THE IMPACT OF ELECTRICITY SUPPLY ON THE PERFORMANCE OF SMALL AND MEDIUM-SCALE ENTERPRISES IN KIBAIGWA WARD, TANZANIA

PRISIUS G. MROSSO

A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF PROJECT MANAGEMENT

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CERTIFICATION

The undersigned certify that they have read and hereby recommend for acceptance by the Open University of Tanzania, a dissertation entitled: ***"The Impact of Electricity Supply on the Performance of Small and Medium-scale Enterprises in Kibaigwa Ward, Tanzania",*** in partial fulfilment of the Degree of Master of Project Management (MPM) of the Open University of Tanzania.

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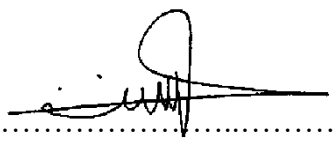
Prof. Saganga Kapaya

(1st Supervisor)



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Dr. Bukaza Chachage

(2nd Supervisor)

DECLARATION

I, **Prisius G. Mrosso**, declare that the work presented in this dissertation is original. It has never been presented to any other University or Institution. Where other people's works have been used, references have been provided. It is in this regard that I declare this work as originally mine. It is hereby presented in partial fulfilment of the requirement for the Degree of Master of Project Management of the Open University of Tanzania.

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Signature

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Date

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DEDICATION

I would like to dedicate this work to my mother, Mary Mrosso. Also, I dedicate this work to my family, especially my lovely wife, Lucy Mrosso, and my daughters, Brightness, Precious, Iris, Faith & Blessing, and my sons, Bernard, Ian & Ion.

May God bless you all.

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ABSTRACT

The primary aim of this study was to examine the impact of electricity supply on the performance of small and medium-scale enterprises (SMEs) in Kibaigwa ward, Tanzania. Specifically, the research focused on assessing the influence of electricity accessibility, stability of power supply, and electricity costs on SME performance in the area. An explanatory research design paired with a quantitative approach was employed to gather data from 175 SMEs, utilizing simple random sampling to select participants. Data was collected through a closed-ended questionnaire using a 5-point Likert scale. To analyze the data, inferential statistics, including Pearson correlation and multiple linear regression, were applied to explore the relationships between independent and dependent variables and to assess the effects of the independent variables on the dependent variable respectively. The results from the Pearson correlation coefficient indicated that electricity accessibility, stability of power supply, and electricity costs all have a significant and strong positive correlation with SME performance. Furthermore, multiple linear regression analysis demonstrated that both electricity accessibility and stability of power supply positively impact SME performance, while the cost of electricity had a negative effect. The study concludes that electricity power supply aspects play a crucial role in the success of the SMEs in Kibaigwa ward. The study recommends government should enhance electricity accessibility and stability while managing costs to improve SME performance in Kibaigwa Ward.

Keywords: *Electricity Accessibility, Stability of Electricity, Cost of Electricity, SMEs*

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LIST OF ABBREVIATIONS

ANOVA	Analysis of Variance
ELEC	Electricity Cost
EWURA	Energy and Water Utilities Regulatory Authority
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
IEA	International Energy Agency
JNHPP	Julius Nyerere Hydro-Power Project
MW	Megawatts
OLS	Ordinary Least Squares
PRO	Profit
SMEs	Small and Medium-Scale Enterprises
SPSS	Statistical Package for the Social Sciences
STATA	Statistics and Data
TANESCO	Tanzania Electric Supply Company
UK	United Kingdom
URT	United Republic of Tanzania
VECM	Vector Error Correction Model
VIF	Variance Inflation Factor
VOLL	Value of Lost Load

CHAPTER ONE

INTRODUCTION

1.1 Chapter Overview

The introductory chapter of the study contains the background information, problem statement, objectives, and research questions. Additionally, it outlines the scope, significance, and organization of the study.

1.2 Background to the Problem

Small and medium-sized enterprises (SMEs) play a crucial role in the economic development of any country (Adie *et al*., 2019). In both developed and developing countries, SMEs are regarded as the engines of growth, as they contribute significantly to job creation, innovation, and overall economic output (Ayivi *et al*., 2022). Access to reliable and affordable electricity is essential for the performance and growth of SMEs (Akyuz *et al*., 2020). However, many SMEs face challenges related to the accessibility, stability, and cost of electricity power supply, which can ultimately impact their performance (Arumdeben *et al*., 2023).

In the United States and Canada, SMEs benefit from a well-established electricity infrastructure that provides them with stable and affordable power supply (Gaskell, 2020; Muriithi, 2017). This allows businesses to operate efficiently and competitively in the market. However, in Brazil, Mexico, and Argentina, SMEs face challenges due to issues related to accessibility, stability, and cost of electricity supply. The lack of accessibility to electricity in rural areas in Brazil and Mexico hinders the growth of

SMEs located in those regions (Gunten & Moerman, 2021; Silva *et al*., 2020). Frequent power outages and voltage fluctuations in Brazil and Mexico also disrupt business operations and affect the productivity of SMEs. Moreover, high electricity costs in these countries add to the financial burden of SMEs, making it difficult for them to remain competitive (Gunten & Moerman, 2021; Silva *et al*., 2020).

Similarly, a stable and affordable electricity supply is a key driver of growth and sustainability for SMEs in UK, Germany, France, Italy, and Spain (Dudley & Sanghvi, 2020; Heider & Wulf, 2021; Martin & Perez, 2020; Rossi & Bianchi, 2020; Sanz & Lopez, 2020). Electricity powers essential operations such as lighting, heating, cooling, and machinery, allowing SMEs to increase productivity, reduce costs, and improve product quality (Heider & Wulf, 2021). Also, access to electricity enables SMEs to adopt new technologies and innovations that can give them a competitive edge in the market (Rossi & Bianchi, 2020).

In the context of Asian countries, access to electricity has been a major challenge for SMEs, particularly in countries such as India, Bangladesh, Pakistan, Indonesia, and the Philippines. In India, for example, the government has made significant efforts to improve electricity access through initiatives such as the Rural Electrification Corporation and the Deen Dayal Upadhyaya Gram Jyoti Yojana (Phadke & Nikit, 2019). Despite these efforts, many SMEs still face challenges in accessing reliable and affordable electricity, particularly in rural areas (Banerjee & Gupta, 2020). In Bangladesh, SMEs also struggle with access to electricity, with frequent power outages and inadequate infrastructure hindering their operations. The government has

launched initiatives such as the Rural Electrification and Renewable Energy Development Project to improve electricity access for SMEs (Kabir & Akter, 2020), but challenges remain in ensuring stable and affordable electricity supply (Islam & Ahammed, 2021). Similarly, in Pakistan, SMEs face challenges related to electricity access, particularly in remote and rural areas. The government has implemented measures such as the Prime Minister's Sustainable Development Goals Achievement Program to expand electricity access (Iqbal *et al*., 2020), but issues of reliability and affordability persist for many SMEs (Siddiqui & Khurram, 2020). In Indonesia, electricity access has been a major issue for SMEs, particularly in remote islands and rural areas. The government has launched initiatives such as the Indonesia Infrastructure Guarantee Fund to attract investment in electricity infrastructure (Soria & Wardhana, 2020), but challenges remain in ensuring access to reliable and affordable electricity for SMEs. Similarly, in the Philippines, SMEs also struggle with electricity access, particularly in areas prone to natural disasters such as typhoons and earthquakes. The government has implemented measures such as the Electric Cooperatives Emergency and Resiliency Fund to improve electricity access and reliability for SMEs, but challenges remain in ensuring stable and affordable electricity supply (Rivera & Cruz, 2021).

In Africa, electricity supply has been a persistent challenge for many years, with millions of people still lacking access to electricity. The continent has some of the lowest rates of electrification worldwide, with only about 43% of the population having access to electricity (Moreblessing *et al*., 2024). This lack of access to electricity has a direct impact on the economic development of African countries,

particularly on small and medium-scale enterprises (SMEs) (Meles, 2020). In many African countries, SMEs are the backbone of the economy, contributing significantly to job creation, income generation, and overall economic growth (Blimpo & Cosgrove-Davies, 2019). However, the performance of these businesses is severely hampered by the lack of access to electricity, as well as the instability and high cost of electricity supply (Kalisa & Tarus, 2021). Without reliable and affordable electricity, SMEs struggle to operate efficiently, leading to lower productivity, reduced competitiveness, and limited growth opportunities. For example, in Nigeria, frequent power outages and unreliable electricity supply have been cited as major obstacles for SMEs, causing disruptions in operations and increasing business costs (Adie *et al*., 2019). In Kenya, high electricity tariffs have been a significant burden for SMEs, affecting their profitability and sustainability (Ayieko & Kangara, 2019). Similarly, in South Africa, electricity shortages and load shedding have had detrimental effects on SMEs, leading to disruptions in production and financial losses (Masmoudi & Guergachi, 2018). Additionally, the lack of access to electricity in rural areas hinders the growth of SMEs in Mozambique and Zimbabwe (Mkoma *et al*., 2020; Ugembe *et al*., 2023).

Tanzania, located in East Africa, is no exception to these challenges. While the country has made significant progress in expanding electricity in recent years (Abdalla & Kwame, 2023), many consumers, including SMEs, still face obstacles related to the accessibility, reliability, and affordability of electricity supply. For example, as of June 2024, the installed capacity for carrying out electricity activities for sale was 4,300.80 MW, while the maximum demand was 2,263.44 MW, which is less than the total electricity power produced (EWURA, 2025). Meanwhile, the government invested in

new power generation capacity, such as the Julius Nyerere Hydro-Power Project (JNHPP), which recently announced the activation of turbines that contribute a total of 705 MW to the national grid (TanzaniaInvest, 2024).

However, despite these government efforts in increasing electricity power production and supply, significant gaps remain in terms of meeting the needs of consumers (Rwegasila, 2015), including SMEs, particularly those located in rural areas, such as Kibaigwa ward.

Kibaigwa Ward, a rural area located in Dodoma, is a microcosm of the broader challenges faced by SMEs in Tanzania. Many small businesses in Kibaigwa Ward operating in various industries, including agriculture, manufacturing, and services (URT, 2024), struggle with unreliable electricity supply, high tariffs, and limited access to financing for energy-efficient technologies (Mushi, 2018). These challenges not only affect the day-to-day operations of SMEs but also limit their growth potential and ability to create jobs and contribute to the local economy (Mushi, 2018).

Despite these challenges, there is a lack of research conducted in Kibaigwa ward to provide a comprehensive analysis of the impact of electricity accessibility, stability, and cost on SME performance. Therefore, with this backdrop, this study aims to fill a knowledge gap with the aid of the Economics of Power System Reliability and Planning theory developed by Mohan Munasinghe in 1979 (Munasinghe, 1979). The study aims to provide empirical evidence on how these factors influence the competitiveness, productivity, and growth of small businesses in the area. By

understanding the specific challenges faced by SMEs in accessing reliable and affordable electricity, policymakers and stakeholders can design targeted interventions to support the growth of small businesses and improve the overall economic outlook of the region.

1.3 Problem Statement

Small and medium-scale enterprises (SMEs) play a crucial role in driving economic growth and development in Tanzania (Diyammi & Mkude, 2022). However, one of the key challenges they face is the accessibility, stability, and cost of electricity power supply. The impact of these factors on the performance of SMEs is of significant concern, particularly in a rural area like Kibaigwa Ward. SMEs in Kibaigwa Ward face unique challenges related to electricity supply (Mushi, 2018), including frequent power outages, high costs of electricity, and limited access to reliable electricity infrastructure. These challenges have a significant impact on the performance of SMEs, including reduced productivity, increased operating costs, and barriers to growth and expansion.

Previous studies in Tanzania have highlighted the importance of electricity supply for the growth of SMEs (Ajibola *et al*., 2022; Arumdeben *et al*., 2023; Ayivi *et al*., 2022), but there is a research gap in terms of understanding the specific impact of accessibility, stability, and cost of electricity power supply on the performance of SMEs in Kibaigwa Ward. The current study seeks to address this research gap by examining the impact of accessibility, stability, and cost of electricity power supply on the performance of SMEs in Kibaigwa Ward.

1.4 Objectives of the Study

1.4.1 General Objective

the general objective of the study is to examine the impact of electricity supply on the performance of small and medium-scale enterprises (SMEs) in Kibaigwa ward, Tanzania.

1.4.2 Research Objectives

i) To determine the impact of accessibility of electricity power supply on the performance of SMEs in Kibaigwa ward.

ii) To find out the impact of stability in power supply on the performance of SMEs in Kibaigwa ward.

iii) To identify the impact of cost of electricity power supply on the performance of SMEs in Kibaigwa ward.

1.5 Research Questions

i) What is the impact of accessibility of electricity power supply on the performance of SMEs in Kibaigwa ward?

ii) What is the impact of stability in power supply on the performance of SMEs in Kibaigwa ward?

iii) What is the impact of cost of electricity power supply on the performance of SMEs in Kibaigwa ward?

1.6 Significance of the Study

The findings of this study offer a significance insight with far-reaching implications across various sectors. For SMEs, understanding this relationship reinforces the

critical importance of reliable energy in enhancing productivity, reducing operational disruptions, and fostering business growth. It highlights that consistent electricity access is not merely a utility but a catalyst for innovation, competitiveness, and economic sustainability within their enterprises.

From the perspective of TANESCO, the national electricity utility, the study provides empirical evidence on the tangible impacts of their service provision, emphasizing areas where infrastructure improvements and service reliability can directly contribute to economic development. Such insights can guide strategic investments and operational reforms aimed at minimizing outages and enhancing grid stability, ultimately supporting the broader national goal of industrialization.

Policy makers and government agencies stand to benefit from the study's findings by gaining a significance understanding of the vital role electricity plays in small and medium enterprises performance. This knowledge can inform the design of targeted policies and programs that promote increased access to reliable electricity, incentivize private sector investments in energy infrastructure, and address barriers faced by SMEs in energy utilization. It underscores the necessity for integrated approaches that align energy policies with economic development objectives.

Scholars and academicians find the study significant as it contributes to the body of knowledge on energy economics, development studies, and entrepreneurship. It offers a valuable case study that can serve as a foundation for further research into energy access and enterprise performance, fostering academic discourse on sustainable development strategies. Moreover, it encouraged a multidisciplinary approach,

combining insights from engineering, economics, and social sciences to holistically address energy-related challenges faced by SMEs.

1.7 Scope of the Study

The study took place in Kibaigwa ward, which is found in the Kongwa district. The research focused on only three objectives, including examining the impact of accessibility of electricity power supply, stability in power, and cost of electricity power supply on the performance of SMEs in Kibaigwa ward. Additionally, the study was guided by the Economics of Power System Reliability and Planning theory developed by Mohan Munasinghe in 1979 (Munasinghe, 1979). The study timeframe spanned eight (8) months, covering all phases from concept development to the final research report.

1.8 Organization of the Study

Chapter one presents background information on the research problem, the problem statement, the general objective of the study, research objectives, research questions, the significance of the study, and the scope of the study. Chapter two covers definitions of key terms, a theoretical and empirical literature review, knowledge gaps, and conceptual frameworks. Chapter three details the research methodology to be used, including the target population, sample and sampling techniques, data collection techniques, data analysis methods, and ethical considerations. The fourth chapter of the study detailed the presentation of data analysis results, encompassing both descriptive and inferential statistics. Subsequently, the fifth chapter provided a summary of the findings, along with conclusions and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Chapter Overview

This chapter focused on a literature review made from studies, journals, the internet, and reports from various organizations about the impact of electricity supply on the performance of Small and Medium-Scale Enterprises. It defines the key terms, explains the theoretical review, followed by the empirical review based on the study objectives, and then shows the research gap. Last, the conceptual framework was drawn according to the study objectives.

2.2 Definition of Key Terms

2.2.1 Electricity Supply

Electricity Supply, as defined by the International Energy Agency (IEA, 2021), refers to the provision of electrical energy to consumers for various purposes, including lighting, heating, and powering electrical devices. Also Nenna *et al*. (2021) defined electricity supply as the process by which electrical energy is generated, transmitted, distributed, and delivered to consumers for use in homes, businesses, and other establishments. This study used the definition of Ogunleye *et al*. (2021) who defined electricity supply the availability and reliability of electricity to power industrial machinery, equipment, and other operations essential for business activities.

2.2.2 Accessibility of Electricity Power Supply

The International Energy Agency (IEA) defines the accessibility of electricity power supply as the ability of users to be supplied with essential or desired levels of electricity

services when they need them at affordable prices (IEA, 2013). In the same vein, the International Energy Agency (2019) defined accessibility of electricity power supply as the extent to which the consumers are able to get electricity services regardless of their location or socio-economic status. This study use the definition of Mkoma *et al*. (2020), who defined accessibility of electricity power supply as the ease with which small and medium-sized enterprises (SMEs) can obtain and utilize electricity for their operations, including the availability of electricity infrastructure, reliability of supply, affordability of electricity tariffs, and the ease of connecting to the power grid.

2.2.3 Stability of Electricity Power Supply

According to Hosseini *et al*. (2017), stability of electricity power supply is the ability of an electricity grid to maintain a consistent and reliable supply of electrical power to consumers. Also, Aditya and Naidu (2019) defined stability of electricity power supply as the ability of a power system to maintain a steady and reliable flow of electrical energy to consumers under varying operating conditions. This study use the definition of Adepoju *et al*. (2020) that the stability of electricity power supply refers to the consistent and reliable flow of electric power to meet the needs of consumers without significant interruptions or fluctuations in voltage or frequency.

2.2.4 Cost of Electricity Power Supply

Pandey *et al*. (2020) defined the cost of electricity power supply as the total expenses, including the charges for electricity consumption, connection fees, service fees, taxes, and any other related expenses that consumers incurred in acquiring electricity from the grid or any other source. Also, the International Energy Agency (2020) defined the

term "cost of electricity power supply" as the total expenditure that consumers have to bear in order to access electricity supply for their use, including the cost of purchasing electricity from utility companies, as well as any additional charges or fees associated with the delivery and maintenance of the electricity grid. This study employed the definition of Bhattarai et al. (2017), who defined the cost of electricity power supply as the expenses incurred by small and medium enterprises (SMEs) in securing and maintaining access to electricity for their operations, including the costs associated with installing and maintaining electrical infrastructure, as well as the ongoing expenses of purchasing and using electricity for production processes.

2.2.5 The Performance of Small and Medium Enterprises

Fjeldstad *et al*. (2020) defined the performance of small and medium-sized enterprises (SMEs) as a measure of how well a company is achieving its objectives and goals based on various factors such as financial metrics, market share, customer satisfaction, and overall growth. In the same vein, Mamprugu Moagduri District Assembly (2021) in their report defined the performance of Small and Medium Enterprises (SMEs) as the ability of small businesses to achieve their objectives and goals, such as profitability, growth, and market share. However, this study used the definition of Ajide and Raheem (2020) SMEs refers to the effect of consistent and reliable electricity supply on the operational efficiency, productivity, profitability, and overall success of small and medium enterprises.

2.3 Theoretical Literature Review

The study was guided by the Economics of Power System Reliability and Planning

theory developed by Mohan Munasinghe in 1979 (Munasinghe, 1979). The Economics of Power System Reliability and Planning theory is based on the idea that a reliable and efficient power system is crucial for the functioning of modern society (Munasinghe & Gellerson, 1979). The theory, which combines principles of economics and engineering, aims to optimize the planning and operation of power systems in order to minimize costs and maximize reliability (Munasinghe & Warren, 1979).

The origins of the Economics of Power System Reliability and Planning theory can be traced back to the early 20th century, when pioneering researchers and engineers began to recognize the importance of reliability and efficiency in power systems. One of the key founders of this field is Mohan Munasinghe, a Sri Lankan physicist, engineer, and economist with a focus on energy, water resources, sustainable development, and climate change who was instrumental in developing the foundational principles of power system reliability analysis. Today, the Economics of Power System Reliability and Planning theory is a well-established and widely used framework in the field of power system engineering, helping utilities and policymakers make informed decisions to ensure reliable, cost-effective, and sustainable energy delivery to consumers.

Power system reliability refers to the ability of an electrical grid to deliver a consistent and uninterrupted power supply to consumers while planning theory involves designing and optimizing the power system infrastructure (Küfeoğlu & Lehtonen, 2016). The theory is based on the prediction that electricity is essential for productive

purposes (Olajuyin & Mago, 2022). According to Küfeoğlu and Lehtonen (2016), the theory posits that the provision of dependable electricity to consumers at the necessary time and place is contingent upon three key elements: generation, transmission, and distribution. Electricity can experience a lack of dependability in instances of power surges, blackouts or voltage fluctuations, load shedding, and blackouts (Olajuyin & Mago, 2022). Based on the theoretical framework, the impact of unreliable electricity, specifically load shedding, can be assessed through the estimation of industrial outage cost. This estimation is derived from a comprehensive examination of various factors, including spoilage, idle production, and the recuperation of lost production. These factors are evaluated in relation to both regular working hours and overtime, ultimately resulting in suboptimal business performance (Küfeoğlu & Lehtonen, 2016). Therefore, based on the mentioned hypothesis, any disruptions to the various components involved in the production, distribution, and transmission of electricity will inevitably affect the energy supply to end-users. (Olajuyin & Mago, 2022).

From the theory, power outages can lead to significant economic losses, impacting productivity, disrupting supply chains, and causing inconvenience to consumers. One key aspect of Munasinghe's (1979) theory is the concept of "value of lost load" (VOLL), which quantifies the economic impact of power outages (Gorman, 2022). By assigning a monetary value to each unit of lost load, decision-makers can assess the trade-offs between investing in additional capacity and accepting a certain level of unreliability. This approach allows for more informed decision-making in power system planning. Furthermore, it is postulated by the notion that the impact of power

outages is contingent upon the specific industrial users or industry type, the length of the disruption, and the timing of the event (Gorman, 2022).

According to Olajuyin and Mago (2022), the idea posits that a consistent provision of power is a crucial factor for enhancing the productivity of small-sized enterprises. The other key aspect of power system reliability and planning theory is the assessment of power outage costs (Aklin *et al*., 2016). These costs include not only the direct financial losses incurred by consumers during power outages but also the indirect costs such as lost productivity and damage to equipment (Aklin *et al*., 2016). By quantifying these costs, policymakers can make informed decisions regarding investments in infrastructure upgrades or implementing measures to reduce outage durations (Gorman, 2022).

Moreover, the theory supports the importance of planning for providing strategies for mitigating the effects of power outages. This theory emphasizes proactive measures such as diversifying energy sources, implementing energy conservation practices, and investing in backup generators or battery storage systems (Olajuyin & Mago, 2022). By incorporating planning into their operations, small-scale businesses can minimize disruptions caused by load shedding and ensure continuity in their operations.

In relation to this study, the Economics of Power System Reliability and Planning theory plays a crucial role in ensuring the accessibility of electricity supply to consumers. One aspect of this theory that relates to accessibility is the ease of connecting to the electricity grid. By planning and designing power systems in a

reliable and efficient manner, utilities can ensure that new customers can easily connect to the grid without facing unnecessary barriers or delays. This helps to expand access to electricity supply and reach underserved populations.

Also, efficient billing and payment processes are essential for improving accessibility. By incorporating economic principles into the design of billing systems, utilities can ensure that customers are able to pay for their electricity usage in a convenient and cost-effective manner. This helps to prevent disconnections due to non-payment and ensures continued access to electricity.

Moreover, the Economics of Power System Reliability and Planning theory emphasizes the importance of responsive customer service for handling complaints and inquiries. By providing easy access to customer service representatives who can address issues promptly, utilities can improve the overall experience for customers and enhance accessibility to electricity supply.

Additionally, the theory highlights the significance of availability of technical support for customers. By offering resources for troubleshooting and assistance with technical issues, utilities can ensure that customers have the necessary support to maintain reliable access to electricity.

Regarding the stability of electricity supply, the theory emphasizes the importance of maintaining a reliable power supply at all times, with minimal or no power outages. This is essential for ensuring that consumers have access to electricity when they need it, whether it be for residential, commercial, or industrial purposes.

One key aspect of this theory is the need for back-up power options in case of emergencies or prolonged outages. By having alternative sources of power available, such as generators or battery storage systems, power system operators can quickly restore electricity supply and prevent disruptions to consumers. Additionally, the theory highlights the importance of maintaining stable voltage levels to prevent damage to electrical equipment. Fluctuations in voltage can lead to equipment failures and costly repairs, so ensuring a steady supply of electricity is essential for protecting valuable assets. Furthermore, the theory emphasizes the importance of having adequate capacity to meet the demand of consumers. This requires careful planning and investment in power generation, transmission, and distribution infrastructure to ensure that there is enough electricity available to meet peak demand periods.

The Economics of Power System Reliability and Planning theory is essential in understanding and managing the costs associated with accessing electricity supply for consumers. This theory helps utilities make strategic decisions regarding investments in transmission infrastructure, installation of equipment, metering technologies, connection fees, and operational and maintenance costs to ensure reliable and cost-effective electricity supply.

Similarly, regarding cost of accessing electricity supply, the theory also can assist in optimizing installation costs by identifying the most cost-effective solutions to achieve the desired level of reliability. Metering costs can be reduced by implementing advanced technologies that provide valuable data for monitoring and managing electricity usage. Additionally, the theory helps utilities minimize connection fees by

optimizing the design of the network and by navigating regulatory requirements to reduce taxes and levies. Operational and maintenance costs can also be minimized through efficient scheduling and practices, ensuring the reliability of the power system while keeping costs in check.

On the other hand, the Economics of Power System Reliability and Planning theory emphasizes the significant impact that a reliable power system can have on the performance and success of small and medium-sized enterprises (SMEs). It highlights various ways in which SMEs can benefit from a stable and consistent power supply, such as increased productivity, improved quality of products and services, expansion of business operations, job creation, enhanced competitiveness, and innovation. By ensuring uninterrupted power supply, SMEs can operate efficiently and effectively, leading to higher productivity levels and output. This, in turn, allows SMEs to meet market demands, stay ahead of competitors, and attract more customers, ultimately resulting in business growth and sustainability.

Furthermore, a reliable power system enables SMEs to maintain a high standard of production and delivery, enhancing the overall quality of their offerings. This not only boosts customer satisfaction but also helps in building a strong reputation in the market. Moreover, with a reliable power system, SMEs can expand their business operations, reach new markets, and increase revenue streams. This growth potential can lead to job creation within SMEs, contributing to economic development and prosperity. Additionally, a reliable power system fosters innovation within SMEs by enabling them to invest in new technologies, research, and development. This helps

SMEs to continuously improve their products and services, stay competitive in the market, and drive overall industry innovation.

While Economics of Power System Reliability and Planning theory is widely accepted and used in various fields, However, there are several criticisms that have been raised regarding its application in the context of SMEs and their interactions with electricity power supply in relation to accessibility, stability, and cost of electricity.

One of the main criticisms of this theory is that it often overlooks the specific needs and challenges faced by SMEs when it comes to accessing electricity power supply. SMEs, especially those in developing countries or remote areas, may not have the resources or infrastructure to connect to the main grid, resulting in unreliable or inconsistent electricity supply. This lack of accessibility can severely impact the productivity and growth potential of these businesses. In terms of stability, the theory has been criticized for prioritizing large industrial consumers over SMEs when it comes to ensuring a stable electricity supply. This can result in frequent power outages or fluctuations, which can disrupt the operations of SMEs and lead to financial losses.

Moreover, the cost of electricity power supply for SMEs is often a major concern. The theory often focuses on maximizing profits for power utilities, leading to higher electricity tariffs for SMEs. This can put a strain on their finances and hinder their ability to compete in the market.

Despite the weakness of the theory, there are a number of empirical studies proved the positive outcome of using the theory. For example Mutambo, *et al*. (2023) in their

study aims to understand of the effects of electricity load shedding on small and medium enterprises by exploring the Economics of Power System Reliability and Planning theory that underpin these impacts. Drawing from this theory, the study examines how power outages disrupt business operations, influence adaptation strategies, and shape stakeholder dynamics within the SME context. By delving into this theoretical perspective, the study provides valuable insights for policymakers, practitioners, and researchers seeking to mitigate the adverse consequences of electricity load shedding on SMEs.

Also, Burke and Bruns (2017) in their study that utilized exploring the Economics of Power System Reliability and Planning theory found that electricity use and access are strongly correlated with economic development. Furthermore, Mohamad and Teh (2018) in their study that applied Economics of Power System Reliability and Planning theory to investigate the impacts of energy storage system on power system reliability found that energy storage utilization in power systems is significant in improving system reliability and minimizing costs of transmission upgrades.

2.4 Empirical Literature Review

The empirical literature review is structured into subsections based on the specific objectives outlined in Chapter one.

2.4.1 The Impact of Accessibility of Electricity Power Supply on the Performance of SMEs

The study conducted by Ahmad and Sahar (2021) focused on the impact of accessibility of electricity power supply on the performance of small and medium-

scale enterprises in Malaysia. The researchers utilized a quantitative research design to gather data from a population of small and medium-scale enterprises in the country. A sample size of 200 enterprises was selected using a random sampling technique. Data was collected through surveys and interviews with the enterprise owners. The findings of the study revealed a significant positive relationship between the accessibility of electricity power supply and the performance of small and medium-scale enterprises. The researchers concluded that improved accessibility to electricity has a direct impact on the growth and success of these enterprises. They recommended that policymakers should prioritize improving electricity infrastructure to support the development of small and medium-scale enterprises in Malaysia.

Also, Rahman and Paikari (2020) in their study used quantitative research approach to investigate the impact of accessibility of electricity supply on the performance of small and medium-scale enterprises (SMEs) in Bangladesh. The findings of the study highlighted that there is a significant positive relationship between the accessibility of electricity supply and the performance of SMEs. Based on their analysis, the researchers concluded that improved accessibility to electricity supply can significantly enhance the performance and productivity of SMEs in Bangladesh.

In the same vein, a study conducted by Samson and Kabiru (2021) found a significant positive correlation between the accessibility of electricity power supply and the performance of SMEs in Nigeria. Furthermore, Araujo and Cardona (2020) used a quantitative research approach to examine the impact of accessibility to electricity on the performance of micro-enterprises in Brazil. The population of interest was small

and medium-scale enterprises in Brazil. The sample size of 500 was selected using stratified random sampling technique. Data was collected through questionnaire that were administered to business owners and managers. The findings of the study showed a strong positive correlation between accessibility to electricity and the performance of micro-enterprises. Based on their findings, the researchers concluded that access to electricity is a critical factor in determining the success of small and medium-scale enterprises.

2.4.2 The Impact of Stability in Electricity Power Supply on the Performance of SMEs

Arumdeben *et al*. (2023) in their study aimed at evaluating the effect of stability in power supply on SMEs performance in Southern Taraba State, Nigeria. The study used primary data obtained through open-ended questionnaires. A total of 114 copies of questionnaires were administered to managers of registered SMEs in the Southern Zone: Ibi, Wukari, Donga, Takum, and Ussa, through a simple random sampling technique. The data obtained were analyzed through descriptive statistics and ordinary least squares methods. The study revealed that stability in power supply proved a positive and significant effect on SMEs performance in the study area. Therefore, it recommended that the government should provide constant and steady electricity supply for SMES in order to improve the profitability of SMEs in Nigeria.

Also, Afukonyo (2023) adopted a cross sectional survey to find out the impact of inadequate or epileptic power supply on the performance of small and medium scale enterprises (SMEs) in Takum local government area of Taraba state. The population

of the study consists of small and medium scale enterprise in Takum Local Government Area of Taraba State. The choice of this local government was based on the poor nature of power supplied to them and its attendant effect on SMEs, which have impeded their establishment, growth, survival, development, and performance. The sample of the study comprises 30 SMEs. The study also used structured questionnaires to collect primary data directly from the selected SMEs. The data collected was analyzed using simple percentage (%) while the hypothesis was tested using chi-square (X^2) statistical technique at 0.05 level of significance. The study identified that epileptic power supply has a negative impact on SMEs making them to spend about 20% - 30% on backup energy.

The study also revealed that epileptic power supply does not affect the operational performance of SMEs and that the supply of power to SMEs is not sufficient. Based on these findings, the study recommends that government should take total control of the privatized power sector and that all the states should develop all the various power sources at their disposal.

Similarly, Udoinyang and Daniel (2024) looks at the impact of power supply on the profitability of SMEs and the effect of power (electricity) on the sales and income of SMEs in the state of Rivers. Survey method was employed in this study and Cochran's sample size formula was used as the sampling strategy since the study's population size was limitless thereby leading to a sample size of 384. Power supply indicators are used as explanatory factors in the models, whereas performance indices are used as dependent variables. Questionnaires were developed by the researchers to get the

necessary information from the respondents and the data was analyzed using the discrete response approach and the logistic model. The findings of the study showed that SMEs' storage of goods, productivity, and revenue were all negatively impacted by the short duration of public power supply and it serve as a bottle neck that limit the profit, sales and revenue generation of SMEs in Rivers State, Nigeria.

Furthermore, Pami-Pami (2021) examined the impact of electricity insecurity on the performance of small and medium scale businesses in Cameroon within the period of 1980 to 2018. The study made use of time series data within the period of the study and uses two methodological approaches; the time series data are analyse using a multiple linear regression for the first method of the work with statistical package SPSS, STATA for treatment. The work also made use of a survey analyses which helps in the collection of field data which are treated using the SPSS. Survey result from this study showed that small and medium scale businesses in Cameroon perceive insufficient electricity supply from the energy company which render their business activities difficult. Based on findings from this work, it is suggested and recommended that, the government of Cameroon with the energy company should expand the source of energy to meet up the high electricity demand. A move to the renewable sources such as solar and wind energy will help to boost the energy sector and improve on the economic growth of the country.

Additionally, Bassey and Ikpe (2021) analyze the comparative study of the effect of electricity supply on the performance of small and medium-scale enterprises in Calabar South and Calabar Municipality. The survey research design was adopted and

a twelve (12) item structured questionnaire was used to obtain a sample size of 248 small and medium scale business owners and power holding staff randomly selected from the population. The results of the study revealed that there is a significant effect of electricity supply on the performance of small and medium-scale enterprises in Calabar South and Calabar Municipality. The results further revealed that insufficient electricity supply significantly affect the performance of small and medium-scale enterprises in Calabar South and Calabar Municipality. The study concludes that there are enormous difficulties being experienced by businesses in Cross River State and other parts of Nigeria due to inadequate and unreliable electric

power supply.

2.4.3 The Impact of Cost of Electricity Power Supply on the Performance of SMEs

Moreblessing *et al*. (2024) examined the impact of energy price volatility on the financial performance of retail businesses in Zimbabwe. Quantitative research approach was adopted and data were collected using questionnaires. The study draws on existing literature and empirical evidence to analyze the effects of power supply and energy price volatility on the profitability and competitiveness of retail firms. The findings suggest that energy price volatility have negative effects on the financial performance of retail businesses, leading to reduced sales, increased costs, and lower profits.

Also, Arumdeben *et al*. (2023) assessed the cost-effect of power supply on SMEs Performance in Southern - Taraba State, Nigeria. The data used for the study were

primary data obtained through open-ended questionnaires. The sample size of the study was 114 managers of registered SMEs in Southern Zone: Ibi, Wukari, Donga, Takum and Ussa that were obtained through a simple random sampling technique. The study used questionnaires to collect data from the respondents. Descriptive statistics and ordinary least squares methods were used to analyze data. The study revealed that cost of power supply proved positive and significant effect on SMEs performance in the study area. Therefore, it recommended that government should minimize the cost of energy rate for SMES in order to improve profitability of SMEs in Nigeria.

Similarly, Ayivi *et al*. (2022) explored the effect of electricity prices on the growth and development of Small and Medium Enterprises (SMEs) in the Ashanti Region of Ghana by the use of the Vector Error Correction Model (VECM) and the Johansen co-integration method. The findings suggest that there is a negative, long-term relationship between the prices of electricity and SMEs growth and development. Empirical findings indicate that the long-run relationship between electricity prices and SMEs growth is special and negative. Higher energy rates were found to have a negative effect on SMEs ' growth and development. The findings suggest that a 1% increase in ELEC (average electricity price hikes) has a 0.68 percent lag in decreasing profit. Furthermore, according to the VECM findings, a 1% increase in Producer Price Index lags PRO by 1.2 percent.

Furthermore, Barteková and Ziesemer (2019) examined the impact of electricity price variation on net FDI (%GDP) inflows in countries of the European Union. The study employed a panel data of 27 EU countries for a period of 2003 – 2013. The finding

showed that, in the short run, a 10% increase in electricity prices leads to a decrease in net FDI inflows as a share of GDP by 0.4 percentage points for the south-western and 0.33 for the north-eastern region. In the long run, the response is 0.60 percentage points for south-western and 0.48 for north-eastern regions.

2.5 Research Gap

Despite the abundance of research on the impact of electricity accessibility, stability, and cost on the performance of small and medium-scale enterprises in various countries such as Malaysia, Bangladesh, Nigeria, and Brazil, there is still a research gap in specifically examining these factors in the context of Kibaigwa ward in Tanzania. While existing studies have highlighted the positive relationship between improved electricity accessibility, stability, and cost on the performance of SMEs, there is a need for a study that focuses specifically on the unique challenges and dynamics faced by SMEs in Kibaigwa ward. Given that each country has its own unique challenges and opportunities when it comes to electricity infrastructure and its impact on SMEs, factors such as government policies, energy sources, infrastructure development, and regulatory frameworks can vary significantly between countries; therefore, research specific to Kibaigwa ward, Tanzania, is essential to understand the nuances of how electricity accessibility, stability, and cost affect SME performance in that particular context.

2.6 Conceptual Framework

The conceptual framework presented in Figure 2.1 in this study is based on the impact of electricity accessibility, stability, and cost on the performance of SMEs in Kibaigwa

ward, Tanzania. The independent variables in this study are the electricity accessibility, stability, and cost. These factors are expected to have a positive or negative impact on the performance of SMEs. On the other hand, the dependent variable in this study is the performance of SMEs.

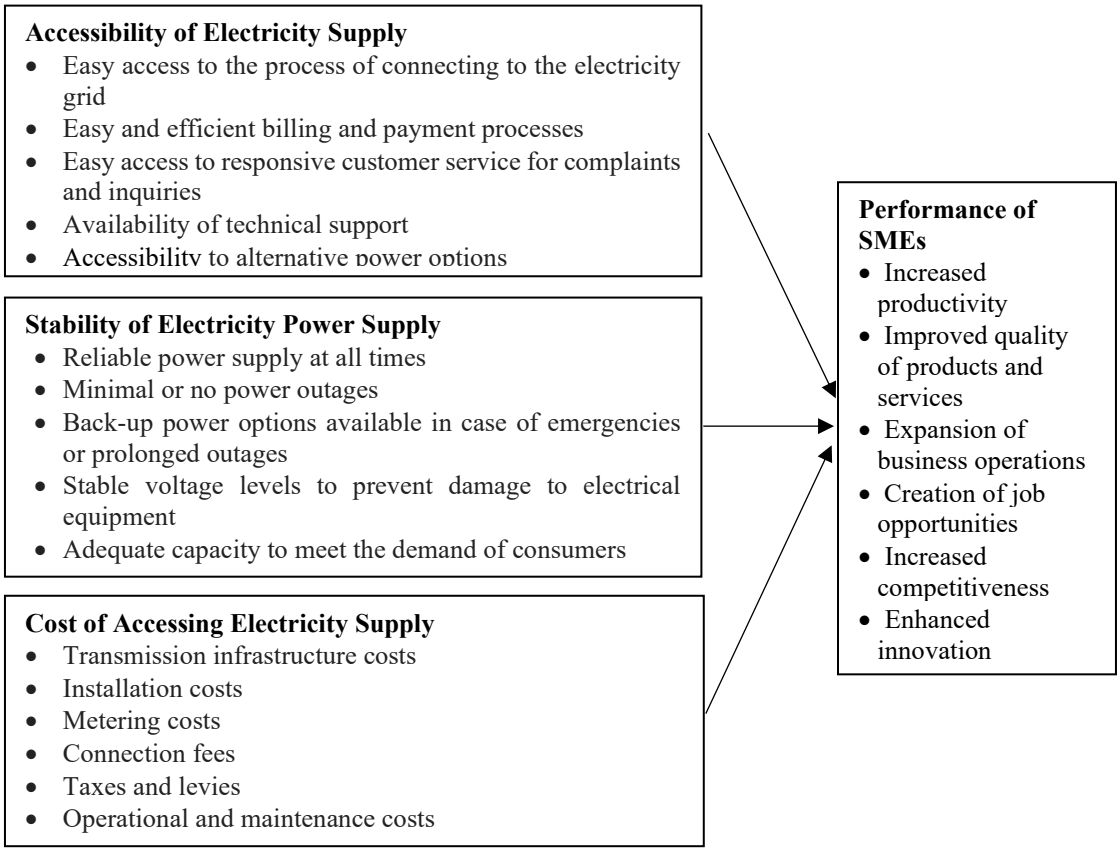

Figure 2.1: **Conceptual Framework**

Source: Researcher (2024).

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Chapter Overview

In this chapter, the researcher outlines the methodological perspective used to address the research objectives, as well as the foundational philosophies that support this approach. Additionally, the chapter covers the study's area, population, sample size, sampling techniques, data collection methods, data collection instrument, reliability and validity, data analysis methods, and ethical considerations.

3.2 Research Philosophy

Gabay *et al*. (2023) defined research philosophy as the manner in which social facts are examined based on a specific phenomenon or belief in the methods of collecting, analyzing, and utilizing data. Tamminen and Poucher (2020) categorize research philosophy into four types: Pragmatism; Positivism; Realism; and Interpretivism. This study adopted positivism as its guiding paradigm. In the context of this study, positivism research philosophy supports the use of quantitative data to examine the impact of electricity accessibility, stability, and cost on the performance of small and medium-scale enterprises in Kibaigwa ward which found in Kongwa district, Tanzania. Positivism is chosen for this study for several reasons. Firstly, it often associated with a quantitative research approach, which involves collecting and analyzing numerical data to test hypotheses and answer research questions (Padilla-Díaz, 2015). Secondly, the philosophy is based on the principle of objective observation and measurement of the phenomenon being studied.

3.3 Research Approach

According to Žukauskas *et al*. (2018), when conducting research within the positivism research philosophy, the main approach used for primary research is a quantitative research approach. This approach, as described by Walliman (2017), entails gathering numerical data on multiple variables with the goal of identifying, confirming, or validating relationships, and forming generalizations that contribute to theory.

3.4 Research Design

According to Turner (2020), research design is the plan for how data will be collected, measured, and analyzed. Leavy (2017) categorizes research design into three main types: descriptive, exploratory, and explanatory research. This study utilized a explanatory research design to examine the impact of electricity accessibility, stability, and cost on the performance of small and medium-scale enterprises in Kibaigwa ward. Marshall and Rossman (2014) defines explanatory research as a method that examines cause-and-effect relationships between variables. This design is chosen for its ability to establish the relationship between dependent and independent variables.

3.5 Area of the Study

This study was conducted in Kibaigwa ward, which is located in Kongwa District, Dodoma. Kibaigwa is an administrative ward of Kongwa district in the Dodoma region of Tanzania. Recently, this ward has risen to a township authority. Kibaigwa ward is purposely selected because it is a rapidly growing business hub with a high concentration of SMEs operating in various sectors such as manufacturing, agriculture, and retail. However, like other areas in Tanzania, the ward is faced with unreliable

electricity supply, which ultimately leads to a significant challenge for consumers, including SMEs operating in the area, as they often struggle to maintain consistent productivity and efficiency due to frequent power outages and high costs associated with alternative power sources.

3.6 Target Population

Population encompasses all items being studied in any area of research. The target population refers to the entire group of actual or potential individuals, events, or objects on which the researcher is expecting to make generalizations of the study (Majid, 2018). In this study, the population of the study are the SMEs business owners engaging in the business related to welding, food processing industries, shops, furniture making, grain milling, cobbling, tailoring, sport-watching houses, movie halls, and barbers' shops. According to the Kibaigwa Township Report (2019), there are 320 registered SMEs businesses in Kibaigwa ward.

3.7 Sample Size and the Sampling Technique

3.7.1 Sample Size

The sample size of this study was determined using the Krejcie and Morgan (1970) sampling size table as shown in the appendices. Krejcie and Morgan (1970) sampling size table shows clearly the sample size to be used without any calculations that could mislead the sample taker. Since the population is 320 SMEs, hence by considering Morgan and Krejcie sampling size table, this study used a sample of 175 SMEs for the quantitative data. This sample is enough for correlation analysis as suggested by Moser and Korstjens (2018). Statistically, the sample size is large enough to study and make

generalizations about the population (Perneger *et al*., 2015). Logistically, this sample size is considered proportionate of the population under study (Bartlett *et al*., 2015).

3.7.2 Sampling Technique

A sampling technique is a definite plan for obtaining a sample from a given population. It refers to the technique or the procedure the researcher would adopt in selecting items for the sample (Krejcie & Morgan, 1970). Since the study involve quantitative data collection approach then, the researcher employed probability sampling design to select individuals to participate in the study. That said, the study used a simple random sampling to obtain SMEs representative in the study.

3.8 Variable and Measurement

This study aims to examine the impact of electricity accessibility, stability, and cost on the performance of small and medium-scale enterprises in Kibaigwa ward. In this study, the independent variables include the electricity accessibility, stability, and cost, whereas the dependent variable is performance of small and medium-scale enterprises. According to Maul *et al*. (2018), variables are measured using questionnaires, which are presented on four different scales, including the nominal, ordinal, interval, and ratio 4scales. In this study, the researcher used the nominal scale as labels to categorize demographic features consisting of age, gender, education level, and electricity use for business activities. Also, the 5-point Likert scale was used to collect data on discrete opinions from respondents related to the level of agreement on the impact of electricity accessibility, stability, and cost on the performance of small and medium-scale

enterprises in Kibaigwa ward using the scales "1=strongly disagree, 2=disagree, 3=undecided, 4=agree, and 5=strongly agree."

3.9 Unit of Analysis

In this study, the unit of analysis is focused on small and medium-scale enterprises (SMEs) in Kibaigwa ward. The researchers are interested in understanding how accessibility, stability, and cost of electricity power supply impact the performance of these businesses. SMEs play a significant role in the economic development of Tanzania, and their ability to access reliable and affordable electricity is crucial for their success. The researchers aim to investigate the extent to which the availability of electricity and its affordability affect the productivity, profitability, and overall performance of SMEs in Kibaigwa ward. By focusing on this specific unit of analysis, the researcher was able to gather detailed insights into the challenges and opportunities facing SMEs in the area in relation to electricity supply.

3.10 Data Collection Instruments

The researcher used a closed-ended questionnaire to collect data from selected SMEs in Kibaigwa ward regarding the impact of electricity accessibility, stability, and cost on the performance of small and medium-scale enterprises in Kibaigwa ward. According to Perneger *et al*. (2015), a questionnaire is a data collection instrument used to collect information from a group of people regarding their attitudes, characteristics, or beliefs. Utilizing a questionnaire in this study enabled the researcher to efficiently survey a large number of participants in a short period of time. In this study, the questionnaires were presented on a 5-point Likert scale ranging from

strongly disagree to strongly agree, and the selected SMEs were required to fill out their level of agreement on the impact of electricity accessibility, stability, and cost on the performance of small and medium-scale enterprises in Kibaigwa ward.

3.11 Validity and Reliability of Research Instruments

Prior to embarking on field work, the instruments for data collection were tested for validity and reliability. According to Kothari and Grag (2014), validity is defined as the extent to which an instrument measures what it is supposed to measure. To ensure validity of the instrument the drafted questionnaires were given to the supervisors and colleagues for critical assessment of each item. The suggestions given by them were included when reviewing and improving the final research instrument.

Also, to test reliability, instruments were administered to 32 SMEs (10% of the target population). These respondents were then not included in the actual study. The respondents filled in the questionnaire depending on their level of agreement with the 5-point Likert scale. Then the questionnaire collected from the respondents were analyzed to test the reliability of the instrument using Cronbach's alpha coefficient with the help of a computer program called SPSS (Statistical Package for the Social Sciences). According to McMillan and Schumacher (2013), an instrument is considered reliable when alpha is greater than 0.7 (alpha > 0.70).

3.12 Data Analysis Procedures

Data processing involved coding and classifying collected data, cleaning raw data, and organizing data based on emerging themes. Data coding was conducted prior to

entering them into SPSS for analysis. Descriptive statistics, following Nassaji (2015), was used to describe socio-demographic characteristics of respondents and present them through frequency and percentage. On the other hand, Pearson's correlation analysis was used to determine relationships between variables, while multiple regression analysis was used to estimate effects of independent variables on the dependent variable as described by (Vatcheva et al. (2016). The multiple regression coefficient quantifies the extent to which the dependent variable changes with a one-unit change in the independent variable, while keep constant all other variables in the equation (Nair & Ganapathy, 2023). Given that the study focuses on the performance of SMEs as the dependent variable and examines three independent variables, namely the accessibility of electricity supply, stability of electricity supply, and cost of connectivity, linear regression emerges as the suitable analytical method. This approach effectively explores the relationship between one dependent variable and multiple independent variables, facilitating the establishment of both the nature and strength of these relationships. Through multiple linear regression, the researcher can quantify how variations in electricity supply accessibility, stability, and connectivity costs influence SME performance, particularly in areas such as productivity, product and service quality, business expansion, job creation, and innovation enhancement. Furthermore, this method offers diagnostic tools to evaluate the model's fit and check crucial assumptions, including linearity, normality, independence, multicollinearity, and homoscedasticity. Such capabilities are vital for ensuring the validity of the findings, thereby bolstering the reliability of the conclusions regarding the impact of electricity supply factors on the performance of SMEs. The following regression equation was used:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$$

Where:

Y = The Performance of SMEs

$\beta_0 =$ Constant term

$\beta_1, \beta_2,$ and β_3 are coefficients of $X_1, X_2,$ and X_3 variables

$X_1 =$ The accessibility of electricity supply

$X_2 =$ The stability of electricity supply

$X_3 =$ The cost of conectivity of electricity supply

ε = Stochastic Disturbance Error Term

3.13 Model Diagnostic Test

Before estimating the regression model, diagnostic tests were conducted to determine if the model complies with the assumptions of linear regression.

3.13.1 Linearity Test

Linearity assumption in the context of linear regression states that the relationship between the independent variables and the dependent variable is a straight line, meaning changes in the independent variables result in proportional changes in the dependent variable (Hickey & Kontopantelis, 2019). To test linearity in this study, the researcher used Means methods which in SPSS to determine whether there is a linear relationship between dependent and independent variables.

3.13.2 Normality Test

Mishra *et al*. (2019) defined normality distribution of data as a probability distribution

that is symmetric about the mean, showing that data near the mean are more frequent in occurrence than data far from the mean. In this study, Kolmogorov-Smirnov test and Shapiro-Wilk tests were used to determine if a variable follows a normal distribution. These tests compare the variable to a set of scores that are normally distributed, with the same mean and standard deviation. If the value of these tests are greater than 0.05, the data is normal. If it is below 0.05, the data significantly deviate from a normal distribution.

3.13.3 Test of Assumptions of Multi-collinearity

According to Yoo and Mayberry (2014), multi-collinearity refers to a high level of inter-correlation among independent variables that makes it difficult to separate their effects on the dependent variable. The study analyzed the correlation matrix to understand the extent of inter-correlation among all variables. Vatcheva *et al*. (2016) suggests that inter-correlation above 0.8 indicates multi-collinearity and should be investigated further. However, Kim (2019) argue that using a correlation matrix alone may not accurately identify multi-collinearity. Therefore, this study also examined tolerance and the Variance Inflation Factor (VIF) to thoroughly assess the issue of multi-collinearity. Generally, a VIF greater than 10 and a tolerance value below 0.10 suggest a possible multicollinearity problem (Hair *et al*., 2010).

3.13.4 Heteroscedasticity

According to Hair *et al*. (2017), a fundamental assumption in linear regression is that the residuals exhibit equal variance across all levels of the predictor variable, a condition referred to as homoscedasticity. Greene (2020) note that the occurrence of

heteroscedasticity signifies a breach of this assumption, which can result in unreliable regression outcomes. To assess heteroscedasticity in the residuals, the researcher in this study performed the Breusch-Pagan test, specifically designed to detect variations in variance among the regression residuals. A p-value greater than 0.05 from this test suggests that we fail to reject the null hypothesis, thereby indicating the presence of homoscedasticity in the model.

3.14 Ethical Considerations

Artal and Rubenfeld (2017) defined ethics as the behavior to be observed and adhered to by a researcher during the course of the study. Also, according to Yip and Han (2016), ethics in research means conformance to the standards of conduct of a given profession or group. To ensure ethical considerations, the researcher obtained clearance from both the Open University of Tanzania and the Kongwa District Council before conducting the study. Verbal consent was also obtained from respondents before data collection begins. Respondents were not required to provide their names on questionnaires to maintain confidentiality and objectivity, and the information collected is solely for academic purposes. The researcher treated all respondents openly and honestly, regardless of their social or physical differences.

CHAPTER FOUR

FINDINGS AND DISCUSSION

4.1 Chapter Overview

This chapter presents the reliability of the research instruments and examines the response rate to the questionnaire. Additionally, it presents the findings from the data analysis and interpretation, leading into a discussion of the results. The data analysis utilized both descriptive and inferential statistics. Descriptive statistics provided insights into the demographic characteristics of the participants, while inferential statistics focused on correlation and regression analysis.

4.2 Testing Results for the Reliability of the Research Instruments

The reliability of the questionnaire was assessed using Cronbach's alpha. Cronbach's alpha is a coefficient that measures how well the items in the scale represent a single underlying construct (Heale & Twycross, 2015). The findings are shown in Table 4.1 below.

Table 4.1: Reliability Test Results

Variable	Cronbach's Alpha	No. of Items
Accessibility of Electricity	0.873	5
Stability of Power Supply	0.830	5
Cost of Electricity Power Supply	0.822	6
Performance of SMEs	0.766	6

Source: Field Data (2025)

The results presented in Table 4.1 indicated that the variables related to the accessibility of electricity, stability of power supply, cost of electricity supply, and

performance of SMEs had reliability values of 0.873, 0.830, 0.822, and 0.766, respectively. These values surpass the recommended Cronbach Alpha threshold of 0.70 (Creswell & Poth, 2017), demonstrating that the instruments used in the study are highly reliable. As noted by Creswell and Poth (2017), a Cronbach Alpha coefficient of 0.7 or higher is deemed adequate for most research. Furthermore, the pilot study enhanced the clarity of the questionnaires by revising ambiguous or insufficient items, thereby further increasing the reliability of the research tools.

4.3 Response Rate

A total of 175 SMEs participated in the study, with 159 completing the questionnaires, yielding a response rate of 90.86%. According to Mugenda and Mugenda (2003), a response rate of 50% is considered adequate, 60% is good, and 70% or higher is excellent for analysis and reporting. The response rate achieved in this study is classified as excellent, suggesting that reliable conclusions can be drawn from the study population. The findings are presented in Table 4.2.

Table 4.2: The Response Rate

Respondent	No. of questionnaires distributed	returned	Percentage (%)
SMEs	175	159	90.86

Source: Field Data (2025)

4.4 Descriptive Statistics Results

This section analyses the demographic information of the respondents to determine if their perspectives represent the diversity within the population. Evaluating demographic data is essential in research, as it contextualizes the findings and helps researchers comprehend how different factors shape responses.

4.4.1 Demographic Characteristics of the Respondents

In this study, the researchers sought to gather demographic information about the respondents, including their gender, age, and education background. The results are displayed in Table 4.3 below.

Table 4.3: Demographic Characteristics of the Respondents

Gender	**Frequency**	**Percentage**
Male	95	59.7
Female	64	40.3
Total	**159**	**100.0**

Age	**Frequency**	**Percentage**
Below 25 years	44	27.7
25-35 years	26	16.3
36-45 years	47	29.6
Over 45 years	42	26.4
Total	159	100.0

Education Level	**Frequency**	**Percentage**
Primary	81	50.9
Secondary	55	34.6
Tertiary	11	6.9
Undergraduate	10	6.3
Postgraduate	02	1.3
Total	159	100.0

Source: Field Data (2025).

The findings presented in Table 4.3 reveal a significant disparity in the representation of male and female respondents in the research study. This disparity raises important implications for the overall findings and conclusions of the study. With 95 male respondents accounting for 59.7% and 64 female respondents making up 40.3%, this imbalance suggests that the perspectives and experiences of female entrepreneurs may be underrepresented. This underrepresentation can lead to skewed insights regarding

the impact of electricity supply on the performance of SMEs, particularly if the challenges and advantages faced by female-owned enterprises differ from those experienced by their male counterparts. Consequently, the findings may not fully capture the nuances of how electricity supply affects all business operators within the community.

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Also, the findings regarding the age distribution of respondents provide critical insights for data collection. With 44 respondents (27.7%) being below 25 years, it suggests a considerable proportion of younger entrepreneurs who may possess a different perspective on the challenges faced by SMEs, particularly in relation to electricity supply. In contrast, the 42 respondents (26.4%) over 45 years represent a segment that likely brings a wealth of experience and traditional approaches to business. Their responses may reflect a more cautious stance regarding the impact of electricity supply, as they may have witnessed various fluctuations and challenges throughout their entrepreneurial journeys. Furthermore, the largest age group, comprising 47 respondents (29.6%) in the 36-45 years range, suggests a middle-ground demographic that may balance innovation with experience. This group's insights could be critical in shaping practical approaches to mitigate the negative impacts of unreliable electricity supply on business performance.

Moreover, the findings reveal a significant disparity in educational attainment among the respondents, with 81 individuals, accounting for 50.9%, having only completed primary school. Following this, 55 respondents, or 34.6%, hold a secondary education. In contrast, the higher education levels are less represented, with only 11 respondents

(6.9%) achieving tertiary education and 10 (6.3%) holding an undergraduate degree. The presence of just 2 respondents (1.3%) with graduate-level education further emphasizes the low level of advanced academic qualifications within this group. The implications of these findings are significant, particularly in the context of how well respondents might understand and engage with a research questionnaire. The majority, with only primary education, may struggle with nuanced questions, potentially leading to misinterpretation or oversimplification of their responses. This could affect the reliability and validity of the data collected, as their understanding of the questions may not align with the research objectives.

Additionally, the limited educational background could lead to a lack of familiarity with research terminology, making it challenging for respondents to provide informed opinions or insights.

4.4.2 Inferential Statistics Findings

The researcher conducted a correlation and multiple linear regression analysis to examine the impact of accessibility, stability, and cost of electricity supply on the performance of Small and Medium-sized Enterprises (SMEs) in Kibaigwa Ward.

4.4.2.1 Correlation Analysis

The study employed Pearson Correlation to evaluate the strength and direction of linear relationships among electricity accessibility, stability, and cost of electricity supply, as well as their impact on the performance of SMEs. The findings are displayed in Table 4.4.

Table 4.4: Pearson Correlation Results

		AE	ST	CoE	PF
AE	Pearson Correlation	1			
	Sig. (2-tailed)				
ST	Pearson Correlation	.491**	1		
	Sig. (2-tailed)	.000			
CoE	Pearson Correlation	.459**	.481**	1	
	Sig. (2-tailed)	.000	.000		
PF	Pearson Correlation	.798**	.612**	-.840**	1
	Sig. (2-tailed)	.000	.000	.000	

**. Correlation is significant at the 0.05 level (2-tailed).

AE represent Accessibility of Electricity; ST represent Stable Electricity
CoE represent Cost of Electricity; PF represent Performance of SMEs
N=159

The findings presented in Table 4.4 reveal critical insights into the relationship between electricity accessibility, stability, cost, and the performance of Small and Medium Enterprises (SMEs). A strong positive correlation is evident between accessibility of electricity and the performance of SMEs, with a correlation coefficient of r=0.798. This indicates that as access to electricity improves, the performance of SMEs tends to enhance correspondingly. The significance of this correlation is confirmed at a 5% level, suggesting that the relationship is unlikely to be due to chance.

In addition to accessibility of electricity, stability of electricity supply also plays a crucial role in the performance of SMEs, with a correlation coefficient of r=0.612. This strong positive correlation indicates that SMEs that experience a more stable electricity supply are likely to perform better. The significance at the 5% level further reinforces the reliability of this finding, emphasizing the importance of stable electricity in fostering the growth and operational efficiency of SMEs.

Moreover, the cost of electricity supply emerges as another significant factor influencing SME performance, with a correlation coefficient of r= -.840. This notably high value indicates a strong negative relationship, implying that as the cost of electricity supply decreases, the performance of SMEs tends to improve significantly. This correlation is also significant at the 5% level, underlining the impact that electricity costs have on the operational viability of SMEs.

4.4.2.2 Multiple Linear Regression Analysis

A multiple linear regression model was created to evaluate causation and forecast an outcome variable. Before performing the regression analysis, diagnostic checks were conducted on the model to ensure that the assumptions of linear regression were met, as detailed in the subsequent sections.

Linearity Assumption: A linearity test was performed to assess whether a linear relationship exists between the independent variables and the dependent variable. The results of the analysis are presented in below.

Table 4.5: Linearity Test Result for Relationship between SMEs Performance and Accessibility of Electricity Supply

			Sig
PF * ST	Between Groups	(Combined)	0.000
		Linearity	0.000
		Deviation from Linearity	0.020

Source: Field Data (2025)

The Means Test results presented in Table 4.5 reveal that the P-values for linearity are below 0.05. This enables the researcher to reject the null hypothesis, which asserts that there is no linear relationship between the performance of SMEs and their access to

electricity. Therefore, the study concludes that a linear relationship does indeed exist between SMEs' performance and their electricity accessibility.

Table 4. 6: Linearity Test Result for Relationship between SMEs Performance and the Stability of Electricity Power Supply

			Sig
PF * ST	Between Groups	(Combined)	0.000
		Linearity	0.000
		Deviation from Linearity	0.001

Source: Field Data (2025)

The result of the Means Test presented in Table 4.6 reveal that the P-values for linearity is below 0.05. This suggests that we can reject the null hypothesis, which states that there is no linear relationship between SMEs' performance and the stability of power supply. Therefore, it can be concluded that a linear relationship exists between SMEs' performance and the stability of power supply.

Table 4.7: Linearity Test Result for Relationship between SMEs Performance and the Cost of Accessing Electricity Supply

			Sig
PF * ST	Between Groups	(Combined)	0.000
		Linearity	0.000
		Deviation from Linearity	0.005

Source: Field Data (2025)

The findings from the Means Test shown in Table 4.7 indicate that the P-value for linearity is below 0.05. This allows the researcher to reject the null hypothesis, which posits that there is no linear relationship between the performance of SMEs and the cost of electricity. Consequently, the study conclude that a linear relationship does exist between these two variables.

Normality Assumption: A normality test was conducted to assess whether the sample data originates from a normally distributed population. In this study, the Kolmogorov-Smirnov test was employed to examine the distribution of the variables. The null hypothesis asserted that the data follow a normal distribution, while the alternative hypothesis suggested that the data do not follow a normal distribution. The findings are summarized in Table 4.8.

Table 4.8: One-Sample Kolmogorov-Smirnov Test for Normality

	Variables			
	Performance of SMEs	Accessibility of Electricity	Stability of Power Supply	Cost of Electricity
Kolmogorov-Smirnov Z	0.942	1.625	1.164	1.247
Sig. (2-tailed)	0.337	0.060	0.133	0.089

Source: Field Data (2025)

According to the results of the One-Sample Kolmogorov-Smirnov Test shown in Table 4.8, the P-values for all study variables exceed 0.05. This indicates that the null hypothesis cannot be rejected, suggesting that the data follows a normal distribution. Consequently, it can be concluded that the variables performance of SMEs, accessibility of electricity, stability of power supply, and cost of electricity are normally distributed.

Multicollinearity Test Results: Multicollinearity is a common issue in regression models when independent variables exhibit correlations with one another. This phenomenon can inflate the variance of the regression coefficients, potentially violating the reliability of the regression equation. In this study, we evaluated the

presence of multicollinearity by employing the Variance Inflation Factor (VIF) and tolerance values. Generally, a VIF greater than 10 and a tolerance value below 0.10 suggest a possible multicollinearity problem (Hair *et al*., 2010). Table 4.9 presents the tolerance and VIF values for the independent variables.

Table 4.9: Multi-collinearity Test Results

Independent variables	Collinearity Statistics	
	Tolerance	VIF
Constant		
Access of Electricity	.404	2.478
Stability in Power Supply	.731	1.367
Cost of Electricity	.409	2.448

Dependent Variable: Performance of SMEs

Source: Field Data (2025)

The results shown in Table 4.9 indicate that there is no evidence of multi-collinearity among the independent variables. This is supported by Tolerance values greater than 0.10 and VIF values below 10. Consequently, the study conclude that multi-collinearity is not a concern in this study.

Heteroscedasticity Test Result: The presence of heteroscedasticity in a regression model indicates that the variance of the errors differs across observations. To evaluate whether heteroscedasticity exists in the model, a Breusch-Pagan test was performed. In this test, the null hypothesis states that the variance of the errors is constant across observations, while the alternative hypothesis posits that the variance changes between observations. The results of this analysis are presented in Table 4.10.

Table 4.10: Breusch-Pagan Test Result

Model	P-Value
Residual	0.212

Dependent Variable: Res_Squared
Predictors: (Constant), Cost of Electricity, Stability of Power Supply, Accessibility of Electricity

Since the p-value for the errors in Table 4.10 is greater than 0.05, the study did not reject the null hypothesis, which asserts that the variance of the errors does not differ between observations. This suggests that the variance of the errors is consistent across observations. Consequently, we can conclude that heteroscedasticity is not an issue in the regression model.

Multiple Linear Regression Parameters Estimation: The study utilized a Multiple Linear Regression model, employing Ordinary Least Squares (OLS) to assess the impact of electricity accessibility, stability of power supply, and cost of electricity on the performance of SMEs in Kibaigwa ward. OLS was chosen for its straightforwardness and interpretability (Wooldridge, 2016), enabling precise estimation of regression coefficients and reliable predictions based on the data (Greene, 2018). This method is recognized for yielding estimates that closely resemble true parameter values, maintaining minimal variance among unbiased estimators, and converging towards these true values as the sample size increases (Stock & Watson, 2018). Detailed results from the Model Summary, ANOVA, and Regression Coefficients are presented in the Tables below.

i) Model Summary

The model summary in Table 4.11 reveals a correlation coefficient (R) of 0.895, indicating a strong relationship between the independent variables—electricity

accessibility, stability of power supply, and cost of electricity—and the performance of SMEs in Kibaigwa ward. The regression coefficient (R^2) of 0.801 suggests that these factors account for 80.1% of the performance variance among SMEs in the area. Nonetheless, it is possible that other unexamined variables contribute to the remaining 19.9% of the performance variation in Kibaigwa ward's SMEs.

Table 4.11: Model Summary

Mode	R	R Square	Adjusted R Square
1	0.895	0.801	0.797

Predictors: (Constant), electricity accessibility, stability of power supply, and cost of electricity.

ii) Ability of Model to Predict Outcomes

The study employed ANOVA to evaluate the effectiveness of the multiple regression model in predicting the performance of SMEs in Kibaigwa ward. As shown in Table 4.12, all variables included in the model were found to be statistically significant, affirming the model's suitability. The P-Value produced a significant result ($p<0.000$), indicating a robust relationship between the independent variables—electricity accessibility, stability of power supply, and cost of electricity—and the performance of SMEs in Kibaigwa ward. Consequently, it was concluded that the regression model effectively predicts the dependent variable and is appropriately aligned with the data.

Table 4.12: ANOVA Statistics

Model	Sum of Squares	Df	Mean Square	F	P-Value
Regression	22.671	3	7.577	208.141	0.0000
Residual	5.628	155	.036		
Total	28.299	158			

Dependent Variable: Performance of SMEs
Predictors: (Constant), electricity accessibility, stability of power supply, cost of electricity

iii) Beta Coefficients Estimation of Multiple Linear Regression

In multiple linear regression analysis, beta coefficients indicate how much the dependent variable (Y) changes with a one-unit change in an independent variable (X), while keeping other variables constant. A positive beta indicates a positive relationship, while a negative beta indicates a negative relationship. The significance value (sig) for each beta coefficient shows whether the relationship is statistically significant, with a value below 0.05 considered significant. The t-test assesses the significance of each coefficient, with a t-value greater than 2 or less than -2 indicating a significant impact on the dependent variable. In this study's Table 4.13, the t-test results show that the variables—electricity accessibility, stability of power supply, cost of electricity—have t-values greater than 2 and sig values less than 0.05, indicating a significant impact on the dependent variable, which is the performance of SMEs.

Table 4.13: Regression Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	P-Value
	B	Std. Error	Beta		
(Constant)	1.565	0.106		14.764	
Accessibility	0.164	0.030	0.314	5.568	0.000**
Stability	0.152	0.029	0.219	5.229	0.000**
Cost of electricity	-0.307	0.035	0.496	8.854	0.000**

Dependent Variable: Performance of SMEs

Multiple linear regression representing the results displayed in Table 4.13 is given by the following model:

$$\text{Performance of SMEs} = 1.565 + 0.164X_1 + 0.152X_2 - 0.037X_3$$

X_1, X_2, and X_3 represent the accessibility of electricity, stability of electricity power supply, and cost of electricity respectively.

The regression coefficients reveal that, while keeping other variables constant, a one-unit increase in electricity accessibility would lead to a significant increase in SME performance by 0.164 (16.4%). Additionally, a one-unit increase in the stability of electricity power supply, with other variables held constant, would also result in a notable increase in SME performance by 0.152 (15.2%). Conversely, a one-unit increase in electricity costs, while controlling for other factors, would significantly reduce SME performance by 0.307 (30.7%).

4.5 Discussion of Findings

4.5.1 The Impact of Accessibility of Electricity Power Supply on the Performance of SMEs in Kibaigwa Ward

The study found that electricity accessibility is a critical factor in enhancing the performance of small and medium-sized enterprises (SMEs) in Kibaigwa ward. It highlights that improvements in the ease of connecting to the electricity grid significantly influence operational success. Furthermore, the analysis indicates that efficient billing and payment processes also play a positive role in the performance of these enterprises. The importance of responsive customer service for addressing complaints and inquiries cannot be overlooked, as it contributes to overall satisfaction and operational efficiency. Additionally, the presence of technical support during electricity supply issues further strengthens the capacity of SMEs to thrive in their respective markets.

The findings of this study resonate with existing research from various countries highlighting the critical role of electricity accessibility in enhancing the performance

of small and medium-sized enterprises (SMEs). For instance, Ahmad and Sahar (2021) conducted a study in Malaysia that demonstrated a significant positive relationship between electricity supply and SME performance, indicating that reliable power access is vital for operational efficiency and growth.

Similarly, research by Rahman and Paikari (2020) in Bangladesh reinforced this perspective, showing that SMEs benefit substantially from accessible electricity, which in turn supports their productivity and overall success. This theme continues in Nigeria, where Samson and Kabiru (2021) also established a significant positive correlation between electricity availability and the performance of SMEs, suggesting that consistent power supply is fundamental for entrepreneurial activities in that context.

Furthermore, the study by Araujo and Cardona (2020) in Brazil echoed these findings, illustrating a strong positive correlation between electricity accessibility and the performance of micro-enterprises. This collective body of research highlights a consistent trend across diverse geographical settings: improved access to electricity is crucial for the operational success of small and medium enterprises. It underscores the necessity for policymakers to prioritize energy access as a strategic component in fostering entrepreneurship and economic development.

4.5.2 The Impact of Stability of Electricity Power Supply on the Performance of SMEs in Kibaigwa Ward

In this objective, the study found that the stability of electricity supply is instrumental in enhancing the performance of small and medium-sized enterprises (SMEs). The

findings underscore that improvements in power stability significantly correlate with better operational outcomes for businesses. A consistent and reliable electricity supply is fundamental, as it minimizes disruptions that can hinder daily operations.

Moreover, the reduction of power outages is critical for ensuring that SMEs can function smoothly without unexpected interruptions. The availability of backup power solutions during emergencies is also essential, as it provides a safety net that protects businesses from potential losses. Stable voltage levels further contribute to this reliability, as they help prevent equipment damage, which can be costly and detrimental to operations. Additionally, having an adequate capacity to meet the specific demands of SMEs is crucial for their growth and sustainability.

These findings resonate with a study conducted by Arumdeben *et al*. (2023), which highlighted the crucial role of stable power supply in enhancing the performance of small and medium-sized enterprises (SMEs) in Southern Taraba State, Nigeria. The study emphasized that consistent electricity availability positively impacts SMEs, allowing them to operate more efficiently and effectively. Similarly, research in the Takum local government area by Afukonyo (2023) illustrated the detrimental effects of unreliable power supply, revealing that SMEs were compelled to allocate 20% to 30% of their operational costs towards backup energy solutions. This financial strain not only diminishes their profit margins but also hampers overall business growth.

Further corroborating these concerns, Udoinyang and Daniel (2024) found that the short duration of public power supply adversely affected SMEs in terms of goods

storage, productivity, and revenue generation. The intermittent power supply creates significant bottlenecks, restricting profit potential and limiting sales opportunities. In a broader context, Pami-Pami (2021) explored the experiences of small and medium-scale businesses in Cameroon, where insufficient electricity supply from energy providers was identified as a major obstacle to smooth business operations. This lack of reliable power further complicates the already challenging landscape for SMEs. Additionally, research by Bassey and Ikpe (2021) in the Calabar South and Calabar Municipality revealed a significant correlation between electricity supply and the performance of SMEs. Their findings reinforce the notion that reliable access to electricity is critical for the success and sustainability of small and medium enterprises.

4.5.3 The Impact of Cost of Electricity on the Performance of SMEs in Kibaigwa Ward

In this objective, the study found that rising electricity costs have a negative impact on the performance of small and medium-sized enterprises (SMEs). An increase in these costs is associated with a notable decline in overall operational effectiveness. This decline can be attributed to several factors, including expenses related to transmission infrastructure, installation, metering, and connection, along with various taxes and levies. These financial burdens can significantly impede the ability of SMEs to operate efficiently and compete in the market.

Additionally, the study highlights that operational and maintenance costs contribute further to the financial pressures faced by these businesses. The combination of these

escalating expenses creates a challenging environment for SMEs, complicating their ability to sustain growth and profitability.

These observations are supported by a study conducted by Moreblessing *et al*. (2024) in Zimbabwe, which highlights the detrimental impact of energy price volatility on the financial performance of retail businesses. The study found that fluctuations in energy costs lead to reduced sales, increased operational costs, and ultimately lower profits. Similarly, research by Arumdeben *et al*. (2023) in Nigeria underscores the significant positive effect that the cost of power supply has on the performance of small and medium-sized enterprises (SMEs) in their region, indicating that energy costs can play a critical role in operational success.

In the Ashanti Region of Ghana, Ayivi *et al*. (2022) further explored this dynamic, revealing a negative long-run relationship between electricity prices and SME growth. Their findings indicated that rising energy rates adversely affect the growth and development of SMEs, asserting that a 1% increase in average electricity prices correlates with a 0.68% decrease in profits over time.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Chapter Overview

This chapter provides a summary of the study, encompassing its purpose, research questions, methodology, and findings. It also includes a discussion and conclusions drawn from the research. The chapter ends with recommendations and suggestions for future studies.

5.2 Summary of the Study

The general objective of the study was to examine the impact of electricity power supply on the performance of SMEs in Kongwa district, Tanzania, specifically in the Kibaigwa ward. To achieve the general objective, the study employed three specific objectives. It first examines the impact of accessibility of electricity power supply on the performance of SMEs in Kibaigwa ward. The second objective was to examine the impact of stability in power supply on the performance of SMEs in Kibaigwa ward. The third objective was to examine the impact of the cost of electricity power supply on the performance of SMEs in Kibaigwa ward.

The study passed through a number of procedures to achieve the results for these three objectives. At first, the researcher utilized the Economics of Power System Reliability and Planning theory to explore issues related to electricity power supply and the performance of SMEs. The researcher subsequently performed a thorough review of pertinent literature to pinpoint gaps regarding the relationship between electricity

accessibility, power supply stability, and electricity costs in relation to the performance of SMEs.

Thirdly, the researcher utilized explanatory research design with a quantitative approach. The study focused on a total population of 320 registered SMEs in Kibaigwa ward, from which a sample size of 175 SMEs was determined using Krejcie and Morgan's tabulation method. Simple random sampling technique was used to obtain SMEs representative in the study.

To gather pertinent information from the respondents, a closed-ended questionnaire was used. The gathered quantitative data was examined using SPSS software. Descriptive statistics were utilized to analyze demographic data, whereas correlation and multiple linear regression analyses were conducted to evaluate the relationships among the variables. Finally, the presentation of the key findings that obtained from these approaches was done based on the stated specific objectives.

The results of the correlation analysis indicated a significant and strong relationship between the electricity accessibility, power supply stability, and electricity costs in relation to the performance of SMEs. Meanwhile, the multiple linear regression analysis revealed that access to electricity significantly improved the performance of SMEs in Kibaigwa ward. This indicates that an increase in electricity accessibility correlates with enhanced SME performance, while a decrease in accessibility corresponds to a decline in performance. Additionally, the study found that the stability of power supply positively affects SME performance in Kibaigwa ward, suggesting

that greater stability leads to improved performance, whereas reduced stability negatively impacts it. On the other hand, the cost of electricity was identified as having a significant negative effect on SME performance. Specifically, an increase in electricity costs correlates with a decrease in performance, while a decrease in costs is associated with an increase in performance.

5.3 Conclusion

This study concludes that the accessibility, stability of electricity supply, and cost of electricity supply are critical determinants of the performance of small and medium-scale enterprises (SMEs) in Kibaigwa ward. The findings indicate a significant and robust correlation between the availability of electricity, the reliability of power supply, and the operational success of SMEs. Specifically, enhanced access to electricity is directly linked to improved SME performance, highlighting the vital role that electricity plays in facilitating business activities and driving economic growth in the area.

Moreover, the analysis reveals that the stability of power supply significantly influences SME performance; consistent and reliable electricity contributes positively to operational efficiency and productivity. Conversely, fluctuations in power supply can result in disruptions that adversely affect business operations, ultimately hindering performance. However, the study also identifies the cost of electricity as a critical barrier to SME success, with higher electricity costs correlating with diminished performance.

5.4 Implication of the Findings

The research findings on the critical role of electricity accessibility, supply stability, and costs for small and medium-scale enterprises (SMEs) in Kibaigwa ward have both theoretical and practical implications that resonate with the Economics of Power System Reliability and Planning theory.

Theoretically, the study underscores the importance of integrating electricity supply reliability into economic models that assess SME performance. Traditional economic theories might focus on broader macroeconomic indicators, but this research highlights the microeconomic impacts of power supply characteristics on local business dynamics. The Economic of Power System Reliability and Planning theory posits that a reliable electricity supply is not just a utility concern but a foundational element that directly influences economic productivity. The strong correlation found between electricity availability and SME performance suggests that the theory should incorporate operational factors such as accessibility and reliability of electricity into its frameworks, thereby enriching the understanding of how energy access shapes local economies.

Practically, the findings call for targeted interventions in energy policy and infrastructure planning. They suggest that policymakers and energy providers must prioritize improvements in the stability and accessibility of electricity for SMEs to enhance economic growth. The identification of electricity costs as a barrier implies that pricing strategies should be evaluated to ensure that they do not inhibit the operational viability of small businesses. This aligns with the theory's emphasis on

planning and investment in power systems that not only meet demand but also foster economic resilience. Therefore, strategies could involve subsidizing electricity costs for SMEs, investing in renewable energy sources, or improving grid infrastructure to minimize outages, which would support both economic development and the reliability of power supply.

In essence, the research findings not only reinforce existing theoretical frameworks regarding the economics of power systems but also provide actionable insights that can guide energy policy and planning efforts to support the performance of SMEs, ultimately contributing to broader economic stability and growth.

5.5 Recommendations

This study recommends that government, policymakers and other stakeholders in Kibaigwa ward prioritize improving electricity accessibility for small and medium-scale enterprises (SMEs). Given the significant correlation between electricity access and SME performance, enhancing the availability of electricity is crucial for fostering business growth and economic development in the region. Initiatives aimed at expanding the electricity grid and ensuring reliable power supply should be implemented to support local SMEs.

Additionally, the findings underscore the importance of maintaining a stable power supply. Efforts to minimize outages and fluctuations in electricity provision will significantly benefit SMEs, as stability in power supply is linked to improved operational efficiency and productivity.

Moreover, the study highlights the adverse impact of high electricity costs on SME performance. Therefore, it is essential for local authorities and utility providers to explore strategies for reducing electricity tariffs, such as subsidies or alternative energy solutions, to alleviate the financial burden on SMEs.

5.6 Limitation of the Study

Several limitations arose during the data collection process. One significant challenge was the accessibility of the SMEs themselves. Many small businesses operate in informal settings, making it difficult for researchers to identify and reach them. To overcome this challenge, researcher collaborated with local businessman that have better knowledge of the SME landscape in the area.

Another limitation was the reluctance of business owners to share sensitive information, particularly regarding their financial performance or operational challenges. This hesitation stems from concerns about confidentiality or fear of negative consequences from disclosing such data. To address this issue, researcher ensured that they communicate the confidentiality of the information provided and emphasize the purpose of the study as a means to support local business development.

Lastly, language barriers hindered effective communication during surveys because some of the respondents are not fluent in the research language. To overcome this limitation, researcher used local available researchers who are familiar with the language and cultural context so as to enhance communication and ensure that questions are understood correctly.

5.7 Areas Recommended for Further Research

As the study concentrates exclusively on grid electricity power supply and does not delineate the specific sectors in which small and medium-sized enterprises (SMEs) operate, nor does it assess the effectiveness of current policies and regulations governing electricity supply, it is recommended that future researchers investigate the following areas.

i) Analyze how the impact of electricity supply varies across different sectors of SMEs (e.g., manufacturing, services, agriculture) within Kibaigwa Ward.

ii) Explore the role of alternative energy sources (solar, wind, etc.) on SME performance in case of unreliable electricity supply.

iii) Analyze the effectiveness of current policies and regulations governing electricity supply and their implications for SME performance.

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APPENDICES

APPENDIX I: Questionnaire

Section I: Introduction

Dear respondent,

I am Prisius Mrosso, a student at the Open University of Tanzania, conducting research with the purpose of finding out “The impact of electricity supply on the performance of small and medium-scale enterprises in Kibaigwa ward, Tanzania." In this study, you have been selected to be one of my respondents, and I believe that you have the necessary information that will be very useful and supportive. The information you provide will be treated more confidentially for ethical reasons.

Regards,

Prisius Mrosso

Section II: Demographic Information

Please tick to indicate your opinion on each of the statements

1. What is your Age? a) Below 25 b) Between 26 and 35 c) Between 36 and 45 d) Above 45.
2. What is your gender? a) Male b) Female
3. What is your highest level of education? a) Primary b) Secondary c) Tertiary d) Undergraduate e) Postgraduate

Section III: The impact of accessibility of electricity power supply on the performance of SMEs in Kibaigwa ward

Using a scale of 1-5, kindly tick appropriately as: 5=Strongly agree, 4=Agree, 3 = Neither Agree nor Disagree, 2=. Disagree, and 1=Strongly disagree

Code	Statements	1	2	3	4	5
AE1	To what extent do you agree that easy access to the process of connecting to the electricity grid positively impacts the performance of SMEs in Kibaigwa ward?					
AE2	How strongly do you agree that efficient billing and payment processes contribute to the success of SMEs in Kibaigwa ward?					
AE3	Do you believe that accessible and responsive customer service for complaints and inquiries is important for the performance of SMEs in Kibaigwa ward?					
AE4	To what extent do you believe that the availability of technical support in case of electricity supply problems benefits SMEs in Kibaigwa ward?					
AE5	To what extent do you agree that the accessibility to alternative power options contribute to the success of SMEs in Kibaigwa ward?					

Section IV: The impact of stability in power supply on the performance of SMEs in Kibaigwa ward

Using a scale of 1-5, kindly tick appropriately as: 5=Strongly agree, 4=Agree, 3 = Neither Agree nor Disagree, 2=. Disagree, and 1=Strongly disagree

Code	Statements	1	2	3	4	5
ST1	To what extent do you agree that reliable power supply at all times positively impacts the performance of SMEs in Kibaigwa ward?					
ST2	How much do you agree that minimal or no power outages contribute to the success of SMEs in Kibaigwa ward?					
ST3	Do you believe that having back-up power options available in case of emergencies or prolonged outages enhances the performance of SMEs in Kibaigwa ward?					
ST4	To what degree do you agree that stable voltage levels to prevent damage to electrical equipment are important for the growth of SMEs in Kibaigwa ward?					
ST5	How strongly do you believe that adequate capacity to meet the demand of SMEs is crucial for their success in Kibaigwa ward?					

Section V: The impact of cost of electricity power supply on the performance of SMEs in Kibaigwa ward

Using a scale of 1-5, kindly tick appropriately as: 5=Strongly agree, 4=Agree, 3 = Neither Agree nor Disagree, 2=. Disagree, and 1=Strongly disagree

Code	Statements	1	2	3	4	5
CoE1	To what extent do you agree that transmission infrastructure costs have a significant impact on the performance of SMEs in Kibaigwa ward?					
CoE2	How strongly do you disagree or agree that installation costs affect the performance of SMEs in Kibaigwa ward?					
CoE3	Do you believe that metering costs play a role in the performance of SMEs in Kibaigwa ward?					
CoE4	To what extent do you agree that connection fees have an impact on the performance of SMEs in Kibaigwa ward?					
CoE5	How strongly do you disagree or agree that taxes and levies affect the performance of SMEs in Kibaigwa ward?					
CoE6	Do you think operational and maintenance costs affect the performance of SMEs in Kibaigwa ward?					

Section VI: The performance of SMEs in Kibaigwa ward as a Result of electricity accessibility, stability, and cost of connectivity

Using a scale of 1-5, kindly tick appropriately as: 5=Strongly agree, 4=Agree, 3 = Neither Agree nor Disagree, 2=. Disagree, and 1=Strongly disagree

Code	Statements	1	2	3	4	5
PF1	With access to electricity, I have been able to operate machinery and equipment more efficiently, leading to increased productivity and output					
PF2	Electricity allows me to maintain consistent production processes, leading to higher-quality products and services for customers.					
PF3	Reliable electricity enabled me to expand business operations, enter new markets, and attract more customers.					
PF4	Improved performance of SMEs due to electricity accessibility leads to job creation and economic growth in Kibaigwa ward.					
PF5	Access to stable and affordable electricity enabled me to compete effectively in the market and grow my businesses.					
PF6	Electricity accessibility can enable me to enhance innovation in products and services.					

APPENDIX II: Sample Size Determination Using Krejcie & Morgan (1970) Tabulation

N	*S*	*N*	*S*	*N*	*S*
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Note.—*N* is population size. *S* is sample size.

Source: Krejcie & Morgan, 1970

APPENDIX III: SPSS Outputs

I: Results for Reliability Tests

Reliability Statistics for Accessibility of Electricity

Cronbach's Alpha	N of Items
.873	5

Reliability Statistics for Stability of Power Supply

Cronbach's Alpha	N of Items
.830	5

Reliability Statistics for Cost of Electricity Power Supply

Cronbach's Alpha	N of Items
.822	6

Reliability Statistics for Performance of SMEs

Cronbach's Alpha	N of Items
.766	6

II: Result for Demographic Information of the Respondents

Sex of the respondent

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	95	59.7	59.7	59.7
	Female	64	40.3	40.3	100.0
	Total	159	100.0	100.0	

Age group of the respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-25 years	44	27.7	27.7	27.7
	26-35 years	26	16.4	16.4	44.0
	36-45 years	47	29.6	29.6	73.6
	Above 45 years	42	26.4	26.4	100.0
	Total	159	100.0	100.0	

Education background

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Primary	81	50.9	50.9	50.9
	Secondary	55	34.6	34.6	85.5
	Tertiary	11	6.9	6.9	92.5
	Undergraduate	10	6.3	6.3	98.7
	Postgraduate	2	1.3	1.3	100.0
	Total	159	100.0	100.0	

III: Correlation Analysis

Correlations

		AE	ST	CoE	PF
AE	Pearson Correlation	1	.491**	.459**	.798**
	Sig. (2-tailed)		.000	.000	.000
	N	159	159	159	159
ST	Pearson Correlation	.491**	1	.481**	.612**
	Sig. (2-tailed)	.000		.000	.000
	N	159	159	159	159
CoE	Pearson Correlation	.459**	.481**	1	-.840**
	Sig. (2-tailed)	.000	.000		.000
	N	159	159	159	159
PF	Pearson Correlation	.798**	.612**	-.840**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	159	159	159	159

**. Correlation is significant at the 0.05 level (2-tailed).

IV: Model Diagnostics

Linearity Test Result for Relationship between SMEs Performance and Accessibility of Electricity Supply

			Sum of Squares	df	Mean Square	F	Sig.
PF * AE	Between Groups	(Combined)	19.246	16	1.203	18.867	.000
		Linearity	18.018	1	18.018	282.619	.000
		Deviation from Linearity	1.227	15	.082	1.284	.020
	Within Groups		9.053	142	.064		
	Total		28.299	158			

Linearity Test Result for Relationship between SMEs Performance and the Stability of Electricity Power Supply

			Sum of Squares	df	Mean Square	F	Sig.
PF * ST	Between Groups	(Combined)	14.162	14	1.012	10.304	.000
		Linearity	10.587	1	10.587	107.834	.000
		Deviation from Linearity	3.575	13	.275	2.801	.001
	Within Groups		14.137	144	.098		
	Total		28.299	158			

Linearity Test Result for Relationship between SMEs Performance and the Cost of Accessing Electricity Supply

			Sum of Squares	df	Mean Square	F	Sig.
PF *CoE	Between Groups	(Combined)	21.683	17	1.275	27.183	.000
		Linearity	19.956	1	19.956	425.319	.000
		Deviation from Linearity	1.726	16	.108	2.300	.005
	Within Groups		6.616	141	.047		
	Total		28.299	158			

One-Sample Kolmogorov-Smirnov Test

		PF	AE	ST	CoE
N		159	159	159	159
Normal Parameters[a,b]	Mean	4.0363	4.0767	3.6465	4.0734
	Std. Deviation	.42321	.80844	.61137	.68503
Most Extreme Differences	Absolute	.075	.129	.092	.099
	Positive	.037	.127	.076	.088
	Negative	-.075	-.129	-.092	-.099
Kolmogorov-Smirnov Z		.942	1.625	1.164	1.247
Asymp. Sig. (2-tailed)		.337	.060	.133	.089

a. Test distribution is Normal.
b. Calculated from data.

Multicollinearity Test Results

Model		Unstandardized Coefficients		Standardized Coefficients	Collinearity Statistics	
		B	Std. Error	Beta	Tolerance	VIF
1	(Constant)	1.565	.106			
	AE	.164	.030	.314	.404	2.478
	ST	.152	.029	.219	.731	1.367
	CoE	-.307	.035	.496	.409	2.448

Breusch-Pagan Test for Heteroscedasticity

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.010	3	.003	1.518	.212[b]
	Residual	.357	155	.002		
	Total	.367	158			

a. Dependent Variable: res_squared
b. Predictors: (Constant), Mean_CoE, Mean_ST, Mean_AE

V: Results for Multiple Linear Regression Model Estimation

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.895[a]	.801	.797	.19054

a. Predictors: (Constant), Mean_CoE, Mean_ST, Mean_AE

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	22.671	3	7.557	208.141	.000[b]
	Residual	5.628	155	.036		
	Total	28.299	158			

a. Dependent Variable: Mean_PF
b. Predictors: (Constant), Mean_CoE, Mean_ST, Mean_AE

Parameter Estimate of Linear Regression

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.565	.106		14.764	.000
	AE	.164	.030	.314	5.568	.000
	ST	.152	.029	.219	5.229	.000
	CoE	-.307	.035	.496	8.854	.000

a. Dependent Variable: PF

APPENDIX IV: Research Clearance from the Open University of Tanzania

THE UNITED REPUBLIC OF TANZANIA

MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

THE OPEN UNIVERSITY OF TANZANIA

Ref. No OUT/PG202186171 **23rd December, 2024**

District Executive Director,

Kongwa District Council,

P O.Box 57,

DODOMA.

Dear Director,

RE: RESEARCH CLEARANCE FOR MR. PRISIUS MROSSO, REG NO: PG202186171

2. The Open University of Tanzania was established by an Act of Parliament No. 17 of 1992, which became operational on the 1st March 1993 by public notice No.55 in the official Gazette. The Act was however replaced by the Open University of Tanzania Charter of 2005, which became operational on 1st January 2007.In line with the Charter, the Open University of Tanzania mission is to generate and apply knowledge through research.

3. To facilitate and to simplify research process therefore, the act empowers the Vice Chancellor of the Open University of Tanzania to issue research clearance, on behalf of the Government of Tanzania and Tanzania Commission for Science and Technology, to both its staff and students who are doing research in Tanzania. With this brief background, the purpose of this letter is to introduce to you **Mr. Prisius Mrosso, Reg.No: PG202186171),** pursuing **Master of Project Management (MPM).** We here by grant this clearance to conduct a research titled **"Impact of Electricity Accessibility,**

Stability, and Cost on the performance of SMEs in Kibaigwa ward, Tanzania" He will collect his data at your area from 27th December 2024 to 30th January 2025.

4. In case you need any further information, kindly do not hesitate to contact the Deputy Vice Chancellor (Academic) of the Open University of Tanzania, P.O.Box 23409, Dar es Salaam. Tel: 022-2-2668820.We lastly thank you in advance for your assumed cooperation and facilitation of this research academic activity.

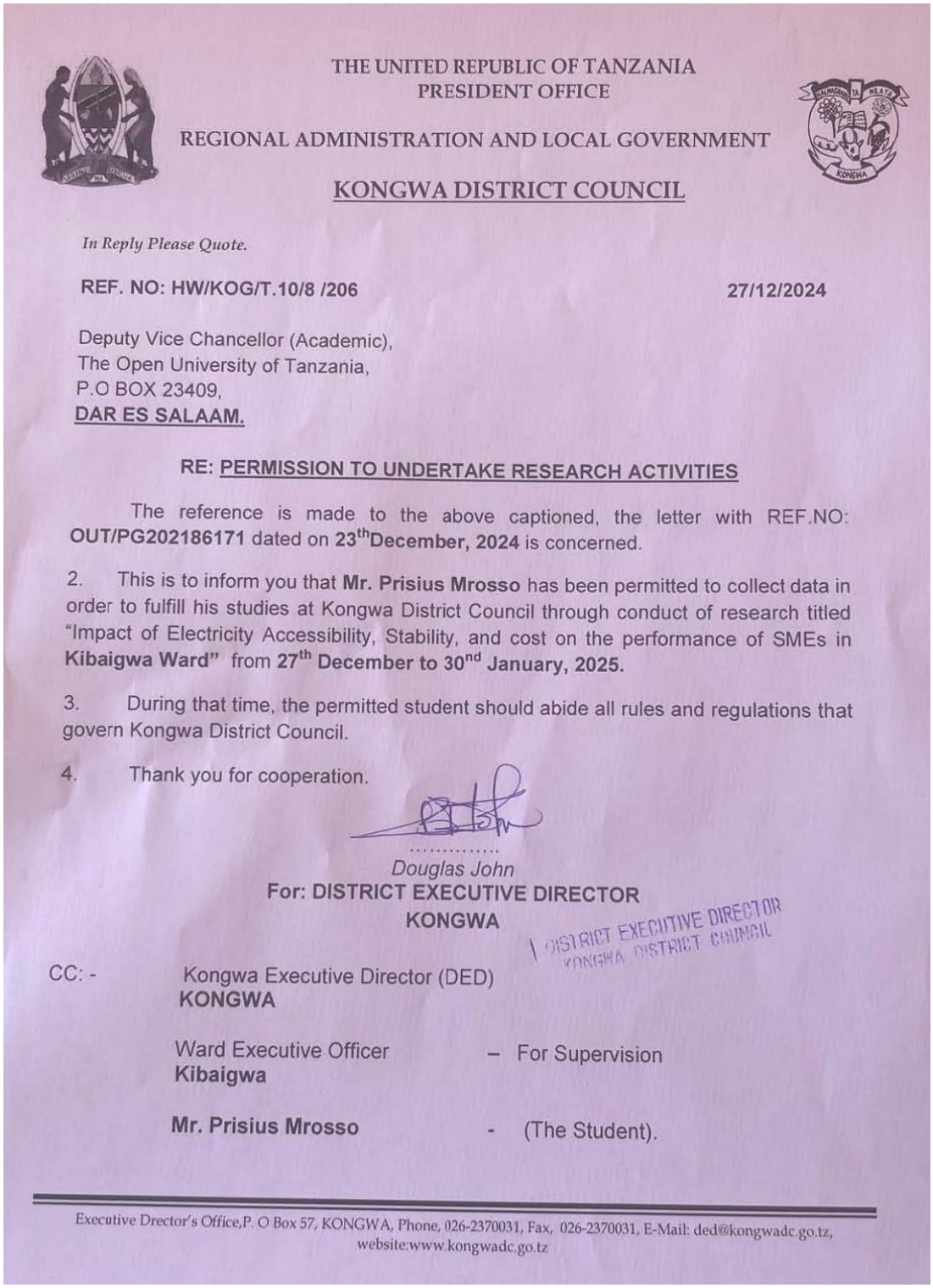
Yours sincerely,

THE OPEN UNIVERSITY OF TANZANIA

Prof.Gwahula Raphael Kimamala

For: VICE CHANCELLOR

APPENDIX V: Permission Letter from Kongwa District Council



THE UNITED REPUBLIC OF TANZANIA
PRESIDENT OFFICE

REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT

KONGWA DISTRICT COUNCIL

In Reply Please Quote.

REF. NO: HW/KOG/T.10/8 /206 **27/12/2024**

Deputy Vice Chancellor (Academic),
The Open University of Tanzania,
P.O BOX 23409,
DAR ES SALAAM.

RE: PERMISSION TO UNDERTAKE RESEARCH ACTIVITIES

The reference is made to the above captioned, the letter with REF.NO: **OUT/PG202186171** dated on **23thDecember, 2024** is concerned.

2. This is to inform you that **Mr. Prisius Mrosso** has been permitted to collect data in order to fulfill his studies at Kongwa District Council through conduct of research titled "Impact of Electricity Accessibility, Stability, and cost on the performance of SMEs in **Kibaigwa Ward"** from **27th December to 30nd January, 2025.**

3. During that time, the permitted student should abide all rules and regulations that govern Kongwa District Council.

4. Thank you for cooperation.

.....
Douglas John
For: DISTRICT EXECUTIVE DIRECTOR
KONGWA

DISTRICT EXECUTIVE DIRECTOR
KONGWA DISTRICT COUNCIL

CC: - Kongwa Executive Director (DED)
KONGWA

Ward Executive Officer – For Supervision
Kibaigwa

Mr. Prisius Mrosso - (The Student).

Executive Drector's Office,P. O Box 57, KONGWA, Phone, 026-2370031, Fax, 026-2370031, E-Mail: ded@kongwadc.go.tz, website:www.kongwadc.go.tz

APPENDIX VI: Manuscript

IMPACT OF ELECTRICITY SUPPLY ON PERFORMANCE OF SMALL AND MEDIUM-SCALE ENTERPRISES IN KIBAIGWA WARD, TANZANIA

Prisius G. Mrosso, Prof. Saganga Kapaya & Dr. Bukaza Chachage
Corresponding Email: prisius.mrosso@gmail.com

Abstract
The study examined the impact of electricity supply on the performance of small and medium-scale enterprises (SMEs) in Kibaigwa ward, Tanzania. Specifically, it focused at the effects of electricity accessibility, power supply stability, and electricity costs on SME performance in Kibaigwa Ward. The study adopted an explanatory research design combined with a quantitative research approach. The study used Krejcie and Morgan (1970) sampling size table to obtain a sample size of 175 SMEs from target population of 320 registered SMEs in Kibaigwa ward. Simple random sampling was used to select study respondents. Data collection was conducted using a closed-ended questionnaire based on a 5-point Likert scale. Inferential statistics, including Pearson correlation and multiple linear regression were employed to examine the data. The Pearson correlation results revealed a significant strong positive relationship among electricity accessibility, power supply stability, and electricity costs with the performance of SMEs in Kibaigwa Ward. The multiple linear regression analysis showed that greater electricity accessibility and improved power stability positively influenced SME performance, whereas higher electricity costs had a negative impact. The findings concluded that electricity accessibility, power supply stability, and electricity costs play a vital role in the success of SMEs. The study recommends that the government should work to improve electricity access and stability while controlling costs to enhance SME performance in Kibaigwa Ward.

Keywords: *Electricity Accessibility, Stability of Electricity, Cost of Electricity, SMEs*

INTRODUCTION

Small and medium-sized enterprises (SMEs) are vital drivers of economic development worldwide (Adie *et al*., 2019). They are often regarded as engines of growth, contributing significantly to job creation, innovation, and overall economic output in both developed and developing countries (Ayivi *et al*., 2022). According to Akyuz *et al*. (2020), access to reliable and affordable electricity is crucial for the performance and expansion of SMEs. However, many SMEs face significant challenges related to electricity accessibility, stability, and costs, which can hinder their operations and growth prospects (Arumdeben *et al*., 2023).

Across the globe, developed countries such as the United States and Canada benefit from well-established electricity infrastructure that provides stable and affordable power, enabling SMEs to operate efficiently and remain competitive (Gaskell, 2020; Muriithi, 2017). In contrast, many developing countries struggle with electricity access issues. For example, in Brazil, Mexico, and Argentina, SMEs often face difficulties due to unreliable electricity supply, frequent outages, voltage fluctuations, and high costs, especially in rural and remote areas, which hampers their productivity and growth (Gunten & Moerman, 2021; Silva *et al*., 2020). These electricity challenges directly impact SMEs' capacity to adopt new technologies and innovate, further limiting their competitiveness.

In Asia, access to electricity remains a pressing issue for SMEs, particularly in countries such as India, Bangladesh, Pakistan, Indonesia, and the Philippines. Despite government efforts to

improve electricity access like India's Rural Electrification Corporation and the Deen Dayal Upadhyaya Gram Jyoti Yojana, many SMEs in rural areas still grapple with unreliable and costly power supplies (Phadke & Nikit, 2019; Banerjee & Gupta, 2020). Similarly, initiatives like Bangladesh's Rural Electrification and Renewable Energy Development Project and Pakistan's Prime Minister's Sustainable Development Goals Achievement Program aim to enhance electricity access, yet challenges persist in ensuring stability and affordability (Kabir & Akter, 2020; Iqbal *et al*., 2020; Siddiqui & Khurram, 2020). Indonesia and the Philippines also face similar difficulties, particularly in remote islands and disaster-prone areas, where electricity infrastructure is underdeveloped and unreliable, affecting SMEs' operations and growth (Soria & Wardhana, 2020; Rivera & Cruz, 2021).

In Africa, low levels of electrification severely constrain SME development. The continent has some of the lowest electrification rates globally, with only about 43% of the population having access to electricity (Moreblessing *et al*., 2024). This lack of reliable power hampers the ability of SMEs, which are key contributors to employment and economic activity, to operate efficiently. Countries such as Nigeria, Kenya, South Africa, Mozambique, and Zimbabwe experience frequent power outages, high tariffs, and unstable supply, all of which increase operational costs and reduce competitiveness (Adie *et al*., 2019; Ayieko & Kangara, 2019: Masmoudi & Guergachi, 2018; Mkoma *et al*., 2020; Ugembe *et al*., 2023). These challenges are particularly acute in rural areas, where infrastructure development is often limited.

Within this African context, Tanzania exemplifies the ongoing struggles and efforts to improve electricity access for SMEs. While the country has made notable progress, including the commissioning of the Julius Nyerere Hydropower Station (JNHPS) with a capacity of 705 MW, significant gaps remain in meeting the energy needs of various sectors, especially in rural areas (Abdalla & Kwame, 2023; EWURA, 2023; TanzaniaInvest, 2024; EWURA. 2025). As of June 2025, Tanzania's installed capacity exceeded demand, but issues of reliability, affordability, and access persist, particularly for small businesses operating in less connected areas (Rwegasila, 2015).

Focusing specifically on Kibaigwa Ward in Dodoma, demonstrates these challenges at the local level. As a rural area, Kibaigwa hosts numerous SMEs across industries such as agriculture, manufacturing, and services (URT, 2024). Despite recent investments in national power generation, many SMEs in Kibaigwa continue to grapple with unreliable electricity, high tariffs, and limited access to financing for energy-efficient solutions (Mushi, 2018). These issues constrain daily operations, restrict growth potential, and limit SMEs' contributions to the local economy and employment creation (Mushi, 2018).

Despite these challenges, there is a notable lack of focused research examining the specific impact of electricity accessibility, stability, and cost on SME performance in Kibaigwa. To address this gap, this study adopts the theoretical framework of the Economics of Power System Reliability and Planning developed by Mohan Munasinghe (1979). The research aims to empirically investigate the impact of these electricity-related factors toward the performance of SMEs in Kibaigwa. Understanding these dynamics is crucial for informing policymakers and stakeholders to design targeted interventions that enhance electricity access, improve SME performance, and foster sustainable economic development in the region.

STATEMENT OF THE PROBLEM

Small and medium-sized enterprises (SMEs) are vital contributors to the economic growth and development of Tanzania (Diyammi & Mkude, 2022). Despite their importance, they often

face significant challenges related to electricity supply, including issues of accessibility, stability, and affordability. These electrical factors extremely influence the performance of SMEs, especially in rural areas such as Kibaigwa Ward. In Kibaigwa, SMEs encounter particular difficulties with electricity, such as frequent power outages, high electricity costs, and limited access to reliable infrastructure (Mushi, 2018). These problems result in decreased productivity, higher operational expenses, and obstacles to business growth and expansion.

While previous research in Tanzania has underscored the critical role of electricity supply for SME development (Ajibola *et al*., 2022; Arumdeben *et al*., 2023; Ayivi *et al*., 2022), there remains a gap in understanding the specific effects of electricity accessibility, stability, and cost on SME performance within Kibaigwa Ward. The present study aims to fill this gap by examining the impact of accessibility, stability, and cost of electricity power supply on the performance of SMEs in Kibaigwa Ward.

THE STUDY OBJECTIVES

General Objective

The main objective of the study is to examine the impact of electricity supply on the performance of small and medium-scale enterprises (SMEs) in Kibaigwa ward, Tanzania.

Specific Objectives

i. To determine the impact of accessibility of electricity power supply on the performance of SMEs in Kibaigwa ward.
ii. To find out the impact of stability in power supply on the performance of SMEs in Kibaigwa ward.
iii. To identify the impact of cost of electricity power supply on the performance of SMEs in Kibaigwa ward.

SIGNIFICANCE OF THE STUDY

The findings of this study hold substantial theoretical and practical significance within the context of small and medium enterprises (SMEs) in Kibaigwa ward. Theoretically, the findings contribute to the broader understanding of how electricity supply influence business performance. By examining the impact of accessibility, stability, and cost of electricity, the study enriches existing literature on the nexus between energy infrastructure and entrepreneurial success, offering insights into the mechanisms through which energy availability and quality affect operational efficiency, productivity, and growth prospects of SMEs. These findings can help refine theoretical models that link energy infrastructure to economic development at the microenterprise level, providing a significance understanding that can be generalized to similar settings.

Practically, the significance of these objectives lies in their potential to inform policy and decision-making processes aimed at enhancing SME performance through targeted interventions in the energy sector. Understanding how accessibility influences business operations can guide infrastructure development priorities, ensuring that SMEs are adequately connected to reliable power sources. Insights into the effects of power stability can help stakeholders design strategies to minimize disruptions and improve operational continuity, thereby boosting productivity. Examining the cost implications of electricity enables policymakers and entrepreneurs to identify affordability challenges and devise strategies to reduce expenses, fostering a more conducive environment for SME growth. Addressing these factors can lead to improved economic resilience, increased employment opportunities, and broader economic development within Kibaigwa ward and similar areas, making the research highly relevant both academically and practically.

LITERATURE REVIEW

Theoretical Literature Review

The Economics of Power System Reliability and Planning theory, developed by Mohan Munasinghe (1979), provides a comprehensive framework for understanding how to design and operate electrical power systems efficiently and reliably. This theory emphasizes that reliable electricity is vital for modern society's functioning, serving as a backbone for economic activities, industries, and everyday life (Munasinghe & Gellerson, 1979). It uses principles from both economics and engineering to guide decision-making in power system planning, aiming to balance costs while ensuring a stable supply of electricity.

The roots of this theory trace back to the early 20th century, a period when engineers and researchers first recognized the importance of reliable energy for economic growth. Mohan Munasinghe, a distinguished Sri Lankan physicist, engineer, and economist, played a pivotal role in formalizing these ideas, focusing on sustainable development, energy, water resources, and climate change. Over time, the framework became widely adopted and forms the foundation of modern power system engineering, helping utilities and policymakers make informed decisions that promote energy security, affordability, and sustainability.

At its core, the theory highlights that power system reliability depends on the seamless functioning of generation, transmission, and distribution networks. Any disruption such as blackouts, voltage fluctuations, or load shedding can have significant economic and social consequences. For instance, power outages can lead to production halts, spoilage, and idle resources, all of which translate into financial losses for businesses and the economy at large (Lüfeoğlu & Lehtonen, 2016). The theory underscores that the reliability of electricity supply directly influences industrial productivity, consumer welfare, and overall economic stability.

The theory stresses the importance of proactive planning to mitigate outage impacts. Strategies such as diversifying energy sources, investing in backup systems like generators or batteries, and adopting energy-saving practices are central to maintaining reliability. For small and medium enterprises (SMEs), these measures are especially crucial because consistent power supply directly impacts their productivity and growth potential (Olajuyin & Mago, 2022). When electricity is unreliable, SMEs often face increased costs, reduced output, and challenges in expanding their operations.

Also, the theory emphasizes that reliable power supply enhances accessibility, which is vital for economic inclusion. Proper planning ensures that new consumers can connect to the grid without excessive delays or barriers, thus broadening access, especially in underserved areas. Efficient billing systems, responsive customer service, and technical support also contribute to improved accessibility, helping consumers maintain continuous electricity access. Stability in voltage and having backup power options are essentials for protecting both consumers and equipment, reducing the risk of costly damages and service interruptions.

Despite its strengths, the theory has faced criticism. One major concern is that it may overlook the unique challenges faced by SMEs, particularly in developing countries or remote areas. These businesses often lack the infrastructure or resources to connect reliably to the grid, making them vulnerable to frequent outages. The theory tends to prioritize large industrial consumers over SMEs, which can lead to unequal service and higher tariffs for smaller businesses (Mutambo, *et al*., 2023). Additionally, some critics argue that the focus on maximizing utility profits can inflate electricity costs for SMEs, hampering their competitiveness and growth.

Another critique involves the potential neglect of social and environmental factors. The theory's primary focus on economic efficiency might downplay the importance of equitable access and sustainable development goals. For example, in areas with weak infrastructure, the costs of ensuring reliability may be prohibitive for utilities, leading to service gaps that disproportionately affect small-scale businesses and marginalized communities.

Despite the weakness of the theory, there are a number of empirical studies supports the utility of Munasinghe's framework. For example, a study by Burke and Bruns (2017) show a strong correlation between electricity access and economic development, demonstrating the theory's relevance. Similarly, Mohamad and Teh (2018) highlight that integrating energy storage within power systems, as suggested by the theory, can significantly enhance reliability and reduce transmission costs. These findings underscore that, despite its limitations, the theory offers valuable insights for improving power systems.

Empirical Literature Review

The Impact of Accessibility of Electricity Power Supply on the Performance of SMEs

Empirical studies consistently demonstrate a positive relationship between the accessibility of electricity supply and the performance of SMEs across different countries. Ahmad and Sahar (2021) conducted a quantitative study in Malaysia, utilizing surveys and interviews with 200 SME owners selected through random sampling. Their findings revealed a significant positive correlation, emphasizing that improved electricity access directly contributes to SME growth and success. Similarly, Rahman and Paikari (2020) investigated the same relationship in Bangladesh, employing a quantitative approach with a focus on SME performance metrics. Their results confirmed that enhanced electricity accessibility significantly boosts SME productivity, underscoring its importance for economic development. In Nigeria, Samson and Kabiru (2021) also identified a strong positive relationship between electricity supply and SME performance, suggesting that reliable energy is vital for operational efficiency. Additionally, in Brazil, Araujo and Cardona (2020) utilized a stratified random sampling and questionnaires to gather data from 500 respondents. Their results demonstrated a robust positive relationship between electricity access and enterprise performance, highlighting electricity as a vital factor for success.

The Impact of Stability in Electricity Power Supply on the Performance of SMEs

Empirical research examining the impact of electricity stability on the performance of SMEs provides valuable insights into how power supply influences business outcomes. Arumdeben *et al*. (2023) conducted a study in Southern Taraba State, Nigeria, aiming to evaluate this relationship. Their research employed primary data collection through open-ended questionnaires administered to 114 registered SME managers across various localities, including Ibi, Wukari, Donga, Takum, and Ussa, utilizing a simple random sampling technique. The data analysis combined descriptive statistics and the ordinary least squares (OLS) method, revealing that a stable power supply positively and significantly influences SME performance in the region. The study underscores the importance of consistent electricity provision, recommending governmental efforts to ensure steady power to enhance SME profitability.

Similarly, Afukonyo (2023) explored the detrimental effects of epileptic power supply on SMEs in Takum Local Government Area of Taraba State, employing a cross-sectional survey methodology. The focus on Takum was motivated by the area's chronic power issues, which have hindered enterprise growth and sustainability. The study involved a purposive sample of 30 SMEs, with data collected via structured questionnaires. Analytical techniques included simple percentage analysis and chi-square tests at a 0.05 significance level, aimed at

understanding the extent of power supply challenges and their impact on business performance. The study revealed that epileptic power supply compelled SMEs to allocate 20% to 30% of their operational costs to backup energy sources, highlighting a significant financial burden. Interestingly, despite these costs, the study found that power instability did not directly impair operational performance, although it severely limited the sufficiency of power supply. The research strongly advocated for government control over the power sector and urged diversification of energy sources at regional levels to mitigate power challenges and foster SME development.

Furthermore, Udoinyang and Daniel (2024) investigated the influence of power supply on SME profitability within Rivers State, Nigeria, employing a survey approach with a sample size of 384 based on Cochran's formula. Their study used power supply indicators as explanatory variables and SME performance metrics, such as sales and income, as outcome variables. Data collected through custom-designed questionnaires were analyzed using discrete response models and logistic regression techniques. The findings demonstrated that inconsistent and short-duration power supply negatively affects SME activities, including storage capacity, productivity, and revenue generation. The study concluded that unreliable electricity acts as a bottleneck, constraining profitability and growth prospects for SMEs in Rivers State.

Additionally, in Nigeria, Bassey and Ikpe (2021) provided a comparative analysis of electricity's effect on SMEs in Calabar South and Calabar Municipality. Using a structured questionnaire administered to 248 business owners and power sector staff, their study found a significant correlation between electricity supply and SME performance. Inadequate power was linked to operational difficulties, emphasizing the critical role of reliable electricity in sustaining SME growth.

The Impact of Cost Electricity Power Supply on the Performance of SMEs

Various empirical studies yielded significant insights regarding the impact of energy price volatility and power supply costs on business performance. Moreblessing *et al*. (2024) conducted a quantitative study focusing on retail businesses in Zimbabwe, utilizing questionnaires to gather data from the respondents. Their findings indicate that energy price volatility negatively affects financial performance, resulting in diminished sales, increased operational costs, and reduced profitability.

Similarly, Arumdeben *et al*. (2023) explored the influence of power supply costs on the performance of SMEs in Southern Taraba State, Nigeria. Using primary data from 114 managers via open-ended questionnaires and analyzing the data through descriptive statistics and ordinary least squares (OLS), the study found that higher power supply costs positively and significantly impact SME performance. The study recommend government intervention to lower energy costs, thereby enhancing SME profitability.

In Ghana, Ayivi *et al*. (2022) examined the long-term relationship between electricity prices and SME growth using the Vector Error Correction Model (VECM) and Johansen co-integration techniques. Their results reveal a negative, significant long-term relationship, indicating that increases in electricity prices diminish SME growth. A 1% rise in electricity rates correlates with approximately a 0.68% decrease in SME profits, highlighting the adverse effects of energy costs on enterprise development.

Furthermore, Barteková and Ziesemer (2019) analyzed the influence of electricity price fluctuations on foreign direct investment (FDI) inflows across EU countries using panel data

from 2003 to 2013. The findings showed that short-term increases in electricity prices decreased FDI inflows as a percentage of GDP, with long-term responses being more pronounced, highlighting the adverse effects of energy price variations on investment flows.

Conceptual Framework

The conceptual framework, illustrated in Figure 1, explores how electricity accessibility, stability, and cost influence SME performance in Kibaigwa ward. From these variables, the independent variables are represented by electricity accessibility, stability, and cost, whereas the dependent variable is represented by SME performance in Kibaigwa Ward. Rooted in the Economics of Power System Reliability and Planning theory, it emphasizes the relationship between power system characteristics and economic outcomes. Accessibility refers to how easily and reliably SMEs can connect to the grid, influenced by system expansion and planning strategies aimed at broad coverage. Power stability indicates the consistency and reliability of electricity supply, critical for minimizing outages that disrupt business operations. The cost of electricity, derived from economic planning models, affects SME affordability and competitiveness by balancing investment and operational expenses. These variables collectively shape SME performance, which depends on reliable, affordable, and accessible electricity to operate efficiently, innovate, and grow. The framework highlights that changes in accessibility, stability, and cost can positively or negatively impact SME outcomes. By applying these theoretical principles, the study provides a comprehensive approach to defining, measuring, and analyzing how electricity-related factors influence SME performance in Kibaigwa ward.

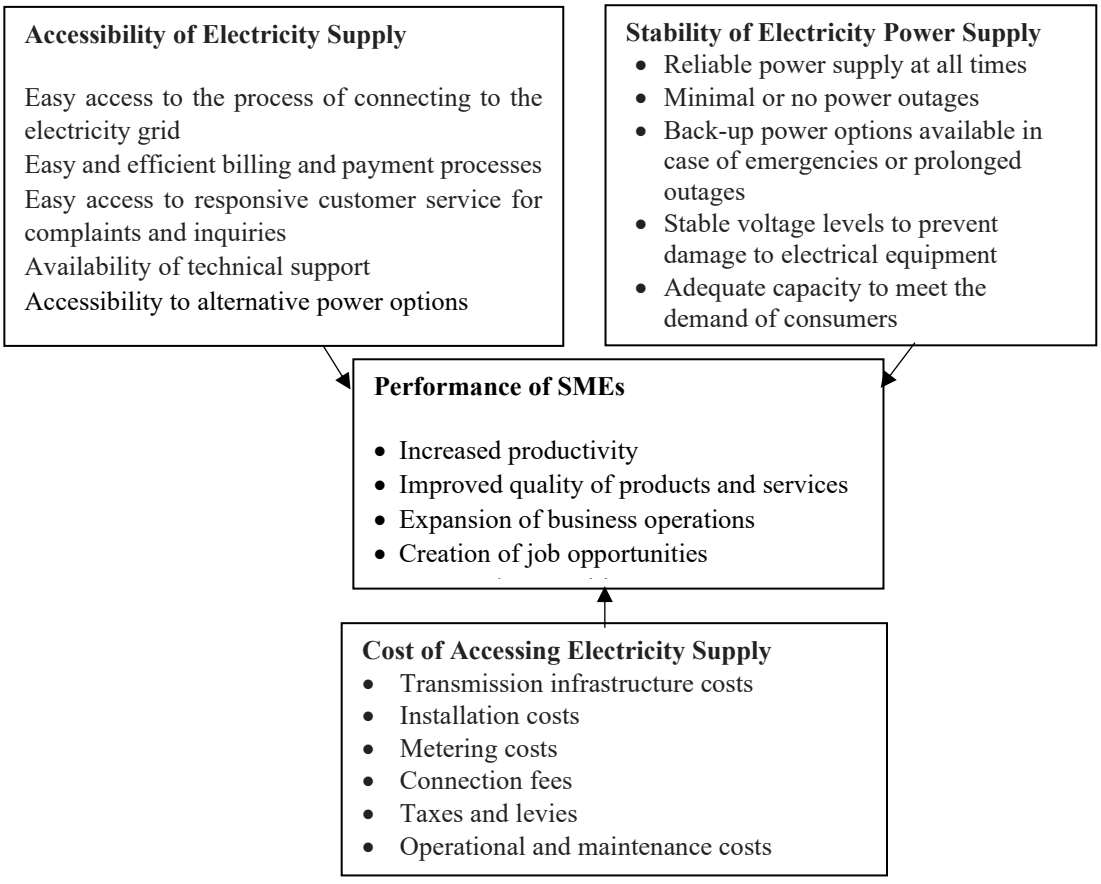


Figure 2: Conceptual Framework
Source: **Researcher (2025)**

METHODS

Research Philosophy

The philosophical foundation guiding this research is rooted in positivism, which emphasizes objective measurement and quantification of social phenomena (Gabay *et al*., 2023). The choice of positivism aligns with the study's primary focus on quantifying the impact of electricity-related variables on SME performance. Positivism, in this context, advocates for the use of numerical data and statistical tools to establish causal relationships, grounded in the assumption that social phenomena can be objectively observed and measured. The rationale for adopting a positivist paradigm is multifaceted. It facilitates hypothesis testing, supports the use of structured questionnaires, and allows for generalization of results across similar contexts. Moreover, positivism is particularly suitable in investigating the tangible effects of infrastructural variables such as electricity on business performance, as it minimizes subjective bias and emphasizes empirical evidence.

Research Approach

Building upon this philosophical stance, the study adopts a quantitative research approach, which is characteristic of positivist inquiry. As Žukauskas *et al*. (2018) note, when the research philosophy is positivist, the predominant approach involves collecting numerical data to analyze relationships among variables. This approach enables the researcher to employ statistical techniques, such as correlation and regression analysis, to quantify the strength and direction of relationships (Walliman, 2017), thereby providing a clear understanding of how electricity factors influence SME performance. The emphasis on quantification ensures that the findings are objective, replicable, and capable of informing policy and managerial decisions.

Research Design

The research design employed in this study is explanatory, which is appropriate for examining cause-and-effect relationships. Turner (2020) describes explanatory research as a methodology aimed at understanding the underlying mechanisms that link independent variables (electricity accessibility, stability, and cost) with a dependent variable (SME performance). This design allows for a systematic investigation into the nature and magnitude of these relationships, providing insights into how variations in electricity supply influence business outcomes. The explanatory approach also facilitates hypothesis testing, which is critical for establishing empirical evidence of causality (Marshall & Rossman, 2014).

Area of the Study

The geographical focus of the research is Kibaigwa ward in Kongwa District, Dodoma. This area was selected due to its rapid economic growth and burgeoning SME sector, which faces significant electricity-related challenges. The ward's strategic importance as a business hub, coupled with its infrastructural constraints, makes it an ideal site for investigating how electricity issues impact enterprise performance.

Target Population

The targeted population comprises SMEs operating in diverse sectors including manufacturing, agriculture, retail, and services. According to the latest reports, there are approximately 320 registered SMEs in the area, serving as the accessible population for sampling (Kibaigwa Township Report, 2019).

Sample Size and Sampling Technique

The study employed probability sampling, specifically simple random sampling, to select 175 SMEs from the total population of 320. The sample size was determined using the Krejcie and

Morgan (1970) table, which provides a standardized method for calculating the number of respondents required to achieve a specified confidence level (typically 95%) and margin of error (commonly 5%). This method ensures that the sample accurately reflects the characteristics of the entire population, thereby enhancing the generalizability of the findings. The sample size of 175 SMEs is deemed sufficient for conducting correlation and regression analyses, as supported by statistical literature (Moser & Korstjens, 2018; Perneger *et al*., 2015).

The choice of simple random sampling is particularly advantageous in reducing selection bias, ensuring that each SME in the population had an equal chance of being included. This method also simplifies the sampling process and enhances the representativeness of the sample, which is critical for deriving valid inferences about the population.

Data Collection Instruments

Data collection was primarily carried out through structured questionnaires, tailored to capture quantitative data on the variables of interest. The questionnaires incorporated a combination of nominal and Likert-scale items. Nominal scales facilitated the collection of demographic data such as age, gender, education level, and the nature of electricity use. The core measurement of the key variables such as electricity accessibility, stability, cost, and SME performance was conducted using a 5-point Likert scale. Respondents expressed their level of agreement or disagreement with statements related to how these electricity factors influence their business outcomes, with options ranging from "strongly disagree" (1) to "strongly agree" (5). This approach enabled the researcher to quantify subjective perceptions, which could then be statistically analyzed to identify patterns and correlations.

Prior to data collection, the research instruments underwent validation and reliability testing to ensure their accuracy and consistency. Validity was assessed through expert reviews, where supervisors and colleagues evaluated the questionnaire items for clarity, relevance, and comprehensiveness. Feedback from these assessments was incorporated into revisions to enhance content validity. Reliability testing involved administering the questionnaires to a pilot sample of 32 SMEs approximately 10% of the target population who were excluded from the main study. The responses were analyzed using Cronbach's alpha coefficient in SPSS, with a threshold of 0.70 indicating acceptable internal consistency (McMillan & Schumacher, 2013). The instruments demonstrated sufficient reliability, thereby ensuring that subsequent data collected would be consistent and reliable.

Data Analysis Procedures

Data analysis techniques were selected to align with the research objectives and the nature of the data. Descriptive statistics, such as frequencies and percentages, were used to profile respondents' socio-demographic characteristics. To examine the relationships among variables, Pearson's correlation analysis was employed, which quantifies the degree of association between pairs of variables. For assessing the influence of electricity-related factors on SME performance, multiple linear regression analysis was performed. This technique estimates the extent to which each independent variable (electricity accessibility, stability, and cost) explains variations in SME performance, represented mathematically by the regression equation:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$$

Where Y indicates SMEs performance, X_1,X_2, and X_3 represent electricity accessibility, stability, and cost respectively, β coefficients measure the strength and direction of relationships, and ε captures the residual variation not explained by the model.

Prior to interpreting the regression results, diagnostic tests were conducted to verify the underlying assumptions of linear regression. These included assessments for multicollinearity (using Variance Inflation Factor), heteroscedasticity (via residual plots), normality of residuals, and linearity of relationships. Addressing these assumptions ensures the validity of the regression estimates and the robustness of the conclusions.

FINDINGS

Reliability of the Research Instruments

The reliability of the questionnaire obtained from 32SMEs during a pilot study was evaluated using Cronbach's alpha. As shown in Table 1, the variables pertaining to electricity accessibility, power supply stability, electricity cost, and SME performance yielded reliability coefficients of 0.873, 0.830, 0.822, and 0.766, respectively. All these values exceed the common accepted threshold of 0.70 (Heale & Twycross, 2015), indicating that the measurement instruments are highly reliable.

Table 14: Reliability Test Results

Variable	Cronbach's Alpha	No. of Items
Accessibility of Electricity	0.873	5
Stability of Power Supply	0.830	5
Cost of Electricity Power Supply	0.822	6
Performance of SMEs	0.766	6

Source: Field Data (2025)

Response Rate

A total of 175 SMEs participated in the study, with 159 respondents completing the questionnaires, resulting in a response rate of 90.86%. Based on Mugenda and Mugenda (2003), a response rate of 50% is deemed adequate, 60% is considered good, and 70% or above is regarded as excellent for analysis and reporting. The response rate in this study is classified as excellent, indicating that the findings are likely to be reliable. The detailed results are shown in Table 2.

Table 15: The Response Rate

Respondent	No. of questionnaires distributed	returned	Percentage (%)
SMEs	175	159	90.86

Source: Field Data (2025)

Descriptive Statistics Results

In the realm of descriptive statistics, the researchers aimed to collect demographic details from the respondents, such as their gender, age, and educational background. The findings are presented in Table 3 below.

Table 16: Demographic Characteristics of the Respondents

Gender	Frequency	Percentage
Male	95	59.7
Female	64	40.3
Total	**159**	**100.0**

Age	Frequency	Percentage
Below 25 years	44	27.7
25-35 years	26	16.3
36-45 years	47	29.6
Over 45 years	42	26.4
Total	159	100.0

Education Level	Frequency	Percentage
Primary	81	50.9
Secondary	55	34.6
Tertiary	11	6.9
Undergraduate	10	6.3
Postgraduate	02	1.3
Total	159	100.0

Source: Field Data (2025).

The data summarized in Table 3 highlights notable disparities in respondent demographics, which have important implications for the study's outcomes. Male respondents constitute 59.7% (95 individuals), while females make up 40.3% (64 individuals), indicating an underrepresentation of female entrepreneurs. This imbalance may limit the comprehensiveness of insights regarding how electricity supply influences the performance of SMEs, especially if female-owned businesses face distinct challenges or benefits that are not adequately captured. Consequently, the overall findings might not fully reflect the experiences of all entrepreneurs within the community.

The age distribution of respondents offers further valuable insights. With 27.7% (44 individuals) under 25 years, there is a significant presence of younger entrepreneurs who may perceive or experience electricity-related challenges differently. Conversely, 26.4% (42 individuals) are over 45 years, likely bringing extensive experience and traditional approaches to their responses, possibly exhibiting a more cautious view of electricity's impact. The largest group, comprising 29.6% (47 individuals) aged 36-45 years, represents a middle ground that combines innovation with experience. Their perspectives could be key in developing practical strategies to address electricity supply issues affecting business performance.

The educational background of respondents also reveals considerable disparities. Half of the participants (50.9%, or 81 individuals) have only completed primary school, with 34.6% (55 individuals) holding secondary education. Higher education levels are markedly less common, with just 6.9% (11 individuals) attaining tertiary qualifications, 6.3% (10 individuals) holding undergraduate degrees, and a mere 1.3% (2 individuals) possessing graduate-level education. This low level of advanced education suggests potential challenges in understanding and engaging with the research questionnaire. Participants with only primary education may find complex or nuanced questions difficult to interpret, which could compromise the reliability and validity of their responses. Additionally, limited familiarity with research terminology may hinder their ability to provide fully informed insights, potentially affecting the overall quality of the data collected.

Inferential Statistics Findings

Correlation Analysis

The study utilized Pearson Correlation analysis to assess the strength and direction of linear relationships between electricity accessibility, stability, and cost of electricity supply, along with their influence on the performance of SMEs. The results are presented in Table 4.

Table 17: Pearson Correlation Results

		AE	ST	CoE	PF
AE	Pearson Correlation	1			
	Sig. (2-tailed)				
ST	Pearson Correlation	.491**	1		
	Sig. (2-tailed)	.000			
CoE	Pearson Correlation	.459**	.481**	1	
	Sig. (2-tailed)	.000	.000		
PF	Pearson Correlation	.798**	.612**	-.840**	1
	Sig. (2-tailed)	.000	.000	.000	

**Correlation is significant at the 0.05 level (2-tailed).
AE represent Accessibility of Electricity; ST represent Stable Electricity
CoE represent Cost of Electricity; PF represent Performance of SMEs

The data summarized in Table 4 offer valuable insights into the influence of various aspects of electricity on the performance of SMEs. A notable positive relationship exists between electricity accessibility and SME performance, with a correlation coefficient of 0.798. This strong association suggests that improvements in access to electricity are closely linked to enhanced SME outcomes. Similarly, the stability of electricity supply significantly correlates with SME performance, evidenced by a coefficient of 0.612. This indicates that SMEs experiencing more reliable electricity are likely to perform better. The stability of power supply appears to be a critical factor in fostering operational efficiency and growth within SMEs. Furthermore, electricity cost demonstrates an even more pronounced correlation with SME performance, with a coefficient of 0.840. This strong positive relationship implies that reductions in electricity costs can lead to substantial improvements in SME performance.

Multiple Linear Regression Analysis

A multiple linear regression model was developed to assess causality and predict the outcome variable. Prior to conducting the regression analysis, diagnostic tests were performed to verify that the assumptions underlying linear regression were satisfied, as outlined in the following sections.

Normality Assumption

A normality test was performed to determine whether the sample data originate from a normally distributed population. In this study, the Kolmogorov-Smirnov test was used to assess the distribution of the variables. The null hypothesis stated that the data are normally distributed, while the alternative hypothesis indicated they are not. As shown in Table 5, all P-values for the variables exceed 0.05. This suggests that the null hypothesis cannot be rejected, indicating that the data are consistent with a normal distribution. Therefore, it can be concluded that the variables SME performance, electricity accessibility, power supply stability, and electricity costs are normally distributed.

Table 5: One-Sample Kolmogorov-Smirnov Test for Normality

	Variables			
	Performance of SMEs	Accessibility of Electricity	Stability of Power Supply	Cost of Electricity
Kolmogorov-Smirnov Z	0.942	1.625	1.164	1.247
Sig. (2-tailed)	0.337	0.060	0.133	0.089

Source: Field Data (2025)

Multicollinearity Test Results

Multicollinearity is a common issue in regression analysis, occurring when independent variables are highly correlated with each other. This can lead to inflated variances of the estimated coefficients, which may undermine the reliability of the regression model. In this study, the researcher assessed multicollinearity using the Variance Inflation Factor (VIF) and tolerance values. Typically, a VIF exceeding 10 and a tolerance below 0.10 indicate potential multicollinearity (Hair *et al*., 2010). As shown in Table 6, the tolerance and VIF values for the independent variables fall within acceptable ranges. Specifically, the tolerance values are above 0.10, and the VIF values are below 10, suggesting that multicollinearity is not present. Therefore, the study conclude that multicollinearity does not pose a concern in this analysis.

Table 6: Multi-collinearity Test Results

Independent variables	Collinearity Statistics	
	Tolerance	VIF
Constant		
Access of Electricity	.404	2.478
Stability in Power Supply	.731	1.367
Cost of Electricity	.409	2.448

Dependent Variable: Performance of SMEs

Source: Field Data (2025)

Heteroscedasticity Test Result

Heteroscedasticity in a regression model refers to the situation where the variance of the error terms varies across observations. To determine whether heteroscedasticity is present, a Breusch-Pagan test was performed. The null hypothesis of this test states that the error variances are constant across observations, while the alternative hypothesis indicates that the variances differ. As shown in Table 7, the p-value obtained was greater than 0.05. Therefore, the study do not reject the null hypothesis, suggesting there is no significant evidence of heteroscedasticity. This indicates that the error variance remains consistent throughout the dataset. Based on these results, the study conclude that heteroscedasticity does not pose a concern in this regression analysis.

Table 7: Breusch-Pagan Test Result

Model	P-Value
Residual	0.212

Dependent Variable: Res_Squared

Predictors: (Constant), Cost of Electricity, Stability of Power Supply, Accessibility of Electricity

Multiple Linear Regression Parameters Estimation

The research employed a Multiple Linear Regression model using Ordinary Least Squares (OLS) to examine the impact of electricity accessibility, power supply stability, and electricity costs on the performance of SMEs in Kibaigwa ward. The detailed findings, including the Model Summary, ANOVA results, and Regression Coefficients, are summarized in the tables below.

Model Summary

The model summary presented in Table 8 shows a correlation coefficient (R) of 0.895, indicating a strong association between the independent variables (electricity accessibility, power supply stability, and electricity cost) and SME performance in Kibaigwa ward. The coefficient of determination (R^2) is 0.801, meaning that these factors explain 80.1% of the variability in SME performance in the area. However, it is important to acknowledge that other

unconsidered variables may influence the remaining 19.9% of the performance differences among SMEs in Kibaigwa ward.

Table 8: Model Summary

Mode	R	R Square	Adjusted R Square
1	0.895	0.801	0.797

Predictors: (Constant), electricity accessibility, stability of power supply, and cost of electricity

Ability of Model to Predict Outcomes

The study employed ANOVA to evaluate the effectiveness of the multiple regression model in predicting daily maximum pavement temperature at a depth of 00mm at the airport. As shown in Table 9, all variables included in the model were statistically significant, validating the model's suitability. The P-Value was highly significant ($p < 0.000$), demonstrating a strong relationship between the electricity aspects and the performance of SMEs in Kibaigwa ward. Consequently, it was concluded that the regression model reliably predicts the performance of SMEs in Kibaigwa ward.

Table 9: ANOVA Statistics

Model	Sum of Squares	df	Mean Square	F	P-Value
Regression	22.671	3	7.577	208.141	0.0000
Residual	5.628	155	.036		
Total	28.299	158			

Dependent Variable: Performance of SMEs

Predictors: (Constant), electricity accessibility, stability of power supply, cost of electricity

Beta Coefficients Estimation of Multiple Linear Regression

In multiple linear regression analysis, beta coefficients represent the expected change in the dependent variable (Y) for a one-unit increase in an independent variable (X), assuming all other variables remain constant. A positive beta signifies a positive relationship, whereas a negative beta indicates a negative relationship. The significance value (sig) associated with each beta coefficient assesses whether the relationship is statistically significant, with values below 0.05 denoting significance. The t-values exceeding 2 or falling below -2 suggest a significant influence on the dependent variable. As shown in Table 4.10 of this study, the variables (electricity accessibility, stability of power supply, and cost of electricity) exhibit t-values greater than 2 and sig values less than 0.05, indicating they significantly affect the performance of SMEs.

Table 10: Regression Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	P-Value
	B	Std. Error	Beta		
(Constant)	1.565	0.106		14.764	
Accessibility	0.164	0.030	0.314	5.568	0.000**
Stability	0.152	0.029	0.219	5.229	0.000**
Cost of electricity	-0.307	0.035	0.496	8.854	0.000**

Dependent Variable: Performance of SMEs

The multiple linear regression model corresponding to the results shown in Table 4.10 is expressed as follows: $\text{Performance of SMEs} = 1.565 + .164X_1 + .152X_2 - .037X_3$

X_1,X_2 and X_3 represent the accessibility of electricity, stability of electricity power supply, and cost of electricity respectively.

The regression analysis indicates that improvements in electricity accessibility and stability are associated with substantial enhancements in SME performance when other variables are held constant. Specifically, an increase in electricity accessibility by one unit correlates with a notable rise in SME performance, approximately 16.4%. Similarly, enhancements in the stability of the power supply also contribute positively, with a one-unit increase leading to roughly a 15.2% boost in SME performance. In contrast, higher electricity costs appear to exert a negative influence; as costs increase by one unit, SME performance tends to decline by about 30.7%. These findings underscore the critical role that reliable and affordable electricity infrastructure plays in fostering the growth and success of small and medium enterprises. The results suggest that policymakers and stakeholders should prioritize improving electricity accessibility and stability while managing costs to optimize SME performance.

DISCUSSION OF THE FINDINGS

The Impact of Accessibility of Electricity Power Supply on the Performance of SMEs in Kibaigwa Ward

The study's findings determined that electricity accessibility is a vital determinant of SME performance in Kibaigwa ward. Specifically, enhancements in the ease of connecting to the electricity grid significantly impact operational success, emphasizing the importance of reliable power supply for business activities. Additionally, the study highlights that efficient billing and payment processes positively influence SME performance, likely by reducing operational uncertainties and fostering financial stability. The role of responsive customer service in addressing complaints and inquiries further contributes to overall satisfaction and operational efficiency, while the availability of technical support during electricity supply issues enhances SMEs' capacity to operate effectively and sustain their market presence.

These findings align with Ahmad and Sahar (2021) in Malaysia which found a significant positive relationship between reliable electricity supply and SME performance. Similarly, Rahman and Paikari (2020) in Bangladesh showed that accessible electricity substantially benefits SMEs by supporting their productivity and overall success. The importance of electricity availability is also evident in Nigeria, where Samson and Kabiru (2021) established a strong positive correlation between electricity supply and SME performance, suggesting that consistent power is foundational for entrepreneurial activities. Furthermore, Araujo and Cardona (2020) in Brazil reported a robust positive association between electricity access and micro-enterprise performance, reinforcing the notion that improved energy access is universally beneficial for small-scale businesses.

The Impact of Stability of Electricity Power Supply on the Performance of SMEs in Kibaigwa Ward

The study's findings find out that the stability of electricity supply plays a crucial role in enhancing the performance of small and medium-sized enterprises (SMEs). Improved power stability is significantly associated with better operational outcomes, as a consistent and reliable electricity supply minimizes disruptions that could otherwise hinder daily business activities (Arumdeben *et al*., 2023). The availability of uninterrupted power reduces the incidence of outages, allowing SMEs to operate smoothly without unexpected interruptions that can lead to financial losses and operational delays. Furthermore, backup power solutions during emergencies serve as a vital safety net, safeguarding businesses from potential damages and losses (Afukonyo, 2023).

Stable voltage levels are also instrumental in preventing equipment damage, which can be costly and detrimental to business continuity. Adequate capacity to meet the specific energy

demands of SMEs is essential for fostering growth and ensuring sustainability, as insufficient power supply constrains operational efficiency and expansion opportunities (Udoinyang & Daniel, 2024). These findings align with a study conducted by Pami-Pami (2021) which identified unreliable electricity as a significant obstacle for SMEs in Cameroon, complicating their operations and growth prospects. Similarly, Bassey and Ikpe (2021) established a strong correlation between reliable electricity supply and SME performance in Nigeria, reinforcing the importance of stable power for business success.

Research by Afukonyo (2023) further emphasizes that the financial burden of backup energy solutions often accounting for 20% to 30% of operational costs reduces profit margins and hampers overall growth. The short duration of public power supply also adversely affects SMEs' ability to store goods, productivity, and revenue generation, highlighting how intermittent power creates bottlenecks that restrict profit potential and sales (Udoinyang & Daniel, 2024).

The Impact of Cost of Electricity on the Performance of SMEs in Kibaigwa Ward

The study's findings identified the adverse impact of rising electricity costs on the performance of SMEs. An increase in electricity expenses is associated with a significant decline in operational effectiveness, primarily due to costs related to transmission infrastructure, installation, metering, connection, as well as various taxes and levies. These financial burdens can hinder SMEs' ability to operate efficiently and compete effectively in the market (Moreblessing *et al*., 2024).

Furthermore, operational and maintenance costs compound these financial pressures, creating a challenging environment that complicates efforts to sustain growth and profitability (Arumdeben *et al*., 2023). The combined effect of escalating energy-related expenses diminishes SMEs' capacity to thrive, highlighting the importance of stable and affordable energy prices for their development.

Supporting this, study conducted by Ayivi *et al*. (2022) in the Ashanti Region of Ghana found a negative long-run relationship between electricity prices and SME growth. Their results indicated that a 1% increase in electricity prices correlates with a 0.68% decrease in profits over time, demonstrating how rising energy costs can significantly impede SME development and profitability. Similarly, the study by Moreblessing et al. (2024) in Zimbabwe emphasizes that fluctuations in energy prices lead to reduced sales and increased operational costs, ultimately lowering profits for retail businesses, further illustrating the detrimental effects of energy cost volatility on SME performance (Moreblessing *et al*., 2024).

CONCLUSION AND RECOMMENDATIONS

Conclusion

The study concludes that the accessibility, stability of electricity supply, and cost of electricity are essential factors influencing the performance of SMEs in Kibaigwa ward. Specifically, improved access to electricity is directly associated with better SME performance, underscoring the crucial role electricity plays in facilitating business operations and fostering economic growth within the community. Additionally, the analysis shows that the stability of power supply markedly affects SME performance; consistent and dependable electricity enhances operational efficiency and productivity. Conversely, irregularities or fluctuations in power supply can cause disruptions that negatively impact business activities, ultimately impairing performance. The study also highlights that the high cost of electricity serves as a major obstacle for SMEs, with elevated electricity prices linked to reduced business performance.

Recommendations

The study recommends that the government, policymakers, and other stakeholders in Kibaigwa ward should prioritize enhancing electricity accessibility for small and medium-scale enterprises. Given the significant correlation between electricity access and SME performance, improving the availability of electricity is vital for promoting business growth and regional economic development. Initiatives focused on expanding the electricity grid and ensuring a reliable power supply should be undertaken to support local SMEs.

Furthermore, the findings emphasize the importance of maintaining a stable power supply. Efforts to reduce outages and fluctuations will greatly benefit SMEs, as consistent electricity supply is associated with increased operational efficiency and productivity.

Additionally, the study highlights the negative impact of high electricity costs on SME performance. Consequently, it is crucial for local authorities and utility providers to consider strategies such as subsidies or alternative energy solutions to lower electricity tariffs and ease the financial burden on SMEs.

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