Power Outages in Ghana: Did They Have an Effect on the Financial Performance of Listed Firms?

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Abstract- *The paper seeks to find out whether the recent power outages in Ghana had an effect on listed firms. Out of 35 listed firms in Ghana, 25 were purposively chosen as the sample size for the study. The research design was explanatory and employed quantitative methods that enabled comparison of six years trend analysis of firms performance – 'before' and 'during' power outage periods. Key performance indicators measured were Revenue, Profitability and Growth Rate. Findings were that power outages did not have an effect on revenue generation of listed firms and that on the contrary, the firms recorded higher maximum revenues for power outage periods. Again, an average growth rate of 122.26 percent for periods of power outages as against 79.0 percent mean growth rate for periods of consistent power established that power outages did not have an effect on the growth rate of listed firms. However, power outages had an effect on listed firms' profitability and more so, accounted for increases in operational expenditure. Our findings on revenue generation and growth rate are unique in literature but that on profitability confirms earlier studies. We conclude that the effect of power outages on financial performance of listed firms in Ghana is mixed. To investors, we still recommend Ghana as an investment destination since power outages that beset the country were well managed and did not, to a large extent, have a negative effect on firms' financial performance.*

Keywords: *Power outages; Consistent power; Profitability; Revenue; Growth Rate*

1. INTRODUCTION

Power outages in Ghana between 2012 and 2015 were trumpeted and politicized to have had serious negative consequences on industry but the evidence to this was largely anecdotal. Very few empirical evidence has been provided on this. Doe and Asamoah's (2014) cross sectional study and Forkwuoh and Li's (2015)[8] trend analysis, both on Small and Medium-Scale Enterprises (SMEs) indeed established negative impacts of power outages on the enterprises. However, literature on power outages does not show that the phenomenon always has negative effects on industry – in fact sometimes it is believed to be perceptional. This study took on the mantle and used a three year comparative trend analysis of 'before' and 'during' the power outage periods to establish how the 'dumsor' (term coined in Ghana meaning '*off" and 'on'*) and load shedding (local parlance for planned power outages) affected the financial performance of listed firms in Ghana. Power outage occurs as a result of unreliable power supply or interruptions in the power supply to firms (customers) (Singh and Mangat, 2012)[16]. They explain that these interruptions can generally be grouped into two categories - unplanned and planned. An unplanned outage is that which has not been defined, hit customers unaware in a random fashion and results in damaging of equipment and office gargets leading to more losses for business sectors, contextually, listed firms. A planned outage occurs at designated time periods, is scheduled in advance with notification to affected customers and is necessitated for the provider of the power to undertake maintenance and alterations on electrical lines, network or equipment. Also, a planned outage is adopted when the available generation is not sufficient to meet current demand. Scott, Darko, Lemma, and Juan-Pablo (2014)[15] argue that in low and middle income countries, electricity power insecurity to firms can be mitigated by facilitating access to alternative supply sources. This paper measures the effect of the recent power outages on listed firms in Ghana by comparing their revenue generation, profitability and growth rate 'before' and 'during' the power outage period and to make recommendations for potential investors and the energy sector policy makers.

2. REVIEW OF LITERATURE

2.1 Empirical Evidence: Power Outages

Empirical evidence on the effect of power outages on industry is mixed. Some research reveals insignificant effect. Allcott Collard-Wexler, and O'Connellú (2014)[1] provided empirical evidence from India that electricity shortages reduce average output by about five percent, but because most inputs can be stored during outage, productivity losses are much smaller and firm losses are not statistically significant. A research work sponsored by the Department for International Development (DFID) and conducted by Scott et al. (2014)[15] found that

electricity insecurity impacts the productivity of manufacturing SMEs negatively, but these impacts are often statistically insignificant. They concluded that the impacts of power outages on SMEs are not as big a constraint as perceptions suggest and that the perception of these enterprises may be due to the fluctuated nature of the supply and the considerable stress and frustration of coping with electricity insecurity, thereby magnifying the actual impact on firm performance. Hallward-Driemeier and Aterido (2009)[10] contribute that firms that complain most about outages may do so because they experience more outages, not because of the impacts.

Other research provide evidence of negative effect on firm performance. Doe et al (2014) compared average production of SMEs in Ghana when power was consistent against average production when there was power outage and established that output declined during period of power outage and that a fall in production resulted in decreased sales (revenue) and hence profit margins. Again, Forkuoh and Li's (2015)[8] survey of 250 SMEs in Kumasi metropolis in Ghana to determine the effect of electricity insecurity on enterprise growth established that power outages led to loss of sales; the fluctuations damaged assets; operation cost was increased due to the high cost of alternative energy supply and that the combination of these impacted negatively on SMEs' growth. Other empirical evidence revealed negative effects of power outages not directly on performance but in the employment of alternative power sources, and increases in Capital Expenditure (CAPEX) and Operational Expenditure (OPEX). Evidence from Scott et. al. (2014)[15] that surveyed 4,485 selected firms from six countries established that on the average 59.9 percent of them owned a generator as a way of managing approximately an average of six hours power outage. Wang (2002)[18] offered that outages increased OPEX in the form of fueling generator plants, overtime pay to staff and outsourcing service and that the employment of alternate power supply had a damming effect on the growth of the SMEs, since most of the revenue meant for reinvesting were absorbed into additional OPEX due to power outages. Moyo (2012)[13] offered that in general, power outages seem to affect small firms more than large firms probably because large firms are easily able to provide for alternative source of energy. Fisher-Vanden, Mansur, and Wang (2013) show that when shortages become more severe, Chinese firms purchase more energy-intensive inputs, but they do not self-generate more electricity.

2.2 Theoretical Issues

The balanced scorecard theory by Kaplan and Norton (1992)[11] is employed to explain listed firms performance 'before' and 'during' power outage periods. The theory measures performance using critical Key Performance Indicators (KPIs) from the financial, customer, internal and learning and growth perspectives to present both financial and non-financial overall performance in organizations. This paper's financial perspective's critical KPIs are Revenues, Profitability and Growth rate. *Revenue* (sales, turnover) in this paper refers to the income firms generate from sale of goods or services, or any other use of capital or assets, associated with the main operations of an organization. It is shown usually as the top item in an income (profit and loss) statement from which all charges, costs, and expenses are subtracted to arrive at net income. The revenue used for analysis was the total from the annual financial statements of the selected companies. *Profitability* has been measured and proxied in different ways in different publications. In this paper, Earnings before Interest and Tax (EBIT) was used as the proxy for profitability. In accounting and finance, the EBIT is a measure of a firm's profit that includes all expenses except interest and income tax expenses. The EBIT was measured as the difference between Total Revenue and Total Operating Expenses taken from the annual financial statements of the 25 listed firms: TOTAL REVENUE – TOTAL OPERATING EXPENSES …………**(1)**. *Growth Rate* is a measure that determines the amount of change at which a company's sales and assets can grow over a period of time given the company's strategy and prevailing economic environment. This KPI was selected to assess the average growth rate of sampled firms when they had consistent power preceding the power outage period (Period A) and during the period of power outages (Period B). The formula employed to calculate the growth rate was one of the firm valuation models explained as: GROWTH RATE = REINVESTMENT RATE (RRate) **x** RETURN ON CAPITAL (ROC)….**(2)**

Where: RRate =

$$\text{RRate} = \frac{net\ capital\ expenditure - depreciation + change\ in\ working\ capital}{EBIT\ (1 - tax\ rate)}$$

…….**(2A)** and

$$\text{ROC} = \frac{\text{Net profit}}{\text{Capital}} \quad \dots \textbf{(2B)}$$

3. METHODOLOGY

The research was a comparative analysis of two periods of different electricity power supply (i) Period A of consistent power and (ii) Period B of power outages in order to determine the effect of power outages on financial performance of listed firms in Ghana. With a small population of 39 equities listed on the Ghana Stock Exchange (GSE) (www.gse.com.gh, 2014), the Sample Survey Calculator (Fluid Survey, 2014)[7] provided a random sample size of 34. However, financial reports were retrieved for only 25 of them (www.gse.com.gh and annualreport.com) and of these, thirteen (13) were manufacturing, two (2) were distribution and ten (10) were service organizations. The research design was explanatory however, descriptive statistics were used first to quantitatively assess the effect of the outages on the firms before employment of inferential statistics to establish associations and test hypothesis. According to

Creswell (2008), quantitative research helps in explaining phenomena by collecting numerical data that are analyzed using mathematically based methods. The dependent variables measured were revenue, profitability and growth rate with corresponding independent variables of 'before' and 'during' power outage periods. Even though primary data is considered as credible testimony and accurate descriptions of past events, secondary data was used and Ghauri, (2005) [9]argues that it saves time and is much less expensive while Fàbregues (2013)[4] adds that it helps in generating new insights from previous analyses. The data was gathered in two parts - Period A (Consistency power: 2009 – 2011) and Period B (Power outages: 2012 – 2014). For each period, three consecutive years of data points were selected for each firm, producing a total data point (N =75) which were fed into SPSS for analysis. Particularly, for the growth rate, values for the 25 firms were manually computed (see appendix 1) using the formula stated under literature review before entries into SPSS for analysis.

4. DATA ANALYSIS

The Statistical Package for Social Sciences (SPSS) version 20 (2012) was used to analyze data Both descriptive (measures of central tendency and dispersion) and inferential analyses were conducted on the data. Our sample size comprised heterogeneous firms both in size and different economic activities (see methodology) and to enable comparison, mean values were used in conjunction with standard scores to ensure standardization of the standard deviation values (Singleton and Strait, 2005). The descriptive analyses were followed by the use of paired samples correlations to establish associations among the variables and furthermore, the acceptance or rejection of the hypothesis construed. Three hypotheses were formulated based on the performance variables:

H_o: Power outages have effect on revenue generation by listed firms in Ghana.

H_1: Power outages do not have effect on revenue generation by listed firms in Ghana.

H_o: Power outages have effect on profitability of listed firms in Ghana.

H_1: Power outages do not have effect on profitability of listed firms in Ghana.

H_o: Power outages have effect on growth rate of listed firms in Ghana.

H_1: Power outages do not have effect on growth rate of listed firms in Ghana.

5. RESULTS

Results are displayed first on revenue generation, then on profitability and lastly on growth rate.

Table 1. Listed firms' revenue (2009 – 2014)

Variables	N	Mean [GHC]	Std. Deviation
PERIOD 'A'	75	563,492,032	1,734,859,581.76
PERIOD 'B'	75	1,032,946,686	3,027,634,106.16

Source: Secondary Data (2016)

Table 2. Paired samples correlations on revenue

Pairings	Variables	N	Correlation	Sig.
Pair 1	Period 'A' & Period 'B'	75	0.969	0.001

Source: Secondary Data (2016)

From Table 1 the mean revenue for the three years of power outages (Period B) was 1,032,946,686.00 while average profit for the same firms in periods of consistent power (Period A) was 563, 492, 032. In comparison, firms recorded higher revenues during the period of power outages than for the periods of consistency power.

Paired sample correlation employed to find out if any relationship exist between the two periods provide the results (r = 0.969, p < 0.001). This shows a strong positive direct relationship between the two periods and suggests that when there are increases in revenue generation in the period of power outages, there are also corresponding increases in the period of consistent power. With a statistically significant (p< 0.001) the alternative hypothesis is accepted that power outages do not have effect on revenue generation of listed firms in Ghana.

Table 3. Listed firms' profitability (2009 – 2014)

Variables	N	Mean [GHC]	Std. Deviation
PERIOD 'A'	75	105,217,823.33	471,961,736.06
PERIOD 'B'	75	62,295,834.80	798,614,855.02

Source: Secondary Data (2016)

Table 4. Paired samples correlations on profitability

Pairings	Variables	N	Correlation	Sig.
Pair 2	Period 'A' & Period 'B'	75	0.010	0.934

Source: Secondary Data (2016)

From Table 3 the mean profit for the three years aggregated profit for Period A of consistent power was GHC 105,217,823.33 while average profit for the same firms in Period B of power outages was GHC62,295,834.80. In comparison, firms recorded higher profitability during the periods of consistent power than for the periods of power outages. Inferential statistics in Table 4 that considered pairings of the two variables reveal a direct positive association (r = 0.010) such that increases in profits for the two periods move in the same direction even though the similarity is a weak one. Further to this was a p value of 0.934 which was statistically insignificant (being above the 5% margin of error) therefore the null hypothesis that 'power outages have an effect on profitability of listed firms in Ghana' is accepted.

Table 5. Listed firms' growth rate (2009 – 2014)

Variables	N	Mean [%]	Std. Deviation
PERIOD 'A'	75	0.788427	3.4533944
PERIOD 'B'	75	1.222568	4.6118056

Source: Secondary Data (2016)

Table 6. Paired samples correlations on growth rate

Pairings	Variables	N	Correlation	Sig.
Pair 3	Period 'A' & Period 'B'	75	0.344	0.003

Source: Secondary Data (2016)

From Table 5, average growth rate recorded of firms when they experienced power outage (Period B) was 122.26% relative to an average growth rate of 78.84% when the same firms experienced consistent power (Period A). In comparison, firms recorded higher growth rates during the period of power outages than during periods of consistency power. Paired sample correlations in Table 6 produced (r = 0.344) which shows a direct positive association between the growth rate records for the two different periods even though it was weak. The test is statistically significant at a p = 0.003 < 0.05 so the null hypothesis is rejected in favour of the alternate that power outages do not have effect on growth rate of listed firms in Ghana.

6. DISCUSSION

Results showed that firms recorded higher revenues during the period of power outages than for the periods of consistent power. This finding is based on mean values and is therefore not a blanket interpretation of individual firm's performance but subject to the dispersion of firms' revenue values around the mean. The individual firms revenues for the period of power outages were more dispersed at a standard score of 2.1:

$$\frac{Maximum\ Revenue - Mean}{Std\ Deviation} = \frac{17,263,380,000 - 1,032,946,686}{3,027,634,106.162} = 2.1$$

as compared with the 1.0 score for the period of consistent power:

$$\frac{Maximum\ Revenue - Mean}{Std\ Deviation} = \frac{11,336,225,000 - 563,492,032}{1,734,859,581.76} = 1.0$$

This implies that for power outage periods, some revenues were very high and others very low while for power consistent periods values were relatively close to the mean. This result does not corroborate with any of the earlier literature cited and is a new contribution to studies on power outages. The scenario is not seemingly odd because the Balanced Scorecard theory (Kaplan and Norton, 1995) [11]explains that revenue as a financial KPI and analyzed quantitatively is but a fractional perspective of the performance of the entire firm and so other qualitative strategies comprising *efficiency in the firms internal processes* and *knowledge and innovations in its organizational capacities* during power outages could account for the increases in performance. For example, several authors including Singh et al (2012)[16] and Scott et al (2014) [15]offer that when there are planned power outages with notification to customers, affected firms could innovatively mitigate it by facilitating access to alternative supply sources. We contribute that much as such infusion of additional CAPEX could increase revenue they could also have an effect on profitability as discussed below.

The results that firms recorded higher profitability during the period of consistent power relative to power outage periods in Ghana is discussed against the backdrop that the firms' individual profits for the period of consistent power are more widely dispersed with a standard score of 7.4 and is therefore not as representative as the 2.7 standard score for the period of power outages where the individual profits are more closer to the average profit. This finding mimmicks an empirical study of SMEs in Ghana by Doe et al (2014)[3] where it was found that periods of power outage experienced a fall in average production resulting in decreased revenue and hence profit margins. Other extant literature discussed (Wang, 2002[18]; Scott et al., 2014[15]; Forkuoh and Li, 2015)[8] do not reveal power outages effect on profitability but rather on OPEX and offer that during power outage periods, firms expenses grow because they resort to paying workers overtime, and buying and fueling plants and generators. A comparison of the OPEX (mean revenue in Table 1 less profit in Table 3) of this research's two periods *(and holding other factors constant)* confirm these earlier studies that listed firms in Ghana spend twice more of OPEX during periods of power outages (GHC 970,650,852.00) than in periods of consistent power (GHC 458,274,209.00). On growth rate, results showed that listed firms recorded higher growth rates during the period of power outages than during periods of consistency power. Isolating supply of power as the influencing factor, the finding suggest that power outages do not have a negative effect on firms' growth rate but comparatively, improves it. Empirical studies have not been cited in literature on the use of growth rate as a KPI to determine performance of firms during power outage periods and this finding is a pace setter.

7. CONCLUSION

25 listed firms in Ghana were purposively selected to determine the effect of power outages on their financial performance. The research design was explanatory and quantitative methods were employed on secondary data that was analyzed and discussed using the mean values, standard scores and paired sample correlations to accept or reject hypotheses. Findings showed that the effect of power outages on revenue, profitability and growth rate of listed firms was mixed. It was statistically proven that power outages do not have effect on revenue generation or growth rates of listed firms in Ghana. However, power outages have an effect on profitability of listed firms and more so, account for increases in operational expenditure relative to periods of consistent power.

8. RECOMMENDATIONS

To investors, we recommend Ghana still as an investment destination since power outages that beset the country were well managed and did not, to a large extent, have a negative effect on firms' performances. To the energy sector policy makers, we recommend decisions for locally produced alternative power sources to reduce its cost that affect profitability of firms. Individual firms should interpret the findings with caution since average figures were used with some showing large dispersions (reducing reliability of the means) of individual firms' values around the mean.

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