World Journal of Innovative Research (WJIR)
ISSN: 2454-8236, Volume-6, Issue-4, April 2019 Pages 91-99

Electricity Supply and Performance of Small and Medium Enterprises in Nigeria: Assessing Selected Firms in North-Western States

Abubakar Sabo, Olusegun Kazeem Lekan

Abstract*— The Paper examines the effect of controlling firm characteristics in the energy-business growth relationships. Consistent with this objective, the paper posit that electricity supply is significantly related to SMEs growth in Nigeria. The paper also employed a quantitative methodology. Data were collected through a self-administered survey questionnaire. The questionnaire was adopted from a previous validated survey measuring electricity supply in Nigerian SMEs. The target population consisted of SMEs operating in the city of Kano, Katsina and Jigawa state, Nigeria. Multi-stage sampling was applied to collected data from three stratums i.e manufacturing, hotel & restaurant and wholesale & retail sector SMEs. In the first stage, the SMEs were purposively selected; the next stage involved stratified sampling while SMEs were randomly selected in the third stage. A total of 322 sampled SMEs were invited to participate in the survey. Of these firms 197 SMEs (61 percent response rate) accepted the invitation to fill out the survey questionnaire. Reliability of the measurement model is tested using Chronbach Alpha while multiple linear regression model is incorporated to test the hypothesis. The study found that, relationship exists between SMEs growth, electricity supply and firm characteristics (firm age, size and leverage). Specifically, the relationship is positively strong between SMEs growth, electricity supply and firm age whereas both firm size and leverage had a similar less relationships. On the basis of these empirical findings, the paper recommends that there is an an urgent need to improve electricity supply to SMEs in order to accelerate the growth of enterprises and by extension the economy.

***Index Terms*— Electricity supply, SMEs growth, firm age, firm size, leverage.**

I. INTRODUCTION

Despite the key role of SMEs in national development, their contribution to economic growth in Nigeria has remained at a low rate due to a number of factors. Nigerian SMEs face growing challenges ranging from low capacity utilization, a sharp increase in the cost of doing business, widening trade imbalance, stiff competition from developed countries, and high mortality rate of enterprises. The implication is that small and medium scale industries are collapsing and competitiveness are weakening by the detrimental effect on productivity which in turn reduces the growth potential of economy. Due to critical constraints to SMEs performance in recent decades, the important role of reliable electricity supply has been heavily emphasized in most of today's organizations in order to enhance business performance.

A large volume of published studies around the subject unveil that energy-business growth relationship was inconsistent. Some studies argue that there is strong relationship between the two variables (Escribano et al., 2009; Fedderke and Bogetic, 2006; Grimm et al., 2011; Kirubi et al., 2009; Legros et al., 2011; Mayer-Tasch et al., 2013; Osobase, Anthony, Bakare & Tunde, 2014; Solomon & Yao. 2015; Ukpong, 1993), but no less believe that the two variables do not have a strong relationship (Chissokho & Seck, 2013; Maleko, 2005; Meadows, Riley, Rao, and Harris, 2003; Tarun, Uddin, & Ambarish, 2013). However, there is remarkable lack of empirical evidence determining to resolve the inconsistency in the result of the relationship between electricity supply and enterprises growth. Besides, no known studies specifically attempt to include control variables in the studies in order to establish a true link between the studies variables and keep the results reasonable with stronger conclusion. Realizing these gaps in the extant literature, the current study aims to contribute to the existing literature by empirically exploring the role of control variable (i.e firm characteristics: firm size, firm age and leverage) on the relationships between electricity supply and enterprises growth.

The theoretical contribution of this research is in exploring the association between electricity supply and SMEs performance in Nigeria. If significant relationships are established, the study would assist government and electricity suppliers to give adequate attention to effort to increase accessibility of electricity and create an enabling environment to stimulate and ensure growth of SMEs in the country. It would also stimulate the electricity-reliant SMEs to improve their business plan and use electricity services productively. In addition, the study serves to extend the findings of prior researches and add to the existing body of empirical literature. From the practitioners' perspective, the findings of this research are hoped to provide a better understanding to entrepreneurs, energy suppliers, policy makers and other modern energy stakeholders on the linkages between electricity services and enterprises in Nigeria.To policy makers like government agencies such as the Nigerian Electricity Supply Industry (NESI), NIID, IPPs, and SMEDAN, the findings and results of the study will provide insights and a more reliable guide for monitoring the challenges faced by SMEs. It will serve as a benchmark for

Abubakar Sabo (PhD), Department of Business Administration Faculty of Management Sciences Usmanu Danfodiyo University, Sokoto
Olusegun Kazeem Lekan, Department of Business Administration Faculty of Management Sciences, Federal University, Dutsinma

measuring partly their respective policy goals and objectives. These findings are further expected to facilitate productive uses of grid electricity and stimulate SMEs performance with regards to enterprises growth.

A. *SMEs Performance*

Performance seems to be conceptualized, operationalized and measured in different ways thus making cross-comparison difficult. In enterprise management, Moullin (2003) defines an organization's performance as "how well the organization is managed" and "the value the organization delivers for customers and other stakeholders." On the other hand, modern literature defines performance as the results of the activities of a company or investment over a given period. To attain superior relative – performance, an SME must achieve its expected objective with greater effectiveness and efficiency than its competitors. Effectiveness and efficiency are the two fundamental dimensions of performance – this is emphasized by Neely et al., (2002).

Whatever the definition adopted, as Trkman (2009) pointed out, regardless of the size of the firm, firm performance evaluation is very crucial to monitor the success or failure of the firm so as to take proper actions to ensure competitive advantage. By measuring firm performance, a company can identify its strengths and weaknesses. The reasons of firm performance measurement is to upgrade the extant performance in terms of seeking new opportunities internally or externally, redesigning better strategies or action plans, obtaining overall business performance and capabilities improvements, and acquiring sustainable growth in the long run. In this study, performance is defined as the extent to achieving proposed objectives using resource economically in the face of internal/external environment (stockholders, competitors, society). Business growth is adopted to measure firm performance in terms of sales growth, growth in market share, assets growth, margin growth so as to be able to clearly determine enterprises ability to meet long term financial obligations (Sirajuddin, Muhammad & Muhammad, 2017).

B. *Electricity Supply*

A considerable number of modern literature buttressed that electric power supply is an electronic device that supplies electric energy to an electrical load (Bhagavan, 1999; Louw, Craigwell, & Moore, 2008; Herath, Gebremedhin, & Fletcher, 2011; Hickling, 2006; Holtedahl & Joutz, 2000, 2004; Lin & Quising, 2003; Xiaohua&Zhenmin, 2001). The primary function of a power supply is to convert one form of electrical energy to another. According to James Watt (1736) electrical energy supply is the quantity of electrical energy delivered to residential, commercial and industrial consumers' electrical load measured by Joule, which is the power consumed by an electrical device (one watt per second). One kilowatt/hour is equal to 1000 watts/hour, which is the operating unit that recorded by the meter. Kilowatt-hours(kWh) is the standard unit of measure for electricity.The concern for reliability of the electricity supply is faced by every country in the world. The expectation that the electricity supply will be reliable is the basis for many decisions and impacts on all sectors of the economy. According to the CAE (1993) reliability is considered to be made up of two aspects, adequacy and security. Adequacy "refers to the ability of the electricity system to provide and transport energy to meet the requirements of customers," while security "relates to the ability of the power system to respond to disturbances arising from equipment within either the bulk power system or the local distribution system, and so maintain supply at an acceptable frequency and voltage" (CAE, 1993). Limited access to quality and quantity electricity has remained an unresolved scourge in Nigeria. The ravage cuts across all electric energy utilization sectors in the nation.

C. *Firm Characteristics*

Quite a number of studies have been carried out to examine the relationship between firm characteristics and performance of enterprises. Mond (2005) asserted that firm characteristics seem to play a critical role in determining the overall performance of firms. Studies by Bulent and Christopher (2000), Dogan (2013), Vafeas (1999) and Yazdanfar (2013) indicate that certain firm characteristics such as firm size, leverage, firm age, liquidity, board size and many more others are associated with firm performance.

Davidsson and Henrekson (2002) however argued that firm performance is not only explained by the entrepreneur characteristics and external firm attributes such as firm sector, age and location. There are internal firm characteristics that pertain to the financial structure and production efficiency of the firm that highly explains SME growth. These internal firm characteristics include; degree of firm leverage, liquidity, physical capacity and factor productivity. Theory also asserts that government regulation and policy plays an important role in influencing the performance and growth of SMEs (Libutti,2000; Powell, 1990; Davidsson and Henrekson, 2002). According to Davidsson and Henrekson (2002) excessive government regulation and bureaucratic business registration procedures hinders the development of SMEs. In this study, attention is focused on firm size, enterprises age and leverage

D. *Empirical Literature*

The impact of electricity on growth has been the subject of numerous previous studies. Researchers have examined the relationships between electricity and enterprises growth at the economy-wide level on country–specific studies and compared firm with and without electricity. Labour productivity and total factor productivity have generally been the measures used for growth while quality of electricity supply is measured in terms of outages and voltage of fluctuation of electricity.

Osobase, Anthony, Bakare & Tunde (2014) investigate the relationship between electricity generation/supply and manufacturing sector performance in Nigeria using time series data from 1975-2011. The variables utilised include: index of manufacturing production, electricity generation, government capital expenditure, inflation rate, exchange rate and capacity utilisation. The work employed the correlation analysis, Granger Causality test and Johansen Co-integration test for the empirical analysis. The correlation result revealed

a weak positive nexus between electricity generation and index of manufacturing production in Nigeria. The Granger Causality test showed a unidirectional causality between electricity generation and index of manufacturing sector production. In view of the findings, the researchers assert that, irregular electricity supply has been a major bane to output growth in the manufacturing sector; therefore, it is recommended that the power sector by means of guided private sector initiative should be given more attention for the growth of the nation's economy. In the same vein, Ukpong (1993) applied production function approach to investigate the impact of erratic power supply on selected firms in commercial and industrial sectors in Nigeria from 1965-1966. His finding shows that about 130 KW/H and 172KW/H were not supplied to the firms in the two periods. The estimated cost of this is N1.68 million in 1965 and N2.75 in 1966. By implication, he noted that erratic power supply has adverse impact on productivity growth of manufacturing sector in Nigeria.

The vast majority of earlier studies widely considered electricity supply to be vital to the operations of most small and medium-scale businesses and firms (Escribano et al., 2009; Fedderke and Bogetic, 2006; Grimm et al., 2011; Legros et al., 2011; Mayer-Tasch et al., 2013; Osobase, Anthony, Bakare & Tunde, 2014; Solomon & Yao. 2015; Ukpong, 1993). Kirubi et al. (2009) analysed community-based micro-girds in rural Kenya, and showed that use of electricity can increase productivity per worker by approximately 100-200% for carpenters and by 50-170% for tailors, depending on the item being produced.

Some researchers are of the view that poor electricity supply generally may not always impact negatively on firm's output, as Cissokho and Seck (2013) obtained quite different findings in Senegal. Here, outages were found to have a positive and significant effect on the productivity of firms, and SMEs performed better than large-scale firms. The suggested explanation for this contradictory finding is that outages stimulated better management practices, which mitigated the negative effects of power supply interruptions, and that the more inefficient, lower productivity firms had gone out of business in the face of electricity insecurity (Cissokho and Seck, 2013).

Alligned with the study of Chissokho and Seck (2013), Meadows, Riley, Rao, and Harris (2003) and Tarun, Uddin, &and Ambarish (2013) studies as cited in Maleko (2005) confirmed electricity outage to have no significant impact on the growth of SMEs as well as improving the performance of new commercial establishments.

The empirical research on electricity supply and SMEs growth present an ambiguous picture. Negative effects of electricity on growth are found in various geographical areas. However, this is not consistently found in all circumstance. In some cases, SMEs experiencing electricity insecurity have higher productivity and growth. The energy-business literature analyzing the energy-growth nexus is generally inconclusive, there seems to be no consensus on the existence or direction of correlation between electricity and enterprises growth. Therefore, further research is needed to uncover the relationships.

E. Theoretical Contributions

This section discusses theories of SMEs performance. The outstanding SMEs performance theories include the BSC, Performance Prism, System Theory and ABC approach.

BSC is a good strategy-management tool; it reviews the entire organization from four balanced perspectives. However, BSC is not sufficient to help SMEs because it does not examine many competitive and external factors. Furthermore, previous research has shown that BSC does not fit the flexible environment of SMEs because of BSC's inherent mechanization and inflexibility (McAdam, 2000).

Performance Prism is not a prescriptive measurement framework; instead, it is a tool (framework) that helps management teams to think about key questions and strategies to address them. The very same benefits that make the Performance Prism a strong, comprehensive model, however, also make it difficult to easily utilize.

System Theory regards an organization as a holistic system. Each part of the organization contributes to the system and ensures its survival and continuity. To achieve this objective, managers should not only understand the various parts of their organization and interconnection, but also the relationship of the system to its external environment (Jackson, 2000). System Theory can help SMEs to set-up a dynamic and flexible PM system which can measure both internal and external information, including competitive performance. On the other hand, System Theory does not provide a feasible PM framework with which to measure performance. It needs to combine with other PM frameworks in order to construct a dynamic, flexible, and comprehensive PM framework for SMEs.

Finally, the ABC approach measures the cost of a resource used to perform organizational activities and then links the activity to the costs of the outputs. Subject to the SMEs performance requirements, ABC approach satisfies more requirements than other theoretical approaches. Consequently, this theoretical approach is adopted in building a performance measurement framework for SMEs.

II. METHODOLOGY

This study adopts correlational-survey research design which is cross-sectional in nature because data was collected at one time. In order to collect data, researcher constructed a structured questionnaire and distributed across the selected respondents through a survey method. There are three variables in this research. The independent variable is electricity supply; dependent variable is SMEs performance (i.e growth) and control variable is firm characteristics. The unit of analysis is individual owner-manager.

A. Study Population

The target population for this study comprises SMEs in Kano, Katsina and Jigawa states, which total 1986 enterprises according to national MSME collaboration survey, 2012. The enterprises are those in manufacturing, hotels and restaurants, and wholesale and retail sectors. These sectors are included in this study because their businesses depend heavily on electricity supply. The sectors also contribute significantly to the SMEs sector GDP (NBS, 2012; SMEDAN, 2013). The

breakdown of the registered SMEs by state and sector is shown in table 1.

Table 1 Registered SMEs by States and Sectors

State	Sector			Total
	Manufacturing	Hotels & Restaurants	Wholesale & Retail Trade	
Kano	978	121	427	1,526
Katsina	143	47	132	322
Jigawa	102	21	15	138
Total	1,223	189	574	1986

Source: National MSME Collaboration Survey 2012.

B. Sample and Sampling Technique

Given the nature of the study variables, population and data, standard deviation of the population, desired confidence level, and level of precision, Krejcie and Morgan model was incorporated to determine the sample size: $n = \frac{Z^2 \alpha/_2 \times N \times \sigma^2}{e^2 (N-1) + Z^2 \alpha/_2 \sigma^2}$

Where, N = population size

n = sample size

e = acceptable margin of error or the precision or the estimation error

σ = standard deviation of the population

$Z^{\alpha}/_2$ = the value of the standard variate at a given confidence level

To be 95% confident that acceptable margin of error is within 5% for the pre-determined population size of 1986 with 0.5 variance estimate, the resulting sample size, therefore, is three hundred and twenty-two (322) SMEs. The study sample size by state and sector is determine by proportional stratum allocation method where Kano state has a total number of two hundred and forty seven (247) sample SMEs (manufacturing: 158, hotel and restaurants: 20, wholesale & retail trade: 69), Katsina state has fifty two sample SMEs (manufacturing: 23, hotel and restaurants: 8, wholesale & retail trade: 21) while Jigawa state has twenty-three sample SMEs (manufacturing: 17, hotel and restaurants: 3, wholesale & retail trade: 3). Manufacturing sector has one hundred and ninety eight (198) sample SMEs (Kano state: 158, Katsina state: 23, Jigawa state: 17), thiry-one (31) sample SMEs are selected from Hotel and Restaurant (Kano state: 20, Katsina state: 8, Jigawa state: 3), and ninety three (93) are taken from Wholesale and retail trade sector (Kano state: 69, Katsina state: 21, Jigawa state: 3). This was achieved with the help of Research Assistant. Proportional allocation is considered efficient and an optimal design for this study because the cost of selecting an item is equal for each stratum and there is no difference in within stratum variances (Kothari, 2014).

In addition, multi-stage sampling technique was adopted for the research sample selection.In the first stage, purposive sampling was used in selecting SME sectors to be studied. There are a total of eleven SMEs sectors. These include: agriculture, mining and quarrying, manufacturing, building and construction, wholesale & retail trade, hotels & restaurants, transport and communication, financial intermediation, real estate and business, education, health and social works and service activities. Three out of the eleven SMEs sectors are selected for the study. The SME sub-sectors selected are the ones depended heavily on electricity supply to survive. The SMEs sectors selected are: manufacturing, hotels and restaurants, and wholesale & retail trade. The next stage of the sampling technique involves stratified sampling. SMEs are stratified based on two criteria: sector (manufacturing, hotels and restaurants, and wholesale & retail trade) and state (Kano, Kastina and Jigawa). Finally, the sample units are drawn randomly for each sector and state. The use of simple random sampling in the selection of participant SMEs for this study is a sure way to give every member of the population a chance of being selected and to reduce bias to the barest minimum. This approach is also used in order to ensure that sample of this study is a true and fair representative of the population of SMEs in the sub-region. For adequate representation of sample size in any studies, lower percentage such as 5% to 20% of the total population is considered appropriate where the population runs in thousand while higher percentage that is 25% to 40% of the total population is acceptable where population is a few hundreds (Asika, 1991; Krejce and Morgan, 1970; Nkpa, 1997; Obasi, 2000; Opaleke, 2012; Paler-Calmorin and Calmorin, 2006; Serakan,2000; Zulueta and Costales, 2003). The researcher, therefore, considers the sample selection for this research as reasonable to enhance the result and credibility of the study. The breakdown of the sample selection of the SMEs by sate and sector is shown in table 2.

Table 2 Sample Selection of SMEs by State and Sector.

State	SMEs Sub-sector	Manufacturing		Hotels & Restaurants		Wholesale & Retail Trade		Total	
		Number	**Sample**	Number	**Sample**	Number	**Sample**	Number	**Sample**
Kano		978	**158**	121	**20**	427	**69**	1526	**247**
Katsina		143	**23**	47	**8**	132	**21**	322	**52**
Jigawa		102	**17**	21	**3**	15	**3**	138	**23**
Total		1,223	**198**	189	**31**	574	**93**	1,986	**322**

C. Research Instrument

A survey questionnaire was conducted on SMEs owners or managers located in Kano, Katsina and Jigawa state in the manufacturing, hotel & restaurant, and wholesale & retail trade sectors. A total of three hundred and twenty two (322) questionnaires were distributed to the sample SMEs owners in the three states under the study areas. Out of the questionnaires distributed only two hundred and twenty two questionnaires were returned, which showed that sixty nine percent (69%) of the respondents answered the questionnaires. Due to incomplete responses for some of the questions, twenty five (25) questionnaires were not analysed. The final analysis was performed for only one hundred and ninety seven questionnaires (197).

D. Statistics Analysis

Descriptive and inferential statistics are utilized in the analysis of data using Statistical Package for Social Sciences (SPSS) version 22. Descriptive statistics tools include mean and standard deviation while multiple regression model (MRM) is employed as inferential statistics tool to establish the relationships between performance of SMEs and electricity supply output while firm characteristics are held fixed.

a. Model Specification

The study estimates the research model below to determine the effect of controlling firm characteristics on the relationship between electricity supply and enterprises growth.

$$y_i = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + u \quad \ldots\ldots\ldots\ldots (1)$$

Where: y_i = SMEs Performance i.e growth.

β_0 = Intercept

β_1 = Parameter associated with x_1

β_2 = Parameter associated with x_2

β_3 = Parameter associated with x_3

β_4 = Parameter associated with x_4

x_1 = Electricity supply

x_2 = Firm size

x_3 = Firm age

x_4 = Firm leverage

u = The error term or disturbance.

Therefore, the model becomes:

$$\text{SMEs Performance}_i = \beta_0 + \beta_1 Electricity\ supply + \beta_2 Size + \beta_3 Age + \beta_4 Leverage + u \ldots (2)$$

Thus, SMEs performance is determined by the four explanatory variables and by other unobserved factors which are contained in the error term (u). The study is still primarily interested in the relationships between SMEs performance and electricity supply holding fixed all other factors (firm size, firm age and leverage) relating to SMEs performance.

III. Analysis of Descriptive Variables

Table 4.1 below depicts the mean, standard deviation and Pearson correlation between the study variables. The total sample selected from the population of this study consists of one hundred and ninety seven (197) SMEs. The SMEs performance measure for this study is growth. The independent variable is electricity supply while control variables are firm size, firm age and leverage. Growth recorded the highest mean of about 38.81 with a standard deviation of 6.89. This signifies a precondition for longevity and achievement of other financial goals of business which could be attributed to consistent increase of annual sale growth with stable increase in the number of employees. During the period of study, availability per hour of electricity supply had a mean of 19.2 with a standard deviation of 6.46. Low variability of standard deviation implies that electricity supply average is a true representation of the sample mean. However, mean value of 19.2 reflects that the present capacity of electricity supply fall short of requirement. This creates serious problems for electricity-reliant firms. In terms of firm years of operation, the mean and standard deviation are 7.10 and 1.51 while the mean and standard deviation are 7.47 and 1.55 for firm size respectively. This signifies that the firm size were relatively larger and have been in existence for period not less than eleven years as some of the firms were clustered around the period. It is also revealed that leverage has a mean of 9.13 with a standard deviation of 3.05. This indicates a modest gearing position by the firms with a relatively low variability which could be attributed to the high cost of borrowing as a result of prevailing high interest rates in Nigeria.

The table further provides a matrix of the correlation coefficients for the study variables. Each variable is perfectly correlated with itself and so r = 1 along diagonal of the table. All the correlations were significant at 0.05 level. For instance, there was a significant strong positive correlation of electricity supply and growth with Pearson correlation coefficient of r = 0.818. The result suggests that electricity supply is vital for SMEs performance. Nearly all organizations need electricity services for proper functioning. It is further shown that positive relationships exist between SMEs growth and firm size. The relationships were significant at 0.05 level. The SMEs performance had moderate positive correlations with firm size. Pearson correlation coefficient was 0.433 with enterprises growth. The result gives an indication that firm size is positively related to performance in terms of sales growth, growth in market share, assets growth, margin growth etc.

On the other hand, firm age registered 0.747 correlations with growth. The result revealed that firm age has a significant strong positive correlation with SMEs performance. Finally, leverage showed a significantly weak positive relationship with SMEs growth. Leverage Pearson correlation coefficients was 0.140 with growth.

Table 3 Mean, Standard Deviation and Pearson Correlation Coefficients

Descriptive Statistics

	Mean	Std. Deviation	N
Elect Supp	19.21	6.469	197
Growth	38.81	6.899	197
Leverage	9.13	3.051	197
Age	7.10	1.517	197
Size	7.47	1.554	197

		Elect Supp	Growth	Leverage	Age	Size
Elect Supp	Pearson Correlation	1	.818**	.120	.593**	.355**
	Sig. (2-tailed)		.000	.094	.000	.000
	N	197	197	197	197	197
Growth	Pearson Correlation	.818**	1	.140*	.747**	.433**
	Sig. (2-tailed)	.000		.050	.000	.000
	N	197	197	197	197	197
Leverage	Pearson Correlation	.120	.140*	1	.019	.043
	Sig. (2-tailed)	.094	.050		.788	.551
	N	197	197	197	197	197
Age	Pearson Correlation	.593**	.747**	.019	1	.424**
	Sig. (2-tailed)	.000	.000	.788		.000
	N	197	197	197	197	197
Size	Pearson Correlation	.355**	.433**	.043	.424**	1
	Sig. (2-tailed)	.000	.000	.551	.000	
	N	197	197	197	197	197

A. Test of Hypotheses

HO_1: Electricity supply is significantly related to SMEs growth.

Electricity was run against SMEs growth while firm characteristics included as control variable on one hundred and ninety seven (197) observations. The result revealed that the model had an R square equal to 0.782 indicating that 78.2% of the variations in SMEs growth are explained by the four variables entered in the model (electricity supply, firm, size, firm age and leverage). As can be seen in table 4.2, the difference between the value of R square and adjusted R square (0.782 – 0.778 = 0.004) is very small. This shrinkage value means that if the model were derived from the population rather than a sample it would account for approximately 0.004% less variance in the outcome. Consequently adjusted R square indicates that the cross validity of this model is very good. This result was further buttressed with prediction of whether change in R square was significant at an F-ratio of 172.563, which is again significant (P<0.001). The change statistics therefore revealed the difference made by adding firm characteristics to the model. Similarly, the F-statistics (ANOVA) of the model equals 172.563, with a p-value equal to 0.000. The ANOVA finding showed that the overall model is a significant predictor of the SMEs growth.

Tabel 4 Mode Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.885[a]	.782	.778	3.252	.782	172.563	4	192	.000	2.077

a. Predictors: (Constant), Leverage, Age, Size, Elect Supp

b. Dependent Variable: Growth

Table 5 ANOVA TEST

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7298.036	4	1824.509	172.563	.000[a]
	Residual	2030.015	192	10.573		
	Total	9328.051	196			

a. Predictors: (Constant), Leverage, Age, Size, Elect Supp
b. Dependent Variable: Growth

The results further indicate in table 5, individual contribution of each predictor to the t-test model. The slope that is b-values show the relationship between SMEs growth and each predictor. For these data all the four predictors have positive b-values signifying positive relationships. So, as electricity supply increases by one unit, SMEs growth increase by 0.594 units provided the effect of firm characteristics that is firm age, firm size and leverage held constant. Besides, every additional firm age increase is associated with an extra 1.753 of growth provided electricity supply, firm size and leverage are held constant, Beta weight under unstandardized coefficient also indicated that a unit increase on both firm size and leverage can expect addition of SMEs growth of 0.307 and 0.143 respectively provided other predictors are held fixed. For this model, all independent variables were significant predictors. Electricity supply t (197) = 13.076, $p < 0.001$; firm age t (197) = 8.823, $p < 0.001$; firm sizet (197) = 1.838; and leverage t = 197 = 1.856 are all significant predictor of SMEs growth, from the magnitude of the t-statistics, electricity supply had the greatest impact followed by firm age whereas both firm size and leverage had similar less impact. However, in order to evaluate the strength of each predictor variable in the model, it is important to use the standardized coefficients (beta). The beta weight indicated that electricity is the strongest predictor ($\beta = 0.557$, $P = 0.000$). This value indicates that as electricity supply increases by one (1) standard deviation (6.469), SMEs growth increases by 0.557 standard deviation. The standard deviation of SMEs growth is (6.899) and so this constitutes a change of (0.557 X 6.899 = 3.842). Therefore, for every 6.469 rises on electricity supply, an extra 3.842 is associated to SMEs growth provided other predictors are held constant likewise, firm age (standardized $\beta = 0.386$) this value indicates that as firm age increases by one standard deviation (1.517), SMEs growth also increases by 0.386 standard deviation, the standard deviation for SMEs growth is (6.899) and so this constitute a change of 2.663 growth (0.386 X 6.899 = 2.663). Therefore, firm age rises by 1.517 units, 2.663 extra growths can be expected. This interpretation is true only if the effects of electricity supply, firm size and leverage are held constant. In additions, firm size (standardized $\beta = 0.069$) which implies that as the size increases by one (1) standard deviation (1.554), SMEs growth increases by 0.069 standard deviation. SMEs growth standard deviation is (6.899) and so this result in 0.454 growths (0.069 X 6.899 = 0.454), therefore, a firm with size rating 1.554 higher than another can expect 0.454 additional growths. This interpretation is true only if the effects of electricity supply firm age and leverage are held constant. Finally, leverage (standardized $\beta = 0.063$) signifies that as firm leverage increases by one (1) standard deviation (3.051), SMEs growth also increases by 0.063 standard deviation. The standard deviation for SMEs growth is (6.899) and so this constitutes a change of 0.434growths (0.063 X 6.899). Therefore, for every 3.051rises on leverage, an extra 0.434 is associated to SMEs growth unless other predictors are held constant.

Table 6 COEFFICIENTS RESULTS

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Correlations			Collinearity Statistics	
	B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
(Constant)	11.360	1.482		7.667	.000					
Elect Supp	.594	.045	.557	13.076	.000	.818	.686	.440	.624	1.602
Age	1.753	.199	.386	8.823	.000	.747	.537	.297	.593	1.685
Size	.307	.167	.069	1.838	.068	.433	.132	.062	.803	1.245
Leverage	.143	.077	.063	1.856	.065	.140	.133	.062	.981	1.019

a. Dependent Variable: Growth

B. Collinearity Test Statistics

Table 4.3 further provided collinearity statistics. The

model showed that multi-collinearity was not serious, since the tolerance values all well above 0.2 and VIF value are all well below 10; therefore this study safely conclude that there is no multi-collinearity within the data. Moreover, the Durbin-Watson value was 2.077, suggesting no evidence of auto-correlation of the errors. The value of cook's distance 0.21 less than 1.00 suggest that there is no potential problems with the outliers (Tabaclinik & Fidell, 2001).

a. linearity normality and homoscedastiaty statistics

The graph of ZRESID and SPRED in figure 4.1 (see appendix) showed a random array of dots evenly dispersed around zero (0). This is an indicative of a situation in which the assumptions of linearity and homoscedasticity were accomplished, for test of normality of residuals, both histogram and normality probability plot in figure 4.2 (see appendix) shows that histogram reflects a normal distribution (a bell-shaped curve) while normal probability plot reveals a straight line implies a normal distribution, and the points represents the observed residuals. Finally scatter plot, shows the strong positive relationship to SMEs growth. For electricity supply with cloud of dots evenly spaced out around the gradient line, indicating homoscedaslicity.

IV. DISCUSSION OF FINDINGS

The multiple regression analysis found statistically significant positive relationship between electricity and SMEs growth while firm characteristics (firm size, age and leverage) were held constant, supporting the hypothesis. Electricity supply and firm age were the strongest predictors of SMEs growth. These results provide compelling evidence in support of the relationships between electricity supply and SMEs growth. Generally the results suggest that those who aim to achieve higher performance in terms of sales growth, growth in market share, assets growth, margin growth etc should consider the role of electricity supply and significant of firm age. These results are certainly in parallel with prior writings on the importance of electricity supply and SMEs growth such as Fedderke and Bogetic (2006), Grim et al (2011) and Kirubi et al. (2009).

The findings of the present study agree with Osobase et al. (2014) and Ukpong (1993) that irregular electricity supply has been a major bane to output growth and that erratic power supply has adverse impact on productivity growth of manufacturing sector in Nigeria. They recommended that the power sector by means of guided private sector initiative should be given more attention for the growth of the nation's economy to thrive.

The statistically significant relationships between the dependent and independent variables affirms the view of Mayer-Tasch et al. (2013), Escribano et al (2009) as well as consistent with research results by Moyo (2012), who establish some evidence that enterprise growth occurs with a distinct time lag following electrification. Likewise, Solomon & Yao (2015) indicate that power outage experience has a negative effect on SMEs growth and pushes the operation cost of businesses high due to the high cost of alternative energy supply and the damages of assets through the power fluctuations. The operational cost in effect also have a damming effect on the growth of the SMEs, since most of the revenue meant for reinvesting will rather goes to the servicing of electricity and alternative power bills.

V. CONCLUSIONS AND RECOMMENDATIONS

Based on the hypothesis results and the research discussion, it can be concluded that there is a strong positive link between energy-growth while firm characteristics (firm size, firm age and leverage) are kept constant. This significant relationship leads to high prediction power of electricity supply, firm characteristics and SMEs performance (growth). Hence, this study recommend that entrepreneurs, energy policy makers and researchers alike should take cognizance of reliability per hour of electricity supply and firm characteristics (firm size, age, leverage) in the process of analyzing and investigating SMEs performance. Regulatory bodies responsible for the energy sectors should also set some standards for the generation, distribution and costing of electric power where preference should be given to key sectors of the economy such as SMEs. This is because they are known to provide jobs for a large number of people and contribute significantly to the economic growth of the country.

Finally, Nigerian enterprises should place more emphasize on firm age and firm age. This is because both firm age and size have significantly relationships to SMEs performance in Nigeria. Increases in firm size and age are critical to the achievement of business financial goal. Large and older firms are more able to take advantage of economies of scale, cope more successfully with possible market change, as well as with high risk situation.

REFERENCES

[1] Asika, N.(1991) *Research Methodology in the Behavioural Sciences*, Ikeja, Nigeria, Longman Nigeria Plc.

[2] Chissokho, L. and Seck, A. (2013) Electric power outages and the productivity of small and medium enterprises in Senegal, Investment Climate and Business Environment Research Fund (ICBE-RF). Research Report No. 77/13, Dakar.

[3] Dickson, O. (2011) Government should implement energy reform aggressively, *THISDAY, Nigeria*.

[4] Esscribano, A., Guasch, J. L. & Pen, J. (2009) Assessing the impact of infrastructure constraints on firms. *International Business & Economics Research Journal*, 11, 1163-1174

[5] Fadderke, J. & Bogetic, Z. (2006) Infrastructure and growth in South Africa: direct and indirect productivity impacts of nineteen infrastructure measures. *World Bank Policy Reseach Working Paper, Washington D.C.*

[6] Grimm, M., Hartwig, R. & Lay, J. (2012) How much does utility access matter for the performance of micro and small enterprises? Accrssed from http://wwww.wds.worldbank.org/external/default

[7] Hoskisson, R. E., Hitt, M. A. & Ireland, R. D. (2008).Computing for advantage, 2nded.Cincinnati: Thomson South-Western.

[8] Kirubi, C., Kacobson, A., Kammen, D. M. & Mills, A. (2009) Community-based eletrcic micro-grids can contribute to rural development: evidence from Kenya. *World Development*, 73, 1208-1221.

[9] Kothari, C. R. and Gaurav, G. (2014)Research methodology method and techniques, New Age International Publishers, 3rd Edition

[10] Krejcie, R.V. and Morgan, D.W. (1970).*Determining Sample Size for Research Activities*. In Hill, R. (1998). "What Sample Size is 'Enough' in Internet Survey Research"? *Interpersonal Computing and Technology: An electronic Journal for the 21st Century*. Available at: http://www.emoderators.com/ipct-j/1998/n3-4/hill.hmtl

[11] Krizanic, F (2007) *The European market of electricity and natural gas*. EIB forum, Ljuljana.

[12] Lawal, A.A. (2011) Strategic Importance of Nigerian Small and Medium Enterprises:Separating the Reality from the Myth, 22nd

Inaugural Lecture Presented at the Lagos State Polytechnic, Lagos, Nigeria

[13] Legros, G., Rijal, K., & Seyedi, B. (2011) Decentralized energy access and the millennium development goals: an analysis of the development Benefits of Micro-hydropower in rural Nepal.

[14] Meadows, K., Riley, C., Rao, G., & Harris, P. (2003), Modern energy: Impacts on microenterprises, a literature review into the linkages between modern energy and microenterprises. *DFID Project Report No.*KaR-R8145: Department for International Development, UK.

[15] Maleko, G. C. (2005). "Impact of Electricity Services on Microenterprise in rural areas in Tanzania. Published Master's Thesis, University of Twente, Netherlands. Retrieved from http://www.essay.utwente.nl/58510/1/scriptie_G_Maleko.pdf Manufacturers Association of Nigeria (2005): Private Sector/ Consumer Perspective on Electric Power Sector Reform, *April 12*

[16] Mayer-Tasch, L., Mukherjee, M. & Reiche, K. (2013) Productive use of energy- Produce: Measuring impacts of electricity on small and micro-enterprises in sub-saharan Africa. .

[17] National Bureau of Statistics (2012) Survey report on micro, small and medium enterprises (MSMEs) in Nigeria: preliminary report, National MSME Collaborative Survey.

[18] Nkpa, N.(1997) *Educational Research for Modern Scholars*, Enugu, Fourth Dimension Publishing Co. Ltd.

[19] Obasi, I.N.(2000) *Research Methodology in Political Science* ,Enugu, Academic Publishing Co.

[20] OECD (2009) The impact of the global crisis on SMEs and entrepreneurship financing and policy responses, Centre for Entrepreneurship, SMES and Local Development.

[21] Opaleke,J.S.(2012) Correlation between Libarians Adopted Leadership Styles and Staff Job Performance in Nigerian Universities, *Nigerian Journal of Operations Research, INFORN, Vol.2, No.2, pp 137-166.*

[22] Osobase, Anthony O., Bakare-Aremu, Tunde. A (2014) The nexus between electricity generation, supply and manufacturing sector performance in Nigeria (1975-2011), *International Journal of Management Sciences and Humanities Volume 2, Number 2, September* .

[23] Paler-Calmorin, L. and Calmorin L. (2006*) Methods of Research and Thesis Writing*, Quezon City, Philippines, Res Book Store.

[24] Serakan, U. (2000) Research Method for Business: a skill building approach. 3rd Edition, *New York: John Wiley & Son.*

[25] Sirajuddin, O. Muhammad, R & Muhammad, J. (2017) The Effect of Strategic Management Practices on SME Performances in Makassar, Indonesia, *American Journal of Theoretical and Applied Business*. Vol. 3, No. 4, pp. 71-80. doi:10.11648/j.ajtab.20170304.12

[26] Solomon, K. F & Yao, L. (2015) Electricity Power Insecurity and SMEs Growth: A Case Study of the Cold Store Operators in the Asafo Market Area of the Kumasi Metro in Ghana, *Open Journal of Business and Management, 3, 312-325*

[27] Tabachnick, B. G., & Fidell, L. S. (2001). *Using multivariate statistics* (4th edn). New York: HarperCollins.

[28] Tarun, B.K., Uddin, M.D.R. and Mondal, A. (2013) Impacts of Electricity Access to Rural SMEs.*International Journal of Managing Value and Supply Chains*, **4**, 17-28

[29] Trkman, P. (2009) The critical success factors of business process management, International Journal of Information Management, 30 (2), 125-134.

[30] Ukpong, I. (1976). An Analysis of the Causes of Power Shortage in Nigeria, *The Nigerian Journal of Economic and Social Studies, 18*, 34-39.

[31] Wiklunda, J. & Shepherd, D. (2005) Entrepreneurial orientation and small business performance: a configurational approach, Journal of Business Venturing, 20: 1-19

[32] Zainudin, A. (2014) A handbook on SEM, Structural Equation Modeling, 1st ed. Kuala Lumpur, Malaysia: MPWS Rich Resources, Bandar BaruBangi, Selangor.

[33] Zulueta, F.M. and CostalesJr, N.B.(2003) *Methods of Research Thesis Writing and Applied Statistics*,Mandaluyung City, Philippines. National Book Store,