

ELECTRICITY OUTAGES AND MICRO-ENTERPRISE PERFORMANCE IN SELECTED SEMI-URBAN AREAS IN LAGOS AND OGUN STATES NIGERIA

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ABSTRACT

This study examined the impact of electricity outages on the performance of micro enterprise firms in selected semi-urban centres of Lagos and Ogun states, Nigeria. Survey data using purposive sampling was analysed with descriptive statistics. These micro enterprises experience electricity power outages frequently and its lasts for at least 5 hours per day and costs N10,000 – N50,000 to get an alternative source of electricity supply. Furthermore, these firms spend between of N5,000 and N10,000 for maintenance of the alternative source of electricity per month which in turn reduces their profit. This impacts on the performance of these firms as their income and activities decrease. It is recommended that government should invest more in the electricity sector and also plan for a means by which the tariffs on electricity can be more correctly determined to reflect the willingness to pay of the micro-enterprises' operators.

1.INTRODUCTION

The main concern behind this study is that of electricity infrastructure failure in a local community. Power supply has been said to be very vital in modern day business regardless of its perceived size which makes customers and business owners to be dissatisfied when not forthcoming. This can lead to production and financial losses and in some cases equipment damage. The development of micro sized businesses has been vital in the process of economic growth as inferred in Rostow's stages of growth. Without the creation of opportunities for the self-employed, there is limited chance for Nigerians to raise their standard of living (Ighodaro and Oriakhi, 2010).

For many decades, electricity has remained a significant component of energy sector which forms the lifeblood of production efficiency (Raza et al.,2016). Electricity is equally an important source of energy in Nigeria but its accessibility in 2016 is reported at 59.3% of the population. In 2015, estimated power supply in Nigeria is 3.1GW while the share of major consumers in key commercial areas or industry simply represent 1% of the aggregate electricity consumption (Energylopedia, 2018).

Over the years, many researchers have studied the impact of infrastructural failure on the performance and activities of firms in Nigeria, Africa and different parts of the world. It has been shown that

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the micro sized businesses consider electricity failure as their major challenge in the growth process, though transportation costs, water and good road system were also considered as constraints (Amadi, Okafor, and Izuegbunam (2016); Sabo and Lekan (2019). It underscores the importance of availability of reliable power supply at reasonable cost to the operation of businesses. Power outages therefore has its effects on enterprises Dalloshi, Misini, Hoti, 2020 ; Fisher-Vanden, Mansur and Wang, 2015). It becomes pertinent to ask the following questions: What is the cost of electricity outage to micro sized firms? What is the impact of electricity outage on the performance of micro sized businesses? What other alternatives did the businesses use to mitigate the impact of electricity outage? To answer these questions will be the pursuit of this paper.

The broad objective of this study is to examine the impact of electricity outages on the performance of firms. Specifically, the research will: survey the business condition of micro enterprises as it relates to electricity outage; investigate the cost of electricity outage to the affected microenterprises; determine the impact of the electricity outage on the performance of these firms; Identify some of their mitigation strategies. The scope of the research will cover selected semi-urban centres in Lagos state and Ogun state in Nigeria and would focus on micro sized businesses (businesses with 4-5 employees) that make use of electricity as an input source in its business activities.

Unlike previous studies, this research is different from other works as it focuses on relatively less developed communities that still have large number of micro enterprises. Other works have been focused on some other selected towns in Lagos city such as Iyanda (1982) (Lagos Island, Ikoyi, Victoria Island, Yaba and Surulere). Uchendu (1993) on his part focused on industrial and commercial firms also in Lagos state. Other studies have also been carried out in Nigeria to see the impact of electricity infrastructure failure on performance of micro sized businesses in Nigeria. These include: Ukpong (1973), Lee and Anas (1991), Adenikinju, (2005) and in recent times Ighodaro and Oriakhi (2010);

Ado and Josiah (2015); Amadi, Okafor, and Izuegbunam (2016); Sabo and Lekan (2019). Their works focused largely on urban communities and industrial firms. This study is therefore important because, it explores the experience in semi-urban areas. The result of the study will help inform policy makers to help promote business development in local areas of the states.

The rest of the paper will be as follows: section two focuses on the review of literature; section three present the theoretical framework and methodology, in section four results are presented and discussed while section five concludes the paper.

2.Review of Relevant Literatures

2.1.Review of Relevant Theories

One of the relevant theories used for estimating power outages is that of consumer welfare loss which is similar to the one used by Adenikinju (2005). The theory stipulates that there is a welfare loss to consumers of electricity when there is electricity power failure. Consumer welfare loss is a cost to the society or consumers of a public good which is created by market inefficiency that occurs when the supply and demand are out of equilibrium. It is mainly a deficiency caused by an inefficient allocation of resources. The market inefficiency occurs when goods within the market are either overvalued or undervalued with certain members of society benefitting from the imbalance, while others will be negatively impacted by a shift from equilibrium (Wikipedia, 2020). In relation to this study, consumer welfare loss occurs when the electricity supplied to the consumer is less than the amount demanded by the consumer.

Another theory used in investigating the impact of electricity outages is the theory of energy in the production function. Some scholars consider energy to have nothing to do with the production of value, commodities and services which reduces the production function to

$$Y=Y(K,L). \quad (1)$$

The energy in the production function theory by Pokrovski (2002), production of value Y , is determined by three production factors namely capital K , labour L , and work of production equipment-productive energy S . Thus :

$$Y=Y(K,L,S) \quad (2)$$

In his analysis, energy and labour inputs act as substitutes for each other, while capital K and work (L and S) are complements. The theory which was an extension of the conventional two-factor theory of economic growth. In the previous theory, capital played two distinctive roles which are separated in the present theory: capital as value of production equipment and capital as a substitute for labour. In the latter case, capital is the means by which the labour resource is substituted by energy rather than a production factor itself.

2.2. Empirical Review

Arlet (2017) examined the impact of electricity tariff, power outages on firm performance using firm level study from 190 countries. In this his study, he found that power outage has a negative impact on firm performance across the globe he also noted that electricity tariffs are also negatively associated to productivity but only for small and medium enterprises. Similarly, Abotsi (2016) used World Bank Enterprise survey statistics as the source of data to examine the impact of power outage on production efficiency of firms in Africa. He used production frontier and a two tail tobit model. The finding is that, the number of power outage experienced in a typical month has a negative impact on the production efficiency of firms in Africa. This view was further corroborated by the work of Oseni and Pollitt (2015).

In Nigeria there have been a number of studies on the impact of electricity outages carried out. For example, Adenikinju (2005) used survey method and revealed preference approach to analyse cost of

power outages to the business sector of the Nigerian economy. In his study, he concluded that the poor state of electricity supply in Nigeria has significant costs on the business sector and that the small-scale operators are more heavily affected by the failures. Streamlining it down to individual sectors. Idah (2009) used an empirical study to examine the effect of electricity supply on industrial development in Nigeria. In his study, he found that the dismal performance of the electricity sector has contributed in retarding the industrial development of Nigeria and therefore concluded that fixing the electricity sector is central to the realization of industrial development in Nigeria. Uzorh and Innocent (2011) analysed the cost of power outage to the business sector of the Nigerian economy using both a survey technique and regression analysis. The finding is that the poor state of electricity supply in Nigeria has imposed significant costs on the manufacturing sector relating to the firm's acquisition of very expensive backup capacity to cushion against larger losses. They also concluded that small scale operators were heavily affected by the power outage as they are unable to finance the cost of backup power necessary to mitigate the impact of frequent outages.

Contrary to the above findings of the researchers, Cissokho and Seck (2013) while using cost technical and allocative efficiency scores assesses the impact of electricity outages on firms' productivity in Senegal. Using survey data of 528 businesses, he found that power outages to have positive and significant effect on the productivity of firms and found that Small and Medium enterprises performed better than large scale enterprises. He explained that outages stimulated better management practices which mitigated the negative effects of power supply interruptions.

Amadi et al (2016), through the use of statistical data collected from two hundred and fifty (250) electricity intensive industries drawn from the nation's three major industrial cities investigated the impact of power outages in Nigeria's industries for the year 2014. It was found that in that year, 2.26% of the nation's GDP for the year and 56.9% of

the national budget for the year 2015 was spent as a result of power outages.

Power outages has effects on the performance of firms, different sectors of the economy and also households. This was established in the work of Amadi (2015). He investigated the consequences of power outages on social economic life of rural households in the Niger Delta region of Nigeria using descriptive research design found that stunted economic growth, reduced leisure time as well as heightened criminality and insecurity are some of the major results of rampant power outages among rural households in Niger Delta, Nigeria.

Business firms attempt to mitigate the effect of the outages on their performances by opting for other alternative measure which is different from the one publicly supplied and this usually constitute a significant amount of their investment outlay. This results to increase in cost of operation for the businesses. For example, Abdisa (2018) while examining how firms in Ethiopia respond to power outages found that firms in Ethiopia self-generate electricity because power outages affect firm's productivity negatively.

According to Cole et al (2017) while using firm level data for 14 countries from the World Bank Enterprise Survey found that the effect of the negative impact of electricity power outage is stronger on firms that do not own a generator. Also according to Adenikinju (2005); Uzorh and Innocent (2011), small scale enterprises spend a significant proportion of their investment outlay on backups.

Olaoye and Talabi (2018) examined the effect of electricity tariff and self-generated power supply on business performance in Nigeria focusing on Ondo state Nigeria. For the purpose of this research, the authors used primary source of data collection through the stratified random sampling method to get the required sample using questionnaire instrument. The authors therefore analysed the data obtained through the use of Ordinary Least Square (OLS) estimation model and from the analysis were able to conclude that both high electricity tariff and self-generated electricity cost

affect firms' performance, showing that they have significant impact on business performance. However, the study covered a small sample size of 100 to estimate for the whole country and also used a different estimation model. Similarly, Adewuyi and Emmanuel (2018), assessed the effect of self-generation on firm performance across the six geo-political zones in Nigeria and made comparison as to whether it is more profitable for firms to self-generate electricity during outage periods or bribe electricity officials to mitigate the effect of electricity outages on their performance. For the purpose of this analysis, the World Bank Enterprise Survey (WBES) was used employing a cross sectional Ordinary Least Squares (OLS) and Two-Stage Least Squares (2SLS) techniques and the results showed that bribery does not mitigate the effect of electricity outages on firms across all the geo-political zones in Nigeria with exception of the North-East and the South-East geo-political zones. Another similar work is that of Ado and Josiah (2015) where the authors examined the impact of deficient electric power supply on the operations of small scale businesses operating in north east of Nigeria. The sample for the study was selected through the stratified random sampling technique from the population of small scale businesses. Using the descriptive analysis and inferential analysis using the simple bivariate regression analysis for this study, the authors were able to conclude that electricity supply outages have a severity on the operation of the small scale businesses in the north east of Nigeria and also there are costs imposed by power supply outages on the operation of this class of businesses in the North east region of Nigeria.

In the works of Ighodaro and Oriakhi (2010) where electricity infrastructure failure and the development of micro sized enterprises in Benin City, Edo State, Nigeria were examined using primary data obtained from five locations in Benin city and a technique of stratified random sampling method was used to select the enterprises based on the sizes of the business. For the analysis, the authors used simple descriptive analysis and were able to find out that firms usually experience light outages for more than five hours per day which

usually peak in the afternoon which leads to financial and customer losses on the operators of micro enterprises.

3. Methodology

The study is designed to use the descriptive statistics for the purpose of this research. This research project work was carried out using a survey. In this survey, questionnaires were administered on micro sized businesses in the Alimosho local government area (Lagos state), Abeokuta south local government area and Odeda local government area (Ogun state) using purposive sampling technique.

This study covers 2 states (Ogun State and Lagos state). In Lagos state, the Ayobo, Megida and Amule communities under the Alimosho Local government area while in Ogun state, 3 communities namely; Olorunsogo community, Ijaiye community, Lantoro community under the Abeokuta South Local government area and a community (camp community) under the Odeda local government area.

The population of this study includes the micro enterprises that make use of electricity in their business activity. The enterprises under the Telecommunication services, computer services, saloon, electronics and electrical, clothing, mobile banking, media, confectionaries, among others.

In administering the questionnaire, purposive sampling technique was used and the sample size in this study is 226. The sample size was determined using conventional approach and cost affordability of the researcher. 105 of the samples were from Lagos state out of which 85 were useable while 121

was from Ogun state (Abeokuta South local government area and Odeda local government areas) with 100 useable.

The instrument used for data collection is the questionnaire. The questionnaire was administered in person. The questionnaire was given to the operator of each business. The questionnaire is divided into 5 segments which include: the biographical data, nature of the business enterprise, occurrence of outage, cost of outages and mitigation strategy and finally respondents' perception on impact on business performance. The copy of the questionnaire could be provided on request.

The questionnaire was subject to a pre-test that was conducted using limited number of respondents to afford necessary corrections and adjustments to be made by identifying ambiguous statements and/or wrongly structured statements.

For the descriptive analysis, the data from the survey is analysed using the simple descriptive approach which included tables showing percentage of responses, and bar charts also cross tabulations will be used for the analysis.

4. Presentation of Results and Discussion

In this study, the first objective set out was to survey the business condition of micro enterprises as it relates to electricity outage. This objective was fulfilled using questionnaires to get data from the respondents. The results are presented below.

Out of the 105 questionnaires from Lagos state, only 85 remained valid to be used for the analysis. Also, out of the 150 questionnaires from Ogun State only 100 remained valid for analysis.

Table 4.1. Table showing the number of questionnaires distributed and the number of responses

Location	No. of Questionnaires Distributed	No. of valid Responses
Abeokuta south local government	76	56
Odeda local government	45	44
Alimosho local government	105	85

Source: Field survey data, 2020.

The table 4.1 above shows a close relationship between the number of questionnaires distributed and the realized samples. The micro enterprises

selected are eventually spread across the various locations in Abeokuta and Ayobo.

Table 4.2. Nature of Business Enterprise by Gender

	Gender		Total
	Male	Female	
Telecommunication	18	3	21
Computer Centre	32	5	37
Saloon	19	9	28
Electronics	10	2	12
Business Clothing	15	7	22
Mobile banking	9	4	13
Media	7	2	9
Food	4	17	21
Others	13	9	22
Total	127	58	185

Source: Field survey data, 2020.

From the above table 4.2, it shows that some of the businesses are gender specific. For example, telecommunication, computer services, electronics/electrical services, and the media are largely dominated by the male gender while the

food business is completely dominated by the female gender. On the other hand, there is no much gender variation in the clothing, saloon and mobile banking businesses.

Figure 4.3. Bar chart showing the gender of respondents by businesses

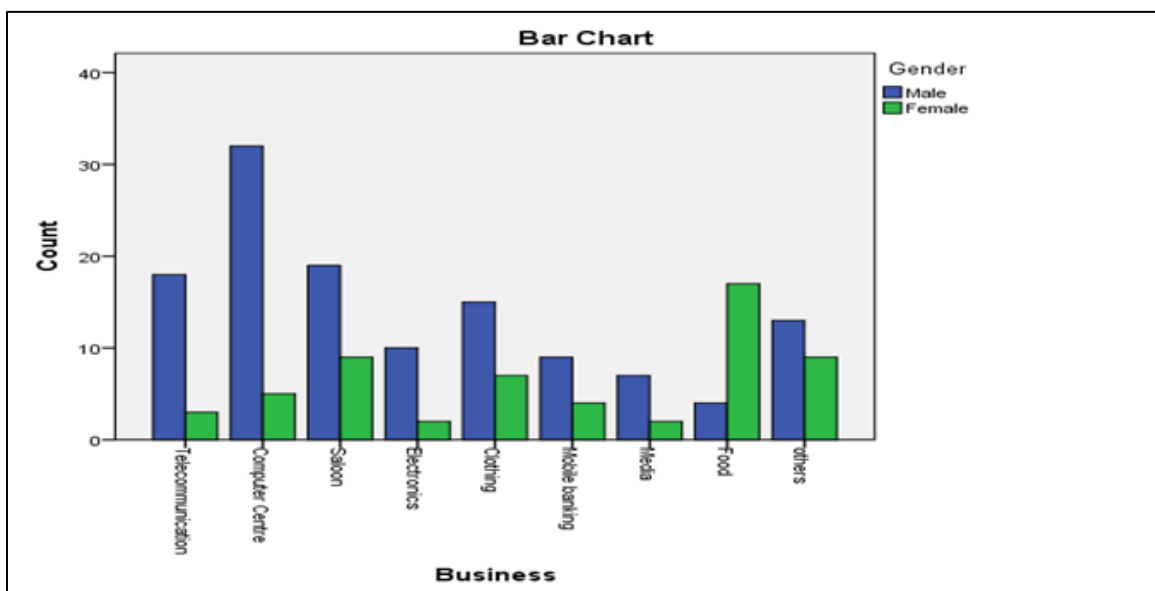


Table 4.3.Frequency of Light Failure

		Frequency			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	88	45.4	47.6	47.6
	Agree	47	24.2	25.4	73.0
	Indifferent	16	8.2	8.6	81.6
	Disagree	24	12.4	13.0	94.6
	Stronglydisagree	10	5.2	5.4	100.0
	Total	185	95.4	100.0	

Source: Field survey data, 2020.

From the above table 4.3, a higher percentage of 73 respondents agree that electricity outages have been occurring frequently in their community while a low percentage of respondents disagree that power outages have been occurring frequently with a rate of 18.4%. Out of the 73% a high percentage of 47.6 strongly agree to this fact while a low percentage of 25.4% of the respondents disagree

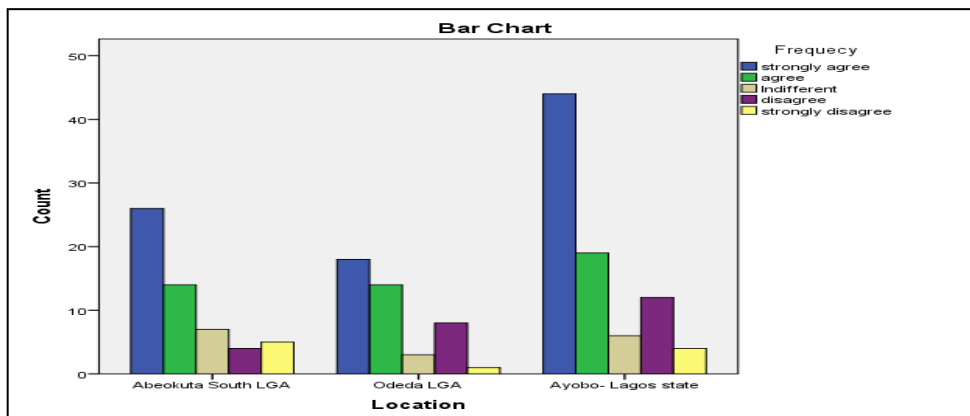
that power outages have been occurring frequently in their community while 8.6% of the respondents were indifferent to the frequency of the occurrence of power outages in their community. This shows that power outages in Ayobo, Megida, Camp, Olorunsogo, Ijaiye, and Lantoro communities occur frequently.

Table 4.4.Location of business and Frequency of power outages

		Frequency					Total
		Strongly agree	Agree	Indifferent	Disagree	Strongly disagree	
Location	Abeokuta South LGA	26	14	7	4	5	56
	Odeda LGA	18	14	3	8	1	44
	Ayobo- Lagos state	44	19	6	12	4	85
Total		88	47	16	24	10	185

Source: Field survey data, 2020.

Figure 4.4. Bar chart showing the location of businesses and the frequency of power outage



The above figure 4.4 and table 4.4 g shows the frequency of power outages according to the different states surveyed. In Ayobo, a 74.11% of the respondents agree that power outages occur frequently compared to the 71.43% and 72.73% of

respondents that agree that power outages occur frequently in Abeokuta south and Odeda Local government areas respectively. On the contrary, a 20.45% of the respondents in Odeda disagree that power outages occur frequently while a 16.07% and

18.82% of respondents from Abeokuta south and Ayobo disagree that power outages occur frequently respectively with the remaining percentage of the respondents being indifferent. This shows that power outages tend to occur more in the communities examined in Ayobo Local government compared to the communities examined in Abeokuta South and Odeda Local governments of Ogun state.

In this section, the intention was to find out how long the firms experience power outages on the

average per day since last year. The table below therefore shows that a high percentage (34.1%) of the respondents' experience power outage for a period of 1-5 hours on the average per day this duration was followed by a 29.7% of the respondents experiencing power outages for 11 hours and above on the average per day. A low percentage of the respondents (11.9%) experience power outages on the average per day for less than an hour.

Table 4.5. Average duration of Power outage per day

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid				
11 hours and above	55	28.4	29.7	29.7
6-10 hours	45	23.2	24.3	54.1
1-5 hours	63	32.5	34.1	88.1
Lessthan 1 hour	22	11.3	11.9	100.0
Total	185	95.4	100.0	

Source: Field survey data, 2020

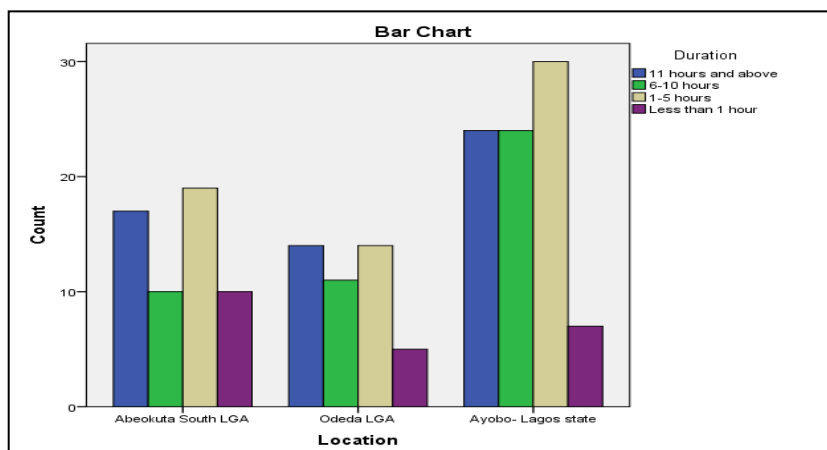
To show the average duration per day according to each local government area, the table 4.7 is given.

Table 4.6. Average duration per day according to location

	Duration				Total
	11 hours and above	6-10 hours	1-5 hours	Lessthan 1 hour	
Location					
Abeokuta South LGA	17	10	19	10	56
Odeda LGA	14	11	14	5	44
Ayobo- Lagos state	24	24	30	7	85
Total	55	45	63	22	185

Source: Field survey data, 2020.

Figure 4.5. Bar chart showing the average duration of power outages per day according to the location of respondents



From the above figure, 33.92% of the respondents in Abeokuta south LGA experience power outage for a period of 1-5 hours per day on the average, similarly, 30.36% of the respondents experience power outage between 11 hours and above per day on the average while 17.86% of the respondents in Abeokuta south LGA experience power outages on the average per day for a period of less than 1 hour and 6-10 hours.

In Odeda Local government, a total of 31.82% of the respondents experience power outage for a period of 1-5 hours and 11 hours and above while only 11.36% of the respondents experience power outages for a period of less than 1 hour per day on the average.

In Alimosho LGA, 35.29% of the respondents experience power outage for a duration of 1-5 hours per day while another 28.24% of the respondents in

Alimosho LGA experience power outage for a period of 11 hours above and 6-10 hours while on the contrary, only 8.24% of the respondents experience power outages for a duration of less than 1 hour.

From the above, firms experience power outages for a duration of 1-5 hours and 11 hours and above on the average per day.

The survey carried out shows that out of the 185 firms, 174 of the firms have an alternative source of electricity supply while 11 of the firms do not have an alternative source of electricity supply, this represents a 94.1% of the respondents having alternative source while 5.9% of the respondents do not have an alternative source of electricity supply. This shows that most firms largely rely on alternative source of electricity for backup during electricity outages.

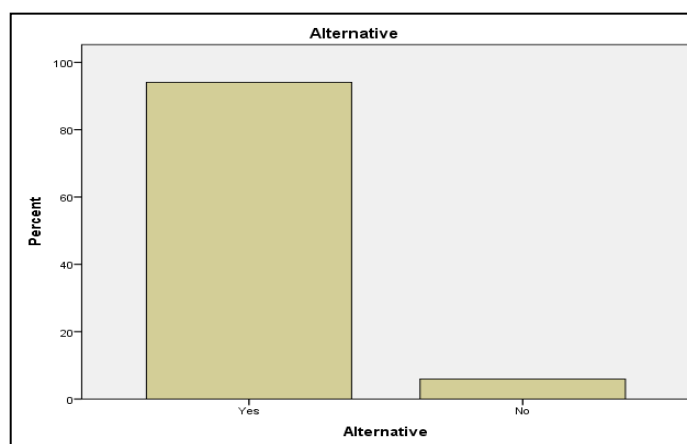
Table 4.7. Alternative Sources Electricity Supply

Alternative				
	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	174	89.7	94.1	94.1
No	11	5.7	5.9	100.0
Total	185	95.4	100.0	

Source: Field survey data, 2020.

This is shown in the bar chart represented in figure 4.6 below.

Figure 4.6. Bar chart showing the percentage of respondents that have an alternative source of electric supply



Out of those that have an alternative source of electricity supply, 89.1% use generator as the source of electricity supply followed by a 6.3% of the respondents that use solar as the source of alternative supply and lastly 4.6% make use of inverter. This shows that majority of the firms

prefer to use generator as the alternative source of electricity supply. The bias towards generator may be because it is relatively easier to maintain and costs lesser than other sources of electricity and easier to purchase.

Table 4.8. Alternative source of electricity supply

		Source			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Generator	155	79.9	89.1	89.1
	Inverter	8	4.1	4.6	93.7
	Solar	11	5.7	6.3	100.0
	Total	174	89.7	100.0	

Source: Field survey data, 2020.

Figure 4.7. Graph showing the alternative source of electricity supply used by respondents

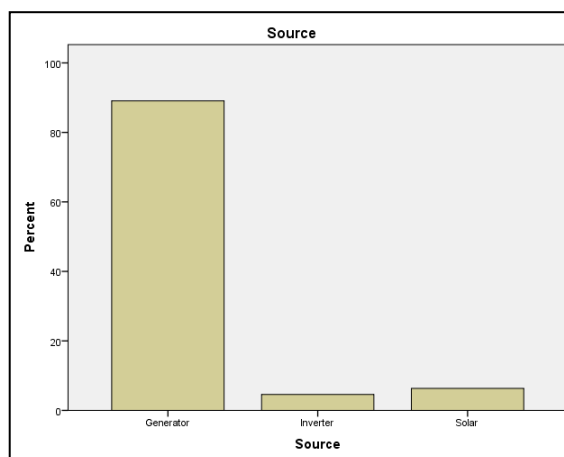


Table 4.9. Alternative source of electricity supply used by businesses

		Source			Total
		Generator	Inverter	Solar	
Business	Telecommunication	16	0	4	20
	Computer Centre	32	3	1	36
	Saloon	27	0	1	28
	Electronics	11	0	1	12
	Clothing	21	1	0	22
	Mobile banking	8	0	3	11
	Media	9	0	0	9
	Food	14	2	0	16
	Others	17	2	1	20
Total		155	8	11	174

Source: Field survey data, 2020.

From the above table 4.9, all businesses make use of generator but the computer center business use it more, also, solar source of electricity supply is mostly used by the telecommunication firms while inverter is mostly used by food firms and computer centers.

Another objective of this study was to investigate the cost of electricity outage to the affected microenterprises. This objective was achieved with the results below.

In this section, we will look at the cost of purchasing the alternative source of electricity supply to the firms. From the survey, as shown in table 4.10 the alternative source of electricity for 49.4% of the respondents costs between the region of ₦ 10,000 – ₦ 50,000 while the alternative source of electricity for 24.1% of the respondents costs ₦ 51,000-₦ 100,000 while only 10.3% of the respondent's alternative source costs above ₦200,000.

Table 4.10. Value of Alternative Source of Electricity Supply

Replacement				
	Frequency	Percent	Valid Percent	Cumulative Percent
	above 200,000	18	9.3	10.3
	101,000-200,000	28	14.4	26.4
Valid	51,000-100,000	42	21.6	50.6
	10,000-50,000	86	44.3	100.0
	Total	174	89.7	100.0

Source: Field survey data, 2020.

Table 4.11. Value of alternative source of electricity supply used according to the source used

	Source			Total	
	Generator	Inverter	Solar		
	above 200,000	11	3	4	18
Replacement	101,000-200,000	25	2	1	28
	51,000-100,000	40	0	2	42
	10,000-50,000	79	3	4	86
Total		155	8	11	174

Source: Field survey data, 2020.

From the 4.11, 50.97% of the respondents using generator spend ₦10,000 – ₦50,000 on the purchase of alternative source electricity supply similarly, 37.5% of respondents using inverter as the alternative source of electricity supply spend either above ₦200,000 or between ₦10,000 –

₦50,000 on the purchase of this alternative source while for respondents using solar as the source of alternative electricity supply, a percentage of 36.36% spend either above ₦200,000 or ₦10,000 – ₦50,000 on the alternative source this can mean that the costs of this alternatives ranges.

Table 4.12. Average Monthly Expenditure Alternative Source of Power Supply

		Alternative cost			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	above 15,000	32	16.5	18.4	18.4
	11,000-15,000	37	19.1	21.3	39.7
	5,000-10,000	68	35.1	39.1	78.7
	Lessthan 5,000	37	19.1	21.3	100.0
	Total	174	89.7	100.0	

Source: Field survey data, 2020.

As shown in table 4.12, the amount spent by these firms on maintenance of the alternative source of electricity supply is been examined. It was established that a larger percentage of 39.1% of the respondents spend between ₦5,000- ₦10,000 per month on alternative source of electricity supply followed immediately by 21.3% of the respondents

that spend less than ₦5,000 and between ₦11,000 and ₦15,000 on alternative source of electricity supply per month. On the contrary, only 18.4% of the respondents spend above ₦15,000 on alternative source of electricity supply per month.

Table 4.13. Average Monthly Expenditure on Alternative Source of Power Supply according to the business

		Alternative cost				Total
		Above 15,000	11,000-15,000	5,000-10,000	Lessthan 5,000	
Business	Telecommunication	5	3	8	4	20
	Computer Centre	11	9	10	6	36
	Saloon	3	4	15	6	28
	Electronics	1	2	6	3	12
	Clothing	5	2	9	6	22
	Mobile banking	1	1	5	4	11
	Media	2	4	2	1	9
	Food	1	6	6	3	16
	others	3	6	7	4	20
Total	32	37	68	37	174	

Source: Field survey data, 2020.

The table 4.13 above shows that most firms under the telecommunication category spends between ₦5,000-₦10,000 on the alternative source of electricity supply per month. Also, firms under the saloon category spends between ₦5,000- ₦10,000

on alternative source of electricity supply per month. Similarly, most firms under the computer centre category spend above ₦15,000 per month on alternative source of electricity supply.

Table 4.14. Table showing relationship between duration of outages and average monthly expenditure on alternative source of power supply

	Alternative cost				Total
	above 15,000	11,000-15,000	5,000-10,000	Less than 5,000	
Duration 11 hours and above	15	13	13	9	50
6-10 hours	5	14	19	6	44
1-5 hours	11	6	24	18	59
Less than 1 hour	1	2	13	5	21
Total	32	35	69	38	174

Source: Field survey data, 2020.

The table 4.14 shows that firms that experience power outage for a period of less than 1 hour per day spend between ₦5,000 – ₦10,000 on the average per month while firms that experience power outages for a period of 11 hours and above spend above ₦15,000 on the average per month.

This shows that the higher period of power outages, the higher the firms spend on the alternative source of electricity.

Under this section, it was examined to know if micro firms are willing to pay a higher electricity tariff for an improved and stable electricity supply.

Table 4.15. Willingness to Pay for Improved Electricity Supply of the respondents

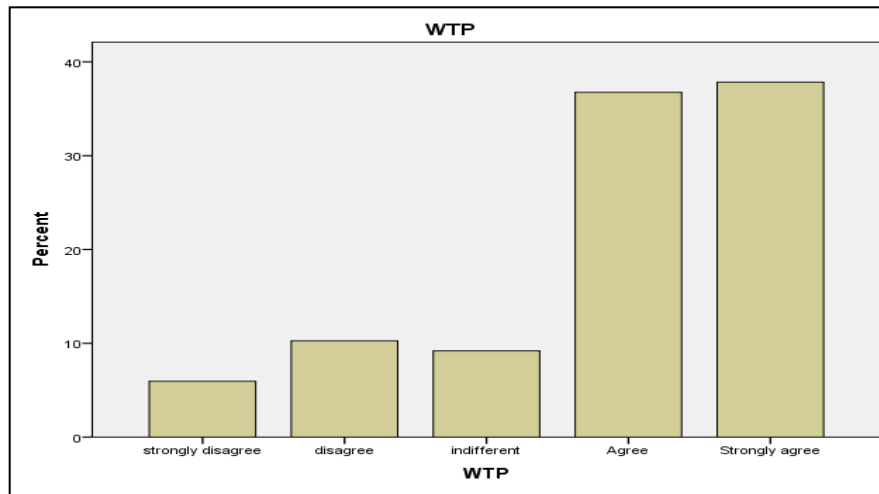
WTP					
	Frequency	Percent	Valid Percent	Cumulative Percent	
Valid Strongly disagree	11	5.7	5.9	5.9	
Disagree	19	9.8	10.3	16.2	
Indifferent	17	8.8	9.2	25.4	
Agree	68	35.1	36.8	62.2	
Strongly agree	70	36.1	37.8	100.0	
Total	185	95.4	100.0		

Source: Field survey data, 2020.

The table above shows that about 74.6% of the respondents are willing to pay more for an improved electricity supply while on the contrary, 16.2% of the respondents were not willing to pay more for an improved electricity supply as some

were of the opinion that a stable and improved electricity supply is not feasible in Nigeria. A total of 9.2% of the respondents were indifferent to pay for an improved electricity supply. As shown in the figure below

Figure 4. 8. Bar chart showing the willingness to pay for stable electricity supply by respondent



Another objective of this study is to identify some of the mitigation strategies of micro sized firms. This objective was achieved and presented below.

This section examines what other measures firms take in case of a prolonged power outage (by prolonged outage we mean an instance where there is power outage and the alternative source is also down). From the table below it shows that a whopping percentage of the respondents are left idle in the case of a prolonged power outage accounting to 74.6% of the respondents, while another 22.2% of the respondents make use of another back up while a 3.2% of the respondents outsource.

4.2. Impact of Electricity Outages on Micro Enterprises

Looking at the effect of power outage on the income of firms, the survey shows that in the case of power outage, the income of firms decrease as 71.4% of the respondents agree that income decrease though at different rate (21.6% of them say income decrease always, 17.8% says it decrease often while 31.9% of them say it decrease sometimes). On the contrary, 11.4% of the respondents claim that in the case of power outages, income does not decrease with the remaining 17.3% claiming income decreases occasionally. This is shown in table 4.16.

Table 4.16. Impact of electricity outages on income (Income decrease)

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid				
always	40	20.6	21.6	21.6
often	33	17.0	17.8	39.5
Sometimes	59	30.4	31.9	71.4
occasionally	32	16.5	17.3	88.6
never	21	10.8	11.4	100.0
Total	185	95.4	100.0	

Source: Field survey data, 2020.

It was also examined if power outages lead to a decrease in the activities of firm and 67.6% of the respondents agree that there is a decrease in the activities of their firms during outages while 16.2%

of the respondents disagree that there is a decrease in their firm's activities during outages while the remaining 16.2% experience activity decrease occasionally.

Table 4.17. Impact of electricity outage on activity of firms (Activity decrease)

	Frequency	Percent	Valid Percent	Cumulative Percent	
Valid	always	38	19.6	20.5	20.5
	often	34	17.5	18.4	38.9
	Sometimes	53	27.3	28.6	67.6
	occasionally	30	15.5	16.2	83.8
	never	30	15.5	16.2	100.0
	Total	185	95.4	100.0	
Missing	System	9	4.6		
Total		194	100.0		

Source: Field survey data, 2020.

Also, the impact of electricity outages on the timeliness of deliveries of micro sized firms was also examined finding out that 52.4% of the firms experience delay in deliveries during outages though at a different degree while 29.2% do not

experience delay in deliveries this is because the firms find a way of going round their business to meet up with deliveries as they find it important to their business.

Table 4.18. Impact of electricity outage on deliveries Delay

	Frequency	Percent	Valid Percent	Cumulative Percent	
Valid	always	31	16.0	16.8	16.8
	often	29	14.9	15.7	32.4
	sometimes	37	19.1	20.0	52.4
	occasionally	34	17.5	18.4	70.8
	never	54	27.8	29.2	100.0
	Total	185	95.4	100.0	

Source: Field survey data, 2020.

This survey also examines the impact of electricity outages on customers. In this survey, it was found out that 55.1% of respondents experience loss of customers during outages while 28.6% do not experience loss of customers during power outages. A 16.2% of the respondents sat on the fence.

Table 4.19. Impact of electricity outages on customers Loss of customers

	Frequency	Percent	Valid Percent	Cumulative Percent	
Valid	always	29	14.9	15.7	15.7
	often	22	11.3	11.9	27.6
	sometimes	51	26.3	27.6	55.1
	occasionally	30	15.5	16.2	71.4
	never	53	27.3	28.6	100.0
	Total	185	95.4	100.0	

Source: Field survey data, 2020.

Also, in this survey it was examined if during outages there is a loss in customer satisfaction and the result is presented below. A 48.1% of the respondents believe that there is always loss of

customer satisfaction during outages while a 31.9% say that loss of customer satisfaction does not occur during power outages.

Table 4.20. Impact of electricity outages on customer satisfaction Customers satisfaction

	Frequency	Percent	Valid Percent	Cumulative Percent	
Valid	Always	31	16.0	16.8	16.8
	Often	20	10.3	10.8	27.6
	Sometimes	38	19.6	20.5	48.1
	Occasionally	37	19.1	20.0	68.1
	Never	59	30.4	31.9	100.0
	Total	185	95.4	100.0	

Source: Field survey data, 2020.

Also from the research, 53.8% of the respondents agree that there is a loss of market opportunities during power outages while 32.6% disagree that

there is a loss of market opportunity during power outages. This is shown in the table below:

Table 4.21. Impact of power outages on market opportunities Loss of market to opportunities

	Frequency	Percent	Valid Percent	Cumulative Percent	
Valid	Always	32	16.5	17.4	17.4
	Often	25	12.9	13.6	31.0
	Sometimes	42	21.6	22.8	53.8
	Occasionally	25	12.9	13.6	67.4
	Never	60	30.9	32.6	100.0
	Total	184	94.8	100.0	
Missing	System	10	5.2		
Total		194	100.0		

Source: Field survey data, 2020.

The result of this study is therefore similar to the result of the work by Ighodaro and Oriakhi (2010) where it was found out that power outages occur

frequently in Benin City. Firms experience outages for an average period of 5 hours per day and that power outages have an impact on the performance

of micro sized firms as they spend huge amount on alternative source of electricity and also maintenance of the alternative source of electricity supply. The result of this work is also similar to the work of Ado and Josiah (2015) on the north east of Nigeria as they found that electricity deficiency has severity on small scale business and also there are costs it adds to the business operation costs. Another finding of this research buttresses the findings of Adewuyi and Emmanuel (2018) when their study revealed that firms in the South-West geo-political zone are better off by relying on electricity supply from the public grid. This was supported by this research as majority of the respondents agree that the alternative source of electricity supply costs more to maintain than the publicly supplied electricity. The result of this work differs from the work of Cissokho and Seck (2013) where the study found that power outages have positive and significant effect on the productivity of firms and found that small and medium enterprises performed better than large scale enterprises. He explained that outages stimulated better management practices which mitigated the negative effects of power supply interruptions.

5. Conclusion

This study examined the impact of electricity outages on the performance of micro sized firms and found that micro sized firms are heavily impacted by power outages. The electricity outages affect the income and activities of the firms which also reduces the customers' satisfaction and delay deliveries of firms though firms try to take other measures to reduce these impacts.

In the areas surveyed micro sized enterprises experienced electricity power outages frequently. It lasts for at least 5 hours on the average per day and it costs micro sized enterprises between N10,000 – N50,000 to get an alternative source of electricity supply. Furthermore, these firms spend between the range of N5,000 and N10,000 for maintenance of the alternative source of electricity per month which in turn reduces their profit. These outages have impact on the performance of these firms as their income and activities decrease. To mitigate against this effects, micro sized enterprises opt for the use of an alternative source of electricity supply mostly generator and in the case of a prolonged power outage where majority of the firms are left idle, some have another set of back up supply of electricity while others outsource during this period as they try to meet up with deadlines.

It is safe to conclude that electricity outages have strong negative impact on the performance of micro enterprise firms located in semi-urban areas of South West Nigeria. The impact drives up the cost of operation such that a high proportion of surveyed firms expressed willingness to pay higher tariff for publicly supplied power in order to have steady electricity supply.

A major policy recommendation based on the results of this research is that the authorities in charge of electricity supply should place more focus on the provision of efficient, reliable and stable electricity supply which will help increase the activities of micro enterprises in the areas surveyed and also create more opportunities for self-employment as other aspiring business owners will be inspired and encouraged. There should also be a

means through which the tariffs on electricity can be more correctly determined to reflect the willingness to pay of the micro-enterprise's operators.

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