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Electricity Infrastructure and the Sustainability of Small Enterprises in Lagos State, Nigeria

Nnamdi Nnabuihe Onyenandu, Timothy Oladele Ishola and Ama Aka Udu
Department of Business Administration, National Open University of Nigeria, Abuja, Nigeria
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Abstract

Electricity infrastructure is a cornerstone of modern economies, fostering development and enhancing living standards globally. In Lagos State, Nigeria, small enterprises grapple with persistent challenges, including frequent power outages, high electricity costs, generator dependence, and insufficient government policies. This study investigated the influence of electricity infrastructure on the sustainability of small enterprises in Lagos State. The research assessed how power generation capacity, transmission and distribution networks, and backup power systems impact small enterprises' sustainability. A survey research design was adopted, utilising both primary and secondary data sources. The population comprised 42,067 small enterprises, and a sample size of 331 was determined using the Taro Yamane (1967) formula. Data was collected using a researcher-designed questionnaire and analyzed with SPSS version 25. To ensure reliability, a pilot study was conducted in Abuja with 33 participants, yielding a Cronbach's Alpha coefficient of 0.84, indicating high reliability. Validity was verified through expert reviews by two supervisors and a university lecturer. Data collection was conducted through face-to-face administration of the questionnaire. Analytical methods included mean scores, standard deviations, and regression analysis, while Pearson's correlation was used to test the hypotheses. The findings demonstrated significant positive relationships between electricity infrastructure components and the sustainability of small enterprises. Power generation capacity ($\beta = 0.514$, $p < 0.05$), transmission and distribution networks ($\beta = 0.493$, $p < 0.05$), and electricity infrastructure maintenance ($\beta = 0.529$, $p < 0.05$), were found to significantly contribute to enterprise sustainability. The overall model (Adjusted $R^2 = 0.946$; $F(7,280) = 956.225$, $p < 0.05$) showed that these variables explained a substantial portion of the variance in small enterprises' sustainability. The study concluded that robust electricity infrastructure is essential for the sustainability of small enterprises in Lagos State. It recommended the adoption of predictive maintenance and condition-based monitoring to enhance reliability and efficiency. Further research was also suggested to investigate the role of energy storage systems in stabilising electricity supply and integrating renewable energy sources into Nigeria's energy mix.

Keywords: Electricity Infrastructure, Small Enterprises, Sustainability

Introduction

Electricity infrastructure is a critical driver of economic growth, development, and improved living standards in modern economies. Reliable and affordable electricity access enables businesses to operate efficiently, enhances productivity, and supports innovation (World Bank, 2019). In developing countries like Nigeria, the electricity sector often faces significant challenges, including inadequate infrastructure, irregular power supply, and policy inconsistencies, which hinder sustainable economic growth (Aliyu, *et al*, 2017). Small enterprises are particularly vulnerable to the inefficiencies of electricity infrastructure. These businesses often rely on stable electricity to power machinery, refrigeration, lighting, and other operational needs. However, in Lagos State, small enterprises are plagued by frequent power outages, high electricity tariffs, and dependence on costly alternative energy sources like diesel generators, which increase operational costs and reduce competitiveness (Akinwale, *et al.,* 2019).

The relationship between electricity infrastructure and small enterprise sustainability has been the subject of various studies. For instance, Okafor (2018) highlights that unreliable electricity is a significant barrier to the growth of small businesses in Nigeria. Similarly, Adedeji and Kehinde (2019) found that high energy costs and poor electricity supply significantly impact the profitability and survival of small enterprises in urban areas. Lagos State, Nigeria's commercial hub, serves as a case study for understanding these challenges. The state's small enterprises contribute significantly to economic development and job creation but remain constrained by electricity-related challenges (Olawale & Garwe, 2020). Addressing these issues is crucial for fostering sustainable development and improving the overall business climate in Lagos.

Nigeria's electricity sector has long struggled with systemic inefficiencies. According to the Nigerian Electricity Regulatory Commission (NERC, 2020), only about 60% of the population has access to electricity, and even those connected to the grid often experience intermittent supply. This erratic power supply has been linked to poor maintenance of infrastructure, underinvestment in the power sector, and an over-reliance on non-renewable energy sources such as gas and oil (Eberhard *et al.,* 2016). The inability of the national grid to meet demand has led many businesses to seek alternative energy sources, further increasing operational costs and reducing competitiveness.

Small enterprises, which constitute over 90% of businesses in Nigeria, are particularly susceptible to these challenges. Igbokwe-Ibeto, *et al* (2016), point out that the survival of small enterprises in Nigeria is heavily dependent on infrastructural support, with electricity being a pivotal factor. These enterprises play a vital role in job creation, poverty alleviation, and economic diversification, making their sustainability crucial to the overall economic health of Lagos State and Nigeria as a whole.

The reliance on generators as a substitute for unreliable grid power further compounds the problem. Research by Ohiare (2015) indicates that the high cost of diesel, coupled with the environmental and health impacts of generator usage, poses a significant burden on small enterprises. These challenges have created a pressing need for effective policy interventions and investments aimed at improving electricity infrastructure. While some progress has been made

through reforms such as the privatisation of the power sector in 2013, its impact has been limited, as many areas, including Lagos, still experience power shortages (Adoghe *et al*., 2019). This has sparked interest in exploring decentralized energy solutions, such as solar mini-grids and energy efficiency programs, as potential alternatives to enhance electricity reliability for small enterprises (Bala *et al.,* 2020).

Given the importance of electricity infrastructure to the sustainability of small enterprises, this study aims to analyze the challenges and opportunities in Lagos State. This study, therefore, seeks to explore the interplay between electricity infrastructure and the sustainability of small enterprises in Lagos State, to identify solutions to enhance their resilience and productivity.

Objectives of the Study

The main objective of this study was to investigate the impact of electricity infrastructure on the sustainability of small enterprises in Lagos State Nigeria.

The specific objectives of the study were:

7. To assess the effect of power generation capacity on small enterprises' sustainability in Lagos State Nigeria.
8. To determine the effect of transmission and distribution networks on small enterprises' sustainability in Lagos State Nigeria.
9. To ascertain the effect of electricity infrastructure maintenance on small enterprises' sustainability in Lagos State Nigeria.

Literature Review

Conceptual Framework

The conceptual framework represents the relationships between the variables, and it is presented in a way that will be clear and easy to understand. It may be a simple flowchart or a diagram with boxes and arrows as shown below.

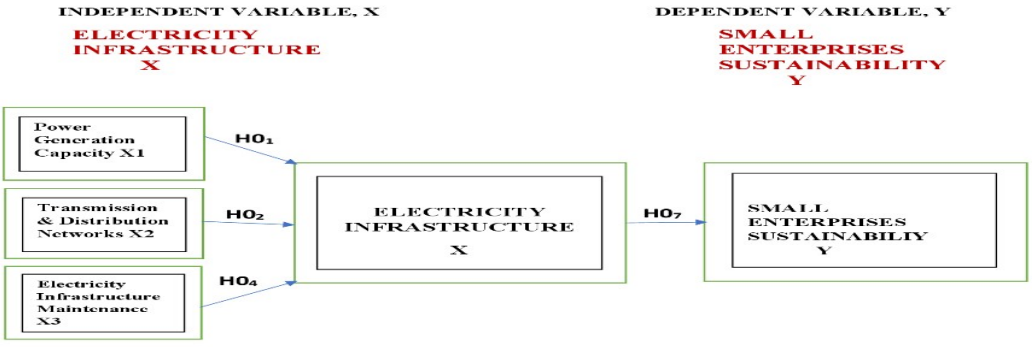

Figure 1: Conceptual Framework Showing the Relationship Between Independent and Dependent Variables

Source: Author's Design (2024)

Electricity infrastructure plays a pivotal role in the economic development and sustainability of small enterprises. In recent years, researchers have explored the relationship between electricity supply and the performance of small businesses, particularly in developing economies. This review examines key findings on electricity infrastructure and its impact on small enterprise sustainability, in Lagos State, Nigeria.

The inadequacies in Nigeria's electricity sector have been widely documented. Eberhard *et al*, (2016), highlights the country's electricity. The authors note that despite efforts to reform the sector, challenges such as underfunding and corruption persist. Similarly, Oyedepo et al. (2021) argue that the reliance on an ageing grid system and inadequate investment in renewable energy sources exacerbate the energy crisis, directly affecting businesses dependent on consistent power.

Small enterprises are disproportionately affected by unreliable electricity infrastructure due to their limited financial and operational capacity to adapt. Adedeji and Kehinde (2019) found that frequent power outages lead to increased operational costs, as businesses resort to generators to maintain productivity. This aligns with the findings of Akinyemi et al. (2020), who observed that high electricity tariffs and generator maintenance costs significantly reduce the profit margins of small businesses in Lagos State.

Recent studies have emphasized the potential of alternative energy solutions in mitigating electricity challenges for small enterprises. Ohiare (2015) highlights the growing adoption of solar energy as a cost-effective and sustainable alternative for small businesses in Nigeria. Bala et al. (2020) suggest that mini-grids and energy-efficient technologies could offer reliable power solutions, particularly in urban hubs like Lagos. However, the high initial investment costs and limited government incentives remain significant barriers to widespread adoption (Abdullahi & Sadiq, 2021).

Policy inconsistencies and inadequate regulatory frameworks have also been identified as critical barriers to improving electricity infrastructure in Nigeria. According to Okoro *et al*. (2022), the privatization of the power sector has yielded limited results due to weak enforcement of contracts and a lack of transparency in governance. In their study, they emphasize the need for targeted policies that address the unique energy needs of small enterprises. Similarly, Onuoha and Okezie (2023) advocate for public-private partnerships to drive investments in renewable energy and modernize Nigeria's electricity grid.

Lagos State, being Nigeria's commercial hub, presents a unique context for studying the interplay between electricity infrastructure and small enterprise sustainability. Olawale and Garwe (2010) note that the state's high concentration of small businesses makes it a vital area for understanding the broader implications of electricity challenges. Recent research by Adepoju *et al.* (2023) reveals that while Lagos has made strides in promoting energy efficiency, the lack of reliable electricity remains a major impediment to the growth of small enterprises.

The socioeconomic impact of unreliable electricity on small enterprises extends beyond financial losses to broader implications for employment and community development. Igbokwe-Ibeto et al.

(2016), highlights that the inability of small enterprises to sustain operations due to frequent power outages often results in job losses and reduced income for employees.

Moreover, Ajayi *et al*. (2021) argue that reliance on generators for alternative power contributes to environmental degradation and public health challenges. They emphasise that the proliferation of generator uses increases carbon emissions and noise pollution, adversely affecting businesses and the communities they serve. Several studies have explored the financial implications of inadequate electricity infrastructure for small businesses. Oladokun and Aina (2022) found that small enterprises in Lagos State spend an average of 20-30% of their operating budget on energy-related expenses, significantly higher than global averages for similar businesses. The study highlights such high energy costs to reinvest in growth and innovation.

In productivity, Adeola and Awoyemi (2022) observed that unreliable electricity supply disrupts production schedules, reduces working hours, and limits the ability of businesses to meet customer demands. This unpredictability often leads to loss of customer trust and market share, particularly for businesses operating in competitive sectors.

While the challenges faced by small enterprises in Lagos are unique, comparative studies provide valuable insights. For instance, Khan et al. (2021) examined the impact of electricity reforms in South Asia and found that targeted subsidies and micro-grid initiatives significantly improved electricity access for small businesses. These findings suggest that similar approaches could be adapted to the Nigerian context to enhance electricity reliability for small enterprises.

Despite the extensive research on electricity infrastructure and small enterprise sustainability, several gaps remain. First, there is a need for more localised studies that explore the specific energy needs of different types of small businesses in Lagos State. Second, while alternative energy solutions have been proposed, few studies have investigated the long-term economic viability of these options for small enterprises. Finally, more research is required to understand the role of emerging technologies, such as smart grids and energy storage systems, in addressing electricity challenges in Nigeria.

Methodology

The study adopted a survey research design. This research method was considered appropriate for the study because of the large population. The population of this study was Forty-Two Thousand and Sixty-Seven (42,067) small enterprises; been officially registered small enterprises in Lagos State Nigeria (SMEDAN, 2021). The sample size of this study was 331 respondents comprising CEOs and business owners from the 42,067 small enterprises in Lagos State using simple random samplings.

The sampling technique refers to the method or approach used to select a subset of individuals or elements from a larger population for inclusion in a research study. The goal of sampling is to obtain a representative sample that accurately reflects the characteristics of the entire population, allowing researchers to make inferences and draw conclusions about the population based on the data collected from the sample (Horvitz, 2015).

Table 2: Population and Sample Table for Small Enterprises in Lagos State Nigeria

State	Population Of Small Enterprises	Per cent	Sample For Small Enterprises
Lagos	42,067	100	331
Total	**42,067**	**100**	**331**

The study sample size is three hundred and thirty-one (331) Small Enterprises across Lagos State Nigeria.

The method of data collection includes surveys, interviews, and document analysis to gather comprehensive and diverse data. The combination of surveys, questionnaires, interviews, and document analyses is a comprehensive and multi-faceted approach to data collection. Quantitative data from surveys will provide numerical information and statistical analysis, while qualitative data from interviews will offer rich, detailed insights into the lived experiences and perceptions of the participants. Document analysis will supplement and validate the primary data, providing a broader context for the study.

Data Analysis and Results

The data collected was analyzed by descriptive and inferential statistical techniques. Demographic data as well as the responses of the respondents were presented using tables. Descriptive data analysis used percentages, means and standard deviation. Inferential statistics was applied for the analysis of the data related to other constructs in the study. Pearson correlation tool was used to test for the relationship between each element of electricity infrastructure and Small Enterprises Sustainability, while a multiple regression tool was used to test for the contribution of electricity infrastructure elements on small enterprises' sustainability in Lagos State, Nigeria using Statistical Package for Social Sciences (SPSS) software version 25 was used to analyze all data generated.

Data Presentation

331 copies of the questionnaire were distributed to the respondents by the researcher and returned. 23 was rejected due to the erroneous fill. Analysis was performed on 308 copies. This indicated an approximately 93.0% overall response rate.

Table: Response Rate

Responses	Frequency	Per cent %
Completed usable copies of the questionnaire	308	93.0
Unusable, unreturned, and disqualified questionnaire	23	7.0
Total	331	100

Source: Researcher's Field Survey, 2024

Demographic Data of Respondents

Based on the receipt of the questionnaire from the respondents, an analysis of their demographics was completed. This information is shown as follows in Table 4.1.1:

Table: Demography of Respondents

Variable	Item	Frequency	Percentage (%)
Gender	Male Female	172 159	52 48
Age bracket	18-28 29-39 40-49 50-59 60 Above	74 47 139 56 15	22.4 14.2 42.0 16.9 4.5
Personnel Cadre	Supervisor Manager G/Manager Director	49 54 124 104	14.8 16.3 37.5 31.4
Educational Qualification	PhD M.Sc. B.Sc. ND O/L	76 29 112 90 24	23.0 8.8 33.7 27.2 7.3

The demographic profile of the respondents was investigated using descriptive analysis (see Table 4.2). In this survey, male employees (52%) outnumbered female employees (48%) by a substantial margin. The workers who accounted for most respondents (42%) ranged from 40 to 49. First-degree holders fared best (33.7%), followed by General Manager Employees (37.5%), in terms of results.

On a five-point Likert scale, respondents were asked to indicate how much they agreed with the listed items explaining the variables using Strongly Agreed=SA (5), Agreed=A (4), Neutral=N (3), Disagreed=D (2), and Strongly Disagreed=SD (1).

Research Question One: To what extent does the power generation capacity affect small enterprises' sustainability in Lagos State Nigeria?

Table: Effect of power generation capacity on small enterprises sustainability in Lagos State Nigeria.

S/N	Item	SA 5	A 4	N 3	D 2	SD 1	$\bar{X}$	StD	Decision

1.	Production schedules are disrupted due to low power generation capacity.	103	78	53	48	49	**3.36**	**0.60**	Agreed
2.	The quality of products and services is affected due to low power generation supply.	101	89	71	35	35	**3.60**	**0.52**	Agreed
3.	Most small enterprises struggle to meet up with daily operational schedules.	91	102	81	24	33	**2.97**	**0.80**	Agreed
4.	Overall business performance is negatively affected because of low power supply capacity.	119	105	63	21	23	**3.17**	**0.52**	Agreed
	$\bar{X}$/StD						**3.28**	**0.61**	**Agreed**

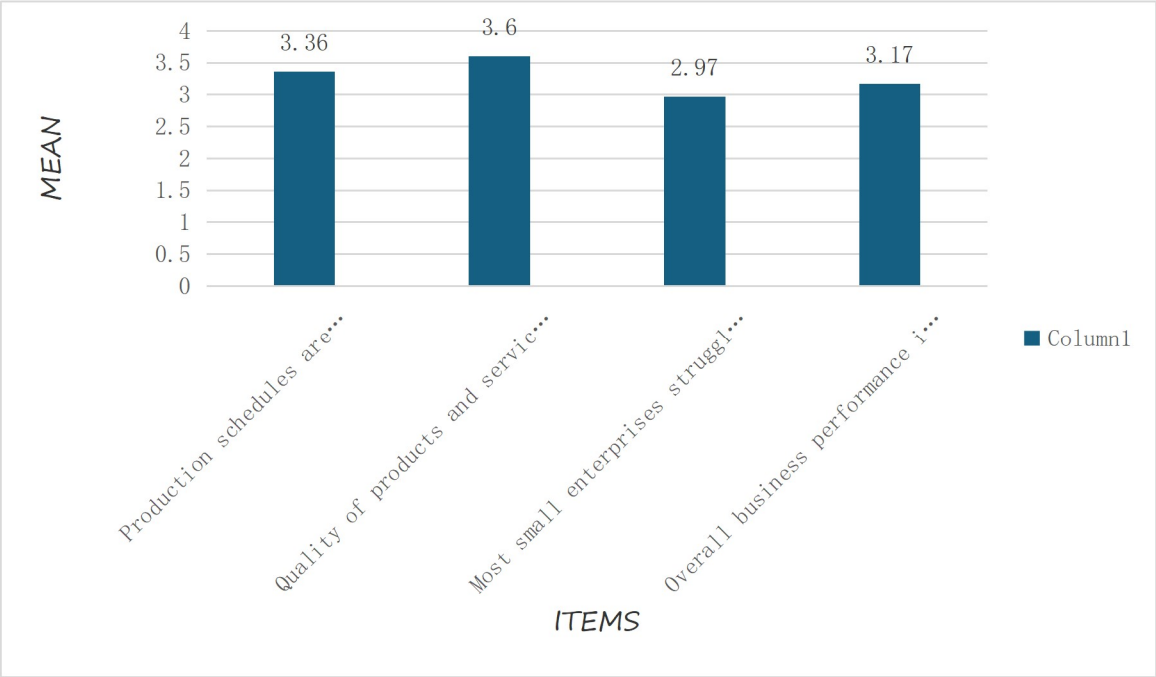

Figure 8: Effect of power generation capacity on small enterprises sustainability in Lagos State Nigeria.

Research Question Two: To what extent does the transmission and distribution networks affect small enterprises sustainability in Lagos State Nigeria?

Table: Effect of transmission and distribution networks on small enterprises sustainability in Lagos State Nigeria.

S/N	Item	SA 5	A 4	N 3	D 2	SD 1	$\bar{X}$	StD	Decision
5.	There is poor product and service delivery due to weak transmission and distribution networks.	118	114	54	20	25	**3.15**	**0.60**	Agreed
6.	There is customer dissatisfaction due to transmission and distribution network issues.	145	69	39	26	52	**3.31**	**0.52**	Agreed
7.	The government provides support to small enterprises because of the failure of transmission and distribution networks.	20	20	65	136	90	**2.49**	**0.78**	Disagreed
8.	Some small enterprises relocate to other regions due to weak power supply networks.	95	129	73	24	10	**3.12**	**0.58**	Agreed
	$\bar{X}$/StD						**3.17**	**0.62**	**Agreed**

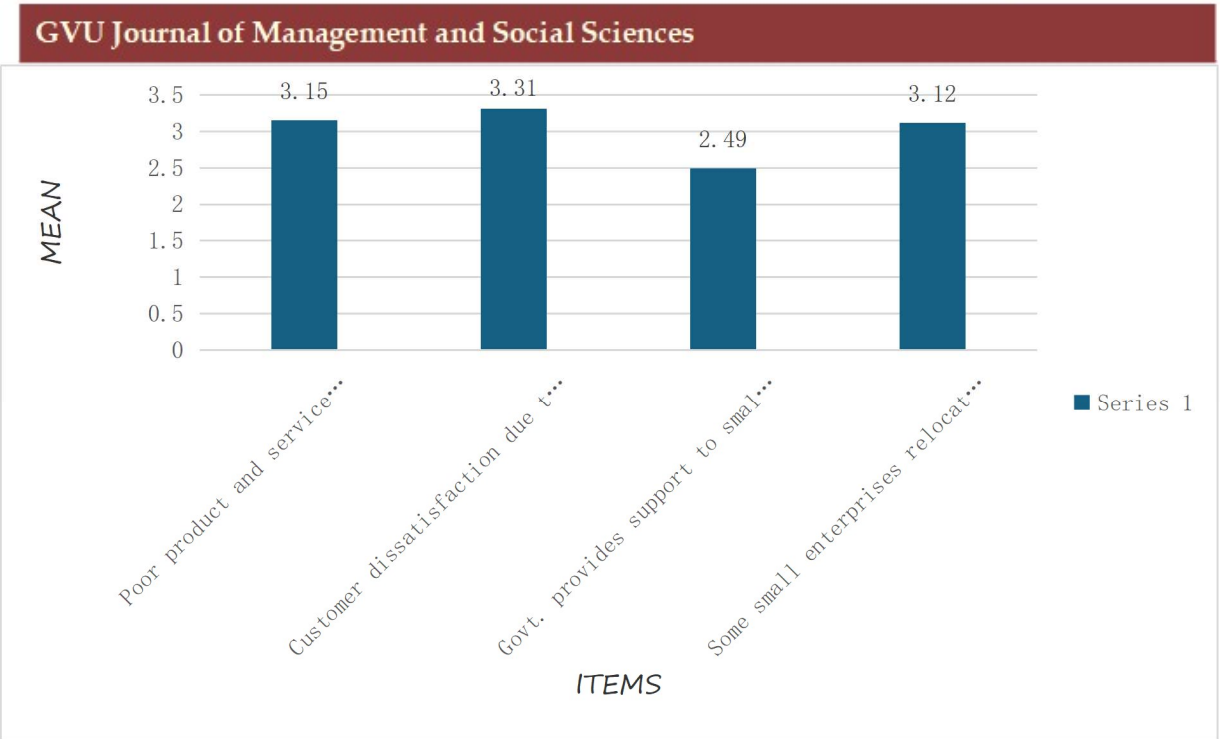

Figure 9: Effect of transmission and distribution networks on small enterprises sustainability in Lagos State Nigeria.

Research Question Three: To what extent does the effect of electricity infrastructure maintenance affect small enterprises sustainability in Lagos State Nigeria?

Table: Effect of electricity infrastructure maintenance on small enterprises sustainability in Lagos State Nigeria.

S/N	Item	SA 5	A 4	N 3	D 2	SD 1	$\bar{X}$	StD	Decision
13.	Daily operations are interrupted during electricity infrastructure maintenance.	90	116	80	30	15	**3.30**	**0.67**	Agreed
14.	Small enterprises face more pronounced challenges due to poor electricity infrastructure maintenance.	99	117	81	19	15	**3.50**	**0.55**	Agreed
15.	There is idle time during repairs and maintenance of failed power supply components.	92	88	44	55	52	**2.99**	**0.70**	Agreed

16.	Most small enterprises lack long-term production planning as result of uncertainty caused by power supply disruptions.	104	92	39	53	43	**3.12**	**0.62**	Agreed
	$\bar{X}$/StD						**3.23**	**0.64**	**Agreed**

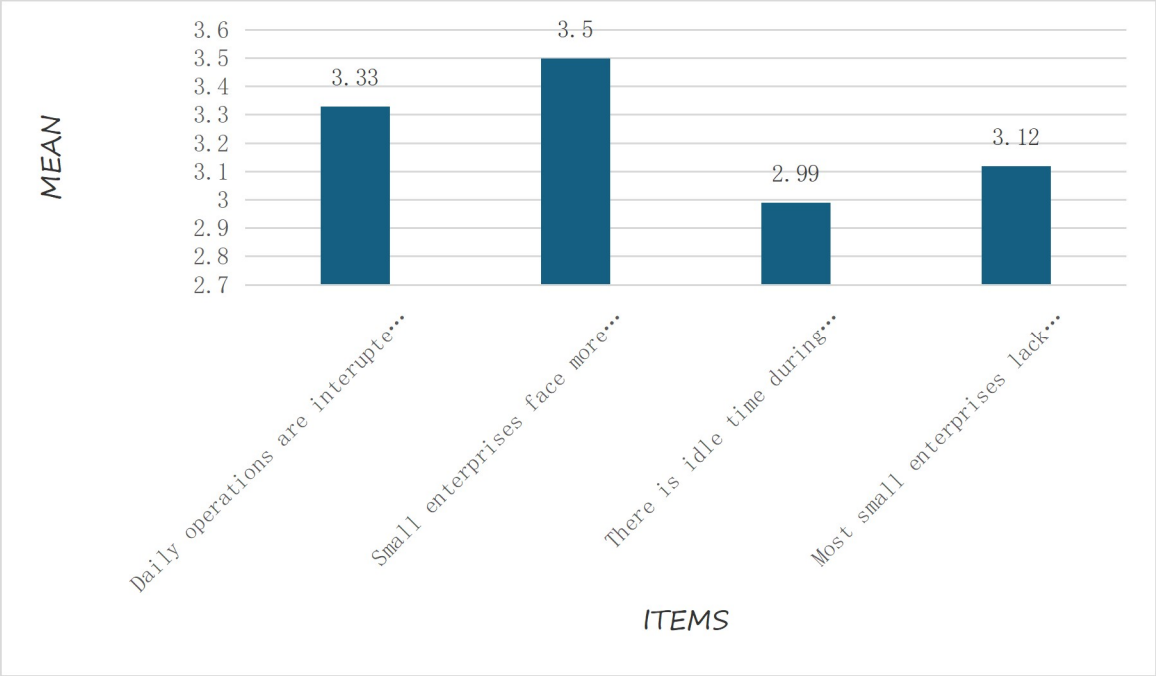

Figure 11: Effect of electricity infrastructure maintenance on small enterprises sustainability in Lagos State Nigeria.

4.4 Testing of Research Hypotheses

Testing Hypothesis One

H01: There is no significant relationship between power generation capacity and small enterprises' sustainability in Lagos State Nigeria.

Table : Summary of simple regression analysis for the relationship between power generation capacity and small enterprises sustainability in Lagos State Nigeria?

N	**Model**	β	**Sig.**	t	**ANOVA** (Sig.)	**R^2**	**Adjusted R^2**	**F (df)**
331	**(**Constant)	1.905	0.000	12.390	0.000[b]	0.305	0.303	144.367 **(330)**
	Power generation	.514	0.000	12.015				

	capacity							
	e. Predictors: (Constant), power generation capacity							
	f. Dependent Variable: market competitiveness of small and medium-scale enterprises							

Source: Field Survey, 2024

Interpretation and Discussion

The results indicated that power generation capacity (β = .514, t = 12.015, p = 0.000, p<0.05), has a positive and significant effect on small enterprises sustainability. The simple regression model used to explain the variation in the small enterprises' sustainability because of power generation capacity can be stated as follows:

$Y = f(x_1)$ $Y = \beta_0 + \beta_1 x_1 + e$

$= \beta_0 + \beta_1 PGC + e$.....Equation 1

$SES = 1.905\beta_0 + .514\beta_1 x_1 + e$ …… eqn 1

Where:

SES = Small Enterprises Sustainability

PGC = Power Generation Capacity

e = is an error term

The result from the simple regression showed that when power generation capacity is improved by one unit, the market competitiveness of small and medium-scale enterprises would be positively affected with an increase of .514. The result shows an overall statistical significance with p<0.05 which implies that power generation capacity is an important determinant of the market competitiveness of small and medium-scale enterprises. Therefore, the **null hypothesis is rejected** due to the statistical significance of the t and p values of the relationship between the exogenous and endogenous variables.

A study by Remteng, *et al* (2023) "Nigeria Electricity Sector" According to the Nigerian Electricity Regulation Commission (NERC), electricity generation started in Nigeria in 1896, the first electric utility company, known as the Nigerian Electricity Supply Company, was established in 1929. The first Nigerian electrical power plant was built in 1896 comprising of a 30kw, 1000v, 80cycle, single-phase supply, with an additional unit installed in 1902, and by 1909, installed capacity had reached 120KW with a registered energy demand of 65KW (Edomah *et al.,* 2016). In 1920, the installed capacity for the Lagos Marina power station was 420 kW. The first coal-fired power plant was built and commissioned on 1 June 1923 with a total installed capacity of 3.6 MW and a 3-phase, 4-wire, 50-cycle system adopted in 1924 (Edomah *et al.,* 2016) with a shutdown of the Marina site on 28 November 1923.

The new power station further grew in installed capacity to 13.75 MW. Despite this growth, between 1944 and 1948, Nigeria started experiencing a decline in the use of coal for electricity generation because of reduced mining activities, as well as the small discoveries of crude oil to the large-scale discovery of oil in Nigeria in 1956. Due to frequent outrages, the Niger Dams

Authority (NDA) under whose scheme three hydro and three thermal generating plants were constructed (Davidson *et al.,* 2001).

The increase in Nigeria's total population was not marked by a consequent increase in available power. Subsequently, in 1988, available power increased to 1273 MW. By 1992 the population had increased to about 80 million. However, the total available power was 3,000 MW (Sule, 2010). In the 1990s the Nigerian electricity system was failing to meet Nigeria's power needs, leading to the National Electric Power Policy of 2001, and several other reforms (KPMG, 2016). In the year 2000, a state-owned monopoly, the National Electric Power Authority (NEPA), oversaw the generation, transmission, and distribution of electric power in Nigeria. It operated as a vertically integrated utility company and a total generation capacity of about 6, 200 MW from 2 hydro and 4 thermal power plants. This resulted in an unstable and unreliable electric power supply situation in the country with customers exposed to frequent power cuts and a long period of power outages and an industry characterised by a lack of maintenance of power infrastructure, outdated power plants, low revenues, high losses, power theft, and non-cost reflective tariffs.

By 2001, the Independent Power Producers (IPPs) and National Integrated Power Projects (NIPP) were established to remedy the power shortage. 2005, Nigeria had an estimated 6,861 MW of installed electricity generating capacity (Babatunde and Shauibu, 2011). Nigeria's energy transformation was marked by vertical unbundling of Nigeria's power sector resulting in 6 generating companies and IPPs jointly referred to as Gencos. The transformation started with the establishment of the Electricity Cooperation of Nigeria (ECN) in 1951 and the Niger Dam Authority (NDA) in 1962. The ECN and NDA were merged through Degree 24 of 1972 to form the Nigerian Electric Power Authority (NEPA), later called Power Holding Company of Nigeria (PHCN). In the year 2001, the reform of the electricity sector began with the promulgation of the National Electric Power Policy which had as its goal the establishment of an efficient electricity market in Nigeria.

It had the overall objective of transferring the ownership and management of the infrastructure and assets of the electricity industry to the private sector with the consequent creation of all the necessary structures required to form and sustain an electricity market in Nigeria. In 2005 the Electric Power Sector Reform (EPSR) Act was enacted, and the Nigerian Electricity Regulatory Commission (NERC) was established as an independent regulatory body for the electricity industry in Nigeria. In addition, the Power Holding Company of Nigeria (PHCN) was formed as a transitional corporation that comprises 18 successor companies (6 generation companies, 11 distribution companies, and 1 transmission company) created from NEPA (See Table 2 below). In 2005, the total site rating of installed capacities at all Power Holding Company of Nigeria (PHCN) power stations was 6656.40MW but with an average available capacity of 3736.55MW, hence having a percentage availability of 56.13%. In July 2009 the total installed generation capacity of the PHCN plant was 9,914.4MW while 1,115.MW was from IPPs (Onuoha. 2010; Buraimoh. *et al*. 2017).

Testing of Hypothesis Two

H02: There is no significant relationship between transmission and distribution networks and small enterprises sustainability in Lagos State Nigeria.

Table : Summary of simple regression analysis for the relationship between transmission and distribution networks and small enterprises sustainability in Lagos State Nigeria.

N	Model	β	Sig.	t	ANOVA (Sig.)	R^2	Adjusted R^2	F (df)
331	(Constant)	1.812	0.000	11.069	0.000^b	0.299	0.296	140.040 **(330)**
	Transmission & distribution networks	.493	0.000	11.834				
	e. Predictors: (Constant), Transmission and distribution networks							
	f. Dependent Variable: Small enterprises sustainability							

Source: Field Survey, 2024

Interpretation

The results indicated that transmission and distribution networks (β = 0.493, t = 11.834, p = 0.000, $p<0.05$) positively and significantly affect small enterprises sustainability.

The simple regression model used to explain the variation in the small enterprises' sustainability because of transmission and distribution networks can be stated as follows:

$Y = f(x_2)$ $Y = \beta_0 + \beta_2 x_2 + e$

$= \beta_0 + \beta_2 TDN + e$ .....Equation 2

$SES = 1.812\beta_0 + .493\beta_2 x_2 + e$ …….... eqn 2

Where:

SES = Small Enterprises Sustainability

TDN = Transmission and Distribution Networks

e = is an error term

The result from the simple regression showed that when transmission and distribution networks is improved by one unit, the financial performance of small and medium-scale enterprises would be positively affected with an increase of 0.493. The result shows an overall statistical significance with $p<0.05$ which implies that transmission and distribution networks is an important determinant of the financial performance of small and medium-scale enterprises. Therefore, the **null hypothesis is rejected** due to the statistical significance of the t and p values of the relationship between the dependent and independent variables.

A study by Oloaye (2018), "Transmission and electricity distribution Network" the study notes that, Transmission and distribution refers to the different stages of carrying electricity over poles and wires from generators to a home or a business. The primary distinction between the two is the voltage level at which electricity moves at each stage. After electricity has been generated, a system of electrical wires carries electricity from the source of generation to our homes and businesses. These lines can be found overhead or sometimes in the ground, and combined, transmission and distribution lines make up what is commonly called "the grid."

Transmission and distribution are two separate stages or systems on the grid. In most cases, the power moving through the transmission system must be reduced to lower voltage levels by electricity distributors before it can be delivered to a residence or business. Power, specifically the voltage level, sent through transmission lines is reduced, or" stepped down," via transformers and sent through distribution lines, which are then connected to homes and businesses. If transmission is the interstate highway of the grid, distribution is the city street. It is the last leg of the delivery of electrical power from generation to consumer. Power travels on the distribution system at a voltage level that can be delivered directly to a home or business. Distribution lines are the lines many people see along streets. Distribution is the power that turns on and runs the appliances we use every day to keep our food fresh, our clothes clean and our homes either cool or warm. The voltage of distribution lines – the lines many people see in their neighborhoods – is approximately 13 kV (13,000 volts); a typical household runs on 110 volts.

Testing of Hypothesis Three

H03: There is no significant relationship between electricity infrastructure maintenance and the small enterprises sustainability in Lagos State Nigeria.

Table : Summary of simple regression analysis for the relationship between electricity infrastructure maintenance and the small enterprises sustainability in Lagos State Nigeria.

N	**Model**	β	**Sig.**	t	**ANOVA** (Sig.)	**R^2**	**Adjusted R^2**	**F (df)**
331	(Constant)	1.900	0.000	10.139	.000[b]	0.226	0.224	96.191 **(330)**
	Electricity infrastructure maintenance	.529	0.000	9.808				
	e. Predictors: (Constant), Electricity infrastructure maintenance							
	f. Dependent Variable: Small enterprises sustainability							

Source: Field Survey, 2024

Interpretation

The results indicated that electricity infrastructure maintenance (β = .529, t = 9.808, p = 0.000, p<0.05), has a positive and significant effect on small enterprises' sustainability.

The simple regression model used to explain the variation in the small enterprises' sustainability because of electricity infrastructure maintenance can be stated as follows:

$Y = f(x_3)$ $Y = \beta_0 + \beta_3 x_3 + e$

$= \beta_0 + \beta_3 EIM + e$ .....Equation 3

$SES = 1.900 + .529\beta_3 x_3 + e$ ……. eqn 3

Where:

SES = Small Enterprises Sustainability

EIM = Electricity infrastructure maintenance

Y=is the predicted value of electricity infrastructure maintenance.

β_0= is the Y-intercept, that is the value of Y when X is 0.

e = is an error term

The result from the simple regression showed that when electricity infrastructure maintenance is improved by one unit, the small enterprises' sustainability would be positively affected with an

increase of 0.529. The result shows an overall statistical significance with $p<0.05$ which implies that electricity infrastructure maintenance is an important determinant of the small enterprises' sustainability. Therefore, **the null hypothesis is rejected** due to the statistically significant t and p values of the relationship between electricity infrastructure maintenance and small enterprises' sustainability.

Thomas *et al.,* (2023), in a study "Sustainable Electricity Investment in Nigeria", noted that Regular, adequate and affordable power supply, which are key indicators of improvements in economic welfare and by extension economic growth, are missing from Nigeria's clime hence the country faces a lot of developmental challenges including the risk of losing potential investors. This paper examined power infrastructure and electricity in Nigeria using descriptive demonstrations. Tables, charts and figures were used to provide evidence which, supports the huge gulf between electricity produced by the various power infrastructures and electricity demand in Nigeria. Electric power production, transmission and distribution capacities of 3,600MW, 5,838MW and, 425MVA respectively are grossly inadequate to meet the power demand of 10,000MW in Nigeria. This leaves estimated power generation, transmission and distribution deficits of, 400MW, 3,502MVA and 6,740MWrespectively. This study emphasized that the infrastructure deficits require about 8.1 trillion naira to finance and therefore recommends that the Nigerian government, the generating companies and the distribution companies should all make concerted efforts towards growing and developing the power infrastructure in the country. The government should also create a secure and enabling environment, free from corruption and undue interference, for the power sector to thrive and contribute positively towards improving the welfare of electricity consumers in the country.

SUMMARY, CONCLUSION AND RECOMMENDATIONS

Summary

7 The result of the study revealed that small enterprises' sustainability in the Lagos State, Nigeria was significantly influenced by power generation capacity. In addition, most small enterprises struggle to meet up with daily operational schedules due to low power generation capacity.

8 It was established that transmission and distribution networks in the Lagos State, Nigeria influenced the sustainability of small enterprises significantly. In addition, it was revealed that there was poor product and service delivery due to weak transmission and distribution networks.

9 It was revealed that small enterprises' sustainability in Lagos State, Nigeria was influenced by backup power systems. Also, small enterprises implement backup power solutions to manage disruptions caused by power supply component failures.

Conclusion

Based on the analysis of the summary of the study findings, the following conclusions were made on electricity infrastructure and small enterprises sustainability in Lagos State Nigeria.

First, the findings led to the conclusion that there was a significant relationship between power generation capacity and small enterprises' sustainability in Lagos State Nigeria at adjusted $R^2 = 0.303$, $F_{(7, 330)} = 144.367$, $p = 0.000 <0.05$.

The findings led to the conclusion that there was a significant relationship between transmission and distribution networks and small enterprises' sustainability in Lagos State Nigeria at adjusted $R^2 = 0.296$, $F_{(7, 330)} = 140.040$, $p = 0.000 < 0.05$.

Finally, the findings of the study led to the conclusion that there was a significant relationship between electricity infrastructure maintenance and small enterprises sustainability in Lagos State Nigeria at adjusted $R^2 = 0.224$, $F_{(7, 330)} = 96.191$, $p = 0.000 < 0.05$.

Recommendations

The following are the recommendations of the study:

7 There is a need for organizations and business owners to invest more on power generation capacity to provide the electricity needed to meet the growing demand for energy services across residential, commercial, and industrial sectors.

8 The transmission and distribution (T&D) networks which form the backbone of the electricity supply chain must be adequately reinforced to facilitate the efficient and reliable delivery of electricity from power generation sources to end-users. As the energy landscape undergoes rapid transformation, driven by factors such as renewable energy integration, electrification of transportation, and digitalisation, T&D networks face new challenges and opportunities.

9 Business enterprises owners should make it a priority to deploy backup power systems in their operations knowing that these are essential components of modern electricity infrastructure, which provide emergency power during outages, grid failures, or other disruptions. These systems play a crucial role in ensuring continuity of operations for critical facilities such as hospitals, data centers, telecommunications networks, and emergency response centers.

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