

Constraints To Efficient Electricity Supply In Nigeria

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Abstract

The objective of the study is to examine the constraints to efficient electricity supply in Nigeria, and recommend ways for policy decisions. Using literature review and case study, it is revealed that efficient electricity supply is dependent on the political, technical, economic and social factors which needed to be addressed.

Introduction

The magnitude of the standard of living in any society, the growth and development of such economy and its ability to affect the course of event is a function of the extent to which electric power system is effective and utilized. This is inline with the Sunny (2016) submission that lack of electricity has stunted socio-economic development, thereby causing a lot of misery which sometimes translates to civil unrest.

For instance, despite the investment in power sector, the Nigeria economy is continually plagued by problems related to electricity supply and disruption inadequacy. The lack of reliability associated with the power supply system still constitutes energy into one of the binding constraints on the pace of economic activities in the country. Anyaehie (2011) opined that inefficient electricity supply is unhealthy for national growth and so needs to be overcome. The power system failures and inadequate infrastructures have had a notable adverse impact on growth and have contributed to poverty in Nigeria.

Power sector reforms have been carried out in order to improve the electricity supply situation of Nigerians. Israel et al (2015) posited that in order to meet the desires of the public populace, the Nigerian government embarked on power sector reforms. The reform program led to the unbundling of the then National Electric Power Authority (NEPA) into seven generating stations, eleven distribution firms and one Transmission Company.

Despite power policy initiatives in promoting power sector reforms, efficient electricity supply has not been successful in Nigeria. The main problem against safe and efficient electricity supply in Nigeria is inadequate infrastructure, poor history of corporate governance and inadequate pricing structure to support the economics of power generation, transmission and end user distribution (NAPE, 2016). The Nigerian power sector has struggled to deliver efficient electricity supply to both individual and industrial consumers.

Experiences in other countries that have profitably succeeded in power sector reform and have attained efficient electricity supply have shown that in addition to adequate regulatory framework, the long-term successful development of efficient electricity supply requires synergy between the Nigerian government and the private investors in electric power sectors.

Currently, there is no adequate collaboration on the development of efficient electricity supply between investors in electric power sector and the Federal government of Nigeria. This study seeks to find answers to the following questions: what do policy makers need to know about electric power system to promote development support strategies that are economically, technically, socially and politically effective.

History of Electric power industry in Nigeria.

Electricity was first generated in Nigeria in 1896. The Nigerian Electricity Supply Company (NESCO) commenced operation as an electric utility company in 1929 with the construction of a hydro-electric power station near Jos. The Electricity Corporation of Nigeria (ECN) was established in 1951, while the first 132KV transmission line was constructed in 1962, linking Ijora Power Station to Ibadan Power Station.

The Niger Dams Authority (NDA) was established in 1962 with a mandate to develop the hydropower potential of the country. Subsequently, ECN and NDA were merged in 1972 to form the National Electric Power Authority (NEPA) which as a result of unbundling and the power reform process, was re-named Power Holding Company of Nigeria (PHCN) in 2005 (World Bank, 2003)

Research methodology

The study adopted a qualitative multiple case study design and literature review in the interpretative research paradigm. Data was collected from secondary sources, arranged into themes and were analyzed for content. It is critical to highlight that the research approach looks at issues historically by addressing specific scenario that produce details when people answer to the why, how and what question (Hennink et al, 2011). The study used existing secondary data or empirical evidence to present issues especially in the literature review part. Several factors have constrained efficient electricity supply in Nigeria among which are:

Economic factors

Capital scarcity: There was a recognized major shortage of capital to finance the required expansion of power capacity in Nigeria, while historically Nigeria like other developing country government had financed their large state-owned power utilities and supplemented their capital with a multi-lateral development bank. It was recognized that these two sources would be inadequate to finance power sector investment in decades to come. The shortage of capital means power is rationed and that only those regions, major industri-

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al or residential blocks that can pay, have a chance of receiving reliable power.

Payment risks and foreign exchange availability: PHCN's collection rates are low, with high levels of technical and non-technical losses, tariffs are not high enough to make PHCN financially self-sufficient, and it will be some time before power sector reform impact is felt. Also there is inadequate foreign exchange for timely purchased of needed spares. This is in line with the Benin electricity distribution company which has claimed that inadequate funds to develop infrastructure to accommodate generated power by generating company GENCO is hindering its operation (Oil, week).

Economic inefficiency: The electric power research institute (2003) conducted a pilot study of electricity consumption in California oilfields and found significant potential for reducing cost through energy efficiency improvements. It offers suggestions for reducing electricity consumption that if implemented could result in a system wide demand reduction and reduce the need for additional generation of power infrastructure capacity. Also, Ohajianya et al (2014) posited that there is over 50% power loss at the point of power generation in Nigeria. This is corroborated in a study carried out in Delta power which revealed that of the total installed power capacity only 30.5% are generated. This implies a loss of 69.5% of the generated power. A majority of electricity consumers in Nigeria leave their electric devices "ON" even when they are not needed. This is because of the inefficient billing system. In addition, this result in overloading of the power transmission and distribution equipment.

Technical factors

Weak human and technological capabilities: This is essentially a problem of research and development which is made worse by lack of trained man power and information on the deployment of resources particularly in developing countries like Nigeria. In general terms there is inadequate skilled human capital, and knowledge about electric power system design as well as personnel with adequate technical, financial, economical and management skills to identify and implement specific power policies and program, According to Ohajianya et al (2014) Nigerians rejoiced as government handed over generation, transmission and distribution of electricity to private companies. However, after six months, Nigerian still complained that power supply had gone from bad to worse (Ukokop et al 2014).

There is inadequate infrastructure across the entire value chain to service the power sector. For instance, the Uquo marginal oil field in Akwa Ibom state came on stream in 2009 and powered the 560MW Calabar plant, Ibom power plant which ought to be about 170MW, but with only one gas turbine functioning, produces 110 MW, Frontier oil field once fed Alaoji power plant but not anymore (Thomas, 2017).

Table 1 is a comparative analysis of electricity generation in Nigeria and population with other countries. According to Obioma (2010) Nigeria has about 3,545 MW (out of a total installed capacity of 5200MW) for

Table 1. Comparison of electricity generation and population

Country	MW	population
South Africa	40,000	50 million
Brazil	100,000	192 million
USA	700,000	308 million
Nigeria	3,450/ 5200MW	160 million

a population of 160 million people and only a supply peak of 3700 MW out of a peak of load requirement of 5103MW and cannot supply power nationwide for 24 hours.

Table 2: Power stations in Nigeria

Power station	Types	Capacity (MW)	Year of completion
Kainji	Hydro	470	1968
Jebba	Hydro	482	1985
Shiroro	Hydro	450	1990
Egbin	Thermal (gas)	1100	1986
Sapele	Thermal (gas)	450	1981
Delta	Thermal (gas)	300	1966
Afam	Thermal (gas)	420	1965
Ijora	Thermal (gas)	60	1976
Geregu	Thermal (gas)	414	2006

Table 3: National integrated power project (NIPP)

NIPP	Project out-put (MW)
Calabar	562.5
Egbema	337.5
Ihovbor	450.5
Gbarain	252.0
Alaoji	960.0
Papalanto	675
Omotosho	451.0

Table 2 and 3 show the power stations in Nigeria and the different independent Power Projects in Nigeria. The total generated power is not adequate when compared to countries with similar population.

Inconsistent energy policies and over-dependence for government for sustenance: Ohajianya et al (2014) posited that the inconsistent energy policy has contributed to the problem of unreliable power supply because from the establishment of ECN in 1950 and setting up of NEPA in 1972, the policy has been that of monopoly. However, if after these years there is need to unbundle the power sector then the previous policy has been unhelpful. Also, the power sector in Nigeria has been privatized yet the company has depended on government for bail out on several occasions.

Social factors

Debt and deficit: The low performance of power generation companies and electricity distribution com-

panies in Nigeria has been attributed to debt profile of ministry, departments and agencies of government, it contributes to the liquidity challenges in the power sector (Oil, week 2017).

In addition, domestic and commercial consumers are resistant to settle their bills as a result of estimated billing model adopted by the power distribution companies DISCOs. The Oil week (2017) stated that the Eko electricity distribution company debt owed by other companies has made it difficult for her to install pre-paid meter to improve revenue collection and improve performance.

Vandalism /insecurity: As a result of poverty in Nigeria, there is high incident of power equipment vandalism. Vandals have a field day stealing of cables and wires. Also, insecurity aids this process of vandalism which results in low capacity utilization.

Poor maintenance culture: There is frequent breakdown of obsolete generating plants and equipment due to inadequate maintenance and lack of spare parts.

Political factors

Poor history of corporate governance of electricity industry: In Nigeria the electricity sector is facing low productivity and corruption. This factor has resulted in commercial unsustainability of the power sector and hence make planning very difficult. Mismanagement also means misallocation of resources which further worsens the availability of quality power service.

According to the exclusive power probe report (2008) (as cited in Israel et al 2015) of all the house of representative committee on power the sum of \$16 billion was misappropriated in the power sector between 1999 and 2007. The committee recommended that 17 figures of interest should be investigated and or disciplined. These figures included the then president of the Federal republic of Nigeria, the minister of power in that period, some federal legislators, some top management of PHCN, some top business men and some companies. Consequent upon the allegations and counter allegations over the power corruption saga, the power probe committee was dissolved and never set up again.

Lack of transparency: This also affected the development of new energy for power generation, most governments in the world seem to prefer centralized distribution systems where everything seems to come from the headquarters or capital before any consideration to other areas. This tendency is a serious barrier to the development of new energies for power generation, which are usually at scattered locations and are produced on relatively small scale.

Damas (2016) posited that there is the need, therefore, to take a second look at the policy of generating, transmitting and distributing power based on national grid principle or format. The national grid principle is a system whereby whenever and wherever power is generated it has to find its way to the national transmission and distribution network. This principle therefore fore closes the ability to produce and distribute power in situ, based on the location and the resources. We could try to produce wind power where there is adequate

wind, be it very remote or localized, and use this power so generated for the immediate environment or locality. The same will go for where there are tidal waves or hydraulic or thermal resources. This area could thus be offloaded from the natural grid, thereby increasing accessibility of power to some areas of the country.

Most new generation capacity in Nigeria is likely to be based on natural gas. Electricity transmission losses over long distances, combined with the high cost of building and maintaining electricity transmission infrastructure, mean that in almost every case it is likely to be more economic to transport gas by pipeline and generate close to centers of demand, rather than to generate close to the supply of gas and incur electricity transmission costs. However, this is only apparent if the true costs of both gas and electricity transmission are made transparent and can be compared by investors (World Bank 2003).

Right pricing of electricity: Appropriate price is central to the subject of electricity power reform. This is because the optimal pricing model must take into account cost recovery over planning horizontal- cost recoverability which is contingent on appropriate pricing is a central requirement for sustainability of electricity sector, the price that is ultimately set must therefore not be too high or not too low. If it is high, access to electricity will be highly circumscribed for the poorer segment of the society and may therefore require subsidization by government. If it is too low, the investors in electricity business will not be able to recover their costs.

A major constraint to efficient electricity supply in Nigeria has been the presence of subsidies in the electricity pricing structure, these subsidized prices have not only promoted an inefficient pattern of end use, but have also prevented the recovery of capital costs, greatly discouraging investment in more energy efficient processes in general and in particular for the electricity sector. Ohajianya (2014) posited that at the point of consumption majority of power consumers do not switch electric devices "OFF" even when they are not required, because of the default billing method applied by the power distribution company.

Conclusion and recommendations

In Nigeria the power sector have been constrained by high technical losses, a lack of cost recovery pricing, poor maintenance culture, low equipment reliability, low productivity, corruption, a crippling non-payment of mounting debt, these factors have resulted in the commercial unsustainability of power supply which are unable to attract needed private investment. Other major problems confronting the electricity sector in Nigeria are summarized as capital scarcity, economic inefficiency, lack of basic industries to service the power sectors, vandalism, insecurity, ineffective billing method, debt and deficit. Power sector reform have been carried out in order to improve the electricity supply situation in Nigeria. Sambo (2010) suggested addressing the issue of collapsing infrastructure for improvement and efficiency. The suggestions on how to resolve the problem of electricity supply are highlighted as follows:

Right pricing of electricity and abolishment of estimated billing: There should be correct pricing of electricity to ensure adequate return on investment for entrepreneurs. Tariff levels need to reflect the cost of electricity supply.

Provision of infrastructures and security: Basic engineering infrastructure for the local manufacturers of electricity should be established. There should be effective measures to ensure security of electrical installations.

Increased funding: There should be appropriate financing to support indigenous investment in the electricity industry. Also, there should be adequate supervision and commitment to the NIPP projects and others.

Capacity building: This should ensure the participation of indigenous engineers in the execution of an ongoing and future project right from feasibility studies with the objective of establishing local capacity in the power sector.

Collaboration and granting of tax incentives: Indigenous contractors should be encouraged to manufacture and install pre-paid meters in collaboration with the distribution companies. Granting of tax incentives by the government would be a welcome development.

Research and development: There should be an intensified national effort in training, research and development with a view to generating electricity using other off-grid power solutions like solar and other renewables.

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