



EFFECT OF GENERATOR USAGE ON SMALL SCALE BUSINESSES IN NIGERIA

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ABSTRACT

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Energy has a major impact on socio-economic development by playing a key role in economic, social and political advancement of any Nation. Inadequate supply of energy limits advancement in all spheres thereby causing depreciation in the quality of life among citizens. Small scale businesses in Nigeria also have their fair share of the effects of inadequate energy supply in Nigeria.

The aim of this study is to analyze the awareness, economic and environmental effects and attitudes of generator usage by small scale businesses and to bring about awareness on the alternatives and benefits of national grid system.

This study analyses how small scale businesses in Nigeria manages to keep business alive by using alternative energy supply such as diesel-fuel generator. This challenge facing small scale business sector is due to the inadequate power supply. The effect of generator usage on their businesses and the environment was analyzed in this study. To successful achieve the aim of the study, a hundred small scale business owners in Akure, Ondo State and Benin City, Edo State, both in Nigeria were interviewed face-to-face.

The results shows that, 77% of business owners didn't see generator usage as environmental friendly and 71% also did not see it as yielding profit to their businesses. Considering their annual turnover, 74% of small scale businesses were willing to pay more for constant electricity supply that is environmental friendly. In addition, businesses with lesser income spend 46% of their annual income on fuelling and maintenance of their generator. The age range that are into small scale businesses were between 20 – 24 years with highest rate of 32%. This shows that more youth are willing to start creative and innovative enterprise to reduce the unemployment rate in the country if there is stable energy supply. This study also suggested some solutions to improve Nigeria's power supply and help businesses to grow. It is expected that this study will help policy makers, stake holders, investors and business owners to understand the effect of generator usage as an alternative power supply on the economy and the environment.

Key words: small scale business, energy supply and generator usage.

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ABBREVIATIONS AND TERMS

USD	United States Dollars
NGN	Nigeria Naira

1 INTRODUCTION

Going to a salon to make my hair in Nigeria was a norm for everyone back home. When I was told the price, it was clearly higher than the usual price. Immediately I was told the increase was due to the fact that there was no constant power supply and generator was in use to keep customers and give good service.

Energy has a major impact on socio-economic development by playing a key role in economic, social and political advancement of any Nation. Inadequate supply of energy limits advancement in all spheres thereby causing depreciation in the quality of life among citizens.

In Nigeria, it's a phenomenon that as soon as there is short of power supply, a substitute called fuel or diesel generator is been used. In homes, offices, churches, mosques, social gatherings and even market area, it has become a norm for everyone to use generator due to unreliable power supply system in the country. Currently, about 90% of businesses and 30% of homes is powered by generator in Nigeria (Niyi Awofeso, 2011).

The usage of generator seem to be the best available alternative to setting up an effective small scale business in Nigeria because when compared to solar energy or biogas converter, it is affordable and easy to operate with any prior knowledge about technology. However, most entrepreneurs in Nigeria do not understand the overall effect of generator usage, some only realise that maintaining a generator system (such as cost of fuelling) is a challenging factor compared to when using the National functional grid which has limited supply.

An analysis of Nigeria's electricity supply problems and prospects found that the electricity demand far outstrips the supply, hindering the country's development, notwithstanding the abundance of energy resource across the country (Ajao et al, 2009).

More also, economic wise the nation, suffers loss due to business depending more on use of generator. This increases the cost of operation and in turn making services provided quite expensive in a country where only about 61,2% lives below World poverty standard (This Day Live, 2013).

Furthermore, the dependence on generator for alternative power supply has crippled small scale businesses which are a key integral for any economic development. Operat-

ing small scale businesses can be competitive and challenging especially in a country with population of about 160million people. Shortage of power supply can also discourage people from starting small scale business. Several small scale businesses are closing every day in Nigeria, some are at the verge of collapsing due to inadequate power supply. A major factor affecting these businesses is inadequate power supply which brings about the alternative for generator usage. However, maintaining generator for business can be challenging alongside with keeping a new business alive.

According to Sambo, adequate energy has a major impact on the modern day life and will also improve the Nigeria's development to be able to compete on the international market level (2008). There is only about 40% of Nigeria's population having access to electricity which indicates the reason why development has been at a slow rate after her independence since 1960 (Iwori, 2008).

From experience, it is easy to identify an industrial or market area in Nigeria due to the noise coming from generator usage. There is however limit to amount and level of noise an individual is expected to be exposed to per day. The situation of people working in such environment can be hectic knowing that they are exposed to an increasing level of noise from generator on daily basis. It is known that noise has effect on human system by reducing her thinking ability and IQ when exposed to noise above 80dB daily over a long time range, noise also causes sleep and psychological disorders (Rauno Paakonen, 2012). Currently, there are no measurements for noise level on most of the generators used in market areas in Nigeria.

The health risk associated with generator usage is also to be considered, knowing that operating generator requires the use of diesel or fuel which is products from fossil fuel. When burning fossil fuel there is emission of greenhouse gases such as CO₂, SO₂ and NO_x which depletes the ozone layer and this in turn has negative effect on the environment. Diesel exhaust contains more than 40 air pollutants which are suspected to be cancer causing substances; benzene, arsenic and formaldehyde (Niyi Awofeso, 2011).

1.1 Aim of Study

The aim of this study is to analyse the awareness, economic and environmental effects and attitudes of generator usage by small scale businesses and to bring about awareness on the alternatives and benefits of national grid system.

The study was implemented as a face-to-face questionnaire to a hundred different small scale businesses in two cities in Nigeria.

2 LITERATURE REVIEW

2.1 Basic history of Nigeria

Nigeria, a country in West Africa became a modern political entity through amalgamation of the south and the north in 1914 by the British. Although it was said to have long habitation before 500 B.C. Nigeria borders the Atlantic with about 336,669 square miles, a size that is twice that of California and thrice the size of United Kingdom. Nigeria elongates with about 700 miles from east to west and 650 miles from south to north (Toyin Falola, 2009). Nigeria gained her independence from her colonial master (Great Britain) in the year 1960, 1st of October.

Nigeria neighbours to the west are Benin and Togo, to the east is Cameroon, to the north is Niger and Chad and bounded by Bights of Benin and Biafra to the south as shown in Figure 1 below.

Climate ranges from tropical to arid in the south, from mangrove swamps and rain forest near the coast and to Sahel savannah and semi-desert in the north with two distinct wet and dry seasons. The wet which is the rainy season begins from April to October with a short dry break in August which is popularly known as “August break” and the dry season begins from November to March with a start of heavy wind from the desert which is known as “Harmattan”. A relatively high temperature is experienced throughout the year varying from 35°C in the north to 31°C in the south. Rainfall ranges from an average of 380cm (150 inches) at Forcados on the coast, to under 65cm (25 inches) at Maiduguri in the northeast (Total Nigeria, 2007).

Nigeria has a population of over 167million people making it the most populous country in Africa, with more than 200 ethnic groups. The official spoken language is English with 3 official ethnic groups, Yoruba, Hausa and Igbo which comprises of the largest ethnic groups in Nigeria.

Nigeria is rich in natural resources such as; petroleum, natural gas, zinc, ore, tin, coal, limestone, niobium, iron and arable land which is about 33% of Nigeria’s landscape. Petroleum exports accounts for about 70% of the nation’s total revenue and 35% of GDP (OPEC, Nigeria, 2013). Nigeria’s currency is Naira (NGN) which 1USD is equivalent to 159.57Naira and 1Euro is equivalent to 216.87Naira (this conversion is accord-

ing to world standard for 8.01.2014, because there are usually slight variations on different days).

Figure 1: Map of Nigeria also showing neighbouring countries.

Source:

(<http://www.waado.org/images/NigerianScholars/NewImages/Maps/RoadsRailways.gif>)



2.1.1 Basic Data

Table 1: Some basic information on Nigeria.

Population (million inhabitants)	167.68
Land area (1,000 km ²)	924
Population density (inhabitants per km ²)	182
GDP per capita (USD)	1,535
GDP at market prices (billion USD)	257.43
Value of exports (billion USD)	142.52
Value of petroleum export (billion USD)	94.64
Proven oil reserves (billion barrels)	37.14
Proven natural gas reserves (billion cu. m.)	5,118
Crude oil production (1,000 b/d)	1,954
Refinery capacity (1,000 b/d)	445
Crude oil exports (1,000 b/d)	2,368
Export of petroleum products (1,000 b/d)	8.2
Natural gas exports (billion cu. m.)	28.27
Fiscal year	1 st of January to 31 st of December

Source: OPEC Nigeria, Annual bulletin, 2013.

2.2 Aim of the study

The purpose of this study was to reach a large number of small scale business owners through a one on one interview considering the fact that most of these small scale businesses do not have access to internet. Interview will be conducted in two cities which is Benin City, Edo State, and Akure, Ondo State, Nigeria on small scale businesses such as; restaurants, salons, cyber café, business centres (which entails photocopying, typing and general school works) from January to March 2014. It is good to note that both cities are the capital of their States respectively.

Benin City and Akure were considered because they both have a Federal institution, a Federal University teaching hospital, and high court and also comprises of many small scale businesses trying to compete and survive every day live without stable power supply in Nigeria.

The interviews conducted cover issues on how these businesses manages and thrives with the current electric supply and distribution in the country. How it manages to keep business going and how alternative power supply increases cost of production and in turn increases cost of services to customers.

In addition, data collection from national grid office was also done through oral interview which made it possible to ask some specific technical and direct questions on energy consumption. Both cities use one regional grid system located in Benin City.

The effect of generator usage on small scale businesses and also on the economy due to the shortage of national grid power supply will be analysed in chapters 5, 6 and 7. The questionnaire used during the interview can be seen in appendix 1 and 2.

2.1.2 Theoretical Frame work

An analysis of Nigeria's electricity supply shows the demand of electricity is far more than the supply; this hinders the general development of the nation despite her rich natural resources (Ajao et al, 2009).

The Energy Commission of Nigeria (ECN) observed that the Power Holding Company of Nigeria (PHCN) was generating a fall short energy supply of 1800megawatts against the required 6000megawatts needed; this has been the cause for inadequate distribution of stable power supply across the country (Sambo, 2008).

The inadequate power supply with limited access to electricity from the national grid system has caused individual and businesses to self-generation of electricity supply; the most available means is the diesel fuel generator.

The cost of generator usage as compared to cost of national grid as not been fully studied which makes an average Nigeria considering starting a small scale business unaware of the economic implications (Ugwu, et. al, 2012). It is therefore important that accurate statistics and information be made available to the general public and policy makers in Nigeria about:

- the cost of operating a national grid
- cost for operating diesel fuel generator
- comparisons of the cost of diesel fuel generator (which is self-generated electricity) and that of national grid
- Loss of revenue due to imports of generators.

When the above listed issues are studied, addressed and made known publicly, it will help to encourage the need for developing an effective power distribution throughout the country and also encourage the growth of small scale businesses which will promote economic development, security and employment.

3 HISTORY OF ELECTRICITY IN NIGERIA

Electricity supply began in Nigeria in 1896 with a 20MW power plant station at Ijora, Lagos State, Nigeria. Although, government regulation, generation and supply of electricity was not available until 1951 which brought about the creation the Electricity Corporation of Nigeria (ECN) to manage electricity in the country. Niger Dam Authority (NDA) was later built in 1960 to maintain dams in Nigeria with a capacity of about 50MW. However, in 1971 the Federal Government of Nigeria (FGN) approved the merger of ECN and NDA which became the National Electric Power Authority (NEPA) and was responsible for the generation, transmission, distribution and trading of electricity in country (PPDC, 2012).

In 2006, NEPA was transformed and it became the Power Holding Company of Nigeria (PHCN) which is responsible for electricity generation while Nigerian Electricity Regulatory Commission (NERC) is responsible for regulations in PHCN (Corporate Nigeria, 2010).

3.1 Functional Electric Grid

Nigeria's national grid has a generating capacity of 5900MW; however, it can only generate electricity of about 1600MW due to poor maintenance. Nigeria power sector loses energy between 30% – 35 % from point of generation to billing and also have a low collection rate of about 75% - 80%. This causes the irregularities in power supply across the country and making the energy sector to have insufficient cash generation from the electricity supplied and distributed, only about 10% of the rural area in Nigeria has access to electricity from national grid (Olusola B, 2013).

According to GBI research, in 2007, only 15 out of the 79 power stations in Nigeria are fully functioning, this is due to poor maintenance and old facilities which were built in the 70's and 80's (Aman Madhok, 2013).

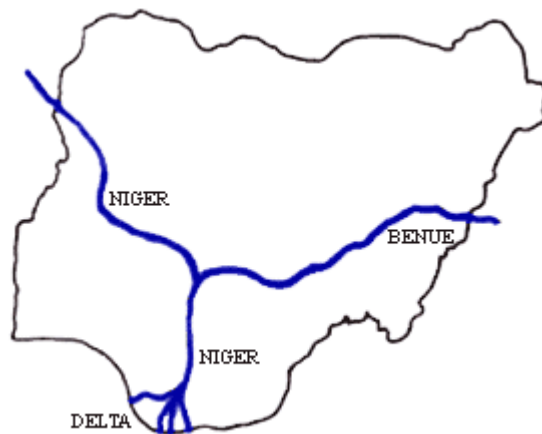
3.1.1 Accessibility of power supply

According to Dayo, only about 49% of Nigeria's population have access to electricity running for about 4 days in a week. Close to 51% has no access to electricity in the country and about 10% from the 49% with access are satisfied with the availability of electricity they get. On a regular basis, it was shown that only 8% get constant electricity, 17% get once a week and 59% are completely dissatisfied with the current electricity situation in the country (May, 2012).

The erratic distribution of power supply in the country has not only threatened bigger companies but has also given little or no room for small scale businesses to grow.

According to Julia, river Niger and Benue accounts for the main source of hydropower in Nigeria, both rivers cut across Niger Republic and Cameroon which makes it difficult for Nigeria to fully own the idea of building dams in these rivers, and as a way of compensation, the already generated electricity is also supplied to Niger Republic (et. al. 2008).

Figure 2: Map of Nigeria showing the main rivers.



3.2 Generator as an alternative

For businesses to survive the unstable electricity supply in Nigeria, self-generated electricity is needed. The suitable option is the widely used

diesel-fuel generator across the country, be it a big multinational company or a medium-small scale business, generator has been generally accepted in Nigeria, even for house hold usage. Generator becomes the quickest way to supplement the erratic power supply because it requires little or no technical knowledge depending on the brand of the generator. This situation has not only boosted the business of generator sales across the country, it has also encouraged importation of generators from different parts of the world to the country, thereby causing loss of huge revenue to the country.

According to ECN, over 60million Nigerians relies on generator usage for electricity and about 30million Nigerians cannot afford generator, while about 20million is not able to frequently manage the generator usage by purchasing of fuel for constant power supply (2012). In 2006 annual report, it was said that over 60million generators were imported to the country annually and about 1.6trillion NGN (equivalent to 7.4million Euros) was spent to fuel these generators (Nebo, 2013).

The Nigerian market provides considerable opportunities for generator set manufacturers, with good growth recorded between 2006 and 2011, although it experienced a slight decline in 2009 after reaching a peak of N65.476 billion (\$411.8 million) in 2008, this is due to the abundance of gas and low price of gas in the country and making the country the largest market for diesel and gas generator sets in Africa, is forecast to see growth rates of 8.7 per cent driving up market volume from N71.55 billion (\$450 million) in 2011, to reach N151.16 billion (\$950.7 million) by 2020 (Aman Madhok, 2013).

3.2.1 Generator and its challenges

Nigeria is one of the biggest telecom markets in Africa; however, telecommunication operators are finding it difficult to cope with the electricity situation of the country. Although, back up electricity such as using diesel fuel generator when there is power failure (which is available for only about 5hours per day) is on the rise but the cost for maintaining these generators is quite high and also associated with operational problems due to long working hours (Satish K, 2012).

Individuals, big companies and small scale businesses are currently searching alternatives to the erratic power supply in the country; with the aim of completely ignoring the use of diesel fuel generator has been abortive. Small scale businesses are currently not comfortable with the problems associated with diesel fuel generator and they also seem to be handicapped to providing a long lasting solution due to financial constraints.

4 WHAT IS SMALL SCALE BUSINESS?

Depending on the country, small scale business can be defined in so many different ways; however, a general term is that it is a privately owned business either by an individual or group of persons which is operated in a scale of 1 to 20 workers. For example a business is termed small scale when it has about 100 employees in the United States while 50 employees in European Union.

According to Oxford English dictionary, small-scale business is defined as a company or business with a relatively small market capitalization (1984).

Small scale business is often identified with managers who are the owners of the business, capital which comes from the managers and locally operated. In a more defined term, it could be said that small scale business is owned independently, managed independently, internally financed, interest is personalized and sales turnover is relatively small.

Small scale business plays a vital role in a nation by increasing its per capital income, providing change in business structure in the society, reducing monopoly thereby creating room for a competitive market. Through small scale businesses, need for local resources are being utilized, reducing rural-urban migration and improving even distribution of industrial activities with effectively promoting leadership market, industrial skills and technology development (Ijeoma, 2011).

4.1 Small scale business in Nigeria

In Nigeria, there is no clear definition of small scale business, the 1988 Monetary Policy Circular No. 22 from Central Bank of Nigeria declares that small scale business should not have more than 500,000 Naira (2269Euros, currency converter, 06.2.14) annual turnover. Also, the Federal Government through the 1990 budget defines small scale business as not exceeding an annual turnover of 500,000 Naira for the purpose of commercial bank loans and for merchant bank loans with capital investment of 2million Naira (land property not included) and a maximum of 5million Naira. However, in 1992, the National Economic Reconstruction Fund (NERFUND) defines small scale business with an annual turnover of 10million Naira (Ekpenyong and Nyong, 1992).

With the above definition of small scale business in Nigeria, it is almost impossible for most of the citizens to meet this requirement in establishing a small scale business. Most of the small scale businesses such as hair dressing or barbing salon, photocopying, typing, printing, pay call phone, restaurants, cyber café etc. usually do not have or require

such amount for startup. Although, the new industrial policy in Nigeria defines small scale business as a business with total investment of 100,000 Naira (453.80Euros currency converter, 06.2.14) to 2million Naira (9076Euros currency converter, 06.2.14) which excludes the capital cost and includes the working capital (NERFUND, 2005).

4.2 Impact of small scale business on the economy

The transformation of local ideas into small scale businesses has been the spring board of development to the economy of any nation. Small scale business has helped in building structural transformation, accelerated economic growth and rapid industrialization which has helped to diversify the industrial sector (Stephen & Wasiu, 2013).

In Nigeria, small scale businesses is the anchor to reducing the rise in unemployment, while it cost about 26,000Naira for a big industries to employ one staff, it cost only about 8,500Naira for a small scale business to employ a staff (Oguntoye, 1990). More than half of the industrial labor in developing countries is engaged in small scale businesses (Morawets, 1974), which is also evident in Nigeria, where the young, middle age and old can be found in small scale businesses across the country.

Most big industries have earlier been started on a small scale level, encouraging small scale businesses will increase national domestic income; reduce rural-urban migration thereby reducing congestion in bigger cities across the country.

4.3 Challenges of operating small scale business in Nigeria

In as much as it is well said that small scale businesses have been the pivot for which bigger industries were established, it can also be seen that in Nigeria, so many factors have limited the effectiveness of small scale businesses across the country. Factors such as finance, access to credit facilities such as bank loans, raw material and electricity has contributed to the slow growth of small scale businesses.

Discussing more on the effect of electricity on small scale business, the unstable energy generation situation in the country has not encouraged small scale businesses due to the fact that to acquire and maintain self-generating electricity can be a financial barrier to individual operating a small scale business.

According to Stephen & Wasiu, technical know-how is a major problem to small scale business operator (2013), however, on a contrary view, it might not be the problem of just technical know-how, the fact that electricity is a major challenge in Nigeria, will discourage small scale businesses from acquiring such technology to improve their

productivity. This can be due to the fact that the needed energy require might not be available even when a generator is being used.

5 METHODS

The study was conducted using interview, this is because most small scale businesses do not have access to internet for it to be conducted online. Interviews seem to be the best way to reach out to them. One hundred small scale business owners were interviewed from both Akure and Benin cities. Sixty business owners responded from Benin City while forty business owners responded from Akure.

During the interview, background questions which were the first part of the interview section, and energy usage were the second part. Background questions entails information about their businesses such as: age, line of business, duration in business, annual turnover, number of employees, etc. While questions in relation to energy usage, energy alternatives due to inadequate power supply and cost implication for energy used in business were made available. Questionnaire used during the interviews can be seen as an attachment in Appendix 1.

During the interview with Benin regional grid system technical unit, it was said that energy distribution is in 3 phases. The first phase is the energy generation which is done in the power plant station. The second phase is the evacuation of the generated energy through the transmission station and the third phase is the distribution of the supplied energy. This distribution is done via distributing companies.

It was not stated how much energy was generated neither do they have details of the number of power plant currently supplying the energy. Maintenance of power plants is carried out when there is fault. It was also stated that there is loss of energy during distribution due to undersized conductors, dissipation of energy through heat and destruction of conductor wires by burglars.

They also suggested that more power stations should be built to reduce the work load of existing stations and for effective distribution of energy across the country. To achieve this, it was said that more transformers that distribute energy to household be supplied to congested locations across the country to ease the load of existing transformers.

However, not all questions asked were answered during the interview. Questionnaire used for this interview can be seen in Appendix 2.

6 RESULTS

6.1 Background information.

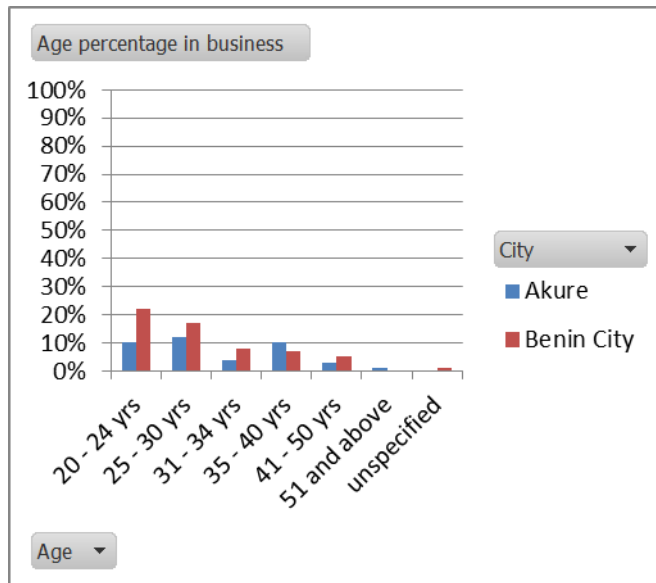
Interviews conducted in both cities (Benin and Akure) revealed the extent to which generator is used for electricity supply in small scale businesses. These businesses needing to survive and overcome the challenging electricity situation in the country, uses even their profit to provide self-generated electricity for business continuity. Table 2 shows clearly the number of various business lines interviewed for this study.

Table 2: The number of different line of businesses in the cities of Akure and Benin interviewed for this study.

Line of business	Numbers of businesses
Restaurant	3
Salon	23
Business centres (typing, photocopying, pay phone, sale of recharge cards, binding and laminating).	40
Cyber café	6
Others (electrician, printers and sales of shoe and bags, baby shop etc.)	27
Frozen food shop	1
Total	100

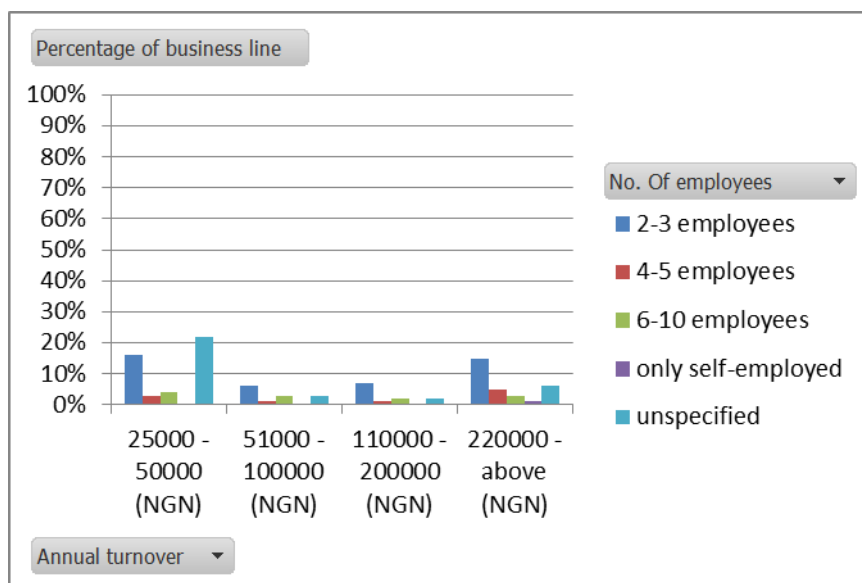
During this study, it was also found out that more youth between the ages of 20 – 24 years are self-employed in Benin City than their counterparts in Akure.

Chart 1: The share of entrepreneurs of different age groups in the two studied cities in Nigeria



From Chart 1, we can see that; 22% of business owners in Benin City are between 20 – 24 years while their Akure counterpart is 10%. 17% business owners in Benin are between 25 – 30 years while their Akure counterpart is 12%. 8% are between 31 – 34 years in Benin and same age group is 4% in Akure. 10% business owners are between 35 – 40 years in Akure and 7% of same age range in Benin City. 5% of business owners in Benin belong to age range of 41 – 50 years and in Akure it is 3%. 1% of business owners are between 51 years and above and none of such in Benin City which shows that Akure seem to have business owners with increased age.

Chart 2: The share of different sizes of small scale businesses by annual turnover in the studied cities Akure and Benin in Nigeria.



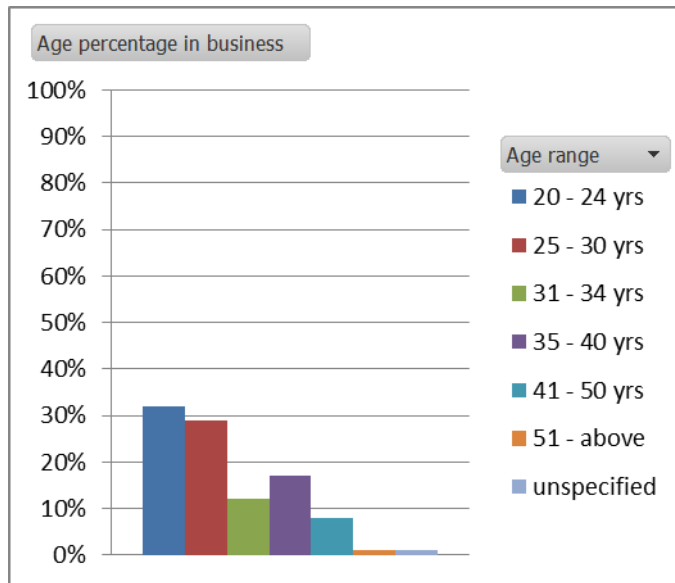
From chart 2, we can see that; the small the business size with smaller annual turnover the higher the number of employees with the highest rate of 4%. This could also be the reason for low annual turnover due to employees' payment. Table 3 below explains in details the percentage according to number of staffs and annual income.

Table 3: Size of business measured by annual turnover compared with percentage rate of employees'.

Annual Turnover	2 -3 employees	4 - 5 employees	6 - 10 employees	Only self-employed	Unspecified	Grand Total
25000 - 50000 (NGN)	16 %	3 %	4 %	0 %	22 %	45 %
51000 - 100000 (NGN)	6 %	1 %	3 %	0 %	3 %	13 %
110000 - 200000 (NGN)	7 %	1 %	2 %	0 %	2 %	12 %
220000 - above (NGN)	15 %	5 %	3 %	1 %	6 %	30 %
Grand Total	44 %	10 %	12 %	1 %	33 %	100 %

During this study, it was found out that most of the business owners were young between the ages of 20 – 24 years. This could be due to the alarming rate of unemployment and young people trying to be entrepreneurs by creating employment. Chart 1 shows the ages and line of businesses.

Chart 3: Share of entrepreneurs in different age group in two cities (Akure and Benin) in Nigeria is study, N = 100.



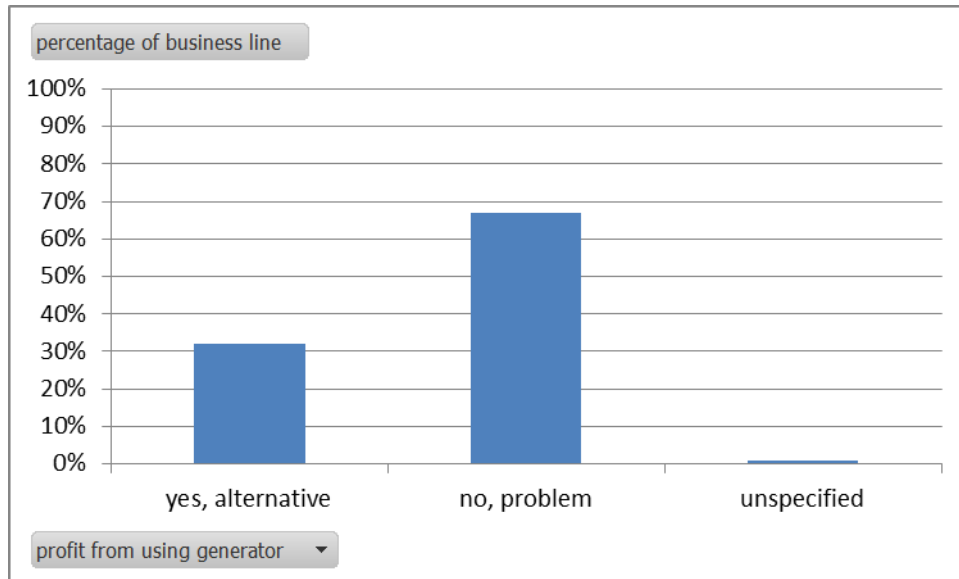
From Chart 3, as we can see; 32% out of the 100 business interviewed are between 20 – 24 years, 29% business owners are between 25 – 30 years, 12% business owners are between 31 – 34 years, 17% business owners are between 35 – 40 years, 8% were between 41 – 50 years, only 1% was between 51 – above and 1% did not specify age.

In addition, 98% of the small scale businesses interviewed uses generator as an alternative energy supply for their businesses and the reason is because electricity is unstable in the country. Only 2% didn't require using generator because the electricity is fair enough and their line of business didn't require generator usage to survive.

6.2 Generator usage in small scale businesses

Generator seems to be the best alternative for small scale businesses due to the irregular power supply in the country. Small scale business interviewed wanted better electricity to support their businesses; however, the dream of having regular power supply is far-fetched. Generator usage was not seen as the best alternative for electricity but because it is accessible, affordable and easy to use, these business owners are left with no better choice than generator for energy supply.

Chart 4: Business lines in both cities (Akure and Benin) in Nigeria response to the economic value of generator usage for their businesses.

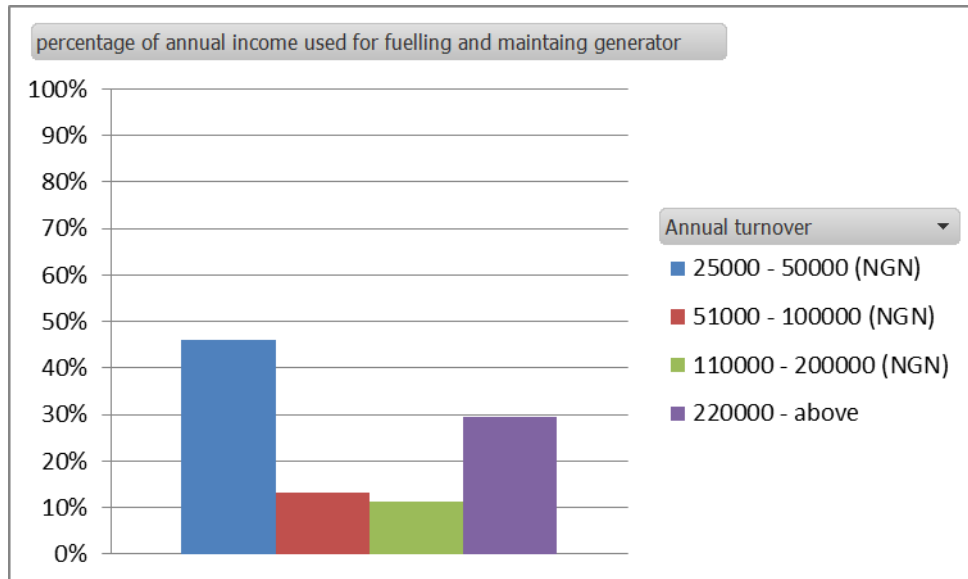


From Chart 4, we can notice that; 67% of businesses saw generator as a problem due to cost implication and environment issues related to generator usage, 32% of businesses saw it as an alternative for inadequate power supply which give their businesses an edge over other competitors without generators and 1% business didn't reply.

6.2.1 Cost of implementation and maintenance

Most of the small scale businesses interviewed do not count the cost while establishing their businesses. The amount used in fueling and maintaining generation is usually more than the profit and also capital is also used unknowingly. This situation is quite challenging to small scale business owners because proper education on business management was not acquire before starting up a small scale business. This can be seen from chart 5.

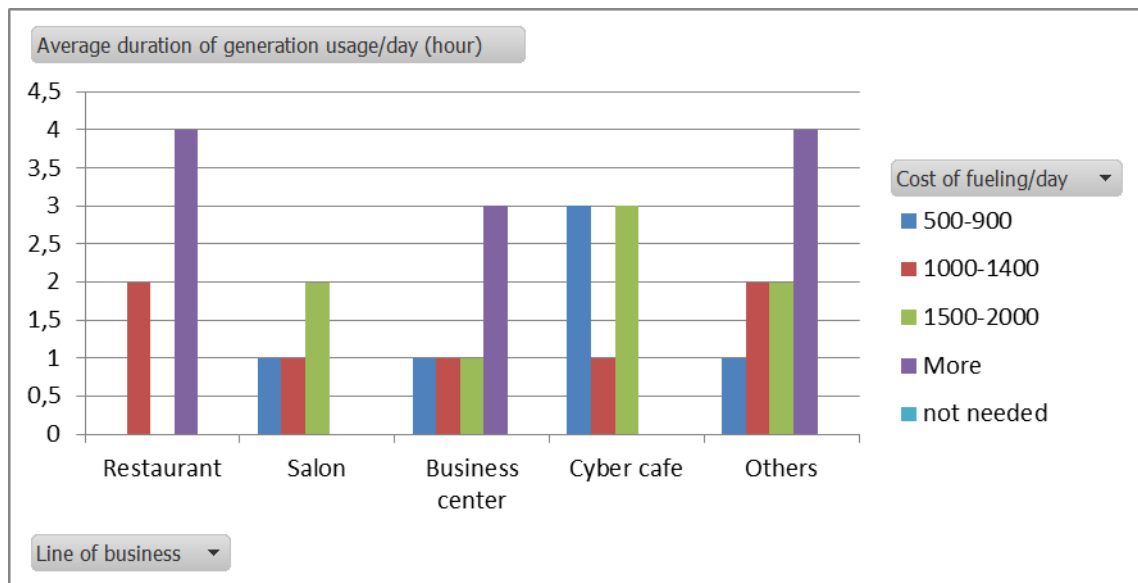
Chart 5: The share of annual income used for generator fuelling and maintenance by the size of business.



From Chart 5, it is seen that; smaller business size tends to spend close to half of their annual turnover on fuelling and maintenance of generator. 45% of their annual earnings from their businesses are spent on fueling and maintaining their generator annually due to irregular electricity supply. This situation is likely unknown to most of these business owners because there are no specific account for annual expenditure and profit made.

During this study, it was observed that the minimum usage for generator is about 4hours and the fuel consumption rate for each business is quite different which is due to the different generator used.

Chart 6: Average usage of generator for different business lines and fuelling cost per day.



From the above chart, it can be seen that restaurants and other businesses such as the electricians uses generator more for an average of 4hours/day. Business center and cyber café also used for at least 3hours per day. This might be due to that fact that most customers who come into such places might want to spend more time than required. In a restaurant, customers might want to relax a little more, an electrician will want to try electrical equipment repaired so as to ascertain if it function properly and also in a cyber café customers might be engrossed with finding information on the internet.

In addition, fuel cost is not regular especially when there is fuel scarcity and business owners tend to buy from ‘black market’ which is more expensive than buying from a regular filling station.

6.2.2 Effects of generator usage on small scale business

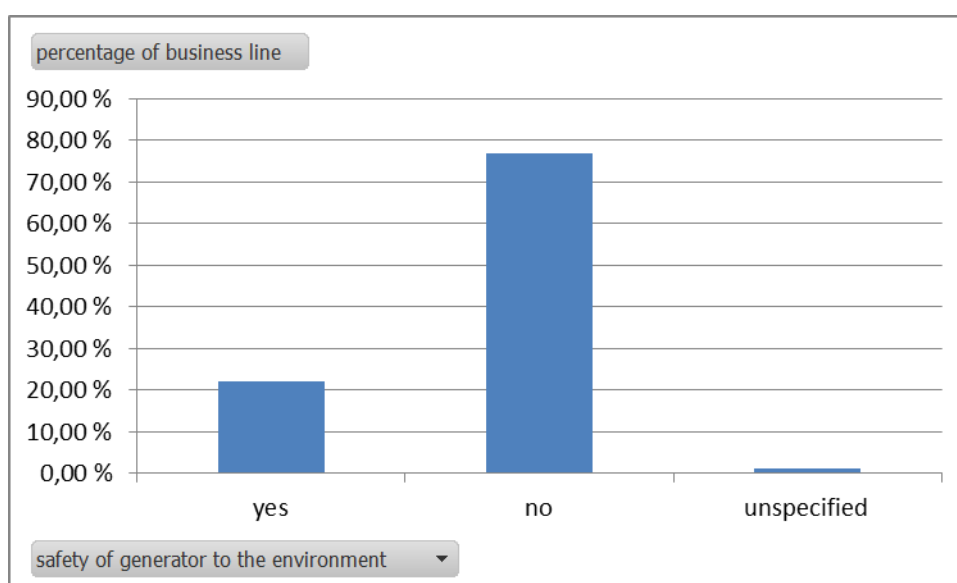
From all the small scale business owners interviewed, 71% business owners said generator usage was not profitable to their businesses, 26% owners sees it as an alternative for the irregular power supply not that it is profitable and 3% of owners did not answer that question. The percentage difference in their responses shows that generator usage has not helped small scale business owners to make profit in their businesses as expected.

6.2.3 Effect on health and environment

The health and environmental effect of generator usage cannot be over emphasized. In Nigeria, there are currently no accurate data on the effect of generator on the environment. Although, there are few specifics health issues related to generator usage. It was reported that in 2009, three members of a family; the father and two sons were killed while trying to refuel a generating set to watch the semi-final match between Nigeria and Spain. The three victims, Professor Onah Emmanuel Ojeka of Chemistry, Nasarawa State University, Keffi and his two sons were trying to mix petrol and engine oil for the generator when suddenly the fuel attracted fire from the kitchen and the generator exploded, (Sun newspaper, Wednesday 25, November, 2009). Also, a story was published in Punch Newspaper about the death of a 95-year-old man, Chief Sopulu Nwankwo and three of his grandchildren. Their death was attributed to carbon monoxide poisoning from the generator fumes. They reportedly went to bed on Saturday night leaving their generator on (April 19, 2012).

However, the low awareness rate can be seen on the rapid increase in generator usage across the country and the negligence of the government to finding a lasting solution to for an effective power supply. It would be thought that all business owners interviewed would be aware that generator usage is not safe for our health or the environment, but on the contrary some 22 percent do think generator is safe for the environment.

Chart 7: Business owners in Akure and Benin cities response on the safety of generator usage to the environment.

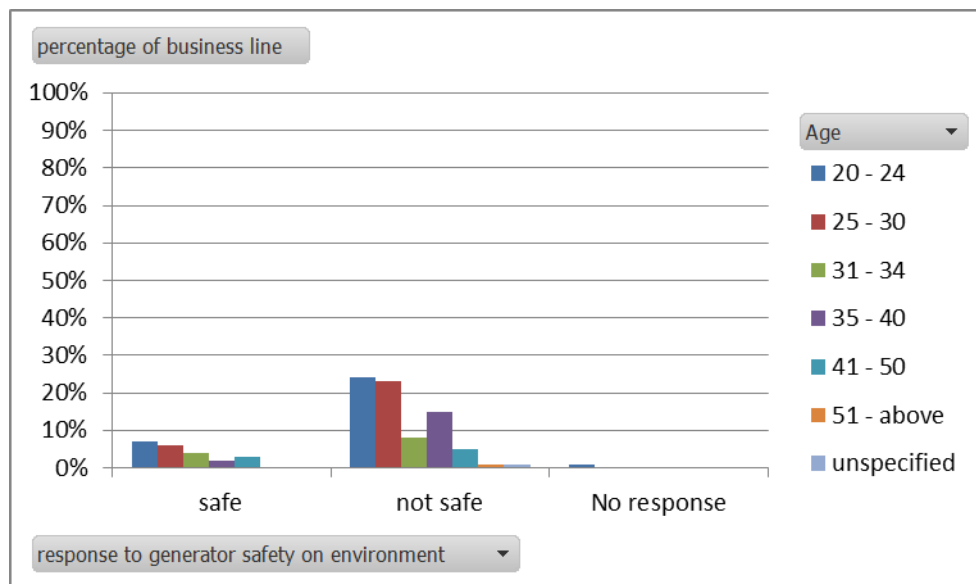


In Chart 7, 77% acknowledged that generator usage is not safe for the environment, 22% said it was safe because if it was not, the government would have stopped the importation or reduced importation of generator.

This findings show that the government have more to do about diesel-fuel generator usage in the country by providing stable power supply that is environmental friendly and safe to human lives.

Furthermore, it was observed that the level of awareness of generator usage safety on the environment was different from age range perspective. Age limits between 20 – 24 years mostly believe that generator usage is safe for the environment. Also the same number of age range with highest percentage did not believe that generator is safe for the environment. It is good to note that those above 50 years did not see generator as environmental friendly as it is shown in chart 8 below.

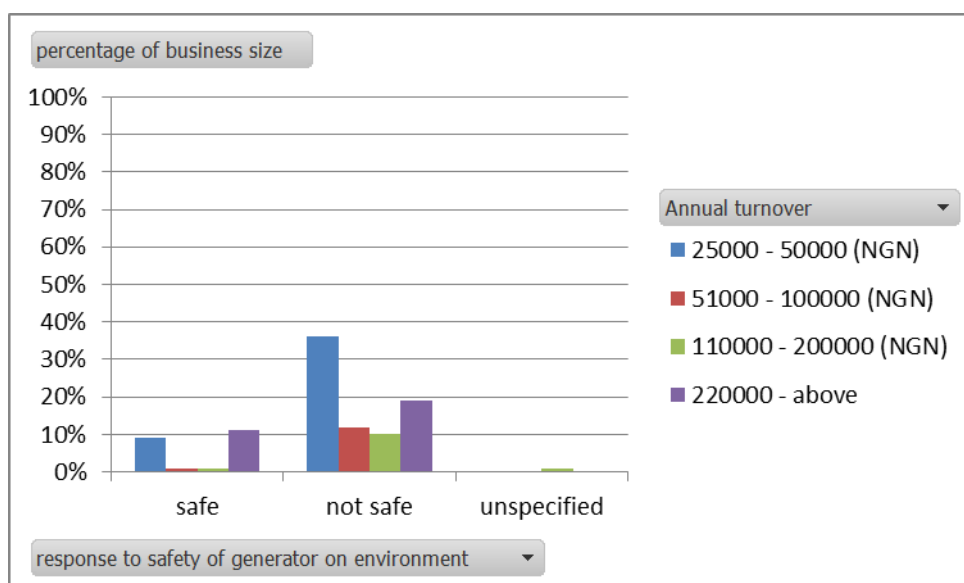
Chart 8: Age response to generator safety on environment.



However, from Chart 8, the highest percentage (7%) of business owners that see generator as environmental friendly are young between the ages of 20 – 24. This might be due to lack of proper information on environmental issues or life experiences.

Business size according to annual turnover was also measured against their response to safety on generator usage to the environment. Chart 11 shows their response by percentage.

Chart 9: Environmental safety of the use of generators by the size of business in the two Nigerian cities (Akure and Benin), N = 100.



From Chart 9, 36% of smaller business size (within the range of 25000 – 50000 NGN) says generator usage is unsafe for the environment making it the highest percent while 11% of bigger business size (range of 220000 – above NGN) believed generator usage is safe to the environment, making it the largest percent. Table 4 below shows the percentage response to safety of generator usage on environment.

Table 4: Environmental safety of the use of generators by the size of business in the two Nigerian cities (Akure and Benin), N = 100.

Business size/ Response	25000 - 50000 (NGN)	51000 - 100000 (NGN)	110000 - 200000 (NGN)	220000 - above	Grand Total
safe	9 %	1 %	1 %	11 %	22 %
not safe	36 %	12 %	10 %	19 %	77 %
unspecified	0 %	0 %	1 %	0 %	1 %
Grand Total	45 %	13 %	12 %	30 %	100 %

6.3 Life cycle of national grid

Aman Madhok, Energy Analyst, GBI Research, said, “Sustained growth is driven by increasing electricity consumption, which has been growing at eight per cent per annum over recent years, and the inability of the Power Holding Company of Nigeria (PHCN) to supply adequate power to meet demand.”

According to PHCN report, the national grid has 14 generating plants (3 hydropower and 11 thermal plants) with an installed capacity of 8,039MW. Transmission network consists of 5,000 km of 330-kV lines, 6,000 km of 132-kV lines. 23 of 330/132-kV substations have a combined capacity of 6,000 or 4,600 MVA at a utilization rate of 80%. Then 91 of 132/33-kV substations also have a combined capacity of 7,800 or 5,800 MVA at a utilization rate of 75%. The distribution sector is consists of 23,753 km of 33-kV lines, 19,226 km of 11-kV lines, and 679 of 33/11-kV substations. There are also 1,790 distribution transformers and 680 injection substations (Oyedepo, 2012). Table 5 below shows a summary of the generation capabilities of PHCN power stations as operated in the year 2008 (January to December).

Table 5: Showing capabilities of power plant stations from January to December, 2008.

Plant	Operator	Age (year)	Type	Installed Capacity (MW)	Average Availability (MW)	Available Factor	Number of Unit Installed	Current Number Available
Kanji	PHCN	38 -40	Hydro	760	438.86	0.58	8	6
Jebba	PHCN	25	Hydro	578.4	529.40	0.92	6	4
Shiroro	PHCN	22	Hydro	600	488.82	0.81	4	4
Egbin	PHCN	23	ST	1320	694.97	0.53	6	5
AES	AES	7	GT	315	233.91	0.77	9	9
Ajaokuta	STS	NA	GT	110	24.88	0.23	2	2
Sapele	PHCN	23-30	ST/GT	1020	156.50	0.15	10	1
Okpai	AGIP	3	GT/ST	480	394.56	0.88	3	3
Afam	PHCN	8-45	GT	709.6	82.12	0.09	20	3
Delta	PHCN	18	GT	912	211.67	0.24	18	24
Geregu	PHCN	NA	GT	414	305.14	0.74	3	3
Omoku	RS	3	GT	150	87.27	0.87	6	4
Omotosho	PHCN	1	GT	335	256.58	0.77	8	2
Olorunsogo	PHCN	1	GT	335	271.46	0.81	8	2
Total				8,039	4,176.24	0.50	93	45

Source: PHCN (2009) Generation and Transmission Grid Operations. National Control Center (NCC), Oshogbo.

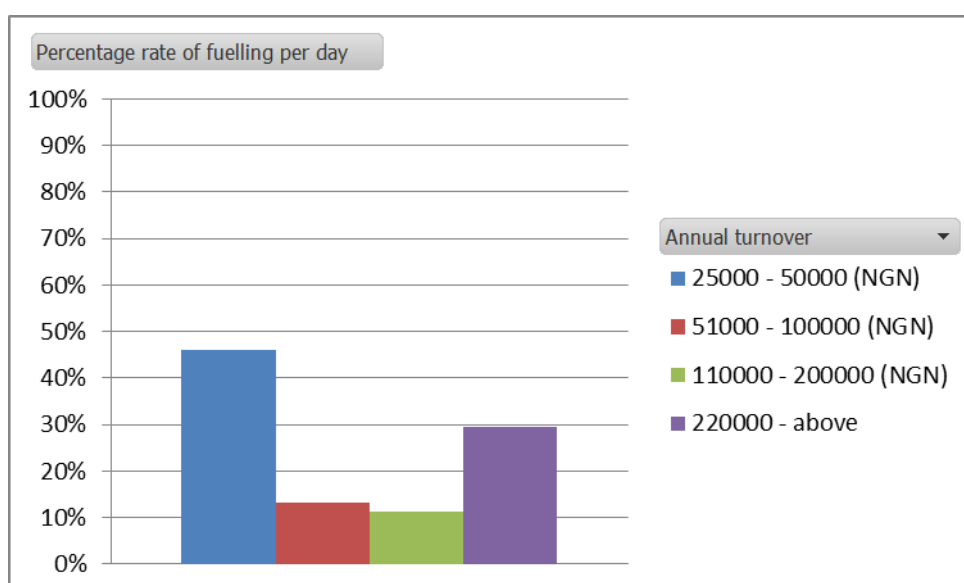
From Table 3, the existing plants operate below their installed capacity. The percentage of generation capability from hydro turbines is 34.89%; from gas turbine (GT), 35.27%; and from steam turbines (ST), 29.84%. The relative contribution of the hydropower stations to the total electricity generation (megawatt per hour) is greater than that of the thermal power stations. Nigeria's energy generation is about 4000MW but the per capital consumption is 0.03kW which is very low and far below the demand (Oyedepo, 2012).

6.3.1 Cost of implementation and maintenance

Cost of implementing and maintaining functional grid was also unknown during the interview. It was stated during the interview that, routine maintenance was done and also repairs and maintenance is carried out when there is fault in the power plants. This situation does not help to sustain the power plants on a long term usage. As seen in Table 3, most of the power plants are old and the need for renovation, replacement and enhancement is mandatory.

6.3.2 Effect of national grid on small scale business

With adequate power supply from the national grid system, small scale business would be relief from the struggle of self-generation of electricity. A report shows comparison of Power Holding Company of Nigeria tariff which is 12.20NGN/kWh to that of self-generated electricity from petrol and diesel generator which is 46.30NGN/kWh and 47.74NGN/kWh (Ugwu et al, 2012). This clearly shows that small scale business owners pay more for self-generated electricity as compared to electricity from national grid and this has kept business at loss for most business owners with most of them unaware of this situation.

Chart 10: Rate of fuelling per day measured by annual income.

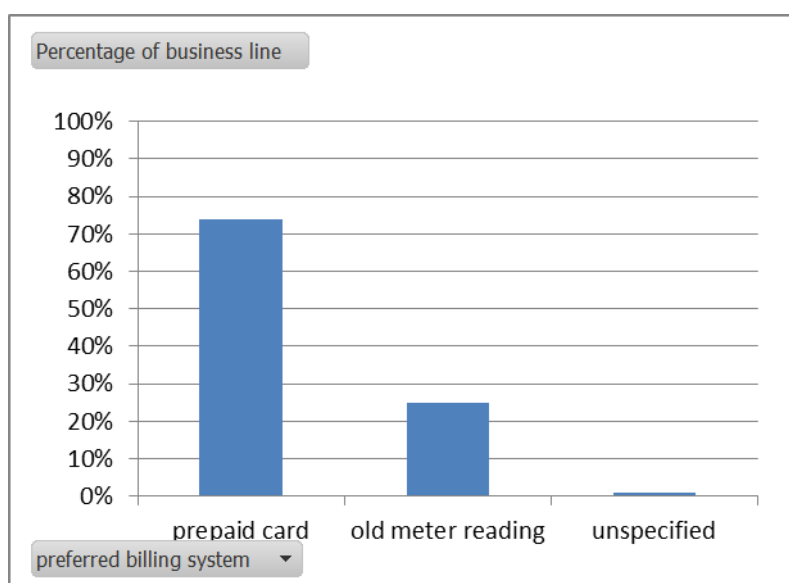
From the above chart, small scale businesses with low annual income tend to spend more, about 45.92% of annual income on fuel consumption to keep their businesses. This is also a clear indicator that profit making is minimal as seen in table 6 below.

Table 6: Percentage rate of fuelling per day has measured by annual income.

Annual income	25000 - 50000 (NGN)	51000 - 100000 (NGN)	110000 - 200000 (NGN)	220000 - above	Grand Total
Percentage rate of fuelling per day	46 %	13 %	11 %	30 %	100,00 %

6.3.3 Tariffs and turnover

During the interview, 25% of business owners were worried about the irregularities in the tariff cost. However, 74% sees it as a good system which shows the amount of electricity used.

Chart 11: Business lines preference of electricity billing.

Business owners worried about tariff cost irregularities preferred the old meter reading system. It is of interest to know that business owners who mostly preferred old meter reading were from Benin City, Edo State with a rate of 19%, more than three times those who preferred old meter reading in Akure. This is because they felt they were paying more tariff cost and card maintenance of 1000NGN than their business counterpart in Akure who pay 800NGN for tariff and card maintenance. Table 7 shows the percentage of preference.

Table 7: Business lines preference of electricity billing system by both cities (Akure and Benin) in Nigeria.

Preferred billing system	Akure	Benin City	Grand Total
prepaid card	33 %	41 %	74 %
old meter reading	6 %	19 %	25 %
unspecified	1 %	0 %	1 %
Grand Total	40 %	60 %	100 %

In addition, businesses with low annual income were willing to pay more for stable electricity, so as to make more profit from their businesses as seen in table 8 below.

Table 8: Willingness to pay for stable electricity per month compared with size of business.

Annual income/ Amount willing to pay for stable energy supply	25000 - 50000 (NGN)	51000 - 100000 (NGN)	110000 - 200000 (NGN)	220000 NGN above	Grand Total
500 - 900 (NGN)	18 %	3 %	2 %	12 %	35 %
1000 - 1400 (NGN)	10 %	4 %	4 %	7 %	25 %
1500 - 1900 (NGN)	7 %	2 %	1 %	3 %	13 %
2000 - 2400 (NGN)	5 %	3 %	2 %	1 %	11 %
2500 - 5000 (NGN)	1 %	1 %	2 %	5 %	9 %
Above 5000 NGN	3 %	0 %	1 %	2 %	6 %
Unspecied	1 %	0 %	0 %	0 %	1 %
Grand Total	45 %	13 %	12 %	30 %	100 %

From table 8, 3% of business earning the least income annual (25000 – 50000Naira) was willing to pay above 5000Naira per month for stable electricity as compared with their counterpart earning more than six times their annual income (220000Naira – above). This also shows the interest of small scale businesses in supporting and encouraging stable electricity supply in Nigeria.

7.0 DISCUSSION

Nigeria is currently seen as a fast growing economy among other developing countries around the world. However, the situation of electricity in the country has not only discouraged local/domestic businesses; it has not attracted enough foreign investors. To maintain a stable economy growth, improved technologies and creative innovations is needed. This cannot be achieved without stable energy distribution in the country.

For survival, small scale businesses have shifted to the alternative of generator usage for self-generation of electricity without having to count the cost. Most of these businesses make more loss than expected for using diesel fuel or petrol generators. Cost of production is also expensive for many small scale businesses due to energy challenge in the country.

During the interview conducted on small scale business owners for this thesis work, it was seen that 77% didn't see generator usage as environmental friendly and 71% also did not see it as yielding profit to their businesses. Considering their annual turnover, 74% of small scale businesses were will to pay more for constant electricity supply that is environmental friendly.

In addition, businesses with lesser income spend 45.92% of their annual income on fueling and maintenance of their generator. The age range that are into small scale businesses were between 20 – 24 years with highest rate of 32%. This shows that more youth are willing to start creative and innovative enterprise to reduce the unemployment rate in the country if there is stable energy supply.

More also, 19% of business owners in Benin City still preferred the old meter reading because of the irregular billing for card maintenance, knowing that their counterpart in Akure pays less than they do. In using old meter reading system, accuracy of electricity used is not guaranteed and energy supplied could either be over billed or less billed.

Furthermore, suggestive measures to overcome loss of generated energy and poor distribution should be emphasized and acted upon. It will be beneficial if government begin to reconsider some of these issues which came up during interview with some business owners that have affected the energy supply and distribution in the country.

These issues are listed below:

- **Better energy policies:** policies that are transparent enough to attract foreign investors and reduced too many third parties involvement in procuring energy license. For instance, Ajayi stated in his research work that Nigeria do not have a concrete policy or regulatory frame work for wind energy (2010).

- **Supplement energy:** currently, Nigeria uses hydro power and thermal energy for energy generation which contributes about 70% of electricity supplied (Sambo et al, 2009). The high dependence on hydro power for energy generation has made electricity generation and distribution less effective. Other alternatives such as solar and wind energy should also be considered.
- **New negotiations with Niger Republic:** Nigeria currently distributes the electricity she produces to Niger Republic as a way of compensation for the dam construction in Niger River. It will be better if the compensation be monetized so that energy supplied to Niger Republic can be channeled back to Nigeria. Also if Niger Republic is demanding electricity, it will be better if they pay for what will be supplied to them from Nigeria.
- **Reduce electricity transportation via improved technologies:** during transportation and distribution of energy, about 30 – 35 % of the produced energy is loss. To reduce this, improved technology is required and also makes for effective distribution. With improved technology, loss of energy through tapping of currents from electric transformer by vandals can be completely erased.
- **Effective maintenance:** operating power plants are not adequately maintained and upgraded. Most of the power plants operating in the country are old and needs to be upgraded for effective performance. Daily routine check is possible for power plants in order to detect problems when it arises.
- **Regular tariff cost:** from interview conducted in both cities (Akure and Benin), it was said by business owners in Benin City that they pay more tariff and card maintenance fee which is about 1000NGN than the counterpart in Akure which pay less fee of 800NGN. Tariff cost should be uniform across the country for transparency. Also prepaid card system should be encourage in the country rather than old meter reading system which is not accurate and less effective.

If all of these suggestions are given a fair consideration, electricity challenges will become history in Nigeria.

7.1 Power supply alternatives for small scale business

From the results of the interview conducted on small scale businesses, it is evident that better energy alternatives be produced for small scale businesses in Nigeria. Small scale businesses should be given enough consideration, seeing that it reduces the rate of unemployment and also encourages an innovative driven economy. Some suggested alter-

natives are listed below. These alternatives serve as an opportunity for foreign investors who are interested in investing in Nigeria.

7.2 Solar Energy

Nigeria is a country with adequate sunlight all year round which makes solar energy supply a good one for most small scale businesses. Although, the purchasing power and installation of solar energy for small scale businesses is capital intensive which most business owners might not be able to achieve. However, investors who are interested in investing into energy sector in Nigeria can start by supplying small scale businesses with constant power supply via the use of solar energy. Solar panel can be built within a business area and distributed to small scale businesses in that area for a certain amount. Prepaid card system can also be used in distributing the energy to businesses for transparent business activities.

7.3 Wind Energy

Wind energy is a renewable energy which is sustainable and environmental friendly. Research has showed that the wind strength of the Southern and Northern States in Nigeria is between 3.0 – 3.5 m/s and 4.0 – 7.5 m/s respectively. And on the beau fort scale, Nigeria is rated 1 – 3 in the Southern States and 3 – 4 in the Northern States (Ajayi, 2010). With these, it is encouraging for investors and government to consider investing in wind energy for even distribution of electricity across the country which will also increase the access to electricity for small scale businesses.

7.4 Economical loss from using generator as an alternative

Generator importation has become a profitable business in Nigeria. It has yield profit to countries like China and the United Kingdom because they are the main suppliers of generator sets to Nigeria.

GBI Research stated that, generator importation to Nigeria is expected to grow to 151.16 Billion NGN (950.7 Million USD) by 2020 with growth rate of 8.7%. A visible increase was seen in 2006 and 2011 with a decline in 2009 after it reached a peak of 65.476 Billion NGN (411.8 Million USD) in 2008 (Aman Madhok, 2013).

The continual increase of generator importation causes revenue loss from Nigeria to enrich other countries.

7.5 Economy benefit from improved national grid system

Nigerians are willing to pay more for improved and efficient power supply. The economy benefits from constant power supply across the country are overwhelming.

- Creative innovations towards a competitive economy on small scale level.
- Improved security systems even on small scale level.
- More foreign investments
- Reduced production cost for small scale business
- Value for money invested in small scale business

8 CONCLUSION

Small scale businesses are currently being limited from using their full potential to boost a competitive economy in Nigeria due to the lack of effective power supply. Generator usage has not allowed improved technical development in small scale businesses and creative innovations are crippled by using self-generated electricity.

This study has shown that small scale businesses are willing to pay for more for stable electricity supply to improve their businesses. The study also identified the effect of generator on small scale businesses and loss of profit from business owners due to constant power shortage and too much dependence on generator as an alternative.

Generator usage is unsafe for business as it increases cost of production to service rendered; it is also unsafe to our environment and health. The rate of generator usage in Nigeria is on the increase which is an indication of the irregular power supply in the country. Small scale businesses are not only limited, unemployment rate is on the rise and pollution to the environment will increase as a result from extensive generator usage.

REFERENCES

- Ajao, K.R; Ajimotokan, H.A; Popoola, O.T and Akande, H.F (2009) Electric Energy Supply in Nigeria, Decentralized Energy Approach. Cogeneration and Distributed Generation Journal, Vol. 24, No. 4, October.
- Ajayi Oluseyi, O. 2010. Senior lecturer, Covenant University of Nigeria. Assessment and Utilization of Wind Energy in Nigeria.
- Aman Madhok, (2013). GBI Global Business Intelligence, Energy Research Analyst. Report on Energy Supply in Nigeria.
- Chinedu Nebo. Minister of Power, 2013. enviro News, Nigeria. June 14, 2013.
- Corporate Nigeria, 2010. Annual Bulletin on Energy and Business.
- Dayo Oketola, May 23, 2012. Punch Magazine, Article on Energy Situation in Nigeria.
- Energy Commission of Nigeria (ECN). 2012 Annual Energy Report.
- Ekpenyong David B and Nyong, M.O. December, 1992. Africa Economic Research Consortium, Nairobi. Small scale business enterprise in Nigeria: Their characteristics, problems and source of finance.
- Figure1
<http://www.waado.org/images/NigerianScholars/NewImages/Maps/RoadsRailways.gif>
- Figure 2
 Julia Kennedy-Darling, Nick Hoyt, Kyle Murao and Allison Ross. 6.3.2008. The Energy Crisis of Nigeria: An overview and implications for the future. University of Chicago.
- Iwori, J (2008). Nigeria: How to Resolve Power Problem. ThisDay News online, July 12, 2008. www.thisdayonline.com.
- Ijeoma Ekwen. December, 2011. Small and Medium Scale Enterprise Development in Nigeria: Constraints and Policy Options. Research Report, University of Stellenbosch.
- Morawets, D. 1974. Employment Implication of Industrialization in Developing Countries. The Economic Journal, September, 1974.
- National Economic Reconstruction Fund, (NERFUND). 2005 Annual Report Conference, Abuja, Nigeria.
- Niyi Awofeso. Generator Diesel Exhaust: a Major Hazard to Health and the Environment in Nigeria. American Journal of Respiratory and Critical Care Medicine, Vol. 183, No. 10 (2011), pp. 1437.
- Oguntoye, O.A. 1990. Small Scale Industries: Western States of Nigeria. University of Ile-Ife, Industrial Research Unit.

Olusola Bello, Business Day News Magazine, October 24, 2013. Article on Energy Challenges in Nigeria.

Organization of the Petroleum Exporting Companies (OPEC), Nigeria. Annual bulletin, 2013.

Oxford Online Dictionary, 1984. <http://www.oxforddictionaries.com/>

Oyedepo Olayinka Sunday. Energy for Sustainable Development in Nigeria: The Way Forward. Energy, Sustainability and Society 2012. Mechanical Engineering Department, Covenant University Otta, 2023, Nigeria.
<http://www.energysustainsoc.com/content/2/1/15>

Power Holding Company of Nigeria (PHCN). 2009. Generation and Transmission Grid Operations and National Control Center (NCC) Reports, 2009. Oshogbo, Nigeria.

Punch Newspaper, Nigeria. Thursday, April 19th, 2012.

Public and Private Development Center (PPDC), Nigeria. 2012 Annual Conference on Energy and Business Summit, Abuja, Nigeria.

Rauno Paakonen. Noise and Radiation Lecture Notes, Tampere University of Applied Science, Environmental Engineering Department, October, 2012.

Satish Kumar, October 11th, 2012. www.gsma.com/mobilefordevelopment

Stephen Etebefia Oghenevwoke and Wasiu Akinkumi Babatunde. The Contribution of Small Scale Industries to National Economy. Standard Research Journal of Business Management Vol1 (2): 60-71, August 2013. <http://standresjournals.org/journals/SRJBM>

Sun Newspaper, Wednesday 25th, November, 2009. Death Caused by Generator.

This DayLive Online Newspaper, Nigeria, January 21st, 2013. Issues in the New Poverty Report.

Total Nigeria. 2007. History of Nigeria. <http://www.ng.total.com/>

Toyin Omoyeni Falola. 2009. Historical Dictionary of Nigeria, Volume 111 of Historical Dictionaries of Africa, Scarecrow Press, 2009.

Ugwu, H.U; Nwankwojike, E.A; Ogbonnaya, E.A and Ekoi, E.J. Energy and Economic Losses due to Constant Power Outages in Nigeria. Nigeria Journal of Technology, Vol. 31 No. 2, July, 2012, pp. 181-188.

Appendix 1: Thesis Questionnaire for Small Scale Business Owners

QUESTIONNAIRE FOR THESIS ON EFFECT OF GENERATOR USAGE ON SMALL SCALE BUSINESSES IN NIGERIA, ENVIRONMENTAL ENGINEER- ING DEPARTMENT, TAMPERE UNIVERSITY OF APPLIED SCIENCES, TAMPERE FINLAND

The answers to this questionnaire are confidential and will be analysed anonymously.
Thank you for your cooperation!

BACKGROUND QUESTIONS

Location of business

1. City

2. Area

3. Age

a) 20-24 ☐

b) 25-30 ☐

c) 31-34 ☐

d) 35-40 ☐

e) 41-50 ☐

f) 51 and above ☐

4. What is your line of business?

a) Restaurant ☐

b) Salon (hair dressing salon and barbers shop) ☐

c) Business center (typing, photocopying, pay phone, sales of recharge cards, binding and laminating) ☐

d) Cyber café (internet) ☐

e) Others? Specify

5. How long have you been in this business?

a) 6months – 1year ☐

b) 2 – 5years ☐

c) 6-10years ☐

d) 11years and above ☐

6. Number of employees ☐/ only self-employed ☐

a) 2-3 ☐

b) 4-5 ☐

c) 6-10 ☐

7. Turnover/Money earned annually

a) 25000 – 50000naira ☐

b) 51000-100000naira ☐

c) 110000-200000naira ☐

d) 220000-above ☐

ENERGY USE

8. Do you use generator in energy supply?

a) Yes ☐

b) No ☐

9. If yes, why?

10. If no, why?

11. How long do you use generator for business in a day?

a) 30minutes – 1hr ☐

b) 2hrs – 5hrs ☐

c) 6hrs – 10hrs ☐

d) More than 10hrs ☐

12. What is the cost for fueling your generator for business in a day?

a) 500 – 900naira ☐

b) 1000 – 1400naira ☐

c) 1500 – 2000naira ☐

d) More? Specify amount

13. Do you think using generator is bringing more profit to your business?

a) Yes ☐

b) No ☐

14. If yes, how?

15. If no, why?

16. Which would you prefer?

a) Generator ☐

b) Normal power supply ☐

17. If you have constant power supply how much are you willing to pay for it on monthly basis?

a) 500-900naira ☐

b) 1000-1400naira ☐

c) 1500-1900naira ☐

d) 2000-2400naira ☐

e) 2500-5000naira ☐,

f) Above 5000naira ☐.

18. Do you think generator usage is good for your business?

a) Yes ☐

b) No ☐

19. If yes, how?

20. If no, why?

21. Do you think using generator is safe for the environment?

a) Yes ☐

b) No ☐

22. Would you prefer the newly introduced pre-paid card for meter reading or the old meter reading system?

a) Yes ☐

b) No ☐

23. If yes, why?

24. If no, why?

25. Any other comments or questions?

Appendix 2: Questionnaire for Benin City Regional Grid System

QUESTIONNAIRE FOR THESIS ON EFFECT OF GENERATOR USAGE ON SMALL SCALE BUSINESSES IN NIGERIA, ENVIRONMENTAL ENGINEERING DEPARTMENT, TAMPERE UNIVERSITY OF APPLIED SCIENCES, TAMPERE, FINLAND.

Questions On National Grid

1. Energy supplied by functional grid.
2. How is energy distributed?
3. Cost of maintenance of functional grid
4. How often is it maintained?
5. Cost of distribution of energy
6. Is there loss of energy during distribution?
7. How much energy is lost if there is any loss?
8. What are the prospects and future plans for effect energy supply in Nigeria?