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Impact of Electricity Service Quality on the Performance of Manufacturing SMEs in Nigeria

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ABSTRACT

Purpose: The objective of this paper is to determine the impact of electricity service quality on both financial and non-financial performance of manufacturing Small and Medium Enterprises SMEs in Nigeria.
Design/Methodology/Approach: Survey questionnaire was used to collect data from 201 Managers, Chief executive officers and owner managers of SMEs that are members of Manufacturers Association of Nigeria MAN. Simple regression analysis was done with the use of SPSS version 22.0.
Findings: The results indicate that quality of electricity tends to account for more than 50% of the variances in the financial and non-financial performance of manufacturing SMEs in Nigeria.
Implications/Originality/Value: This paper contributes to the existing literature on the empirical investigation into the use of service quality as a measure of electricity service and also emphasizes the importance of electricity to the performance of manufacturing SMEs in the developing countries. It recommends that future research may consider collecting longitudinal data to eliminate bias related to time.

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1.Introduction

Small and medium enterprises form the largest percentage of businesses including manufacturing sector of many countries (MAN, 2014). SMEs are highly essential for economic development. This is due to their contributions to the economic and social improvement of the nation. Keskin, Senturk, Sungurt, and Kiris, (2010) identifies a number of SMEs contributions to various economies which includes generation of employment at an increasing rate, export promotion and enhancement of entrepreneurship. Ayanda and Adeyemi, (2011) in a research conducted in Nigeria, add that SMEs also assist in reducing poverty, creating wealth and reduction of income disparity through it income distribution role. That is why SMEs are often referred to as the back bone of economic and industrial developments (Saleh & Ndubisi, 2006). .Harmonization of SMEs activities and government policies have been suggested to boost the growth and

development of SMEs (Osotimehin., Jegede, Charles, Akinlabi, Babatunde, Olajide, 2012). Moreover, SMEs contributed close to 50% of Nigeria gross domestic products GDP to the nation's economy and created up 25% of the employment for year 2012 (Elebeke, 2012). Recent declining rate of performance among manufacturing SMEs especially in the developing countries such as Nigeria, calls for concern.

Available literatures indicate that manufacturing sector generally which includes SMEs is facing serious challenges related to service inputs as one of the main obstacles to their performance. The inputs are; transportation services, banking and financial services. Others are electricity and communication services (Datta, 2012; Gado & Nmadu, 2012; Sherazi, Iqbal, & Asif, 2013). However, this paper pays specific attention to electricity service quality. This is because there are indications that inadequate or poor quality of electricity service has over the years constituted a major source of concern to many developing countries including Nigeria (Akuru & Okoro, 2014; Forkuoh & Li, 2015; Fumagalli, Garrone, & Grilli, 2007; Noor & Nasirun, 2013). The consequence of it has not only affected the household customers and the service sector alone, it was also found to have negative impacts on the performance of manufacturing companies (Aliyu, Ramli, & Saleh, 2013; Gado & Nmadu, 2012). Small and medium manufacturing enterprises are the worst affected by the challenges pose by the electricity problems (Aliyu et al., 2013) because it is a major challenge to manufacturing organizations in sub Saharan Africa including Nigeria (Gado&Nmadu, 2012). Electricity supply challenge in Nigeria is such that the per capita electricity consumption is estimated at 125kwh compared to 4500kwh and 1934kwh in South Africa and Brazil respectively. Moreover, a survey conducted indicated that over 93% of manufacturing firms in Nigeria use other independent sources of energy to supplement electricity grid. It also revealed that power outages accounted for between 20% and 49% of capacity underutilization in the country (Adenikinju, 2005).

Little attention has been given to electricity service quality as a factor that is capable of being responsible for variances in the performance of manufacturing SMEs. This paper is an attempt to fill in this gap.

2. Literature Review

2.1 Electricity service quality

Epileptic power supply was found to be one of the major environmental factors retarding the growth of manufacturing companies in Nigeria (Oginni & Adesanya, 2013). Many manufacturing companies have been closed down as a result of poor electricity in Nigeria. For instance, over 50% of the textile industries operating in the North-west zone of Nigeria were out of business due to poor performance partly orchestrated by electricity power failure Between 2007 and 2008 alone (Gado & Nmadu, 2012).

For the purpose of this research, electricity service quality ESQ is described as the availability of adequate electricity supply to manufacturing SMEs for which service providers are to be responsive and reliable. ESQ was conceptualized from two perspectives, responsiveness and reliability. These have been adapted from the work of (Kang & James, 2004)

Responsiveness concerns the extent to which electricity service firmsgive regular attention and promptly respond to any complaint or request concerning damage facilities and customer challenges. Responsiveness is therefore described as the willingness of the service organizations to assist customers in providing the services promptly as well as helping them to resolve challenges that relate to the optimum utilization of the service (Krishnakumar & Baby, 2012). This dimension have been previously used by some scholars to measure electricity service (Satapathy, 2014).On the other hand**,** reliability as a service quality dimension is conceptualized as the ability of service organizations to provide service that meets or exceeds customer expectation based on a predetermined standard related to quality, delivery time, customer relation and error-free record maintenance (Parasuraman, Zeithaml, & Berry, 1994). Reliability in electricity service was conceptualized as the extent to which electricity service providers perform the service accurately such that customers can consistently depend on them (Satapathy, 2014). Electricity customers attach serious importance to reliability of electricity service provided in terms of

both the frequency and duration of outages. They detest long duration and high frequency of outages (Hensher, Shore, & Train, 2014). Based on its relevance therefore, reliability is a taken as an essential service quality dimension in electricity due the positive relationship between the factor and customer perception of the service (Moon, 2013).

2.2 Organizational performance

Researchers and practitioners have been confronted with challenges concerning the conceptual definitions and the measurement of organizational performance generally (Lenz, 1980). These difficulties in the conceptual description of corporate performance are based on a number of reasons. These include variations in focus and lack of clarity in the objectives of the organizations (Morgan & Rego, 2009). Firms are confronted with varying dimensions in performance due to divergent objectives from different stakeholders such as the directors, managers, employees and customers. Firms may have difficulties in conceptualizing the performance of their organizations since the stakeholders in such firms tend to perceive firms performance from different angles based on their individual or group interests (Striteska & Spickova, 2012). To cater for many firm objectives, this study adopted a comprehensive measure of performance that have been simplified into two; financial performance and non-financial performance for the SMEs. This is in line with the works of (Nandakumar, Ghobadian, & O'Regan, 2010; Selvam, Gayathri, Vasanth, Vinayagamoorthi Lingaraja, & Marxiaoli, 2016).

SMEs are described as the independent and non-subsidiary enterprises with upper and lower limits concerning their number of employees and sales turnover (OECD, 2005). The definitions and conceptualization of SMEs varies from one country to the other depending on their level of development and the yards stick being used. The regular upper limit that is mostly associated with SME is 250 employees, as in the European Union. United States for example puts the upper limit for SMEs to include firms with fewer than 500 employees. However, some countries such as Nigeria set the limit at 200 employees (OECD, 2005). This study adopts the definition of SMEDAN, (2013) in which micro size firms are considered as those with less than 10 employees. While those firms that engage between 10 and 49 workers are regarded as small enterprises. Those with workforce that range between 50 and 199 are considered as medium size enterprises and lastly all companies that have staff strength of 200 employees and above as large companies.

2.3 Electricity service quality and organizational performance

Many researches have been conducted by previous scholars to determine the impact of electricity service quality on firm performance. As stated earlier on, performance in this study was measured using two dimensions which include financial performance and non-financial performance.

Financial performance in this context encompasses; return on assets, return on equity, return on sales, current ratio and a host of others. A number of research outcomes indicated that ESQ have impacted negatively on financial performance. For example, Instability of electricity power supply was found to have significant negative relationship with financial performance among 70 manufacturing SMEs in Ghana (Doe & Asamoah, 2014) . However, the sample size used for the research was rather too small. Similarly, a positive correlation was equally found between poor electricity and cost of production among 250 respondents also in Ghana (Forkuoh & Li, 2015). The high cost recorded consequently translated into reduction profit and other financial measures. This paper therefore hypothesized that;

H1: Electricity service quality is positively and statistically related to financial performance of SMEs

Non-financial performance in this study covers; Improvement in long-term performance, avoiding problem areas, capacity utilization and enhancing management development. Past literature indicate that electricity service quality positively impacted on non-financial performance of SME manufacturing firm. For instance Olayemi, (2012) found that poor electricity supply to manufacturing firms lead to drastic fall in the productivity of the firms between 1980 and 2008 in Nigeria. A similar finding gives an indication that unreliable electricity power supply in Ghana was estimated at 10.3 hours per month as which resulted into at least, 44% per cent of production time for micro and small scale industries as a consequence of are redundancy (Braimah & Amponsah, 2012). The finding of Rud, (2012) also suggested that 14% increase

was recorded in the manufacturing output for every unit of standard deviation in the assessment of electrification. Therefore, this study hypothesized that;
H:2 Electricity service quality is positively and statistically significant to non-financial performance of manufacturing SMEs.

3. Research methodology

3.1 Data collection

Nigeria was chosen for this study as a result poor performance in the manufacturing sector of the country (WorldBank, 2017), and the position of the country in Africa in term of population which is over 186 million people as at July 2016, the largest in the continent of Africa and number eight in the world (CIA, 2017). Quantitative survey was utilized among manufacturing companies that constitute members of Manufacturers Association of Nigeria MAN within the southwest geopolitical zone of Nigeria. MAN was selected as the sampling frame because it membership cut across all parts of Nigeria and all sub-sectors of manufacturing companies in the country (MAN, 2014). South-west geo political zone was selected because more than 70% of members of MAN (1227) are within the region (MAN, 2014). The questionnaire was adapted from two different sources (Kang & James, 2004; Nandakumar et al., 2010). The survey instrument was categorized into three sections: Sections one and two covered the respondents' demographic data and electricity service quality, while section three contained non-financial performance, and financial performance related questions.

The questionnaires were distributed through drop-off and collection method. While using this method, the researchers physically dropped the questionnaires with the selected respondents and retrieved them when they have been duly completed. The process was followed up and through it 319 questionnaires were returned out which 313 were found to be adequately completed. Out of which 50 were screened out for having employees above 200, 62 responses were also disqualified because they less than 10 employees and the remaining 201 were used for further analysis. Statistical package for social science SPSS version 20.0 was employed for analyzing the data.

4. The results

4.1 Respondents' profile

The data was collected based on industry classification of the respondents by Manufacturers Association of Nigeria (MAN, 2014). The participating companies were grouped into 10 in line with the kind of products they manufacture. Majority of the participants in this research were males (85%) and most of them (46%) were owner managers. While others were managers, senior managers and chief executives officers of their companies. The age group of the participating companies shows that majority (47%) of them fall within the age bracket of 10 and 19 years. Considering the size these companies, the data indicates that about 64% (178) of were small scale firms while the remaining 36% (73) of them fall into medium scale enterprises. Looking at their industry classifications, results indicates that chemical and pharmaceutical firms had 23.4% (47) which the largest number of respondents, and it was followed by food and beverages sub-sector with about 20% (40) respondents out of the ten sub-sectors. Table 1 below give details description.

Table 1. Respondents' profile

Description	Frequency	Percentage (%)
Gender		
Male	171	85.1
Female	30	14.9
Highest academic qualification		
National Diploma	58	28.9
HND/Degree	38	18.9
Postgraduate qualifications	47	23.4
Academic & Professional qualifications	58	28.9
Job position in the company		
General manager/C E O	9	4.5
Senior manager	23	11.4
Manager	76	37.8
Owner manager	93	46.3
Company age		
Between 10 and 19 years	101	50.2
Between 20 and 29 years	99	49.3
30 years and above	1	0.5
Industry classification		
Chemical and pharmaceutical	47	23.4
Basic metal and iron/fabricated metal products	31	15.4
Domestic/industrial plastic rubber and foam	21	10.4
Pulp paper and paper products/Printing and publishing	14	7.0
Electrical and electronic products	11	5.5
Textiles and leather products	5	2.5
Wood and furniture products	13	6.5
Non-metallic mineral products	5	2.5
Motor vehicles and miscellaneous assembly	14	7.0
Food beverages and tobacco	40	19.9
Number of employees		
Between 10 and 49 employees	128	63.7
Between 50 and 200employees	73	36.3

Source: Field survey

4.3 Preliminary Analysis

Estimation of nonresponse bias was done to add strength to the research outcome concerning validity (Armstrong & Overton, 1977). This study categorized the respondents into two based on their response time. The first group comprised of people who have completed and returned the questionnaires within the first six weeks and they are regarded as the "Early respondents" and they are 125 in numbers. While those that submitted after six weeks are taken as "Late respondents" and there are 76 of them. The output of the independent samples t-test indicates that the equal variance test of significance values for all variables in this study are 0.161 for financial performance, 0.285 for non-financial performance and 0.705 for electricity service quality. They are therefore greater than 0.05 significance level of Levene's test of equality of variance and by implication, response bias is not an issue in this research (Brody et al., 2004).

The common method of estimating internal consistency reliability is the Cronbach's alpha. It is a diagnostic measure of internal consistency which is commonly used in management research (Nandakumar et al., 2010). In this paper, Cronbac's alpha has been used to examine the reliability of the scales and the findings indicate that the three variables have coefficients of .92, .93, .94 respectively which fall within the acceptable region of 0.7 and above (Pallant, 2011). Table 3 below shows the figure for equal variance significance values as well as the Cronbach's alpha coefficient.

Table 3. Internal consistency and independent sample t-test coefficients

The variables	Cronbach's alpha	Levene's test
Electricity service quality	.92	.71
Non-financial performance	.93	.29
Financial performance	.94	.16

This section contains the findings of hypothesis testing for this study. The data have satisfied normality and other conditions that are necessary for parametric techniques as indicated in the previous sections. The analyses of relationship were performed using simple regression technique. The tests were carried out to assess the impact of electricity service quality on financial and non-financial performance of manufacturing SMEs in Nigeria. The regression analysis was conducted in line with the stated hypothesis. Pearson correlation analysis was specifically utilized to offer clear understanding regarding the strengths of the relationship between the variables (Pallant, 2011).

To understand the relationship between the independent and dependent variables for this study, a simple regression analysis was conducted to examine the relationship in the two hypotheses electricity service quality and financial performance (H1) and electricity service quality and non-financial performance (H:2). The results of the regression analysis indicated that hypothesis H:1 is positively significant at level $p < 0.001$. The coefficient of determination R^2 value for ESQ financial performance relationship of 0.509 was found in the model and it implied that 52.7% of variation in financial performance was explained by the independent variable ESQ. This is an indication of a good model fit. The result also shows that the coefficient of the predictor variable ESQ was statistically significant to financial performance at $p < 0.001$ ($\beta = 0.73$, $t = 14.89$, sig = 0.000). Thus, hypothesis 1 is therefore supported.

Similarly, The results of the regression analysis indicated that hypothesis H:2 is positively significant at level $p < 0.001$. The coefficient of determination R2 value for ESQ⇒non-financial performance relationship of 0.544 was found in the model which implied that 54.4% of variation in non-financial performance was explained by the independent variable ESQ. This is also an indication of a good model fit. Table 4 gives a summary of the findings of the regression for the two relationships. The table also shows that the coefficient of the predictor variable ESQ was statistically significant to financial performance at $p < 0.001$ ($\beta = 0.74$, $t = 15.42$, sig = 0.000). Thus, hypothesis 2 is therefore supported.

Table 4. Summary of simple regression of access to finance and financial performance

Variables	SE	t-test	Sig	Remarks
Electricity service quality⇒Financial performance	0.06	14.89	0.000***	Supported
Electricity service quality⇒Non-financial performance	0.06	15.42	0.000***	Supported

***p<0.001, Sig =Significant

4.5 Conclusion and Implication

The findings in this study indicate that electricity service quality tends to be a good predictor of both financial and non-financial performance in the manufacturing sector Small-medium enterprises SMEs based on the perception of CEOs, managers and owner-mangers of manufacturing companies in Nigeria. This is consistent with the previous findings of in which electricity service quality found to be an essential factor that accounted for variances in SME financial performance and non-financial performance (Adenikinju, 2005; Doe & Asamoah, 2014; Forkuoh & Li, 2015; Gado & Nmadu, 2012). It can therefore be inferred that, SME manufacturing firms that have better access to high quality electricity service tend to perform better than those with less. This study, therefore, recommends that manufacturing companies should try to look for more reliable sources of high electricity that is capable of improving their general performance

This paper contributes to the literature on access to finance and performance of manufacturing sector in

developing economies particularly the sub-Saharan Africa. The research is unique in the sense that; selected respondents in the work were drawn from manufacturing companies of various sizes. Unlike most of the previous research works on access to finance that concentrated only on small-medium enterprises with little or no attention paid to the large organizations. It can also serve as input to managers in their decision making that are aimed at improving the performance of their organizations.

This study, however, has its limitations. The first set back is that this study failed to specifically address the likely differences in the nature of technology being used by various SMEs in terms their energy consumption. The nature of the research design and data collection method used cross-sectional design in which case the data was collected within a limited time. As such it does not provide any possible variance in perception of the respondents that may relate to time. The authors recommend that future research to use a longitudinal design to take care of the response bias related to variations in time.

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