, rather than unemployment. Existing studies have also frequently constructed aggregate measures of infrastructure, potentially obscuring differences between individual infrastructure components (Balogun, 2022; Olayiwola, 2022). This represents an important empirical limitation because improvements in different infrastructure systems may generate distinct—and potentially unequal—labour-market effects. Understanding these differences is particularly important for Nigeria, where public resources are limited and infrastructure investment must be strategically allocated.

Against this background, this study examines the effect of disaggregated public infrastructure expenditures such as road and construction, education, health, communication and security infrastructure expenditures on Nigeria’s unemployment rate. By considering infrastructure components separately, the study seeks to establish whether their effects on unemployment are homogeneous or heterogeneous. The findings are expected to contribute to the infrastructure–labour-market literature while providing evidence that can assist policymakers in prioritising infrastructure investments with greater potential to improve employment outcomes.

2. Literature Review

Theoretical Review

2.1 Keynesian Theory of Employment

The Keynesian Theory of Employment was developed by John Maynard Keynes (1936) in *The General Theory of Employment, Interest and Money*. The theory emerged from Keynes’s rejection of the classical proposition that competitive markets would automatically generate full employment. Its central assumption is that employment and output are determined primarily by effective demand, which depends on consumption and investment expenditure, including government expenditure. Keynes (1936) argued that an economy can settle at an equilibrium below full employment when aggregate demand is insufficient to induce firms to employ all available labour. In this context, government expenditure can stimulate economic

activity through the expenditure multiplier. Applied to the present study, public investment in electricity, roads and railways, air transport, and telecommunications can raise aggregate demand directly through infrastructure expenditure and indirectly by stimulating private-sector production and investment. Expansion of economic activity increases firms' demand for labour and can consequently reduce the unemployment rate. The Keynesian framework therefore provides a short- to medium-run demand-side explanation for how public infrastructure expenditure can influence unemployment (Keynes, 1936).

2.2 Endogenous Growth Theory

Endogenous Growth Theory is principally associated with Paul Romer (1986) and Robert Lucas (1988), although it developed from a broader body of work on economic growth. Romer (1986) emphasized the role of knowledge, technological change, and investment in generating increasing returns, while Lucas (1988) highlighted human-capital accumulation as an engine of sustained growth. A central assumption of the theory is that long-run economic growth can arise from endogenous factors within the economy, rather than technological progress being treated entirely as an external force. In this framework, investments that enhance the productivity of capital and labour can generate persistent effects on output. Public infrastructure can perform such a role by complementing private capital and increasing productivity. Reliable electricity can reduce production disruptions, transport infrastructure can lower movement and distribution costs, and telecommunications can facilitate information flows and technological adoption. These productivity-enhancing effects can encourage investment and output expansion, thereby increasing labour demand and potentially reducing unemployment. Endogenous Growth Theory therefore provides a long-run productivity-based channel through which infrastructure can affect the unemployment rate (Romer, 1986; Lucas, 1988).

2.3 Infrastructure-Led Growth Theory

Unlike Keynesian and endogenous growth theories, Infrastructure-Led Growth Theory does not have a single identifiable proponent or a specific year of formal proposition. Its modern theoretical and empirical foundation is strongly associated with David Aschauer (1989), whose influential study argued that public infrastructure capital constitutes a productive input that can raise private-sector productivity. The subsequent literature, reviewed by Gramlich (1994), further developed the relationship between public infrastructure investment, productivity, and economic performance. The framework assumes that infrastructure is a form of public capital that complements private capital and labour, reduces production and transaction costs, facilitates economic integration, and increases the efficiency of economic activities. This perspective is particularly appropriate for the present study because it recognizes that different infrastructure components can operate through different mechanisms. Electricity supports production, roads and railways improve the movement of people and goods, air transport enhances connectivity, while telecommunications facilitate information exchange and reduce communication costs. Improvements in these infrastructure services can stimulate private investment, productivity, and economic activity, thereby expanding employment opportunities and reducing unemployment. Importantly, this framework provides a theoretical justification for examining infrastructure in disaggregated form, since the employment effects of electricity, transportation, and telecommunications need not be identical (Aschauer, 1989; Gramlich, 1994).

Empirical Review

Aninwagu, Onyema, and Amadi (2024) investigated the impact of infrastructural investment on Nigeria's economic growth from 1990 to 2022 using time-series data obtained from the CBN Statistical Bulletin and World Development Indicators. The study employed the Augmented Dickey-Fuller (ADF) unit root test, bounds cointegration test, ARDL estimation, and residual diagnostic tests. The findings established cointegration among the variables. The ARDL results showed that road and construction investment had a negative but statistically insignificant effect on economic growth, while electricity access and fixed telephone subscriptions had positive but insignificant effects. However, investment in transport and communication had a positive and statistically significant effect on economic growth.

Aninwagu et al. (2026) examined the determinants of Nigeria's economic growth from 1990 to 2023 using the ARDL bounds-testing approach. Real GDP per capita served as the dependent variable, while trade, foreign direct investment, gross fixed capital formation, and government education expenditure constituted the explanatory variables. The findings showed that trade and education expenditure had negative short-run effects, while FDI had a negative short-run but positive and significant long-run effect. Gross fixed capital formation had a positive and significant short-run effect but an insignificant long-run effect. The error correction term indicated approximately 62% annual adjustment toward long-run equilibrium.

Aninwagu, Onyema, Momodu and Amadi (2024) examined the relationship between gender inequality and socioeconomic development in Nigeria. The data for the variables were obtained from the NBS, WDI, and the UNDP from 1991-2022. The dependent variable used for the study was unemployment rate (UMPR), while the ratio of labour force participation for females to males (RLFP), the gross primary school enrolment rate for females to males (GPER), population growth (POPG), and the adolescent fertility rate (ADFR) were used as predictors variables. The data analysis techniques used included KPSS unit root tests, ARDL bounds cointegration, and the autoregressive distributed lag estimation method. The KPSS unit root tests showed a mixture of I(1) and I(0) series. The ARDL bounds cointegration was established. The ARDL results revealed that the ratio of labour force participation for females to males, the gross primary school enrolment rate for females to males, the adolescent fertility rate, and population growth has a relationship with unemployment rate.

Olugbenga et al. (2025) examined the relationship between infrastructural development and sustainable economic development in Nigeria from 1999 to 2022. The study was anchored on New Growth Theory and employed the Augmented Dickey-Fuller (ADF) test and the Autoregressive Distributed Lag (ARDL) model to examine the short- and long-run effects of infrastructure on economic performance. Secondary data were obtained from the Central Bank of Nigeria (CBN) Statistical Bulletin, World Development Indicators, and African Infrastructure Development Reports. The study considered the ICT Development Index, Transport Development Index, Electricity Development Index, and Waste Service System as infrastructure indicators. The findings revealed a long-run equilibrium relationship between infrastructural development and GDP, although most individual infrastructure indicators had statistically insignificant effects in both the short and long run. ICT and waste-service infrastructure exhibited positive but weak effects, whereas transport and education infrastructure had negative effects. The study concluded that infrastructural development in Nigeria remained inadequate to support meaningful and sustained economic growth.

Muhammad and Out (2024) examined Nigeria's infrastructural development between 2014 and 2023, focusing on developments and challenges in transportation, energy, and housing. Using a mixed-methods approach involving literature review, data analysis, and stakeholder perspectives, the study assessed major infrastructure projects, including the Abuja–Kaduna and Lagos–Ibadan railways, the Azura-Edo Power Plant, and urban road upgrades. The findings identified inadequate funding, regulatory inefficiencies, regional disparities, and security

challenges as major constraints to infrastructure development. The study consequently recommended improved infrastructure financing, accessibility, sustainability, and institutional effectiveness to support long-term economic development.

Aninwagu, Onyema, and Amadi (2024) examined the effects of fiscal deficits on economic growth in Nigeria using time-series data from 1982 to 2020 obtained from the CBN Statistical Bulletin and World Development Indicators. The study found that fiscal deficits and external borrowing had positive but statistically insignificant effects on economic growth, whereas foreign exchange reserves and domestic borrowing exerted positive and statistically significant effects. The findings suggested that the composition and management of public financial resources were important for improving Nigeria's economic performance.

3. Methodology

This study adopts an ex-post facto design. This is because it is deemed suitable, as the research depends on pre-existing macroeconomic and financial data that researchers cannot alter. The data for this study was sourced from the World Bank's World Development Indicators (WDI), the United Nations Development Report, and the Central Bank of Nigeria Statistical Bulletin from 1990 to 2024.

The modelling of this study was theoretically anchored in the Keynesian theory of employment.

The study specifies the following models:

$$UMR = f(RCI, EDI, HTI, CCI, SCI) \quad 3.1$$

$$UMR = \beta_0 + \beta_1 \ln RCI + \beta_2 \ln EDI + \beta_3 \ln HTI + \beta_4 \ln CCI + \beta_5 \ln SCI + \mu_t \quad 3.2$$

Where:

UMR = unemployment rate (proxy for unemployment)

RCI = road & construction infrastructure expenditure

EDI = education infrastructure expenditure

HTI = health infrastructure expenditure

CCI = communication infrastructure

SCI = security infrastructure expenditure

$\beta_1 - \beta_5$ = Parameters

e_t = Time subscript

NOTE: The logarithmic transformation of explanatory variables was intended to normalize the data, reduce heteroskedasticity, and interpret coefficients in elasticity terms.

4. Data Analysis

Table 4.1: Summary of descriptive statistics for the variables

	UMR	RCI	EDI	HTI	CCI	SCI
Mean	4.997143	120.4677	371.8654	227.8120	37.11543	125.6174
Median	3.800000	89.16000	214.1500	127.9200	32.13000	67.25000
Maximum	10.10000	402.3100	1260.550	814.0200	140.6100	679.4300
Minimum	1.900000	0.640000	0.450000	0.230000	0.370000	0.000000
Std. Dev.	2.406179	128.4622	391.0710	251.5545	34.67118	154.1037
Skewness	1.075885	0.748988	0.879804	0.921679	0.976891	1.587352
Kurtosis	2.572034	2.214071	2.496260	2.550243	3.615135	5.820139
Jarque-Bera	7.019351	4.173187	4.885382	5.250369	6.118666	26.29656
Probability	0.029907	0.124109	0.086927	0.072426	0.046919	0.000002
Sum	174.9000	4216.370	13015.29	7973.420	1299.040	4396.610
Sum Sq. Dev.	196.8497	561086.6	5199842.	2151508.	40871.08	807430.6
Observations	35	35	35	35	35	35

Source: Researcher's computations using Eviews 12, (2026)

The summary statistics in Table 4.1 indicate that the mean values for unemployment rate (UMR) and road and construction infrastructure (RCI) recorded an average value of 4.99 and 120.47 during the study period, with UMR ranging from a minimum value of 1.90 to a maximum value of 10.10, while RCI ranged from a minimum value of 0.640 to a maximum value of 402.31.

Furthermore, the education infrastructure (EDI) and health infrastructure (HDI) recorded mean values of 371.87 and 227.81, with EDI ranging from 0.45 to 1260.55, while HDI moved from 0.23 to 814.02.

Additionally, the analysis shows that the communication infrastructure (CCI) and security infrastructure (SCI) recorded mean values of 37.12 and 125.62, respectively. While the CCI moved from a minimum value of 0.37 to a maximum of 140.61, the SCI ranged from a minimum value of 0.00 to a maximum value of 679.43.

The standard deviations indicate that the data for all variables are concentrated around their respective means except for RCI, EDI, HTI, and SCI. The outcomes of the Jarque-Bera test demonstrate that all variables exhibit normal distribution at the 5% significance threshold, as shown by JB and p-values exceeding 0.05 except for CCI and SCI.

Unit Root Test

Table 4.2: Augmented Dickey-Fuller (ADF) Test Results

Augmented Dickey-Fuller (ADF)						
Variables	Level	Critical Value @ 5%	1 st Difference @	Critical Value @ 5%	I(d)	Stationary @
LOG(HDI)	0.406697	-2.951125	-6.437183	-2.954021	I(1)	1 st Difference
LOG(RCI)	-1.307660	-2.960411	-5.951357	-2.960411	I(1)	1 st Difference
LOG(EDI)	-6.247955	-2.957110	-	-	I(0)	Level
LOG(HTI)	-4.689011	-2.976263	-	-	I(0)	Level
LOG(CCI)	-2.079476	-2.954021	-7.870732	-2.954021	I(1)	1 st Difference
LOG(SCI)	-1.075432	-2.951125	-6.840760	-2.954021	I(1)	1 st Difference

Source: Researcher's computation using Eviews 12 (2026).

Note: *, **, and *** denote significance at 10%, 5% and 1%, respectively.

Table 4.2 presents the summary results of the ADF unit root tests carried out on all the variables in our model. The unit root test results showed that education infrastructure (EDI) and health infrastructure (HTI) attained stability at levels. This is because their test statistic values are greater than the Mackinnon critical value at 5% level of significance at levels. This further indicates that education infrastructure (EDI) and health infrastructure (HTI) were stationary at order zero [i.e., I(0)]. On the other hand, other variables attained stability after first differencing. This is because their test statistic values are greater than the Mackinnon critical value at 5% level of significance at first difference. This further indicates that the variables were integrated at order one [i.e., I(1)].

Table 4.3: Bounds cointegration test results for the models

Significant Level	Critical Value Bound		Hypothesis	F-Statistics
	I(0) Bound	I(1) Bound		
10%	2.08	3		
5%	2.39	3.38		5.452168***

2.5%	2.7	3.73	H0: There is no cointegration/long run relationship
1%	3.06	4.15	
F _{PVR} (RCI, EDI, HTI, CCI, SCI)			K = 5

Source: Researcher's computation using Eviews 12, (2026).

Note: Null hypothesis: No level relationship; K = number of regressors; *, ** and *** denote significance at 10%, 5% and 1% level, respectively.

The results presented in Table 4.3 demonstrate that the F-statistics for the model, 5.452168, exceed the critical values at both the lower and upper bounds at a 5% significance level. This indicates a strong relationship between the dependent and the independent variables.

Model Result and Discussion

Table 4.4: Estimated Long-Run and Short-Run Coefficients of ARDL UMR Model

Dependent Variable = LOG (UMR)				
Long-Run Results				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LOG(RCI)	-0.864262	0.065773	-13.14016	0.0484
LOG(EDI)	-0.021010	0.004404	-4.771022	0.0014
LOG(HTI)	-0.122037	0.014514	-8.408315	0.0035
LOG(CCI)	-0.075278	0.011834	-6.360951	0.0079
LOG(SCI)	0.519755	0.193710	2.683165	0.2271
C	-2.799774	0.521252	-5.371252	0.1172
EC = LOG(UMR) - (-0.8643*LOG(RCI) -0.0210*LOG(EDI) - 0.1220*LOG(HTI) -0.0753*LOG(CCI) + 0.5198*LOG(SCI) -2.7998)				
Short-Run Results				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
DLOG(UMR(-1))	-0.559235	0.048180	-11.60710	0.0547
DLOG(UMR(-2))	4.314391	0.118522	36.40161	0.0175
DLOG(UMR(-3))	1.784799	0.057116	31.24885	0.0204
DLOG(RCI)	-0.756211	0.033355	-22.67172	0.0281
DLOG(RCI(-1))	1.075870	0.027238	39.49918	0.0161
DLOG(RCI(-2))	2.014115	0.053900	37.36775	0.0170
DLOG(RCI(-3))	0.569688	0.021076	27.02997	0.0235
DLOG(EDI)	-7.060786	0.201699	-35.00656	0.0182
DLOG(EDI(-1))	-4.825447	0.138858	-34.75092	0.0183
DLOG(EDI(-2))	-0.848891	0.042858	-19.80703	0.0321
DLOG(EDI(-3))	0.343419	0.044183	7.772604	0.0815
DLOG(HTI)	-5.110885	0.159652	-32.01275	0.0199
DLOG(HTI(-1))	5.887540	0.161671	36.41680	0.0175
DLOG(HTI(-2))	1.574392	0.047780	32.95054	0.0193
DLOG(HTI(-3))	1.824983	0.073315	24.89221	0.0256
DLOG(CCI)	-0.164834	0.017200	-9.583566	0.0662
DLOG(CCI(-1))	-0.143926	0.017465	-8.240822	0.0769
DLOG(CCI(-2))	1.645683	0.042403	38.81030	0.0164
DLOG(CCI(-3))	1.234234	0.034665	35.60420	0.0179
DLOG(SCI)	-0.003557	0.006290	-0.565538	0.5872
DLOG(SCI(-1))	1.610376	0.456739	3.525811	0.1759

DLOG(SCI(-2))	-0.470056	0.577727	-0.813630	0.5652
DLOG(SCI(-3))	-0.348364	0.075399	-4.620300	0.1357
CointEq(-1)*	-0.248868	0.034912	-7.128490	0.0001
R ² 0.897885				
Adjusted R ² 0.820934				
Durbin-Watson stat	2.502089			

Road & Construction Infrastructure expenditure (RCI) and Unemployment Rate (UMR)

The long-run estimates of the ARDL model as shown in Table 4.4 revealed that road & construction infrastructure has a negative and significant effect on unemployment rate in Nigeria. This is evident by the negative coefficient value (-0.864262) of road & construction infrastructure and its p-value (0.0484) which is less than 0.05. This implies that an increase in the road & construction infrastructure by one percent will lead to 86.4% significant decrease in unemployment rate in the long run. Also, the short-run estimates of the ARDL model results revealed that road & construction infrastructure has a negative and significant relationship with the unemployment rate in Nigeria. This is evident by the negative coefficient value (-0.756211) of road & construction infrastructure and its p-value (0.0281) which is less than 0.05. This implies that an increase in the road & construction infrastructure by one percent will lead to 75.6% significant decrease in unemployment rate in the short run.

Education Infrastructure expenditure (EDI) and Unemployment Rate (UMR)

Furthermore, the results of the long-run estimates of the ARDL model revealed that education infrastructure has a significant negative long-run effect on unemployment rate in Nigeria. This is evident by the negative coefficient value (-0.021010) of education infrastructure and its p-value (0.0014) which is less than 0.05. This implies that an increase in education infrastructure by one percent will lead to 2.1% significant decrease in unemployment rate in the long run. Also, the results of the short-run estimates of the ARDL model revealed that education infrastructure has significant negative long-run effect on unemployment rate in Nigeria. This is evident by the negative coefficient value (-7.060786) of education infrastructure and its p-value (0.0182) which is less than 0.05. This implies that an increase in the education infrastructure by one percent will lead to 706% significant decrease in unemployment rate in the short run.

Health Infrastructure expenditure (HTI) and Unemployment Rate (UMR)

Moreover, the results of the long-run estimates of the ARDL model revealed that health infrastructure has negative and significant effect on unemployment rate in Nigeria in the long-run. This is evident by the negative coefficient value (-0.122037) of health infrastructure and its p-value (0.0035) which is less than 0.05. This implies that one percent increase in health infrastructure will lead to 12.2% decrease in unemployment rate in the long run. Also, the results of the short-run estimates of the ARDL model revealed that health infrastructure has non-significant negative short-run relationship with the unemployment rate in Nigeria. This is evident by the negative coefficient value (-5.110885) of health infrastructure and its p-value (0.0199) which is less than 0.05. This implies that one percent increase in health infrastructure will lead to 511% decrease in unemployment rate in the short run.

Communication Infrastructure expenditure (CCI) and Unemployment Rate (UMR)

Moreover, the results of the long-run estimates of the ARDL model revealed that communication infrastructure has significant negative long-run effect on unemployment rate in Nigeria. This is evident by the negative coefficient value (-0.075278) of communication

infrastructure and its p-value (0.0079) which is greater than 0.05. This implies that one percent increase in communication infrastructure will lead to 7.5% decrease in unemployment rate in the long run. Also, the results of the short-run estimates of the ARDL model revealed that communication infrastructure has a non-significant negative short-run effect on the unemployment rate in Nigeria. This is evident by the negative coefficient value (-0.164834) of communication infrastructure and its p-value (0.0662) which is greater than 0.05. This implies that an increase in the communication infrastructure by a unit will lead to 16.5% decrease in unemployment rate in the short run.

Security Infrastructure expenditure (SCI) and Unemployment Rate (UMR)

Moreover, the results of the long-run estimates of the ARDL model revealed that security infrastructure has non-significant positive long-run relationship with the unemployment rate in Nigeria. This is evident by the negative coefficient value (0.519755) of security infrastructure and its p-value (0.2271) which is greater than 0.05. This implies that an increase in the security infrastructure by one percent will lead to 52% insignificant increase in unemployment rate in the long run. Also, the results of the short-run estimates of the ARDL model revealed that security infrastructure has non-significant negative long-run relationship with the unemployment rate in Nigeria. This is evident by the negative coefficient value (-0.003557) of security infrastructure and its p-value (0.5872) which is greater than 0.05. This implies that an increase in the security infrastructure by one percent will lead to 0.4% insignificant decrease in unemployment rate in the short run.

Interpretation of CointEq(-1) Result

The results of the short-run dynamic coefficients associated with the long-run relationships obtained from the error correction model are given in Table 4.14. The signs of the short-run dynamic interactions are consistent with that of the long-run relationship. The estimated error correction coefficient of -0.248868 (with p-value of 0.0001) is highly significant, has the correct sign, and implies a low speed of adjustment to equilibrium after a shock. This implies that approximately 24.9% of disequilibria from the previous year's shock converge back to the long run equilibrium in the current year.

Interpretation of Adjusted R-Squared (Adj. R²) Value

The Adjusted R-squared value of 0.820934 from the results of the short-run estimates of the ARDL model in Table 4.14 indicated that the estimated model is well fitted as the systematic changes in explanatory variables (road & construction infrastructure, education infrastructure, health infrastructure, communication infrastructure and security infrastructure) explained approximately 82 percent (R-squared) variation in unemployment rate while the remaining 18 percent is explained by other variables of factors outside the model.

Interpretation of Durbin-Watson Statistic Value

Lastly, Durbin-Watson stat of 2.502089 which is greater than 2 indicates the absence of serial autocorrelation.

Post-Estimation Tests of Human Development Index Model

The results of the post-estimation tests are presented and discussed below:

Table 4.5: Post-Estimation Test Results of UMR Model

Test	Null Hypothesis	X ² Value	X ² Prob	Remark
Jarque-Bera	Normal Distribution Exists	0.095388	0.9534	Normal Residuals
Breusch-Godfrey LM	Serial Correlation Does Not Exist	2.731183	0.0741	Serial Independence
Breusch-Pagan-Godfrey	Homoscedasticity Exists	0.669661	0.7501	Constant Variance
Ramsey RESET	Model is Stable	0.760869	0.4561	Correctly Specified Model

Source: Researcher's Computation (EViews 12), 2026.

The Jarque Bera (Normality) test result in Table 4.5 shows that the probability value (0.2262) is greater than 0.05 level of significance which imply that the null hypothesis of Normal distribution cannot be rejected. Thus, this necessitates the acceptance of null hypothesis and therefore concludes that the model is normally distributed.

The Breusch-Godfrey Serial Correlation LM test result in Table 4.15 shows that the probability values (0.0741) is greater than 0.05 level of significance which imply that the null hypothesis of no serial correlation cannot be rejected. Thus, this necessitates the acceptance of null hypothesis and therefore concludes that the model has no serial correlation problem.

Also, the Breusch-Pagan-Godfrey heteroskedasticity test result in Table 4.15 shows that the probability values (0.7501) is greater than 0.05 level of significance which imply that the null hypothesis of homoscedasticity cannot be rejected. Thus, this necessitates the acceptance of null hypothesis and therefore concludes that the model has homoscedasticity. This implies that relevant variables were not omitted.

Lastly, the Ramsey RESET test result in Table 4.15 shows that the probability values (0.4561) is greater than 0.05 level of significance which imply that the null hypothesis of correctly specified cannot be rejected. Thus, this necessitates the acceptance of null hypothesis and therefore concludes that the model is correctly specified. This implies that the functional form of the model is correct.

5. Conclusion and Recommendations

Conclusion

The study concludes that selected public infrastructure components play an important role in reducing unemployment in Nigeria. The ARDL results indicate that road and construction infrastructure, education infrastructure, health infrastructure, and communication infrastructure have statistically significant negative effects on the unemployment rate, particularly in the long run. The findings suggest that improvements in physical connectivity, education facilities, healthcare capacity, and communication networks can strengthen labour-market opportunities and contribute to unemployment reduction. However, security infrastructure does not have a statistically significant effect on unemployment within the estimated model. Overall, the study underscores the need for sustained and targeted investment in infrastructure, with particular emphasis on the components that demonstrate significant employment effects.

Recommendations

Based on the findings and conclusion drawn from this study, the following recommendations are made:

- i. Government should accelerate the construction, rehabilitation, and maintenance of roads and related infrastructure, such investment can create direct construction employment while improving access to markets and economic opportunities.
- ii. Investment should focus on schools, technical and vocational institutions, laboratories, and skills-development facilities, supporting its use as a tool for improving employability and labour-market outcomes.
- iii. Government should expand and upgrade healthcare facilities, particularly primary healthcare centres and related services, suggesting that improved health infrastructure can support a healthier and more productive workforce.
- iv. Government should improve affordable broadband, telecommunications coverage, and digital connectivity, indicating that better communication infrastructure can facilitate job search, entrepreneurship, digital employment, and access to labour-market information.
- v. Public infrastructure programmes should be designed to maximize labour-market benefits by linking investment in roads, education, health, and communication infrastructure with local hiring, vocational training, and private-sector participation. This would help translate the significant negative infrastructure–unemployment relationships into broader employment opportunities.

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