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Independent Power Plants (IPPs): a Panacea to the Growth and Sustainability of Manufacturing Industries in Nigeria

[1]A.M. Gusau and [1]A.M. Orah
1. Mechanical Engineering Technology Department, Federal Polytechnic Kaura Namoda, Zamfara State, Nigeria.

E-mail: orahmohammed@yahoo.com

Abstract: Stable electricity supply symbolizes the success and growth of a developed economy and industrialization contributes positively to the growth of any nation's economy. Nigeria, a country that is blessed with abundant mineral, human and financial resources is however poorly industrialized resulting to the country being amongst the poor nations in the world today. Most industries, small-, medium- or large-scale are heavily dependent on stable electric power for their survival and growth. Unfortunately this stable electricity is not available in Nigeria. The consequence is the heavy importation of standby electric generators and the over dependence on these generators by the industries for their survival resulting in the high cost of production of goods and provision of services in the country. This paper seeks to identify the various power technologies available to the different types of industries that would help in reducing the cost of production of goods and services provided, thereby improving the country's economy. The paper also emphasizes the need for large scale industries especially, to own Independent Power Plants (IPPs) to provide the much needed stable electric power. Recommendations were made to suggest possible ways by which these could be achieved.

Keywords: Industry, Goods and Services, power plants, IPPs, Stable electricity.

1.0 Introduction:

Infrastructure is one of the most decisive factors for economic development because of its interaction with the economy through the production processes. Obokoh and Goldman [1] emphasized that changes in the quality of infrastructure available for production will greatly influence the production and performance of an organisation's levels of output, income, profits and employment creation in the economy. These infrastructure include stable electricity, portable water and good road maintenance networks for economic development. The gap in the availability of these infrastructure in Nigeria has greatly impacted on the production processes in the manufacturing sector, especially the ability of the SMEs to compete in the global market [1].

Most well-meaning Nigerians support efforts to improve the current power deficit Nigeria is experiencing. It might just be time to use the energy resources she is bestowed with to the nation's benefit. Clearly, Nigeria must diversify its power-generation portfolio. Recent power

problems have revealed that the reliance on oil and hydroelectric dams for power have suffered due to interruptions in oil output/supply, severe dry seasons and of course, pure corruption. Edomah [2] reported that Nigeria's current electrical transmission infrastructure is unable to transmit electrical power above 6000 MW (megawatts) consistently.

Obokoh and Goldman[1] reported that roads and poor electricity supply are the two major infrastructure problems confronting the manufacturing industries, business sector, including SMEs in Nigeria. They quoted Adenikinju [3] that a typical Nigerian firm experiences power failure more than seven times per week without the benefit of prior warning which imposes a huge cost on the manufacturing industries and SMEs arising from idle workers, spoiled materials, lost output, damaged equipment and costs of providing their own electricity and these could lead to the increase in business uncertainties, increase in operational costs, reduced competitiveness and lower return on investment . The growth potential of SMEs and even large-scale businesses has been seriously impaired by a lack of functional infrastructure which has become so deplorable that even some Multi-National Companies (MNC) are closing down their factories and shifting operations to other countries [4].

Adenikinju [3] further highlighted five ways some firms in Nigeria cope with irregular electricity supply, to include choice of location, factor substitution, private provision, choice of business and output reduction. All these elements were presently observed among Nigerian firms; however, the most common approach has been through private provision. Electricity consumers have responded to Power Holding Company of Nigeria's (PHCN's) inefficiency through self-generation of electricity done by inputting the cost of self-generated power as part of the cost of their total investment, conscequently raising considerably the set-up cost for manufacturing firms operating in the country.

Akuru and Okoro [5] reported that the effect of electricity power outages on the growth and survival of firms in Nigeria was very significant and established that between the years 2000 and 2008 around 820 manufacturing firms were closed down, with the figure moving up to 834 in the following years, all because of poor electricity power supply and high cost on the alternative energy supply. This paper, therefore, examines the role of Independent Power Plants (IPPs) on the growth and sustainability of manufacturing industries in the country and methods of establishing these IPPs in the various industries.

2.0 Effects of Inadequate Power Supply to Manufacturing Industries in Nigeria

Undeniably, constant power supply as well as the provision of other infrastructural facilities aids the industrial development of any economy. In Nigeria, the inadequacy of these has affected most industries negatively. Adeyemi [6] reported that the state of the manufacturing industries in Nigeria by the end of Obasanjo's administration on May 29, 2007 was classified as follows: 30 percent had closed down, 60 percent were ailing and 10 percent were operating at sustainable level. Table 1 shows the firms in the ailing category according to sectoral analysis to include textile firms, vehicle assemblers, cable manufacturers and paint manufacturers. Others were steel and petrochemical firms. Also firms operating at a sustainable level were those in the food, beverages and tobacco sector, leather sub-sector and household products such as detergents and cleaning materials, and toothpaste among others, Companies in the closed down group cut across all industrial products, but most affected were products such as chalk, candle, dry cell and automobile batteries, shoes polish, matches, etc.

Table 1: State of manufacturing industries in Nigeria as at May 2017.

Industries that have Closed down	*Ailing industries*	*Industries Operating at sustainable level*
Chalk Manufactures	Textiles Firms	Food, beverages and Tobacco sector
Candle Manufacturers	Vehicle assemblers	Leather sub-sector
Dry cell and Automobile batteries Industries	Cable manufacturers	Household products
Shoe Polish	Paint manufacturers	-
Matches	Steel Firms	-
-	Petrochemical firms	-

Source: Adeyemi (2007)

Emeka [7] reported that the Manufacturing Association of Nigeria's (MAN) survey in 2005 revealed that only 10% of industries operated. But then, the 10 % could, on the average, only function at 48.8% of their respective installed capacities. Consequently, 60% of the companies were in comatose while another 30 % had completely closed down. Another survey conducted in 2006 by MAN revealed that most of the industrial areas around the country suffered an average of 14.5 hours of power outage per day as against 9.5 hours of supply at the time [7]. Furthermore, the figure released by the MAN indicated that the cost of generating power supply accounts for 36 % of production. It was revealed that about 1500 firms (60%) of the association's 2,500 members incurred additional operating cost of alternative power generation. This led to over 750 companies (30 %) closing shop out-rightly [7].

With the poor power supply situation, almost all manufacturing companies that have remained in business, run private power plant at great cost and this is evident on the amount spent on the importation of generators into Nigeria. A London based magazine, *African Review of Business and Technology* in its April 2006 edition revealed that Nigeria topped the list of generator-importing countries for the fourth year in a row, having surpassed others since 2002, spending a total of N 53884 trillion on generator imports in 2005 [7].

Akiri, Ijuo and Apochi [8] reviewed that Nigerian government has been putting efforts to increase and sustain the productivity of manufacturing sector in the economy through budgetary allocations, policies and pronouncements. Also, the consistent decline in the oil revenue, which has been the major source of income for the country, has prompted government to diversify the economy by stimulating the manufacturing sector productivity. They also reviewed that electricity supply which is mainly utilized for driving machines for the production of various items is a strong factor that will catalyze the productivity of manufacturing sector and thereby contribute significantly to the development of the economy. On this backdrop, successive Nigerian governments have been committing huge amount of resources into the electricity sub-sector, but no commensurate increased productivity of manufacturing sector in the country. Manufacturing sector in Nigeria is faced with the challenges of erratic power supply from the Nigerian Electricity Power Authority (NEPA), now called Power Holding Company of Nigeria (PHCN) and consequently, high cost of electricity generation from private electricity power generators [9],[10]. Not all manufacturing firms would be able to run profitably on power generating sets in a highly competitive and open economy like Nigeria because of the high costs of fuel and maintenance. Ordinarily, the power generating sets which have now become the primary source of electricity supply to industries that could afford them ought to serve as backups or standby in the event of disruption from government sources [11]. But because of government inefficiency, the backups are serving as the primary source.

3.0 Emergence of Independent Power Plants (IPPs) in Nigeria.

IPPs are privately financed, green-field generation projects supported by non-recourse or limited recourse loans with long-term Power Purchase Agreement (PPA) with the off-taker.
Ensuing on the new government policy, a number of IPPs have started operation in Nigeria such as the 270MW AES project in Lagos State, the 450MW ENI/Agip Okpai project in Delta State, the Omoku project in Rivers State and the 474MW Shell AfamVI in Rivers State to mention but a few.
As at the first quarter of 2009, twenty nine (29) IPPs have been given licenses by NERC to establish generation plants with the following desired objectives:

i. To meet the Growing Energy Demand
ii. To bench-mark Government-owned generating plants.
iii. To stimulate the development of local Capital Markets
iv. To enhance capacity building in manpower development, better management skills and access to efficient technologies that will ensure reliable and affordable supply of electricity.
v. To allow government allocate scarce resources to other priority areas such as health, poverty alleviation, education and agriculture.
vi. To contribute to reduction in Gas flaring

The power sector has elicited high investment interest since privatization, and many developers have secured generation licenses from NERC (as defined in the table below). However, due to varied reasons including securing financing, none of the green-field IPPs have commenced operations. The chart below illustrates the current IPPs in Nigeria.

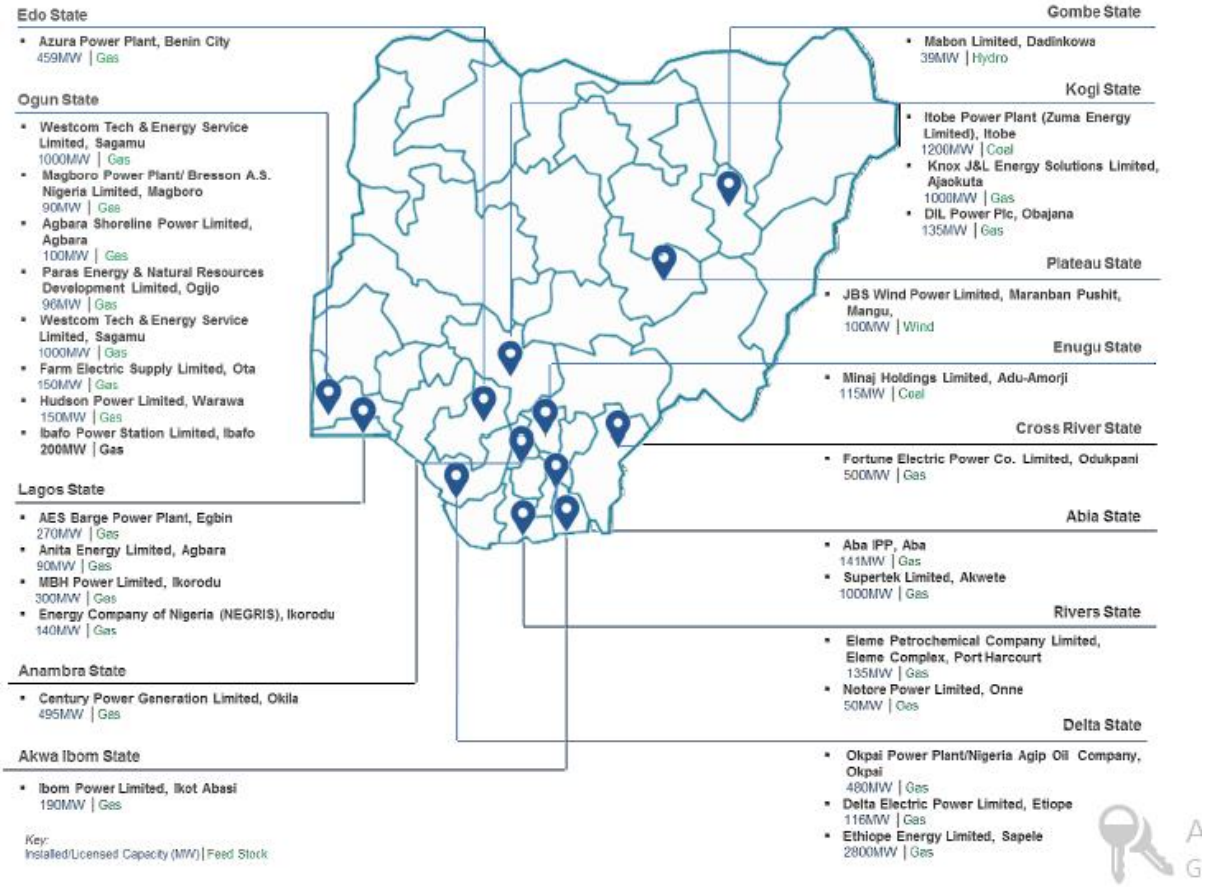

Fig. 1: Chart illustrating Current IPPs in Nigeria.
Source: Nigerian Electricity Regulatory Commission. Adapted from Latham and Watkins [12].

The IPPs projects provide the much needed power (accounting for a little over 20% of generation). They offer an important benchmark against the publicly owned plants and also provides an important model and outlet for the Nigerian Natural Gas Strategy which sought to eliminate gas flaring by 2008 by harnessing gas for power generation. Finally the IPPs are part of a transition to privatization and are therefore inherently helpful in paving the way for Nigeria's proposed future.

4.0 Types of IPPs adaptable to Manufacturing Industries in Nigeria.

IPPs have made tremendous contributions to the national power output. Its non-complexity and short-installation time have encouraged investors and manufacturing companies see it as a viable option for sustainability in power. Currently, majority of the IPPs in Nigeria are gas-powered, though there exist other alternative energy sources for power generation. This paper discusses below the types of IPPs that could be adaptable to manufacturing companies for their survival and growth.

a. Gas-Powered IPPs:

Despite the challenges in the oil and gas sector, investment opportunities exist in the infrastructure required for gas supply. Given the focus on gas fired generation in the country, financing and technical advisory services will be required to provide the necessary

infrastructure to evacuate natural gas from the Niger Delta to the power plants. Manufacturing companies could develop their own self-generating IPPs from gas supply which constitute majority of the power plant types used in the country. Dangote Group of companies is an example of a manufacturing company that utilizes gas-fired plants for its factories especially the cement factories.

b. Hydro Power Projects:

Significant investment opportunities exist in developing hydro-power projects. The Presidential Task Force on Power estimates that there is potential for 11,500 MW in Large hydro power plants as well as up to 730 MW in small hydro-power projects in the country. Much of these hydro schemes have not been fully utilized in the country, probably due to the technology involved and the long installation period. Manufacturing companies could key into the possibility of establishing mini and micro hydro schemes that could serve as IPPs for their growth and sustenance.

c. Solar & Wind Power Plants:

Nigeria lies within a high sunshine belt and is thus endowed with enormous solar energy potential. Resources in the northern parts of the country provide for viable large scale solar Projects such as the 100MW Nigerian Solar Capital project in Bauchi State. Similarly, Nigeria also possesses favorable wind resources that can be utilized for power generation. The 100MW JBS Wind Power project under development in Plateau state in central Nigeria demonstrates the availability of onshore wind resources. Offshore resources are currently being evaluated and mapped. SMEs that do not require much electrical energy could utilize the solar and wind power plants especially the photovoltaic systems. When the need arises the solar and wind power plants could be combined into a hybrid system for optimum performance. Large scale industries could employ the solar thermal power plants (STPPs) option which has the capability of generating large megawatts of electric power.

5.0 Conclusion

Small and medium term industries are the drivers of the economy and are currently suffering inhibited growth. The multinational companies are not faring any better. The main reason for their declining growth is poor infrastructure especially electricity supply. There is no gain saying the fact that electricity supply is crucial in stimulating economic growth and development rate. SMEs and large companies have to sustain their production and ensure their growth by getting over the bottle neck of epileptic power supply from the national grid. The high importation cost as well as operational and maintenance cost of diesel generators could be overcome if manufacturing companies in the country would consider the option of owning their own IPPs corresponding to the amount of electrical energy they require for their operations. This could help them reduce the cost of production, cost of providing services and ensuring sustainability and growth of SMEs and multinational companies in the country, thereby, increasing the contributions of the industrial sector to our national Gross Domestic Product (GDP).

6.0 Recommendations

In order for manufacturing industries in the country to successfully key into the benefits of IPPs, the following recommendations are note-worthy:

i. The government should create the enabling environment for Independent Power Producers to operate successfully in the country.
ii. Government should reduce, if not, provide waivers for IPP equipment or accessories imported into the country in order to reduce the initial cost of establishing IPPs especially to SMEs and large industries indicating interest in self-generating IPPs.
iii. SMEs and multinationals should undertake a power evaluation study of their facilities to seek the type of IPPs relevant to their energy needs.
iv. Multinationals should venture into self-generating IPPs since they have the financial capability to do so.
v. In cities where industrial layouts (or estates) are prevalent or mapped out, different companies could come together to co-jointly own an IPP that would provide the power requirements of such layouts ensuring the growth of such industrial layouts and providing a vibrant business environment.
vi. SMEs and multinationals should install and operate IPPs that are peculiar to their regional locations within the country; for instance, companies in the northern region could own solar power plants, those within the coastal region could own wind power plants, those within the southern region could own gas power plants and those within the tropical region could own mini and micro hydro plants.

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