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An Empirical Investigation into the Link between Infrastructural Development and Poverty Reduction in Nigeria.

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Abstract
The investigation of the relationship between infrastructure development and poverty reduction in Nigeria has been the primary subject of this study. The time series data for the years 1986 to 2021 were compiled from the National Bureau of Statistics and the CBN statistics bulletin. The data were analyzed using the ARDL technique to co-integration and error correction mechanism method. Our Wald bound test results demonstrated a long-term relationship between Real Consumption Expenditure Per Capita, which was used as a proxy for Poverty (POV), Expenditure on Electricity (GEE), Expenditure on Health and Education as a proxy for Social Infrastructure Expenditure (SIE), and Expenditure on Road Construction, Transport, and Communication as a proxy for Economic Infrastructure (EIE) in Nigeria.The Error Correction Model's short-term findings, however, indicated that the factors related to infrastructural development have a major influence on poverty in Nigeria. According to the research's conclusions, the government should make education available to all Nigerians of all ages because it is the foundation for infrastructural development. It is the most crucial and effective way to end the cycle of poverty. Access to electricity, a major infrastructural service for the majority of all activities, is necessary and must be regarded as the most important component of infrastructure. It empowers the society, enhances the social wellbeing of the populace, eradicates ignorance, and opens people's access to health education, among other things. Clean water and water sanitation must be made available by the government to all communities in order to reduce lost productive time spent looking for clean water and the rising incidence of water-borne diseases, illnesses, and illnesses. Additionally, transportation infrastructure must be improved to be efficient and effective in order to promote economic growth, competitiveness, linkage with factors of production, and productive work.

Keywords: Poverty. Government Expenditure on Electricity; Social Infrastructure Expenditure, Economic Infrastructure Expenditure.

I. Introduction

Infrastructure sector in Nigeria is part of the regulatory package for the need of the poorJerome (2021). Therefore, the country's inadequate supply of infrastructure services has been depressing Nigeria's economic development and poverty reduction over the last two decades. Nevertheless, an increase in genuine planning and pro activeness on the part of the government to spend heavily and sincerely on infrastructural facilities should help the country to develop faster to the extent that infrastructure and foreign investors will crowd in private investment that can foster productivity, employment, and per capita income and reduce poverty. Infrastructure development is evident because it means a second feature after government budget/expenditure to determine a nation's competitiveness (Chotia& Rao, 2017). The notion that infrastructure matter for reducing poverty is due to the binding contribution effect it brought to the societalstandard of living

Infrastructure has been described as investment of a country, firm or project thatunderlies and makes possible all its economic activities which include; administrative, telecommunications, transportation, utilities, and waste removal and processing facilities, education, training facilities, health care, research and development (Anon, 2019). Parsons, (2010) also described infrastructure as assets, services and markets which have different attributes such as: transport to include; road, rail, ports and

airports,drinking water and sanitation, power, telecommunications, health and education. Infrastructure can therefore be summarized as the basic systems and services that an organization, body, community or state uses to provide social services and support all productive activities in an effective and efficient manner.

Some characteristics of infrastructure include its relatively permanent nature,durability, foundational capital investment and large capital investment outlay which require funding from government or organization or philanthropic rich individuals. Infrastructure usually provides specific purpose, requires planned maintenance and cost for effective and efficient delivery of services, yields future income or benefits, has extensive complex networks with multiple interfaces, has positive and negative externalities with consequences on third party and has monopolistic profiles and geographies (Parsons, 2010 and Anon. 2019). Infrastructure development is driven by; globalization,population growth, production specialization, and increasing standard of living. Political stability,security, public policies on tax, budgets, institutional capacity, return on investment and legislations are motivating factors for investment in infrastructure (Parsons, 2010).

.Deleck, (1992) argued that poverty is not restricted to one dimension of income but manifests itself in all domains of life which includes; housing education, health, amongst others. TheUnited Nations (1995:5) described poverty comprehensively to include: "…a condition characterized by severe deprivation of basic human needs including food, safe drinking water, sanitation facilities, health, shelter, education and informational access to services". In another work, the United Nations (1998) added social exclusion, insecurity, powerlessness and violation of human dignity as evidence of poverty which makes the poor susceptibility to violence. They added that, poverty is the lack of basic capacity to participate effectively in society, a denial of access to education and health services, a denial of choices and opportunities and a violation of human dignity. In their study, the European Union (E.U., 2004: 8) stated that, "…people live in poverty if their income and resources are so inadequate as to preclude them from having a standard of living considered acceptable in the society in which they live and because of their poverty, they experience multiple disadvantage through unemployment, low income, poor housing and social exclusion".

The study differs in some respects especially in terms of variable measures, methodological approach and scope. For example, while Ogun 2017 employed SVAR approach between 1970 and 2005, and the real consumption expenditure per capita as the poverty indicator, we use Real consumption expenditure per capita which better captures the poor in the country.Government expenditure on electricity was also introduced as one of the explanatory variables as one of the indicators of infrastructural development. In terms of techniques, autoregressive distributed lag (ARDL) based on error correction mechanism (ECM) are used for the period 1986–2022. Based on this, our study would perhaps give another dimension to the empirical analysis, and offer a basis for the effective future (long – term) projection and the workable solutions to the infrastructure challenge plaguing the country. The remaining parts of the study are divided into four sections. The review of literature is presented in the second part while section three provides the methodology and analytical approaches. The fourth part discusses empirical analysis and the last part concludes and proffers policy options.

II. Empirical Review

Calderon and Serven (2014) studied the relationship between infrastructure and growth in developed and developing countries. They develop and index for infrastructure using three independent indicators, that is number of main telephone lines per 1,000 workers; electricity generation capacity of the economy in MW per 1,000 workers and the length of the road network (kilometers of roads to the total land area). Using the panel generalized methods of moment (GMM) techniques for a data set ranging from 1960 to 2000, they established that growth is robust and positively influenced by the quantity of infrastructure which was also positive but less robust for the quality of infrastructure. However, the coefficient of both the quantity and quality of infrastructure has robust and negative estimates.

Raihan (2017) examines the interrelationship between infrastructure, growth and poverty in Bangladesh. The author first constructs an index for infrastructure development using the Principal Component Analysis (PCA) and the outcome suggest that the districts having high indexes are close to the capital city. The second method (SAM Multiplier Model) was used to discover economic gains of Bangladesh from infrastructural investment. It suggests an improvement in overall output, consumer consumption and value accumulation. In magnitude terms, gross output, value-added in production and

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consumption rise by 8.17%, 8.07% and 7.12% respectively to an increase of 20% in infrastructural investment demand. The third involved the use of a CGE model to investigate the impact of a reduction in transport boundaries on macro and sectoral growth as well as welfare and poverty. Its findings showed that output, exports, imports, and national welfare rises by 0.57%, 0.83%, and 0.95% correspondingly as a result of 25% fall in transport margin in the sectors. Likewise, a fall in general price index and poverty rate (national headcount) by 1.43% and 1.24% respectively were also recorded. They concluded that infrastructure financing played an important role in growth promotion and poverty alleviation in the country.

Chotia et al. (2017) reported in their results after running the ARDL technique that there is a strong link between infrastructure development and poverty reduction. The causality test confirmed the existence of an optimistic and unidirectional causality running from infrastructure development to poverty reduction. Therefore, Nigerian societies need the government's intervention to eradicate poverty because their source of dependence for survival includes access to primary resources directly from the infrastructure or collective human settlement.

Runsinarith (2019) used a household data survey from two border provinces in Cambodia in 2006 to investigate the impact of infrastructure on per capita consumption. The four indices of infrastructure (cellular, irrigation, electricity and road) also reflect the ones mentioned in Rectangular Strategy of the Royal Government of Cambodia. Using the ordinary least square and quantile regression, the results showed that the indicators of infrastructure significantly influence poverty rate negatively.

While examining the role played by infrastructure development to growth and poverty reduction, Jerome(2021) found that finances in infrastructure contribute to human welfare in terms of health, education and social structure as well as poverty alleviation in Africa.

Focusing on Nigeria, Ogun using structural vector autoregressive (SVAR) technique, examines the impact of infrastructural development on poverty reduction in Nigeria with secondary data for the period 1970:1–2005:4. For infrastructure development indicator social infrastructure represented by real capital expenditure on social and community services, and physical infrastructure represented by real capital expenditure on economic services (such as roads, transport and communication). Regarding poverty indicator, real consumption expenditure per capita is used. The author finds that infrastructural development results in poverty reduction. Thus, it is suggested that massive investment in social infrastructure in cities could lead to drastic poverty reduction in the urban areas. Other studies that focus on Nigeria, include Olufemi ;Ehizuelen ; Shobande and Etukomeni . However, unlike Ogun , these authors mainly investigate the relationship between infrastructure and economic growth. Following the review, studies that directly examine the nexus between infrastructure investment and poverty reduction seem to be limited. This assertion is also corroborated in a recent review paper ; hence, there exist numerous gaps on several fronts. Although the common argument in the literature is that infrastructure development has adverse relations with inequality, implying that the development of infrastructure enhances reduced income inequality, findings on how infrastructure development affects the poor or reduces poverty rate remain inadequate. It is, therefore, crucial to assess the effects of infrastructure investment on poverty alleviation in a more specific way, using a poverty indicator that specifically accounts for the number of the poor (Poverty headcount ratio), than the seemingly indirect impact employed by the existing works.

III. Methodology

The World Bank's Global Development Indicators and the Central Bank of Nigeria's Statistics Bulletins provided the secondary data for this research project, which uses annual time series data on the Nigerian economy for analysis. The study's time frame was from 1986 until 2022.

3.1Model Specification

In accounting for the nexus between infrastructural development and poverty reduction in Nigeria, this study adopts the Solow growth model as specified in the work of Adelowokan, OluwaseyiAdedayo (2019). The Solow model is

$Q = (K, L)$…… 1

Where Q is the national output, K represents capital resources employed and L for unit of labour employed in the production process. However, since our focus is on the public sector influence, the model includes Real consumption expenditure per capita which was used as proxy for poverty (POV), Expenditure on Electricity (GEE), expenditure on health and education as proxy for social infrastructure expenditure (SIE), expenditure on road construction, transport and communication as

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proxy for economic infrastructure (EIE). The functional relations of the variables included in the model were express by eq. 2 (as):

POV = f(GEE,SIE, EIE) ……..2

The specification of the econometric model which incorporates a drift parameter and a stochastic error term in the model is given by eq. (3) as:

$POV = \beta_0 + \beta_1 GEE + \beta_2 SIE + \beta_3 EIE + Ui$ ……...…….3

Where the dependent variable POV represents poverty. The explanatory variable GEE represent government expenditure on electricity; SIE represents social infrastructure expenditure and EIE represents economic infrastructure expenditure. The drift parameter is denoted by β_0 while Uiis the stochastic error term in eq. (3). β_1 β_2 and β_3 are the parameter estimates for the model.

3.2 Estimation Technique

The Pesaran (Pesaran, 1997) ARDL model was employed in this study (Pesaran et al., 2001). In contrast to other well-known co integration models, Pesaran and Pesaran et al. bound.'s test does not require the time series to be integrated at first order, as is the case with the two-step test technique proposed by (Engle and Granger, 1987) to the problem of uncertainty. To put it another way, Pesaran&Pesaranetalshorttime. 's series features are superior to those of more often used techniques. Time series stationarity leads to skewed and nonsensical regression parameters because of the short sample size and non-stationary variables. In a statement (Kremers et al., 1992). The ARDL model can be used to establish cointegration between the dependent and independent variables, allowing us to discern between a variable's short- and long-term effects. Over the short and long run, these strategies can be used to calculate independent variable parameters that are more accurate. To test the hypothesis of the absence of a co integration relationship between the dependent variable and the variables interpreted in equation, we calculate the F statistic through the (Wald test) for the null hypothesis: $b_1 = b_2 = 0$. Versus the alternative hypothesis of a co integration relationship between the levels of the model variables, where the alternative hypothesis provides: $b_1 \neq b_2 \neq 0$. If the calculated F statistic value is greater than the top limit of the critical value, we reject the null hypothesis (i.e. there is a co integration relationship)

IV. Results and Discussion of Findings

4.2 Unit Roots Outputs

Since the research employed time series data, the first step was to determine whether or not the variables were stationary. To achieve this, a unit root test was performed using the ADF approach.

Table: 4.1 Unit Root Test Using Augmented Dickey Fuller ADF Test

Variables	ADF Statistics at Level	ADF Statistics at 1st Difference	5% Critical Value	1% Critical Value	Conclusion
LRPOV	0.41	-3.82	-2.79	-2.28	I(1)
LGEE	-3.92	-1.63	-2.79	-2.28	I(0)
L SIE	-0.53	-3.59	-2.79	-2.28	I(1)
L EIE	-1.88	-11.43	-2.79	-2.28	I(1)

Source; Computed by the authors

According to the results of the unit root test for this work which are shown in Table 4.1 above, the variables used in the study, including the Real consumption expenditure per capita which was used as proxy for poverty (POV), expenditure on health and education as proxy for social infrastructure expenditure (SIE), expenditure on road construction, transport and communication as proxy for economic infrastructure (EIE) in Nigeria, have no unit root. This is to say that the variables are integrated of the first order I (1), While Expenditure on Electricity (GEE),has unit root that is integrated of order I (0) since all the variables are not integrated of the same order, we proceed the use of Autoregressive Distributed Lag ARDL approach to Co-integration.

4.2 Lag length criteria

This section discusses the procedure of selecting the required lag length for this study From table 4.2 presented below.

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Table 4.2: Lag Length Selection Criteria for the Model

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-460.512	N/A	27102.73	21.13121	10.1255	11.22514
1	-175.547	122.4312	0.16273	11.23355	13.32215	21.11142
2*	12.111	56.1536	1.103003	10.1146	6.21352	7.12145
3	-163.12	42.4516	11.0012	11.12522	13.22413	12.4432
4	-14.2116	41.10773	1.116102	13.03331	11.52345	10.25122

Source; Computed by the authors
**Indicates lag order selected by the criterion (each test at 5% level)*
FPE indicates Final Prediction Error
AIC indicates Akaike Information Criterion
SC indicates Schwartz Information Criterion
HQ indicates Hannan-Quinn Information criterion

The rule of thumb in statistics is to pick the lag time that produced the lowest outcome across the majority of operations. Lag time 2 is chosen because it produces the lowest value among the majority of the techniques in table 4.2 above.

Table 4.3: Critical Lower and Upper Bounds Values

	5%		1%	
	Lower	Upper	Lower	Upper
Restricted intercept no trend	2.43	4.74	3.13	4.51
Unrestricted intercept no trend	3.51	5.19	3.54	4.67

Source; Computed by the authors

Table 4.4: Wald Bound Test of Presence of Co-integration in ARDL for the Model

Equation: ARDL (2,2,2,2).			
Test Statistic	Value	Probability	Decision
F- Statistic	13.5211	0.0031	Cointegration
Chi-square	9.2501	0.0000	Cointegration

Source; Computed by the authors

The rule is that the null hypothesis (no co-integration) cannot be rejected if the computed F statistics is less than the lower bound value. On the other hand, if the computed F. Statistics are higher than the upper bound number, it may be said that the Real consumption expenditure per capita which was used as proxy for poverty (POV), Expenditure on Electricity (GEE), expenditure on health and education as proxy for social infrastructure expenditure (SIE), expenditure on road construction, transport and communication as proxy for economic infrastructure (EIE)in Nigeria are related over the long term. Tables 4.4 shows that there is evidence of long-term correlations between theReal consumption expenditure per capita which was used as proxy for poverty (POV), Expenditure on Electricity (GEE), expenditure on health and education as proxy for social infrastructure expenditure (SIE), expenditure on road construction, transport and communication as proxy for economic infrastructure (EIE)in Nigeria because the calculated F-statistics of 13.5211 is larger than the upper bound critical value of 4.74 at a 5% error level.

Table 4.5: **Long Run ARDL Estimate for the Model**

Variable	Coefficient	Std. Error	t statistics	Probability
C	0.340500	0.300000	0.610000	0.0000
LGEE	0.320090	0.050000	0.510000	0.0300
LSIE	-0.300000	0.100000	0.130000	0.0020

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LEIE	-0.510000	0.011000	0.360000	0.0003

Source; Computed by the authors

Table 4.5 above summarizes the long term findings for the model, which reveals that SIE and EIE are inversely related to POV, while GEE is positively to POV. This demonstrates that only GEEis compatible with the a priori prediction. However all the explanatory variables are shown to be statistically significant

Table 4.6: Error Correction Representation of ARDL for the Model

Dependent Variable DPOV

Variable	Coefficient	Std.Error	t.statistics	Prob.
Constant	0.017701	0.030006	0.353406	0.2616
D(GEE(-1))	-0.0009815	0.003705	-0.036213	0.5541
D(GEE(-2))	-0.013769	0.003363	-0.734060	0.1842
D(GEE(-3))	-0.023511	0.345400	-0.311610	0.0223
D(SIE(-1))	-0.001213	0.004603	0.104301	0.0163
D(SIE(-2))	0.002619	0.006601	0.212741	0.0070
D(SIE(-3))	0.012212	0.006132	0.231385	0.0003
D(EIE(-1))	0.004010	0.004615	0.504120	0.0044
D(EIE(-2))	-0.006310	0.046521	-0.146005	0.0770
D(EIE(-3))	-0.003421	0.052132	-0.050113	0.1030
ECMA(-1)	-0.340630	0.032721	-1.750376	0.0041***

Note: *** indicates significance at 5% level
Source; Computed by the authors

Table 4.6 above displays the economical findings. The ECM is appropriately signed and statistically significant at the 0.05 percent level, according to the negative ECM values in table 4.6. It is assumed that the present value of 0.34 has a feedback of around 34 percent from the prior time of disequilibrium to the present level of POV in order to demonstrate a causal link between the past level of POV and the current and past levels of GEE, SIE and EIE .

V. Conclusion and Policy Recommendations.

This study has focused on the analysis of the link between infrastructural development and poverty reductionin Nigeria. The National Bureau of Statistics and the CBN statistics bulletin were utilized to provide aggregate time series data for the years 1986 to 2021. The ARDL approach to co-integration and error correction mechanism method was used to analyze the data. the results of our Wald bound test showed that there is a long-term relationship between Real consumption expenditure per capita which was used as proxy for poverty (POV), Expenditure on Electricity (GEE), expenditure on health and education as proxy for social infrastructure expenditure (SIE), expenditure on road construction, transport and communication as proxy for economic infrastructure (EIE) in Nigeria while short-term results from the Error Correction Model showed that the infrastructural development variables has a significant impact on poverty in Nigeria. The analysis came to the conclusion that if the government can effectively develop infrastructure, the Nigerian economy will continue to record poverty reduction. In accordance with the findings, the research recommend that:

1. Government should make education accessible to all Nigerians of all ages since education is the key to infrastructure development. It is the most important and fastest means of breaking the chain of poverty. It empowers the society, improves the social wellbeing of the people, removes ignorance, opens people's access to health education amongst others.
2. access to electricity power which is a major infrastructural service to the generality of all activities is imperative and must be considered as the most critical component of infrastructure which

has the greatest effect on poverty alleviation. It must be given priority improvement as access to electricity power to the large population particularly in the rural communities would reduce the increasing migration of rural people to the urban areas and away from their natural habitat where they can be gainfully employed in boosting agricultural production and local trades to a hostile city environment where they would be faced with the challenges of accommodation and joblessness which hitherto would have perpetuated the cycle of poverty.

3. clean water and water sanitation must be made accessible by the government to all communities to reduce productive man hour losses in search of clean water and reduce the increasing incidence of water borne diseases, illnesses and sicknesses.

4. access to health facilities must be improved by the government to reduce the number of sick people and the consequent loss of labor-hour. People who are afflicted with illnesses and sicknesses are often trapped in poverty and unable to make a full contribution to the social and economic development of their households and communities.

5.transportation infrastructure must be improved to be efficient and effective to stimulate economic growth, competitiveness, linkage with factorsof production and productive opportunities and link the rural communities with urban communities and access to healthcare and other services.

6. all the arms of government (local, state and federal) must invest in efficient and sustainable communication network nationwide guarantee easy access to active participation of all in the economic global village and open access to evolving opportunities, technological developments, increasing human mobility, trade and capital.

Refrences

[1]. Adesoye, A.B.; Adelowokan, O.A. &Maku, O.E. (2016). Infrastructural Financing and Economic Growth in Nigeria: Implication on Sustainable Development in the 21st Century'. Ife Social Sciences Review, A Journal of the Faculty of Social Sciences, O.A.U, Ile-Ife. Osun State. Special issue, pp. 421-432.

[2]. Anon, (2019) Nigeria tops the list of the number of private jet owners of private jets in Africa. http://www.legit.ng/1105314.

[3]. Calderon, C. &Serven, L. (2014). The Effects of Infrastructure Development on Growth andIncome Distribution. Working Papers Central Bank of Chile. 270, Central Bank of Chile.

[4]. Chotia, V., & Rao, N. V. M. (2017). An empirical investigation of the link between infrastructure development and poverty reduction: The case of India. International Journal of Social Economics, 44(12), 1906–1918. https://doi.org/10.1108/IJSE06-2016-015

[5]. Deleeck, H., Vanden Bosch, K. and DeLathouwer, L. (1992), Poverty and the Adequacy of Social Security. Inec. AldershotAvebury.

[6]. Jerome, A. (2021). Infrastructure, economic growth and poverty reduction in Africa. Journal of infrastructure development, 3(2), pp. 127-151.

[7]. Ogun (2017). Infrastructure and poverty reduction: implications for urban development in Nigeria. UNU-WIDER, Working Paper No. 2017/43.

[8]. Olufemi E.A., Olatunbosun A.J., Olasode O.S., Adeniran I.G. (2019) Infrastructural development and its effect on economic growth: the Nigerian perspective, Eur. Sci. J. 9 (31) 431–452.

[9]. Osemene O.F. (2018), Government expenditure and poverty reduction in Nigeria, Ilorin J.Bus. Soc. Sci. 10 (1) 119–131

[10]. Raihan, S. (2017). Infrastructure and Growth and Poverty in Bangladesh. Munich Personal RePEc Archive (MPRA) Paper No. 37882, posted 7. 12:12 UTC.

[11]. Runsinarith, P. (2019). Infrastructure Development and Poverty Reduction: Evidence from Cambodia's Border Provinces. Graduate School of International Studies, Nagoya University.