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AVAILABILITY OF POWER SUPPLY FOR INDUSTRIAL DEVELOPMENT IN NIGERIA: A CASE STUDY OF ODOGBE FARMS LTD.

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ABSTRACT

This research paper looked into the availability of power supply for industrial development in Nigeria economic. Odogbe Farms Ltd has multiple lines of production and operates a 24 hours production schedule; even during down time period. Data were collated from power house log book quarterly on the running hours of generator as well as when the public electricity utility is available for a period of seven quarters. It was discovered that for every one hour production cost on generator is above 51% of what it would have cost if it were to be on PHCN Conclusively, if profit margin is to be made constant, consumers will have to pay more culminating into impoverishment of the populace. Likewise public power supply is cheaper for production compared to the use of generators.

KEYWORDS

Power supply, Power outage, Profit margin, Transmission, Distribution.

INTRODUCTION

The technological and industrial development in any country is highly dependent on reliable electricity supply to industries and the public at large. In Nigeria, the electricity authority known as Power Holding Company of Nigeria (PHCN) is unable to supply the required amount of energy needed to industries which has lead to low production in industries and high cost of producing semi-finished and finished goods (Mukoser, 1973).

Some of the technical causes of power outages in power holding company of Nigeria are poor funding for purposes like major repairs, over haul, rehabilitation, mandatory maintenance of facilities, development and construction of new power plants and expansion of power transmission facilities (NEPA Review, 2002) and (NEPA Review, 1988).

Heavily over loaded power and distribution transformers, switches and auxiliary equipment have resulted to loss of power which often over-heat switches and subsequently burst into flames.

Poor forecast of the future load demand of an area and lack of reliable information on the actual power requirements of projects requiring electric power are constraints to effective planning. Also inability of supply to meet power demand of consumers has resulted to load shedding for even spread of the supply. Unforeseen interruptions in form of surges due to lightening strike on power lines; cracks on conductor support and insulators that usually result in flash over, are some of the problems (Usifo, 1998).

Vandalisation of power lines and equipment by unknown persons often lead to power outage as the vandalized lines can no longer feed the consumers and in most cases vandalisation even lead to total blackout of towns and cities. Damages are usually done to electric poles and other supply equipment by vehicles and road construction workers and short circuit lines by trees which fall on transmission lines and eventually collapse wooden poles eaten by termites, rain storm, fire or wind (Niger Power Review, 1999). The problems of power distribution are enormous because it cannot be totally explored.

AN OVERVIEW OF THE NIGERIA POWER SYSTEM

The yearn for reliable and stable power supply was enough reasons for decree No. 24 of 1st April, 1972 which established the National Electricity Power Authority Co-operation of Nigeria (ECN) and the Niger Dam Authority and Economic System of Electricity supply from all the nooks and crannies of the country.

At the inception of Nigeria Electric Power Authority (NEPA) in 1972 it operated through the existing four major power stations namely Delta thermal power station, Ijora thermal plant station, Afam thermal power station and Kanji Hydro power station, Interconnected through the nation and serving over two million Nigerians as at then (NEPA Review 1988, 2002).

As at 1998, the total number of power stations had increased to seven comprising Egbin, Delta, Sapele, Afam thermal power station, Kanji, Shiroro and Jebba hydro power stations with the total installed capacity of 5958 MW as against the minimum peak demand for the sustainability of the grid of 2446 MW (Niger Power Review 1999).

The Nigeria National Grid is a very large one comprising large numbers of distribution and transmission transformers that interconnect between power stations and consumers. The National Grid comprises of seven (7) power stations, twenty eight (28) major transmission stations, in 1998, the length of 330KV lines connecting the substation was 500Km while that of 132KV lines was 600Km.

The supply in Nigeria metamorphosed through various stages at various voltage level before getting to the consumers. The generated power is transmitted through the National Grid at 330KV to the National Control centers which interconnects and monitors the operations of the various power stations. This is achieved by connecting different types of relay, switches, communication and monitoring devices for smooth system running of the generation devices the National Control Centre (NCC) transmits at 132KV through power transformer and seconding transmission lines to various parts of the country before further stepping down the primary distribution system 33/0.415KV to the general consumers in line and phase values of 415V and 240V respectively. This is also achieved through 33/11KV step down transformer directly before distribution to the consumers through 11/0.415KV transformer.

In an attempt to unbound the Power Authority, the Government divided it into eighteen (18) companies and given a corporate name which is now Power Holding Company of Nigeria (PHCN). PHCN presently faces a lot of challenges in the areas of outages (planned or unplanned) as a result of high load demand, aging of equipment and environmental factors which affect power industries in the country.

METHODOLOGY

The methodology employed was to collate data from ODOGBE FARMS LTD using their power house/generator log book/reports on power outages from PHCN, and supply from generators, alongside with direct visit to PHCN located in Benin City (Irrua substation) and interaction was made with technical staff of the industries and PHCN to elicit information, ODOGBE FARMS LTD operate multiple line of production and its production is 24 hours of the day, when production activity is hindered as a result of breakdown of equipment the redundant lines are used in the production activity. The study spanned a period of twenty one months. Cognizance was given to both peak seasons and of peak reasons of power generation.

TABLE 1: PHCN AND GENERATOR COLLATED DATA FROM ODOGBE FARMS LTD. LOG BOOK (2011)

S/N	Month	PHCN supply (Hrs)	Generator supply (Hrs)	% of PHCN supply per month	% of Generator supply per month	Liters of Diesel consumed per month
1	Jan	338	400	7.85	11.53	35,000
2	Feb	430	224	9.99	6.46	19,600
3	March	402	332	9.34	9.57	29,000
4	April	510	193	11.84	5.56	16,887.5
5	May	220	300	5.11	8.56	26,250
6	June	402	217	9.34	6.26	18,987
7	July	409	252	9.50	7.26	22,050
8	Aug	349	198	8.10	5.71	17,325
9	Sept	402	218	9.34	6.28	19,075
10	Oct	225	390	5.23	11.24	34,125
11	Nov	283	385	6.57	11.10	33,687
12	Dec	336	360	7.80	10.38	31,500
Total		4306	3469			303,537

Source: From ODOGBE FARMS LTD Generator Log book (2011)

FIG.1 SHOWS THE PERCENTAGE OF PHCN AND GENERATOR SUPPLY FOR THE YEAR 2011 AS REFLECTED ON TABLE 1

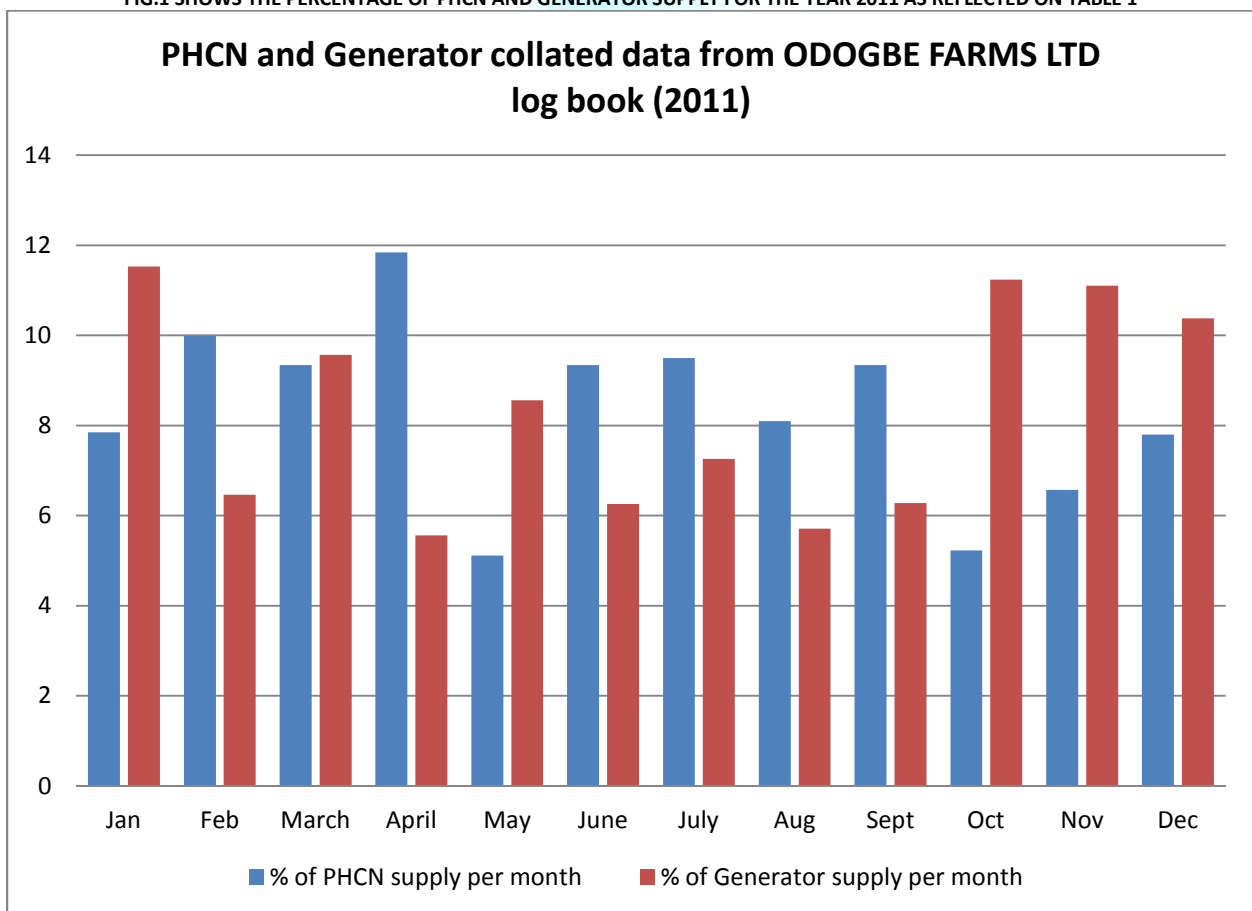
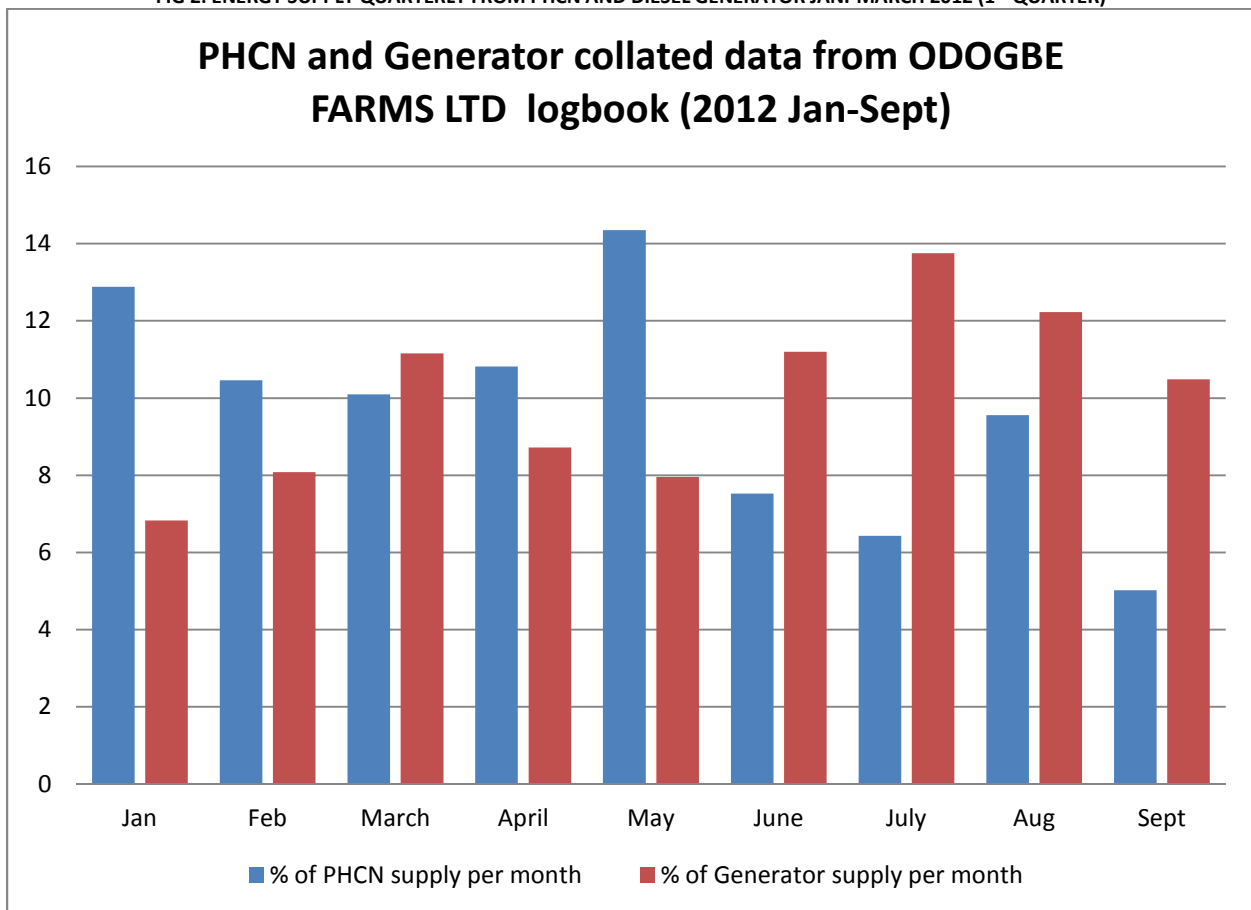


TABLE 2: PHCN AND GENERATOR COLLATED DATA FROM ODOGBE FARMS LTD. LOGBOOK (2012 JAN-SEPT)

S/N	Month	PHCN supply (Hrs)	Generator supply (Hrs)	% of PHCN supply per month	% of Generator supply per month	Litres of Diesel consumed per month
1	Jan	431	224	12.88	6.83	19,600
2	Feb	350	265	10.46	8.08	23,187.5
3	March	338	366	10.10	11.16	32,025
4	April	362	286	10.82	8.72	25,025
5	May	480	261	14.35	7.96	22,835.5
6	June	252	367	7.53	11.20	32,112.5
7	July	215	451	6.43	13.75	39,462.5
8	Aug	320	401	9.56	12.23	35,087.5
9	Sept	168	344	5.02	10.49	29,225
Total		2916	2965			258,562.5

Source: ODOGBE FARMS LTD generator log book (2012)

FIG 2: ENERGY SUPPLY QUARTERLY FROM PHCN AND DIESEL GENERATOR JAN.-MARCH 2012 (1ST QUARTER)



Figs. 2, shows the percentage of PHCN and Generator supply per month for the first nine months for the year 2012, (2nd Quarter of 2012) and (3rd Quarter of 2012)

DISCUSSION OF RESULTS

In other to arrive at the cost of operating the industry on diesel generator compared to public utility supply, using the equation

$$X_p = T_r \times D_{lit} \times N_{Dlit} \dots\dots\dots 1$$

Where X_p = cost of operation in the industry in naira
 T_r = Generator running time in hours
 D_{lit} = Volume of diesel consumed per hour in litres
 N_{Dlit} = No of litres of diesel used for operation per hour.

In the same vein

$$C_h = \frac{\sum N_{Dlit}}{\sum T_r} \text{ (per month)} \dots\dots\dots 2$$

$$= 87.5 \text{ litres per hour}$$

Where

C_h = Diesel consumption for every hour of operation

Using the prevailing cost of diesel per litre @ #150.00

Then the cost of production for just one hour in the industry amounts to

$87.5 \times 150 = \text{\#13,125.00 per hour of operation with generator}$

Further investigation revealed that for a period of 338 hours of PHCN supply the electricity bill was N2,024,592.96

i.e. 338 hrs	=	N2,024,592.96
	=	$\frac{N2,024,592.96}{338}$
	=	N5,989.29 per hour of operation with PHCN supply

Thus from the analysis above the industry spends more on production cost when generator is utilized as the source of power compared to PHCN supply.

CONCLUSION

This paper analyses power outage in an industrial layout using micro soft excel for the plotting of graphs, the study shows that PHCN supply is grossly inadequate for the smooth operations of the industry as reflected in the number of hours of supply; added to this would have been a reduced cost of production at the ODOGBE FARMS LTD, leading to cheap and affordable products from the industry.

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