

Economic Implications of Constant Power Outages on SMEs in Nigeria

Udochukwu B. Akuru, *Member, IAENG, IEEE*, Ogbonnaya I. Okoro, *Member, IEEE*, Chibuikwe F. Maduko, and Josephine M. Mbunwe, *Member, IAENG*

Abstract— This paper is concerned with the unabated epileptic power (electric) delivery which is seen to be periodic with a struggling generation capacity and losses-prone inefficient transmission network in Nigeria. Ordinarily, it should mean that only an average Nigerian suffers directly, and only, the burden of this inefficiency, whereby electricity supply to power both household and commercial appliances becomes unpredictable. Yet, further studies have revealed that there is almost no other sector that this ineptitude does not impact indirectly, especially as adverse economic consequences. GDP per Capita versus electrical energy production data for Nigeria and selected countries for the year 2004 served as input parameters which underwent research validation. Small and medium scale enterprises (SMEs) were a case study in this paper. In the end, submissions are that apart from the internal devastating effect on SMEs, constant power outages have a major connection with the recent trends of big companies closing or relocating from Nigeria. To sum up, measures were suggested for improvement.

Index Terms— Energy, GDP, Nigeria, Power outage, SMEs

I. INTRODUCTION

There are quite a large number of resources that find a common ground for comparing energy and SMEs both locally and internationally. However, few of these which somehow have directly highlighted aspects of this present work will suffice in due course.

In the interim, a lot has equally been said with regards to the appalling state of Nigeria's epileptic power sector according to Akuru and Okoro [1]. Energy consumers do not get electricity supplied to them because the local utility companies do not get power transmitted to them from the electric grid. The managers of electric transmission are quick to accuse the generating stations of insufficient generating MW capacity. And as if trading of blames has become routine with each of these sectors, the generating stations either claim they do not get enough gas to power their plants or they turn around and claim that the transmission companies themselves cannot boast of a strong transmission backbone to transmit what is being generated.

Indeed, modern energy services can impact on the development of SMEs to a great extent. Issues that can affect the development of SMEs such as gross undercapitalization, decrepit infrastructural services, high start-up cost, corruption, government indifference, have been identified by Oboh [2].

Manuscript received May 8, 2014; revised August 12, 2014.

Udochukwu B. Akuru is with the University of Nigeria, Nsukka as a faculty member. He is now in Stellenbosch University, South Africa, for his PhD research (corresponding author: +27 71 816 5427; e-mail: udochukwu.akuru@unn.edu.ng).

Ogbonnaya I. Okoro is with Michael Okpara University of Agriculture, Umudike, Umuahia, Nigeria, as a Professor and Dean of College of Engineering and Engineering Technology (e-mail: oiokoro@yahoo.co.uk).

Chibuikwe F. Maduko is in University of Oviedo, Spain undertaking his postgraduate studies as an Erasmus Mundus scholar (e-mail: chibuikwe.maduko@gmail.com).

Muncho J. Mbunwe is with the Department of Electrical Engineering, University of Nigeria, Nsukka. (e-mail: mamajoe12001@yahoo.com).

A particular finding revealed the high cost of providing back-up energy (partly infrastructural) for SMEs which sometimes is as critical as three times the cost of publicly supplied electricity as discussed elsewhere [3, 4].

In Nigeria and perhaps generally, SMEs classification is done on the basis of capital investment and employed labour force while other criteria could be the annual turnover or gross output as mentioned by Anyanwu [5]. Until very recently, energy was rarely cited as one of the problems militating against the development of SMEs in Nigeria and elsewhere.

This study is built on the argument retrieved from [6] that, unlike larger businesses, the establishment and operation of SMEs promotes economic development, which by extension boosts a country's GDP number (see Fig. 1). A separate study by Beck and Demirgüç-Kunt [7] identifies this link (between SMEs and GDP) but could not establish if it is actually responsible for economic growth while another study by Ayyagari and Demirgüç-Kunt [8] presents a decreasing link of 51%, 39% and 16% of GDP being produced by SMEs in high-income, medium income and low-income countries respectively. Elsewhere [9-10], it has been confirmed that SMEs were responsible for pulling the US out of economic slump and can therefore, serve as any other economy's talisman to economic growth. This study is also important because Nigerian SMEs account for some 95 per cent of formal manufacturing activity and 70 per cent of industrial jobs as discussed elsewhere [11].

In moving from an earlier study which demonstrated empirically that no matter how novel the policies or incentives to drive the industrial sector are, if the electricity problem is not fixed, the policy objective of accelerating the growth of the industrial sector may not be realized [12]. In the same vein, this study is conducted with an aim to chart a new course for SME operators in Nigeria to seek alternative sources of energy generation as a means to fight the prevailing economic inhibition that seems to have it webbed in.

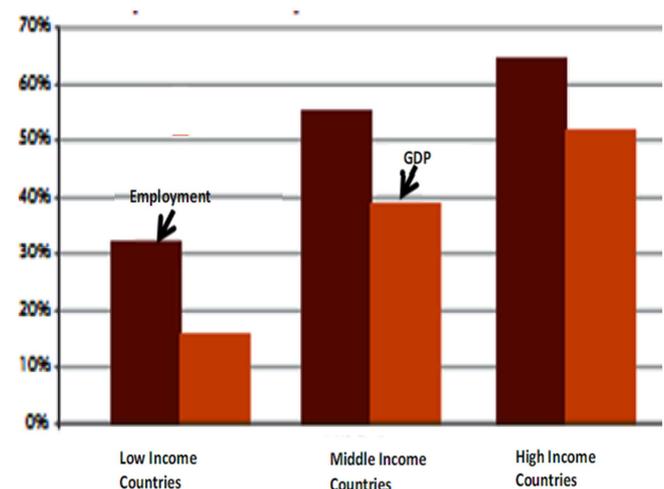


Fig. 1. SME contribution to employment and GDP (median values)
Source: World Bank

It is also anticipated that the federal government will tap into the vital information provided by this research on the overall economic development to set up working mechanisms for the promotion of SMEs. Another important thinking is the fact that it will add to the limited but growing catalogue of research on energy economics in Nigeria. Small businesses can also benefit, to some extent, from the information presented in this study which serves as a guide to alternative viable sources of power generation and even job creation.

For a number of reasons, this study could not give comprehensive details on other possible sectors that can be responsible for the variation of a country's GDP number. It could also not provide sufficient mathematical explanation on the relationship between GDP per Capita and economic development; a very critical comparison in this study. Again, power and energy have been used interchangeably to mean the same thing in the study. It is noteworthy, as portrayed by the trend the work followed in Section 4, that, data for this particular research were more unavailable than limited.

II. TECHNICAL APPROACH

The study employed the tabular information provided by the CIA Fact-book website [13], December 2004 on electrical energy production (and other data) by country. Then combining both the qualitative and quantitative approach of explorative research, the data were captured, retrieved, and analysed accordingly. A comparison was made with electrical energy production for Nigeria and other countries by means of the Gross Domestic Product (GDP), converted to international dollars using the Purchasing Power Parity (PPP) rates and scaled to the 2004 estimate. The study population was Nigeria in particular comparison to nine other countries with a scope of how effectively GDP per Capita (economics) and electrical energy (availability/non-availability) relates with the establishment, operation and survival of SMEs.

The research then sets out to adopt an inductive approach for analyzing the data obtained for a number of countries surveyed alongside Nigeria by closely monitoring their ability to generate a significant GDP value as at 2004. The inductive approach implies that the results were unconventionally traced backwards i.e. moving from specific observations to broader generalisations; supposing that if Nigeria's GDP value measures well, then on a per capita production energy basis, it will be convenient to state that available energy infrastructure needed to power SMEs varies proportionately as reported in IFC [14]. On the other hand, a low GDP output will mean a poor per capita on energy production which further suggests a dearth or decline in structures that encourages small scale business. This generalisation is supported by Vadim [12].

By all standards, nothing can be more suitable to reproduce a deficit in Nigeria's power production record than the chronic epileptic power delivery service conversant with the country's energy grid. This will therefore be a sufficient reason to streamline the results obtained from this study to ascertain whether there is ("or not") a relationship between constant power outage on the economic drive of SMEs to attain national development.

III. ANALYSIS AND RESULTS

Thirty five countries including Nigeria were initially listed and arranged within the class of regions they belong to in an order of declining per capita electricity production corresponding to their GDP values.

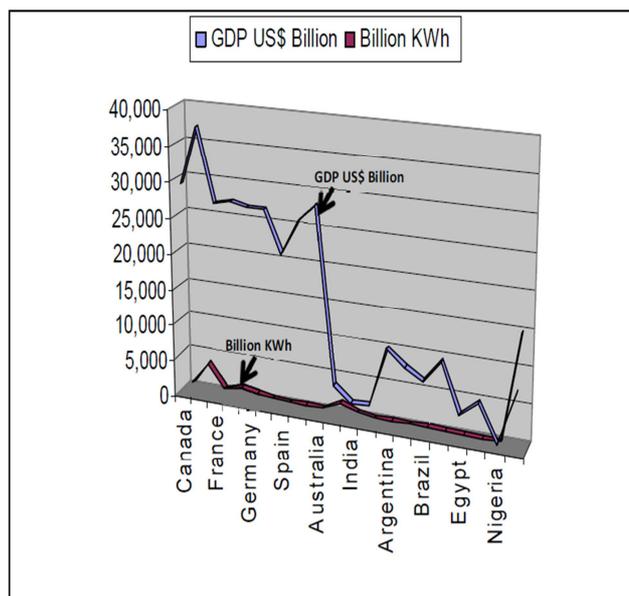


Fig. 2. GDP per Capita vs. electrical energy production by country Source: CIA Fact-book Website, December 2004

Fig. 2 actually represents a graphical fraction from the total number surveyed. The sampled countries chosen were done randomly with no particular reason for their choice other than that the regions mentioned were ably represented. Canada, France, Germany and Spain belong to the G-9 countries, Australia, India is from Australia/Asia-8, Argentina and Brazil represent Latin America-8 while Egypt and Nigeria are from Africa-10.

Now the values compared for the chosen countries were the 2004 GDP per Capita (PPP) in US dollars. Whereas GDP means the total value of goods and services produced in a country over a period of time, GDP per Capita refers to the result obtained when the ratio of this value is made with respect to the total population estimate of the country at that instant.

The GDP per Capita data from Fig. 2 shows that while Australia and the G-9 enjoy, on the average, considerably higher GDP per capita than India, Latin America-8 and Africa-10, notwithstanding their relatively lower population. This is due to their higher capacity to produce electrical energy. On the other hand, as a low-income country, Nigeria compares disproportionately with countries like Argentina, Brazil and another African country – Egypt – all existing in the same economic status.

To a large extent, the position of India as shown in Fig. 2 might be overlooked on the basis that with a GDP per Capita of 3200 and a population size about 8 times that of Nigeria, which is having a GDP per Capita value pegged at 900 as at 2004. Apart from this observation and that of Brazil, amongst the countries that were surveyed, no other country had a population size more than Nigeria.

IV. DISCUSSIONS

Initial findings by Vadim, OECD and Ugwushi [15-17] have revealed that countries like Canada, France, Germany and Spain with higher GDP per Capita values were reckoned to have established good operating conditions as proposed in this study for SMEs to spin off, operate and survive. The predominant question that this section will try to answer is, "How much does Nigeria's GDP per Capita value relates to the original objective of this study?" This is considered as one

basis for the establishment and operation of SMEs serving as a tool for the promotion of economic development in Nigeria. Worth mentioning also, is the extent to which a stable power generation, transmission and distribution structure becomes relevant.

It has been stressed that the lack or decay of infrastructure leads to failure of SMEs. Results from a survey in the UK for high-income country by Ugwushi [17] show that 60% of respondents believe to a little extent that infrastructural inadequacy may lead to SMEs failure while unlike in Nigeria, the same survey led 60% respondents to admit that it is to a very large extent. It also agrees with the findings from other studies [18-20]. In fact, Table 1 sourced from Mambula [20], shows by how much 32 SMEs which were studied, point toward poor infrastructure – vis-à-vis erratic electricity supply – as a major constraint [20].

TABLE I. MAIN GROWTH AND PERFORMANCE CONSTRAINTS OF SMEs IN NIGERIA

Constraint	Number of Respondents (Total=32)	Percentage (%)
Lack of financing	23	72
Poor infrastructure	14	44
Difficulty getting machines and spare parts	13	41
Difficulty getting raw materials	11	34

In a study that was earlier cited in this work [3], firms can indeed incur huge costs on the provision of expensive back-up in order to minimise the expected outage costs; the average costs of this back-up are three times the cost of publicly supplied electricity. Therefore, it can be confidently said at this point that epileptic power supply, which is due to inadequate production and poor transmission from Nigeria’s energy mix, is widely attributable to the growth of SMEs – and this has a complementary economic bearing. Further explanation to this is the possibility of serious consequences on unwary Nigerians who patronize few surviving SME operators, who have other daring means of evading this confrontation. This is in tune with the fact that patronage of SMEs is directly consumer-based according to UNCTD [21].

In order to capture the seriousness of the matter and present a scope on the economic consequences of constant power outages, recent developments have shown that some companies in Nigeria have started relocating elsewhere, especially to neighbouring countries, where power is not only provided constantly, but there is just enough to grant its affordability. Some studies, for instance Mambula [20], show that inadequate infrastructure also affect large companies almost as much as SMEs. Elkan [22] reports that these costs could have been indirectly borne by the government if an efficient system of power infrastructure was provided to these firms. Most large companies, just like SMEs, had to bear heavy costs for the installation and maintenance of infrastructural facilities in Nigeria. In terms of numbers, and according to the Manufacturing Association of Nigeria (MAN), and reported by Mayah [23], 820 manufacturing companies’ closed shop between 2000 and 2008. In a similar instance, MAN again did a survey in January 2010 and Adeloye [24] reported that a total of 834 manufacturing companies closed shop in 2009 alone. This increase is extremely alarming because it surpassed the cumulative 8-year from 2000-2008 value in just a single year (2009). The survey

which usually covers five manufacturing enclave into which the country is divided, in terms of their manufacturing activities, include 214 companies in Lagos downing tools, 176 in the North, 178 in the South-East, 46 in the South-South and 225 in the South-West areas with a summary of the report shown in Fig. 3.

Examples of big companies that have relocated or closed business include Dunlop Nigeria Plc., Coca Cola, Michelin, Cadbury Nigeria Plc., Unilever, Patterson Zochonis (PZ), Guinness Nigeria Plc., International Institute of Tropical Agriculture, OK Foods Group, etc. [23], [25]. Apart from squandering the benefits of goods and services produced and/or rendered by these companies within the shores of the country (Nigeria), in terms of cost and customer utility, it is also painful to mention the indirect loss of millions of earnings by Nigeria to these other countries who have capitalised on these self-induced woes to boost their economy. One survey conducted by the Bank of Ghana revealed that Nigeria was one of its 10 sources of Foreign Direct Investment. To this end, Nigeria placed ninth with a contribution of 2.1 per cent of the GHC1.5 billion invested in Ghana in 2007 [25].

A closer analysis reveals greater overflow of economic implications from the statistics of manufacturing companies closing their businesses in Nigeria. For instance, it was reported by Mayah [23] that the 5% quota that the manufacturing sector contributed to Nigeria’s GDP in 1999 shrunk to 4.9% by 2000 [23]. The current standing quota at 4.19 as at 2009 is depicted in Fig. 4. Also, these huge numbers of closed manufacturing companies in recent times have worsened Nigeria’s growing unemployment rate. An economic analyst, quoted in Adeloye [24], painted a scary picture of it when he was reported to have used a simple calculation to explain the terrible spill-over effect that closing of manufacturing companies have on unemployment generation in Nigeria. His estimation revealed that when a company stops operation, its workforce immediately become frontline victims. Like in the 834 firms submitted by MAN to have down tools in 2009 alone, it can be speculated that not less than 83 400 jobs were lost. This submission is based on the assumption that sampled firms were all medium-size manufacturing firms, with each having at least 100 workers. It becomes scarier when the fact that SMEs account for some 95 per cent of formal manufacturing activity and 70 per cent of industrial jobs is recalled.

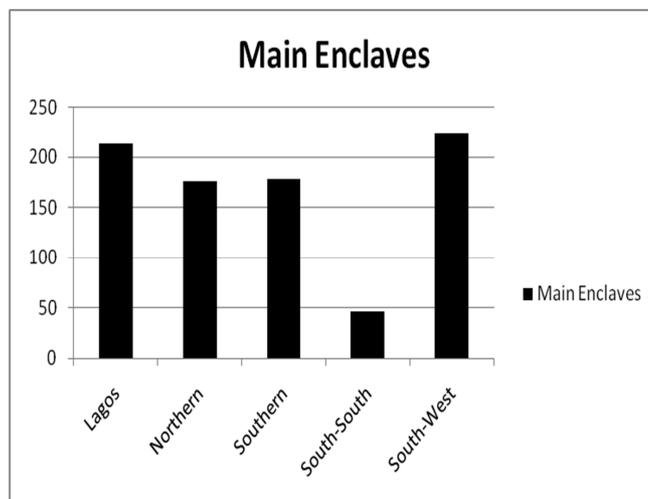


Fig. 3. Summary of MAN’s 2009 survey on closed manufacturing industries in Nigeria

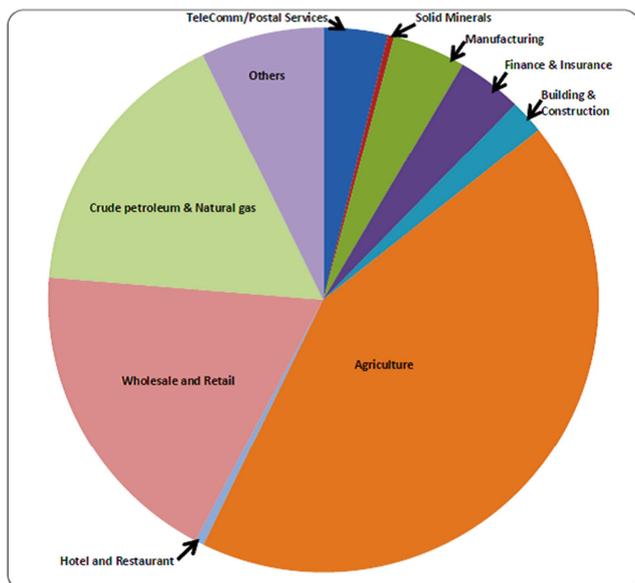


Fig. 4. Contribution of various sectors to Nigeria's GDP in 2009. Source: National Bureau of Statistics Website, November 2010

The pointer in all of the submissions by Mayah, Adeyoye and Daily Trust [23-25] is that poor power supply has been identified as the major factor responsible for these unfortunate trends which carries such great economic repercussions [23]-[25]. Moreover, if big companies fail, small companies will not survive either.

V. RECOMMENDATIONS AND CONCLUSION

Taking advantage of the existence of a track historical record that compares energy with SMEs, the possibility of investigating the effect of Nigeria's epileptic power structure on the economy of SMEs was harnessed. The approach of the study eventually validated this connection by extracting relevant information from the CIA Fact-book website, December 2004 on electrical energy production (and other data) and related studies.

The method of inductive comparison was adopted to answer as to what extent does Nigeria's compared low GDP per Capita results into a poor SME structure with grim economic implications. The results were that since big manufacturing companies and industries are either closing shops or relocating to neighbouring countries where they feel that a more conducive atmosphere for operation exists, SMEs cannot do better as they simply die off as it will be outrageous for them to relocate. Moreover, the trend creates room for unemployment rates to rise. The results arrived at conveniently agree with some past studies with similar propositions.

In summary, the numerical value of Nigeria's GDP as at 2004 (and by all standards, now, because there have been no noticeable improvements) is a consequence of its poor electricity structure and this has affected the development of SMEs, which is considered as a yardstick for economic independence of nations. However, a number of options that can be used to checkmate this unfortunate development exist and are will thus be proposed in this study. For instance, if the Nigerian government should consider the criticality of SMEs as stressed in this work and fast-track programmes on the expansion and optimal operation of the current energy mix; within a very short time frame, these could be measured as an effort towards relief. SMEs villages/clusters can be built to promote industrial activities on the basis that such basic infrastructure like electricity, which is needed for spin-off as

well as for sustainable operation, is collectively and affordably provided by the relevant host authorities to investors and operators. Standalone renewable energy (RE) systems are increasingly getting better than generating sets which still requires expensive and pollution-prone fossil fuels for their operation. Hence, efforts should be made by relevant authorities, tasked with the promotion of SMEs in Nigeria, to facilitate the provision and subsidized costs of procuring these RE systems – some of which are readily available for small-scale use.

On the other hand, these renewable energy systems for small-scale implementation are also easy to install, operate and maintain according to Animalu, Osakwe and Akuru [26]. A serving and practical example is the recent installation of solar PV hybrid-power/entrepreneurship project in the Department of Physics and Astronomy, University of Nigeria, Nsukka [27]. It is a demonstration project which was initiated by the International Centre for Basic Research, Abuja, in active partnership with National Centre for Energy Research and Development, University of Nigeria, Nsukka, in anticipation for a proposed Education Trust Fund (ETF) research grant. Though still at a small-scale testing stage, the long-term expectation is to motivate postgraduate and final year students to study in their class at night during power outages, demonstrate strategy for self-empowerment via entrepreneurship to students after graduation, and also demonstrate possibility for alternative and clean energy provision. In review, an investment in this direction (i.e. the production/marketing of these systems) cannot only be seen as providing solution by tackling the decrepit power sector, but it also serves indirectly to empower Nigerians and provide a long-term approach to sustainable economic and national development.

REFERENCES

- [1] Akuru, UB, and Okoro, OI, (2009), "Sustainable application of solar energy as SMEs in a developing nation," African Journal of Physics Vol. 2, pp. 184-209, ISSN: 1948-0229 CD ROM: 1948-0245 ONLINE: 1948-0237
- [2] Oboh, GAT, (2002), "Bank Participation in the Promotion of Small and Medium-Scale Enterprises," Being a paper presented at the 6th Fellows and Associates Forum of CIBN on 13th April, 2002.
- [3] Adenikinju, AF, (2003), "Electric infrastructure failures in Nigeria: a survey-based analysis on the costs and adjustment responses," in *Energy Policy*, vol. 31, issue 14. November 2003, pp. 1519-1530.
- [4] Essien, OE, (2001), "The role of Development Finance Institutions (DFIs) in financing of Small Scale Industries (SSIs)," Being the Publication of the launching ceremony of the Small and Medium Industries Equity Investment Scheme at Nicon Hilton Hotel, Abuja on 21st August, 2001. Volume 25, No. 3; July/September 2001.
- [5] Anyanwu, CM, (2001), "Financing and promoting small-scale industries: concepts, issues and prospects," Being the Publication of the launching ceremony of the Small and Medium Industries Equity Investment Scheme at Nicon Hilton Hotel, Abuja on 21st August, 2001. Volume 25, No. 3; July/September 2001.
- [6] Retrieved from: <http://rru.worldbank.org/PapersLinks/GlobalResults.aspx>
- [7] Beck, T, and Demirgüç-Kunt, A, (2004), "SMEs, growth & poverty", World Bank, Public policy for the private sector, note 268
- [8] Ayyagari, M, Beck, T, and Demirgüç-Kunt, A, (2003), "Small & Medium Enterprises across the Globe: a new database", World Bank working paper
- [9] Schramm, CJ, (2004), "Building entrepreneurial economies", Foreign Affairs, Jul-Aug pp104-115
- [10] Hoffman, K, (2005), "Enterprise solutions to poverty", Shell Foundation.
- [11] OECD Development Centre: Facts about SMEs in Africa retrieved from, and available as at 12/08/2014: <http://www.evancarmichael.com/African-Accounts/1693/Facts-about-SMEs-in-Africa.html>

- [12] Udah, EB, (2010), "Industrial development, electricity crisis and economic performance in Nigeria", *European Journal of Economics, Finance and Administrative Sciences*, ISSN 1450-2887 Issue 18 (2010) EuroJournals, Inc pp113-115
- [13] CIA Fact-book Website, December 2004. Retrieved from: <http://www.cia.gov>
- [14] IFC (2006), "Micro, Small, and Medium Enterprises: A Collection of Published Data", in Newberry, Derek, (2006), "The Role of Small- and Medium-Sized enterprises in the Futures of Emerging Economies" *Earth Trends 2006*, World Resources Institute under a Creative Commons License.
- [15] Vadim, K, (2007), "Small and Medium Enterprises and ICT", United Nations Development Programme – Asia-Pacific Development Information Programme (UNDP-APDIP) and Asian and Pacific Training Centre for Information and Communication Technology for Development (APCICT) Keen Media (Thailand) Co., Ltd. Printed in Thailand pp. 3-8
- [16] Organisation for Economic Co-operation and Development (OECD) 2000. *Small and Medium-sized Enterprises: local Strength, global reach*, OECD Policy Review, June, pp. 1-8.
- [17] Ugwushi, BI, (2009), "SMEs key failure factors: a comparison between the United Kingdom and Nigeria", *Kamla-Raj 2009 J Soc Sci*, 18(3): 199-207
- [18] Adenikinju, A, (2005), "Analysis of the cost of infrastructure failures in a developing economy: The case of the electricity sector in Nigeria", *African Economic Research Consortium (AERC)*, Research Paper 148.
- [19] Onugu, BAN, (2005), "Small and Medium Scale Enterprises (SMEs) in Nigeria: problems and prospects", Being a dissertation submitted to the St. Clements University in partial fulfilment of the requirements for the award of the degree of doctor of philosophy in management St. Clements University, Lagos, Nigeria.
- [20] Mambula, C, (2002), "Perceptions of SMEs growth constraints in Nigeria (Global Perspective)", *Journal of Small Business Management* Retrieved from: <http://www.allbusiness.com/finance/114817-1.html>
- [21] United Nations Conference on Trade and Development, UNCTD (2005), "Improving the competitiveness of SMEs through enhancing productive capacity", *Proceedings of Four Expert Meetings*, United Nations, New York, Geneva
- [22] Elkan, W, (1995), "An Introduction to Economics", London: Prentice Hall.
- [23] Mayah, E, (2010), "Nigeria to witness Rujugiro's success story," *Daily Sun Newspapers*, Saturday, October 30, 2010.
- [24] Adeloye, L. (2010), "Harsh operating environment claims 834 Nigerian manufacturing companies – investigation," *Sunday PUNCH Newspapers*, Sunday, 31 October, 2010.
- [25] Daily Trust (2010), "Why companies will continue to leave Nigeria for Ghana" Retrieved from: <http://newsstandng.com/news/singleNews.php?id=7324>
- [26] A.O.E. Animalu, E.N.C. Osakwe and U.B. Akuru (Eds.), "Solar & Renewable Energy Company (Nig.) Ltd; Meeting R&D Commercialization Challenge," SNAAP Press (Nig.) Ltd, Enugu, 2009, ISBN: 978-049-976-8
- [27] Onuk, O.E., Akuru, U.B., Animalu, A.O.E., Unachukwu, G.O. and Oparaku, O.U. "Utility interactive solar PV energy demonstration project at the University of Nigeria, Nsukka," *African Journal of Physics* Vol. 4, pp. 104-111, (2011) ISSN: 1948-0229 CD ROM: 1948-0245 ONLINE: 1948-0237