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The Impact of Infrastructural Development on Nigeria's Industrial Sector

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Abstract

The importance of infrastructure to the industrial sector of any economy cannot be overlooked, thus making its development key to the survival of the sector. The purpose of this study is to analyse the effects of infrastructure on the industrial sector of Nigeria. In that vein, ordinary least square method of regression analysis was adopted, using time series data spanning from 1990 to 2015. Industry value-added (% of GDP) was used as an indicator of Nigeria's industrial sector performance, while index of electricity consumption, gross capital formation, and federal government spending on transport and communication were used as indicators for infrastructural development. The results of the regression showed that the index of electricity consumption exerted a positive but insignificant impact on industry value-added;

gross capital formation and federal government spending had a negative but significant impact on industry value-added on industry value-added (on a 5% confidence level). The study recommended that measures to revamp and maintain the power sector of Nigeria must be taken seriously to ensure better supply of power. It was also recommended that corruption be curbed and projects, for which funds are disbursed, be properly monitored so as to ensure that efficient and long-lasting infrastructure will be built and properly maintained to encourage greater industrial output.

Key Words: Industrial sector, Infrastructure, Power supply.

Introduction

The contribution of infrastructure to an economy, especially its industrial sector, cannot be over-stressed; this is because, it makes productivity more of a breeze through promotion of investment, movement of products, people and services, and facilitation of information and communication, all these, being salient factors for economic diversification. However, the deplorable situation of most of the infrastructural facilities in Nigeria (as well as their lack of maintenance) especially of the roads, electric power, and water, tend to go against these values of infrastructure, mostly due to inadequate funding from government for maintenance of these facilities, careless use, vandalization, corruption, and delays in construction. Poor infrastructure leads to low productivity because producers of goods and services are discouraged because of higher cost of production, and sometimes, overall inability to get goods to the points of sale. This further leads to lower generation of income. Inadequate supply of electric power from 1996-1998 can be listed as one of the factors that led to the decline in industrial output (162.9 in 1990, down to 131.8 in 1998) and manufacturing capacity utilization (73.3% in 1981, down to 32.4% in 1998) (CBN, 2000). The scenario given so far begs the question of the impact of infrastructure in Nigeria on its industrial sector.

Brief Literature Review

Oshikoya et al (1999) defines infrastructure as social (or soft-core), or physical (or hard-core) infrastructure. They contented was that soft-core infrastructure had to do with healthcare, governance, education, and accountability, as well as property rights, which are the driving forces of economic activities; whereas, hard-core infrastructure had to do with physical structures such as transport facilities, telecommunication facilities, power, water, and sewage, which they characterised as wheels of economic activities. This paper, however is focussed on physical infrastructure.

The definition of infrastructural services, as given by Jacobson and Tarr (1995), was that it is the structures and networks that frame and hold cities making it possible to carry out economic and social activities like power and water supply, telecommunications, as well as others. World Bank (1994) defines infrastructure to be an umbrella for these economic activities (as given by Jacobson and Tarr, 1995), and further iterated, along-side Lanjouw (1995) and ADB (1999) that adequate infrastructure paves way for investment in less-developed areas, and provides room for economic diversity courtesy of freer movement of people, goods, and information. It promotes environmental sustainability since there will be provision for better waste disposal, and clean water, proper sanitation, etc.

A link was observed between infrastructural development and poverty reduction by ADB (1999), and Oshikoya et al (1999), stating that developing infrastructure can help decrease poverty in two significant ways: first is the link that resides between infrastructural development and economic development, and second is the link between infrastructural development and the pro-poor growth process. In both cases, the outcome is poverty reduction. The provision of basic infrastructure as markets, schools and good roads can help to reduce unemployment and illiteracy, which will lead to higher income and better nutrition.

The impact of the provision of energy infrastructure has been recognized in the provision of proper education, hygiene and healthcare, and this has in turn boosted productivity. The availability of electricity has also made possible the extensive use of electronic technology in businesses and homes; thus, one can only imagine its impact on a larger scale (industrialization) and overall economic development (Agenor and Moreno-Dodson, 2006, and Agenor, 2009).

Hulten and Isaksson (2007) proffer that different types of infrastructure are required at different strata of industrial development to properly demystify income and levels of productivity; through regression of data of 112 countries from 1970-2000 on industrial production and electricity generation capacities.

With respect to investment in an economy, the elasticity of infrastructure is greater than 1 (Isaksson, 2009). This means that an economy that invests more will do so in infrastructure. Adenikinju (2005) relied on firm-level data, as did Lee and Anas (1992), to prove that a significant percentage of companies in Nigeria view inadequate power supply as a major hindrance to productivity. Costs incurred as a result of seeking alternative power sources eats very deep into profit, thereby making the environment uncomfortable for production.

Dollar, Hallward-Driemeier and Mengistae (2005) discovered that fluctuating power supply have a strong negative impact on production in Bangladesh, Pakistan, India, and China. Reinikka and Svensson (2002) submit that in Uganda, employment, probability to export, and private investments have a negative relationship with power losses.

Methodology

The method of analysis used for this research is the ordinary least squares (regression analysis). It was used in this research because of the kind of data to be used, and analysis to be done. Time series data spanning from 1990-2015 was used to conduct the impact analysis of infrastructural development on the industrial sector in Nigeria. The variables used in the research were related to:

- Industry value-added (% GDP): used as a proxy for industrial sector performance;
- Index of electricity consumption by the industrial sector: used to represent power infrastructure performance;
- Gross capital formation: used as a proxy for other social infrastructure; and
- Federal government spending on transport and communication: also used as a measure for infrastructural development.

The equation used, in model expression, was:

IVAG = f(GCF, FG, IEC)

Where, IVAG = Industry Value Added (% of GDP)

GCF = Gross Capital Formation (constant 2014 USD)

FG = Federal government spending on transport and communication (million naira)

IEC = Index of electricity consumption

The model was represented mathematically as;

$IVAG_t = a_0 + a_1GCF_t + a_2FG_t + a_3IEC_t + U_t$ **(1)**

Where, a_0 = regression line intercept

a_1 and a_2 = coefficients of regression

U_t = Error term

t = time (1990-2015)

Equation (1) above was modified to

$IVAG_t = a_0 + a_1GCF_t + a_2LOG(FG)_t + a_3IEC_t + U_t$ **(2)**

Where FG was logged to have a better fit for the regression line.

The apriori expectations are that, electricity consumed and gross capital formation will have a positive relationship with industrial output.

Data presentation

Table 1 below shows the values for Industry value-added, electricity consumption and gross capital formation for Nigeria from 1990-2015.

Table 1: Data for industry value added (IVAG), index of electricity consumption (IEC), and gross capital formation (GCF).

YEAR	IVAG	IEC	GCF	FG
1990	45.27009	124.8	4,437,547,520	0.29
1991	45.7569	125.3	3,778,425,872	0.24
1992	52.99716	139.2	3,751,158,107	0.55
1993	42.68733	142.2	2,149,349,007	2.02
1994	32.85864	152.7	2,025,018,936	0.45
1995	46.01588	150.2	2,022,047,186	1.08
1996	48.51685	147.1	2,555,421,375	2.07
1997	44.13767	143.7	2,999,098,102	1.58
1998	33.55938	138.5	2,758,753,864	1.92
1999	37.85794	139.4	2,515,105,141	11.12
2000	52.20539	141.2	3,261,427,209	3.03

2001	40.87179	144.6	3,351,751,778	33.93
2002	30.51809	146.7	4,150,200,641	29.39
2003	36.75029	147	6.707,073,583	22.68
2004	42.09065	148	6,501,716,389	8.07
2005	43.50783	291	6,136,633,107	8.04
2006	41.91683	281.9	12,032,452,350	9.772307
2007	40.65207	290.8	15,407,429,013	32.16092
2008	41.48267	198.2	17,331,412,194	67.38551
2009	34.20516	198.3	20,498,099,014	90.02793
2010	24.91047	200.7	63,813,637,507	42.40603
2011	27.83723	202.5	66,751,825,543	13.10312
2012	26.72293	206.3	68,717,568,970	23.2
2013	25.33391	206.4	76,749,847,087	18.51493
2014	24.24768	207.9	89,826,662,945	20.3915
2015	24.32468	208.6	99,826,662,945	21.9363

Source: CBN Statistical Bulletin (2016) and World Development Indicators (2016).

Results and Interpretation

The results of the regression are given below:

Table 2: Regression results for IVAG = f(GCF, FG, IEC)

Dependent Variable: IVAG
Sample: 1990 2015

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	40.71011	3.975464	10.24034	0.0000
GCF	-1.97E-10	3.75E-11	-5.263608	0.0000
LOG(FG)	-1.535763	0.739013	-2.078127	0.0496
IEC	0.026143	0.024888	1.050434	0.3049

R-squared	0.693987	Mean dependent var	37.97060
Adjusted R-squared	0.652258	S.D. dependent var	8.764714
S.E. of regression	5.168521	Akaike info criterion	6.263689
Sum squared resid	587.6995	Schwarz criterion	6.457242
Log likelihood	-77.42795	Hannan-Quinn criter.	6.319425
F-statistic	16.63080	Durbin-Watson stat	1.965377
Prob(F-statistic)	0.000007		

Source: Researcher (generated using E-views econometric software)

The regression results produced an R^2 of 69%, meaning that 69% of the changes in industry value-added are explained by the variables stated in the model (gross capital formation, Federal Government spending, and electricity consumption), however, the remaining 31% is explained by the variables not included in the model, but accounted for by the error term U. The results also show that gross capital formation and Federal Government spending in the model have a negative relationship with industry value-added, while index of electricity consumption has a positive relationship with industry value-added; although, federal government spending and gross capital formation have a significant impact on industry value-added (on a 5% confidence level), index of electricity consumption has an insignificant impact on industry value-added (on a 5% level of confidence).

Conclusion

The insignificant impact of electricity on the industrial sector may be explained by its obvious inadequacy in the nation. Power fluctuations, low voltage supply, and outright power outages are enough to drive individuals, much more industries, to seek alternative sources of power. This can encroach on profit (because of the rising cost of all forms of fuel), but production remains autonomous for as long as it is feasible. Some companies rely solely on the alternative source of energy acquired, so much that they don't switch back to the nation's power supply grid for fear of disappointment. For instance, the number of power outages in firms in a typical month increased from 25 in 2007 to 33 in 2014 (World Development Indicators, 2016). This act is salient to some industries as a second of power outage may cause billions in losses, which they cannot afford (considering the costs of other necessary expenditures are rising). Thus, there may be power consumption by some industrial subsectors that can afford to manage the power inadequacy (e.g. low power consuming companies or manufacturers), but the overall effect of electricity consumption on the industrial sector will remain insignificant for as long as this inadequacy in power supply (forcing industries into the arms of alternatives) exists.

The negative and significant impact of gross capital formation and federal spending on transport and communication may be attributed largely to corruption. It is in this researcher's point of view that contracts and funds may have been allocated for the carrying-out of infrastructural projects, and these funds were not used for the project it was allocated for, but rather used to line the pockets of corrupt individuals (as concurred by Okafor, 2013, and Ogbeidi, 2012). In some cases, the projects are carried out, but not done efficiently (done with substandard materials that will cause the infrastructure to break down in the near future); sometimes, the work is done efficiently but takes too long to be finished, and more capital is required and spent for what could have been finished a long time ago (sometimes years) on the same project. Infrastructure abandoned, is as good as no infrastructure, as it cannot be very useful for long, and will not be properly maintained.

It is important that the government ensures that whatever measures that need to be taken to revamp and maintain the power sector, thereby creating better power supply, will be carried out. This will ensure greater industrial output and lower production costs for the sector. It is also necessary that government puts measures in place to curb corruption in the system, so that, the money disbursed for infrastructural development is properly channeled. An inspection is necessary to further ensure that the works (the

constructions, etc) are done right, to make the infrastructure more reliable. This will equally boost output of the industrial sector.

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