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Impact of Electricity Load Shedding on Operations of Small-Scale Enterprises in Selected Developing Countries: A Review of Literature

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Abstract

This paper examines the significant effects of electricity load shedding on small and medium enterprises (SMEs) in developing countries by using traditional literature review as the methodology. The study delves into the various ways in which frequent power outages disrupt business operations, hinder economic growth, and impede the development of these enterprises. The paper also discusses potential strategies and recommendations to mitigate the negative consequences of electricity load shedding on SMEs.

Keywords: Electricity load shedding, small and medium enterprises, developing countries, business operations, economic growth.
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1.0 INTRODUCTION

Electricity load shedding, characterized by scheduled power outages, remains a persistent challenge in many developing countries. This phenomenon has far-reaching implications for the business sector, particularly for small and medium enterprises (SMEs). SMEs play a crucial role in economic development, contributing significantly to job creation and innovation (Dhakal & Marpaung, 2017). However, their operations are heavily reliant on a stable and consistent power supply. This paper aims to explore the adverse effects of electricity load shedding on SMEs and propose potential strategies to alleviate its impact.

General Effects of Electricity Load shedding on Businesses

1.1.1 General Business Operations

1.1.1.1 Disruption of Production Processes

1.1.1.2 Electricity load shedding disrupts production processes, leading to delays in manufacturing and delivery timelines (Sawhney et al., 2019). This directly affects SMEs' ability to meet customer demands, resulting in decreased customer satisfaction and potential loss of market share.

1.1.1.3 Increased Operational Costs

The irregular power supply forces SMEs to resort to alternative power sources such as generators, leading to higher operational costs (Kaplinsky & Morris, 2016). This additional financial burden diminishes the competitiveness of these enterprises and reduces their profitability.

1.1.2 Impact on Economic Growth

1.1.2.1 Stifling of Entrepreneurship

Electricity load shedding hinders the establishment of new SMEs, as potential entrepreneurs are discouraged by the unreliable power infrastructure (Mthanti & Ojah, 2018). This stifling of entrepreneurship limits job creation and innovation, which are essential for sustained economic growth.

1.1.2.2 Attrition of Foreign Investment

The uncertain business environment created by electricity load shedding deters foreign investors from investing in developing countries (Eberhard et al., 2017). The lack of reliable power supply undermines investor confidence and slows down economic development.

1.1.3 Specific Impact of Electricity Load Shedding on Operations of Small-Scale Enterprises

The effects of load shedding for the functioning of small and medium-scale businesses and firms has been well acknowledged in numerous previous studies. Despite the fact that small and medium-sized enterprises remain the most rapidly expanding sector in the economy of emerging nations, their operations have been significantly hindered by insufficient and unpredictable power supplies (Nyanzu & Adarkwah, 2016; Mutambo et al., 2022). As a result, many SMEs are experiencing reduced productivity and inefficiency. Most small and medium-sized enterprises are usually believed to depend on having access to a steady supply of power to operate (Scott *et al.*, 2014). Hence, the impacts of electricity load shedding on the operations of small-scale enterprises cannot be overstated.

Numerous prior studies have examined the influence of electrical load shedding on business operations. Researchers investigated the relationship between power load shedding and business operations at both the macroeconomic and corporate levels. A significant number of research studies has revealed that electricity shedding has significant impacts on businesses. Literature has shown that the practise of load-shedding compels certain small enterprises to suspend operations for a significant duration, resulting in detrimental effects on their operations and financial performance, namely in terms of revenue generation and profitability (Banda *et al.*, 2020; Scott *et al.*, 2014; Trung & Kajozi, 2017; Mwange, Kasongola, & Meyiwa, A, 2022).

Most of the previous research studies have reported that load shedding disrupts production schedules and hampers productivity of firms. As reported by Banda, Simukoko and Tailoka (2020), many SMEs are forced to close during load shedding hours, resulting in a drop in sales, reduced turnover, and an inability to meet operating costs. The statistical analysis by Scott *et al.* (2014) found that electricity lead shedding negatively affects labour and total factor productivity of manufacturing SMEs. In a study conducted by Trung and Kaijozi (2017), the researchers examined the effects of insufficient power supply on the operational efficiencies of enterprises in Vietnam. The research was centered on manufacturing enterprises. The study's results indicated that a lack of power was having a negative impact on the productivity of enterprises (Trung & Kajozi, 2017). In a study conducted by Abotsi (2016), an examination was undertaken to assess the influence of power outages on the production efficiency of businesses in Africa. The findings revealed that the occurrence of frequent electric outages had a detrimental effect on the production proficiency of Small-Scale enterprises located in Africa (Abotsi, 2016).

Electricity load shedding disrupts production processes (Nyanzu & Adarkwah, 2016). As cited in Walsh, Theron and Reeders (2021), many businesses rely heavily on electricity for their operations, such as manufacturing plants and service providers. When power is suddenly cut off, it leads to downtime and delays in production, resulting in decreased output and potential financial losses (Walsh *et al.*, 2021). More so, load shedding affects communication systems of business entities. In today's digital age, businesses heavily rely on technology for communication purposes. Power outages can disrupt internet connectivity and telephone lines, making it difficult for businesses to communicate with clients and customers (Owusu *et al.*, 2022). This can lead to missed opportunities and damage business relationships (Fiawoo, 2016).

The inadequate provision of power resulting from the practice of load shedding has the potential to raise the expenses incurred by industrial enterprises. Consequently, this circumstance may influence their decisions on technological options, leading them to choose less energy-intensive alternatives. As a result, the overall cost of production is likely to escalate (Fiawoo, 2016). This phenomenon has a consequential impact on the competitiveness of enterprises as it compels them to employ alternative approaches, resulting in diminished product quality, production interruptions, and order delivery delays (Abeberes, 2012). In the same view, Scott *et al.* (2014) reported that electricity load shedding in many developing countries is perceived by small-scale enterprises to negatively impact operations by halting production, damaging equipment and affecting product or service quality.

2.0 EMPIRICAL REVIEW OF LITERATURE ON ELECTRICITY LOAD SHEDDING IN SELECTED DEVELOPING COUNTRIES ACROSS THE GLOBE

The following sections presents some of the empirical studies done across selected developing countries across the globe

2.1 Electricity Load Shedding and Business Operations of Small-Scale Enterprises in Pakistan

In Pakistan, load shedding has become a chronic issue that has severely impacted the business operations of small-scale enterprises in the country. Over the past few decades since 2007, Pakistan experienced a severe power crisis characterised by a significant decline in production, resulting in a reduction of 6000 Megawatts and widespread shutdowns (Kazmi *et al.*, 2019). Since then, Pakistan has been confronted with a significant energy crisis that has had profound repercussions across all sectors, including academia and industries (Kazmi *et al.*, 2019). Numerous studies have been conducted on the impact of power load shedding on small and medium enterprises in Pakistan, yielding consistent findings.

For instance, Makhdoom, Nawaz and Narejo (2017) studied the impacts of load shedding on retail SMEs in Pakistan. This study was based on the quantitative survey where data was gathered using structured questionnaires over a random sample of 262 business owners. Data was using multiple regression and descriptive statistics. The findings revealed that 65% of the respondents stated they faced load shedding for 6 to 8 hours where 55.3% used Uninterruptible Power Supply (UPS) systems and generator. The study found that load shedding significantly impacted business operations resulting in problems in dealing with customers, decreased sales, product damage and increases costs. The research conducted by Kaufmann, Kraay, and Mastruzzi (2018) provided empirical evidence supporting the notion that power interruptions in Pakistan exert a substantial negative influence on businesses. Significantly, according to Kaufmann *et al.* (2018), enterprises stated that the overall duration of annual blackouts resulted in an estimated increase in sales losses of 0.29 percentage points for every 100 hours of blackout.

2.2 Electricity Load Shedding and Business Operations of Small-Scale Enterprises in Bangladesh

In Bangladesh, load shedding has become a common phenomenon, severely affecting the business operations of Small-Scale enterprises (Shah *et al.*, 2021). Bose, Uddin and Mondal (2013), are also of the view that, electricity load shedding in Bangladesh has contributed to the rise in operational costs of Small-Scale enterprises leading to suspension or discontinuation of some operations. As found by Rahman, Nesa and Ghose (2018), the persistent and recurrent power outages in Bangladesh are adversely impacting the financial gains of small firms precisely those outside the export processing zones (EPZs). According to Rahman *et al.* (2018), these enterprises have been compelled to resort to expensive diesel fuel in order to sustain their operations, hence leading to an escalation in production costs. In the same vein, Shah *et al.* (2021) reported that the current scheduled load shedding in Bangladesh has had a significant impact on the small and medium firms located outside the export processing zones.

2.3 Electricity Load Shedding and Business Operations of Small-Scale Enterprises in India

Load shedding is also crisis in India that has been prevalent over the past decade where the crisis heightned in 2012. Approximately nine percent of the world's population was without electricity when India was hit by the worst blackout in the history of the globe in the month of July 2012 (Alam, 2013). The breakdown in infrastructure is unfortunately representative of the energy issues that the country is currently facing. Lack of investment in infrastructure and excess demand brought on by price distortion across consumer categories are two key factors contributing to the instability of electricity supply in India. Both of these factors play a role in the country's energy crisis. The crisis has significant negative effects on busineses particularly small firms. According to a survey conducted by the World Bank in 2015, 35.2% of Indian businesses cite the lack of access to electricity as the single most significant barrier to doing business. These same businesses also report that power interruptions result in losses that are equivalent to 6.6% of annual sales Alama, 2013). According to the findings by Alam (2013), the effect of power outages differs greatly depending on the sector of business where only certain industries that rely heavily on electricity will see their output and profitability decline as a result of a rise in the number of power interruptions.

2. 4 Electricity Load Shedding and Business Operations of Small-Scale Enterprises in Cameroon

Load shedding, the deliberate shutdown of power supply to certain areas for a specific period, has become a common phenomenon in Cameroon where this practice has had detrimental effects on Small-Scale enterprises in the country (Aboubakar, Li & Oumarou, 2022; Diboma & Tatietse, 2013). In Cameroon, Ef Ii (2021) studied the the impacts of electricity insecurity on performance of Small-Scale enterprises. The research utilized time series data for the period 1980 to 2018. The time series data using multiple linear regression analysis. The study also utilized a survey research to gather field data. The survey findings from this study indicated that small and medium-scale enterprises in Cameroon hold the perception that the energy company's electricity supply is inadequate, hence impeding their business operations. Findings from the same study showed that high fluctuations in electricity supply negatively impacted profitability of SMEs. In conclusion, load shedding has severe consequences on Small-Scale enterprises in Cameroon as it disrupts production processes, increases operational costs and affects customer satisfaction. Ef li (2021) concluded that small and medium-sized firms that face inadequate electrical supplies encounter regular disruptions in their production operations. In the same view, the study Diboma and Tatietse (2013) which focused on the estimation of power interruptions on industries in Cameroon concluded that power interruptions had significant negative effects on Small-Scale industries in Cameroon.

2.5 Electricity Load Shedding and Business Operations of Small-Scale Enterprises in Nigeria

In recent times, the Nigerian economy has seen a significant problem within the energy sector as a result of unsuccessful privatization initiatives, corruption, inadequate governance, and inconsistency in government policies resulting in epileptic electricirty supply (Alo & Adeyemo, 202; Chukwulobe *et al.*, 2022, Nurudeen, Nafiu & Jibo, 2018). The inconsistent provision of electricity, characterized by frequent disruptions, is a significant determinant of the financial viability and overall welfare of commercial Small-Scale firms in present-day Nigeria (Alo & Adeyemo, 2021). The slow rate of development of small and medium-sized enterprises in Nigeira has been attributed to epileptic electricity supply in the country. According to Alo and Adeyemo (2021), an unreliable power supply negatively impacts the efficiency of production channels, leading to additional costs for firms. This is due to the need to rely on alternative energy sources, increased pressure to

meet deadlines in anticipation of power outages, potential damage to inventories, malfunctioning machinery, and overall uncertainty (Alo & Adeyemo, 2021).

In a separate investigation conducted by Moyo (2012), the consequences of power interruptions on both major and minor manufacturing enterprises in Nigeria were analyzed. The findings of this study revealed that power outages had a detrimental and statistically significant impact on several aspects of operations, production, and productivity. Furthermore, it is worth noting that electrical disruptions, particularly those resulting from load shedding, have a far more pronounced effect on small enterprises with limited ability to adapt (Moyo, 2012). This, in turn, hampers their capacity for entrepreneurship, innovation, and competitiveness (Ajibola *et al.*, 2021; Moyo, 2012).) The study conducted by Nurudeen *et al.* (2018) also examined the correlation between fluctuations in electricity power and the operational efficiency of small and medium enterprises in Nigeria. The primary aim of this research was to investigate the impacts of inconsistent electricity provision on the economic contribution and performance of small and medium-sized enterprises in Nigeria. The research study utilised a survey research strategy, and the results of the study indicated that the presence of an unstable electrical supply has led to an escalation in operational expenses and, ultimately, the closure of several small and medium-sized enterprises.

According to Ajibola *et al.* (2021), the presence of a reliable power supply is of great importance as it offers cost-effective advantages. This, in turn, contributes to the optimization of SMEs' operations, leading to increased profitability and overall growth. Bassey and Imoh (2021) also examined the effects of electricity supply on performance of SMEs in Nigeria. These researchers conducted a comparative analysis to examine the impacts of electricity supply on performance SMEs in Calabar South in Nigeria and Calabar Municipality in Nigeria. The participants to this research were owners of SMEs and staff members from power utilities. The study employed a survey research approach and utilised a structured questionnaire. The sample size of 248 was used basing the simple random sampling technique. The study findings indicate a notable impact of power provision on the operational efficiency of SMEs. The findings additionally demonstrated that the inadequate provision of eelctricity has a substantial negative impact on operational efficiency of SMEs. The study revealed that SMEs were facing significant operational challenges because of insufficient and irregular electricity supply including failure to meet daily targets and increased costs of operating.

Empirical research by Akuru and Okoro (2014) on the effect of electricity load shedding on the growth and survival of firms in Nigeria, established that, between 2000 and 2008 around 820 manufacturing firms discontinued operations. This figure went up to 834 in the following year, all because of poor electricity power supply and high cost of the alternative energy supply. More so, Adanlawo and Vezi-Magigaba (2021) examuined the effects of electricity outages on the operations of Small-Scale enterprises in Nigeria. The descriptive survey design was employed to administer structured questionnaires to SMEs operators in Lagos state, Nigeria. Data were analysed using descriptive statistics whilst the Chi-square method was employed to test the formulated hypothesis that eelecticity outages have significant effects on operations o SMEs. The findings revealed that electricity outages have significant negative effects on operations of SMEs in Nigeria.

The study conducted by Ajibola *et al.* (2021) investigated the influence of electricity supply on the operational effectiveness of small and medium-sized enterprises (SMEs) located in the Ogun State of Nigeria. The descriptive research design was employed and questionnaires were distributed to the participants through the utilization of purposive sampling methodology. The data underwent analysis utilizing the Statistical Package for Social Science (SPSS), employing techniques such as variance analysis (ANOVA) and correlations, as well as linear regression. A total of 120 questionnaires were distributed, out of which 90 were collected and subsequently subjected to analysis. The results of the study indicated a notable positive influence of electricity provision on the operational effectiveness of small and medium-sized enterprises located in the Ogun State of Nigeria. The results imply that unreliable electricity supply tha is load shedding pose negative effects on operational effectiveness of SMEs. Additionally, the utilization of alternative power sources has a substantial influence on the operational efficiency of small and medium-sized enterprises in Nigeria.

A similar research was carried out by Fashanu (2021) who investigated the impacts of electricity outages on SMEs' operations in Nigeria. The secondary objective was to ascertain the impacts of power outages on production efficiency of the SMEs. Primary data was collected through questionnaires and the cross-sectional survey design was employed. Data was analysed using regression and correlation analyses. The results revealed that power outages had significant negative impacts on performance, production efficiency, competitiveness, customer satisfaction and profitability of SMEs. These findings by Fashanu (2021) were in line with those by Abbas and Jibrilla (2016) which examined the impacts of electricity supply on performance of SMEs in Nigeria

using descriptive, correlation and regression analyses and found that electricity supply and performance of SMEs are positively correlated.

Another study in the context of Nigeria was carried out by Olatunji and Umukoro (2018). These researchers examined the impact of electricity power insecurity on the operational efficiency and productivity of Small-Scale enterprises in the Ondo State of Nigeria. The study employed a descriptive survey research design. The multiple regression technique was employed to ascertain the relationship between electricity insecurtity and operational efficiency of SMEs. The findings derived from the analysis indicated that there exists a statistically significant negative correlation between the performance of small enterprises and electricity supply insecurty. Nevertheless, the findings of the research were unable to establish a definitive correlation between the cost and quality of energy supply and the performance of small firms. The research findings indicated that a consistent and reliable electrical supply is of utmost importance in fostering the development and expansion of small enterprises within Nigeria.

According to Azubuike (2013), unreliable power supply in Nigeria negatively impacts the efficiency of production channels, leading to additional costs for Small-Scale firms. This is due to the need to rely on alternative energy sources, increased pressure to meet deadlines due to anticipated blackouts, potential damage to inventories, malfunctioning machinery, and overall uncertainty.

2.6 Electricity Load Shedding and Business Operations of Small-Scale Enterprises in Ghana

Literature provides evidence that power load shedding in Ghana has indirect negative impacts on Small-Scale enterprises, including production losses, revenue losses, wastage, personnel losses resulting from downsizing, and challenges in sustaining operations due to high production costs (Doe & Asamoah, 2016; Owusu *et al.*, 2022). Furthermore, Owusu *et al.* (2022) claim that the recurrence of power rationing in Ghana ultimately results in a decrease in productivity. As a result, the company's sales volume does not meet the expected targets. In the concluding remarks, Doe and Asamoah (2014) asserted that the energy challenges in Ghana have not shown signs of improvement and have exacerbated, resulting in adverse impacts on company operations. More so, Nyanzu and Adarkwah (2016) found that insufficient and unreliable power supplies, rendering the majority of them unproductive and inefficient, have hampered activities and operations of SMEs in Ghana.

According to Doe and Asamoah (2014), the occurrence of electricity load shedding in Ghana leads to interruptions in business operations, resulting in various negative consequences. These consequences include damage to semi-finished goods or materials, delays or cancellations of orders, increased production costs, loss of reputation and competitiveness, decreased sales and customer base, as well as diminished product or service quality. Forkuoh and Li (2015) assert that the occurrence of electrical outages in Ghana has a detrimental impact on the operations and profitability of SMEs. This is primarily attributed to the escalation of production costs, the imposition of exorbitant expenses for alternative power sources, and the consequential impairment of assets, all of which culminate in a decline in sales for these enterprises. Because of escalating operational expenses, businesses allocate their revenue towards the payment of electricity and alternative power bills, rather than reinvesting it, so significantly compromising their performance and impeding their growth (Farawoo, 2016; Forkuoh & Li, 2015). Likewise, a qualitative study by Braimah and Amponsah (2012) revealed that monthly blackouts lasting for about 10.3 hours in a day resulted in increased costs of production of SMEs leading to firms failing to meet contract deadlines.

The study by Doe and Asamoah (2014) examined the effects of electricity power fluctuations on competitiveness and profitability of SMEs in Ghana. The research focused on SMEs located within the Accra business district of Ghana. The researchers employed a cross-sectional survey design and utilised a mixed-method technique. A systematic sampling strategy was employed to choose a sample of 70 SMEs in Ghana. The selection of SMEs was based on utilisation of electricity as a primary component of their major business operations. The data was gathered using a structured questionnaire. The study specifically examined the impact of power fluctuations on the operations of SMEs, with a particular emphasis on profitability and its subsequent influence on the competitiveness of the organisations. The data was analysed using the single-factor analysis. The research revealed that in the absence of dependable energy supplies, SMEs in Ghana faced challenges in enhancing their production capacity and maintaining high product or service quality, resulting in diminished sales and consequently reduced profitability. The study further revealed significant negative effects of electricity fluctuations on Return on Investment and Return on Assets. Doe and Asamoah (2014) also found that electricity outages/irregular electricity supply significantly affect SMEs' operations leading to closure of many businesses.

However, the present study was not able to collect quantitative data on Return on Investment and Return on Assets because most of the Small-Scale enterprises in Zambia lack financial recording skills.

Another study in the context of Ghana by Fiawoo (2016) assessed the effects of load shedding on SMEs as well as the coping strategies. Exploratory research methods were utilised to collect quantitative and qualitative information from 31 SMEs in Madina using a purposive, non-probabilistic sampling. Interviews and questionnaires were used to gather data. The data were analysed using descriptive and content analysis. Results showed that the operations and expansion of SMEs are negatively impacted by power load shedding. The adverse outcomes included an increase in operating costs, reduction in labour force, lost production time, lost revenue, and decreased productivity, damage to plant equipment, higher spending, and midnight work.

The objective of the study conducted by Frederick and Selase (2014) was to examine the impact of fluctuations in electric power supply on the profitability and competitiveness of SMEs in Ghana. The nation had successfully attained a middle-income classification and was required to maintain this state. The research report employed a case study methodology, focusing mostly on SMEs operating within the Accra commercial centre in Ghana. The research employed a cross-sectional survey design and utilised a systematic sampling technique to determine a sample size of 70 SMEs in Ghana. The selection of a SME firm was based on two primary criteria: geographical location and reliance on electricity as a critical input for business operations. Data pertaining to power fluctuations, firm profitability, and firm competitiveness was collected through the utilisation of structured questionnaires. The research findings indicated that an inconsistent power supply had a detrimental impact on the firm's capacity to enhance both the quantity and quality of its products, ultimately resulting in diminished sales and profitability. The objective of this study was to assess the impact of power outages on the operations of SMEs in Ghana. It is imperative to conduct an analysis in order to ascertain whether comparable outcomes may be attained within the context of Small-Scale firms in Zambia.

Another study in the context of SMEs in Ghana done by Dunya *et al.* (2019) investigated the impact of electricity load management on the functioning of Small-Scale firms, while also evaluating the efficacy of the coping strategies employed by these enterprises. The study employed a cross-sectional survey design in conjunction with a mixed-methods research design. A sample size of 152 Small-Scale traders was selected from Madina in the La-Nkwantanang Municipality, located in the Greater Accra Region, Ghana. The research illustrated that the current implementation of load management measures negatively impacted the profitability of numerous small and medium-sized enterprises in Ghana. The study also found that the enterprises had resorted to various coping strategies, including employee layoffs, night shifts, salary reductions, and the use of generators, in order to mitigate the effects of frequent load management. However, these measures were proven to be less effective in addressing the challenges posed by load management to the operations of the SMEs. The study further identified that over 50% of the SMEs used generators during times of power cuts.

2.7 Electricity Load Shedding and Business Operations of Small-Scale Enterprises in Senegal

Small-Scale Enterprises have a significant role in the overall economic landscape of Senegal, as highlighted by Cissokho (2019). Since the onset of the 21st century, small and medium-sized enterprises have been functioning within a context marked by instances of electrical power interruptions. In fact, a significant proportion of these enterprises, specifically 57%, have identified energy as a prominent issue of concern. According to Cissokho (2019) and Cissokho & Seck (2014), small and medium-sized enterprises experienced an average of 26 disruptions per month, with each outage lasting approximately two hours. Cissokho and Seck (2014) unveiled that the occurrence of load shedding in Senegal prompted enterprises to develop effective methods aimed at enhancing management practices in response to unforeseen power outages.

The study by Cissokho (2019) examined the impact of power outages on the productivity of Small-Scale enterprises in the manufacturing sector in Senegal. The analysis was conducted utilising panel data from manufacturing Small-Scale firms. Productivity was quantified through the utilisation of stochastic frontier models, whereas power outages were assessed based on either their frequency or length. Controls for firms that possess a generator were incorporated in the study by Cissokho (2019). The results revealed that power disruptions have a significant detrimental impact on the productivity of small and medium-sized enterprises in Senegal. Moreover, the study found that the Small-Scale firms equipped with a generator have proven to be effective in mitigating the detrimental impact of power outages on productivity. However, Cissokho and Seck (2014) present an alternative perspective based on their comprehensive analysis of the study's findings where the authors unveiled that power outages may occasionally yield favorable outcomes for the organizations.

2.8 Electricity Load Shedding and Business Operations of Small-Scale Enterprises in Ethiopia

Similar to other African nations, Ethiopia is presently experiencing an energy crisis. Abdisa (2018) asserts that the inconsistent provision of electricity is a significant hindrance to conducting economic operations in Ethiopia. One of the primary challenges faced by small-scale firms in the country is the insufficiency of electrical supplies, coupled with an uncertain security environment (Ahadu, 2019; Hassen & Degu, 2019). According to Ahadu's (2019) report, the country has seen a frequent recurrence of power outages over an extended period of time. There are also studies that have studied the impact of load shedding on the operations of Small-Scale etnerprises in the context of Ethiopia. The previous studies have found similar results.

For instance, Ahadu (2019) investigated the impact of power outages on the functioning and efficiency of a small-scale manufacturing businesses Ethiopia. The study found that small businesses in Ethipia often encounter frequent and unanticipated power outages. This regular occurrence of unexpected power outages was found to significantly hamper the capacity of small businesses to adhere to contractual obligations within specified timeframes. The study also foudnt that financial implications of a power outage beyond a duration of three hours were greater compared to a power outage of less than three hours. The study also found that blackouts significantly affected the overall activity of small firms, as well as the work motivation and productivity of their staff.

Similarly, Hassen and Degu (2019) studied the effects of power outages on Small-Scale enterprises' productivity using evidence from Ethiopia. In this study, a cross-sectional survey was undertaken to examine the impacts of power outages on the total factor productivity, labour productivity, and revenue of Small-Scale firms in ten prominent urban regions of Ethiopia. The findings of the study indicated that a marginal increase of one percent in the average duration of power outage is linked to a corresponding drop of 0.54% in total factor productivity, 0.17% in labour productivity, and 0.19% in revenue. The authors proposed that power outages have a detrimental impact on the productivity and profitability of small businesses, as they impose limitations on the production process. Additionally, it is suggested that placing significant emphasis on the provision of sustainable and dependable power is crucial for enhancing the overall efficiency of micro, small, and medium firms.

2.9 Electricity Load Shedding and Business Operations of Small-Scale Enterprises in Sub-Sahara Africa

Loading shedding is a crisis in Sub-Saharan Africa that has plagued the region for decades and the consequences of loading shedding are far-reaching. According to Mensah (2016), power cuts have developed into a distinguishing feature of a number of economies located in Sub-Saharan Africa. According to research conducted by the World Bank (2020), the region has approximately 102 power outages on a yearly basis, on average. The major reason is that power generation capacity in the sub-Saharan Africa region is comparatively smaller than that of any other region globally, and the growth of this capacity has also experienced a state of stagnation (Abotsi, 2016). According to the World Bank Enterprise 2015Survey, the monthly average number of outages in sub-Saharan Africa is 8.5 (4.8 hours), while it is 3.5 (2.5 hours) in East Asia and Pacific, 17.6 (6.5 hours) in the Middle-East and North Africa, 25.4 (3.1 hours) in South Asia, and 2.8 (1.5 hours) in South America and the Caribbean (Mensah, 2016). This is in comparison to the number of outages that occur in East Asia and Pacific, which are significantly lower.

As also cited by Maende and Alwanga (2020), one contributing factor to the insufficient power supply in Sub-Saharan Africa (SSA), is the limited capacity for power generation and inefficiencies within the electricity institutions. In their study, Cole *et al.* (2018) examined the impact of power outages on the performance of firms in Sub-Saharan Africa and noted significant power outages in several countries in the region. According to the findings of Cole *et al.* (2018), frequent and unplanned power outages impose a considerable hardship on enterprises in the region particularly small firms with lower total sales in comparison to medium-sized firms. According to their findings, if the average duration of power outages is lowered, Small-Scale enterprises that do not possess generators might potentially experience a significant gain in sales, amounting to 83 percent (Cole *et al.*, 2018). Further, Cole *et al.* (2018) found that small businesses in the formal sector of Sub-Saharan African countries had losses amounting to approximately 6% of their turnover as a result of power outages whilst firms in the informal sector, which lack alternative power sources, incurred losses of up to 16% of their revenue.

Mensah (2016) also made an effort to assess the impact of power outages at the firm level by using panel data on firms from 15 different Sub-Saharan African countries. Mensha (2016) used a quasi-experimental methodology to analyse the influence that electricity self-generation has on the firm's performance in terms of mitigating the negative consequences that power interruptions have. The findings of the investigation showed that shortages of

power have considerable adverse effects on the productivity of businesses, as well as their sizes and levels of employment. In conclusion, contrary to the assumption that self-generation, the evidence presented by Mensah (2016) suggested that dependence on self-generation is associated with decreased productivity despite short-term increases in revenue. These findings contradict the notion that self-generation may be advantageous for businesses during outage periods.

2.10 Electricity Load Shedding and Business Operations of Small-Scale Enterprises in Kenya

Electricity supply in Kenya is widely recognised for its lack of stability and the significant costs associated with disruptions, which have a negative impact on production efficiency and competitiveness (Cheruto & Munene, 2019; Njiraini, 2021). According to Cheruto and Munene (2019), the presence of an unreliable power supply can result in several negative consequences within a production setting, including disruptions in the manufacturing process, the potential loss of perishable commodities, potential damage to sensitive equipment, and the potential loss of orders. Maende and Alwanga (2020) stated that the occurrence of power outages in Kenya can be attributed, in part, to inadequate infrastructural facilities as well as instances of fraud and vandalism targeting critical assets like transformers and electricity lines. According to Maende and Alwanga (2020), in the context of Kenya's enterprises, there exists a notable and adverse correlation between a scarcity of power and the financial performance of small firms.

2.11 Electricity Load Shedding and Business Operations of Small-Scale Enterprises in Tanzania

Small-Scale enterprises play a crucial role in Tanzania's economy, contributing to employment generation and poverty reduction. However, load shedding impacts the operations of these enterprirses (Ngowi, Bångens & Ahlgren, 2019). According to the study conducted by Mchopa *et al.* (2014), companies in Tanzania experience prolonged periods without access to electricity due to the frequent occurrence of power outages. The aforementioned circumstance had a direct impact on the efficiency of small enterprises, resulting in escalated production costs due to the supplementary financial resources allocated towards fuel consumption for generator operation. Mchopa *et al.* (2014) alsoalso noted that small and medium-sized enterprises encountered significant challenges due to power rationing. These challenges manifested in several ways, including reduced production levels, inadequate service supply, inability to meet desired output or sales targets, and diminished revenue levels. Consequently, the aforementioned circumstances resulted in a decline in profits and a negative impact on the overall financial and nonfinancial performance of these small and medium-sized enterprises (Mchopa *et al.*, 2014). The findings of the study indicated that the implementation of power rationing led to the cessation of production machinery, hence exerting a detrimental impact on productivity (Mchopa *et al.*, 2014). In their survey research, Mchopa, Kazungu and Moshi (2014) discovered that power rationing reduced SME productivity in Tanzania. Furthermore, a drop in productivity was observed to have a positive link with loss of income for SMEs because of power rationing (Mchopa *et al.*, 2014).

2.12 Electricity Load Shedding and Business Operations of Small-Scale Enterprises in South Africa

Load-shedding has been observed in South Africa since 2007, and throughout the course of the last 15 years, the energy crisis has exhibited increased persistence and duration due to a widening gap between supply and demand (Tembe & Hlengwa, 2022; Mutambo, et. al, 2002). This situation poses a significant risk to the stability of the national grid. Load shedding in South Africa has also significant effects on Small-Scale enterprises in the country. According to a previous study conducted by Mbobvu *et al.* (2021), it has been indicated that the sustainability of small and medium-sized enterprises (SMEs) in South Africa is adversely affected by load shedding. This is mostly because to the disruption it causes in the financial performance of these enterprises, impacting factors such as solvency, efficiency, profitability, and liquidity. The study conducted by Botha (2019) presents empirical evidence on the detrimental effects of an unreliable electricity supply in South Africa on company operations and total factor productivity.

Makgopa and Mpetsheni (2022) explored the impacts of load shedding on SMMEs in South Africa focusing on SMMEs in Nelson Mandela Bay Municipality. The qualitative research approach was adopted to gain in-depth understanding of the impacts of load shedding on the SMMEs in Nelson Mandela Bay. Qualitative data was collected using in-depth interviews conducted with SMMEs' managers and was analysed using content analysis. Makgopa and Mpetsheni (2022) revealed that load shedding results in business interruptions and security risks to the SMMEs.

Olajuyin and Mago (2022) which examined the effects of load shedding on performance of SMEs in the South Africa's food industry did a similar study to that of Makgopa and Mpetsheni (2022). The study was explorative and adopted the qualitative research design. The purposive sampling method was employed to select participants. Data was collected using in-depth interviews. The research revealed that load shedding adversely affect performance of SMEs by undermining the capacity of the SMEs to provide quality services and products to customers leading loss of customers and reputation. The study further revealed that to mitigate effects of power outages, SMEs in the food industry embrace alternative energy power sources such as backup generators as well as adjusting operations.

More so, the findings by Makgopa and Mpetsheni (2022), Olajuyin, and Mago (2022) corroborated the findings by the earlier study of Mohammed (2012). The study by Mohammed (2012) focused on the impacts of load shedding on SMEs Johannesburg, South Africa. The secondary objective was to investigate the extent to which particular industries were affected by the load-shedding problem. Data for the study was gathered using structured questionnaires and analysed using the student's t-test and analysis of variance (ANOVA). The evidence showed that small enterprises were more impacted compared to medium-sized enterprises. The study found that load shedding negatively impacted the SMEs by reducing operating profits, impacting service delivery, reducing competitiveness and sales turnover. However, the study findings were confined to the SMEs in Johannesburg in South Africa.

Schoeman and Saunders (2018) which aimed to examine the effects and financial implications of power outages on small enterprises situated in South Africa's City of Johannesburg did a similar South African-based research. The study followed the quantitative research approach where data was collected using questionnaires and interviews. A majority of the surveyed firms, comprising over two thirds, reported an average occurrence of one to three power outages each month. In contrast, 18.5 percent of the businesses indicated experiencing between four and seven power outages during the same period. Business enterprises reported a decrease in client base and a decline in revenue on days when they experienced power outages. In order to mitigate the effects of power outages, many of the SMEs employed backup power systems such as backup generators and solar systems.

Similarly, Mohammed (2017) evaluated the impacts of load shedding on SMEs in Johannesburg, South Africa. The study followed the quantitative research approach. Data was collected using survey questionnaires. Load shedding was measured using frequency and duration of load shedding. The descriptive survey research design was employed. Stratified random and purposive sampling techniques were employed. Data gathered were analysed using cross-tabulations and frequency distrivbutions. The study found that SMEs were negatively impacted in terms of operating profits, service delivery, sales turnover and competitiveness.

2.13 Electricity Load Shedding and Business Operations of Small-Scale Enterprises in Zambia

Load shedding has also found to be one of the xternal factors impacting Small-Scale enteprries in Zambia. According to the research conducted by Mwila (2017), it was found that load shedding has a significant impact on the operational efficiency and financial sustainability of various businesses. The research was carried out in Zambia with the objective of examining the effects of load shedding on Small-Scale industries. The study's findings indicate that small firms saw the greatest impact, mostly because of their limited resilience and constrained ability to invest in alternative energy sources. Many small businesses opted to decrease their production outputs, leading to a decrease in revenue, while also incurring additional expenses such as idle labour and overtime. Phiri's (2017) study also demonstrated that power restriction and energy load shedding has adverse effects on the productivity and profitability of business organizations. This study was conducted in Solwezi on the North-Western part of Zambia while the current study focuses on Masala market in Ndola District, Copperbelt Province. Sichone *et al.* (2016) also found that, at the subsector level, SMEs involved in the food and metal fabrication processes in Zambia experienced sales declines of between 1.4% and 1.9% due to load shedding.

In another local-based research, Banda *et al.* (2020) aimed to determine the effect of load shedding on Small-Scale entrepreneurs in Zambia using the mixed research approach. The sample for the study consisted of 200 Small-Scale entrepreneurs selected using simple random sampling. Data were collected through survey questionnaires and interviews and analysed using Analysis of Covariance. The findings revealed that load shedding had negative effects on Small-Scale entrepreneurs in Zambia. The study was conducted in in Kitwe District, Copperbelt Province whilst the present study focuses on SMEs in Ndola, Copperbelt Province.

Phiri (2018) examined load shedding and electricity demand and its impacts on Zambian businesses. The study's overarching goal was to look into the effects of load shedding and electricity consumption on Zambian small enterprises and entrepreneurs. The study's particular goals were: (a) to determine the productivity and financial impacts of load shedding on Zambian businesses, (b) to determine the impact of load shedding on revenue and output and (c) find out alternatives for reducing the consequences of load shedding. Purposive sampling was used to select a sample of 100 from various sub-sectors. Data was collected using self-administered questionnaires containing closed and open-ended questions and personal observations. The analysis showed that ZESCO's efforts to manage the power shortfall through load shedding and power rationing had a detrimental effect on the productivity and profitability of the Small-Scale enterprises. The survey also showed that very few enterprises turned to alternate energy sources and took steps to lessen the effects of load shedding (Mwange, Kasongola, & Meyiwa, 2022; Mwange,2022; Mwange; Mwange, Kasongola, & Meyiwa, 2022).. However, the study found that the coping strategies implemented to lessen load shedding had not improved profitability and productivity. Additionally, it was determined that load shedding has a detrimental effect on business development and entrepreneurship due to the absence of accessible and trustworthy energy supplies. However, the findings may not be transferable to the situation of Small-Scale enterprises at Masala Market.

Furthermore, a recent study conducted by Lombe and Tembo (2023) investigated the impact of load shedding on small and medium-sized enterprises, specifically focusing on female entrepreneurs in Lusaka Kabwata Market. The primary objectives of this study were to determine the effects of load shedding on output, profit, and workers within the context of businesses. Additionally, the study aimed to analyze the influence of load shedding on the socioeconomic circumstances of female owners of small and medium-sized enterprises, as well as the effectiveness of the coping techniques employed by these organizations. The research was grounded in the principles of the Cybernetic theory and the Stress theory. The research employed a descriptive design to gather qualitative and quantitative data, using a random selection of 100 respondents and interviews with key informants. The data collection process involved the utilization of a questionnaire as well as conducting in-depth interviews with key informants. The statistical analysis employed descriptive techniques to analyze the quantitative data, while theme analysis was applied to examine the qualitative data. Based on the findings of the study, it has been shown that load shedding exerts a negative influence on the workforce, socioeconomic aspects, productivity, and financial gains of small and medium-sized enterprises. A variety of coping tactics were identified, one of which was working during nighttime hours. However, in comparison to utilizing electricity as a power source, the effectiveness of the bulk of these coping approaches employed by small and medium-sized enterprise owners was shown to be somewhat lower. The study reached the conclusion that load shedding had notably more adverse effects on small businesses operated by women.

More so, the study by Kintu (2022) examined key factors that affect the operational elements of Zambia's SMEs affected by load shedding, including the financial implications of material losses, labor costs, and the preservation of business operations. The study also examined the impacts of load shedding on turnover rates, as well as the various coping mechanisms implemented in response to load shedding. The specific aims of the study were to determine effects of load shedding on viability of SMEs and to identify strategies of the SMEs to mitigate the impacts of load shedding. The research strategy employed was non-experimental. The study employed a quantitative research approach employing a semi-structured questionnaire. Kintu (2022) conducted a univariate analysis and chi-square test to determine statistical association between variables. The study revealed that occurrence of load shedding resulted in detrimental disruptions to the operations of a majority of SMEs.

In another study, Siankwilimba (2019) examined the impacts of electricity power load shedding, caused by climate change on the agricultural productivity and production of smallholder farmers in the districts of Mazabuka, Monze, Choma, Kalomo, and Namwala in the Southern Province of Zambia. In order to acquire the necessary data for comprehending the impacts and scope of load shedding, as well as assessing potential variations in outcomes across different enterprises, a total of 149 carefully designed sets of questionnaires were distributed at the enterprise level. In addition, in order to enhance and expand the comprehension of the impacts and scope of load shedding on small-scale farmers, a series of 17 focus group discussions were carried out. The analysis indicated that certain firms within the sample area either lacked awareness of the scheduled power cuts or experienced deviations from ZESCO's programmed load shedding time table. The results indicated numerous firms encountered a decline in the projected mean level of production amidst the occurrence of load shedding. The production level experienced a decrease of 26.6%. The study further found that majority of smallholder farmers (85.26%) opted to rent alternative tools/equipment as a means of coping with load shedding and purchasing alternative tools/equipment to ensure continuous power supply.

Based on the aforementioned empirical literature assessment, an agreement among scholars and researchers emerges; indicating that load shedding has a detrimental effect on Small-Scale firms. However, Scott *et al.* (2014) argue that electricity load shedding has a considerable impact on the productivity of industrial SMEs. However, it is important to note that these effects are often statistically insignificant and, in some cases, even positive. Although the prevailing consensus suggests that load shedding has predominantly negative consequences, Cissokho and Seck (2014) present an alternative perspective based on their comprehensive analysis of the study's findings. The study unveiled that power outages may occasionally yield favorable outcomes for the organizations. The findings of the study indicated that in Senegal, the occurrence of load shedding prompted enterprises to develop effective methods aimed at enhancing management practices in response to unforeseen power outages (Cissokho & Seckm, 2014). Furthermore, alongside the development of effective management methods, proficient companies strategically seized the opportunity to acquire the market share that was formerly held by less efficient enterprises. In accordance with the research conducted by Cissokho and Seck (2013), Bose, Uddin and Mondal (2013) established that electricity outages do not have a substantial influence on operations of small and medium-sized enterprises.

From the reviewed empirical literature, several studies have been carried out to determine the effects of load shedding on operations of businesses particularly. Although, most of the prior studies have proved that load shedding has significant negative effects on operations of SMEs, several theroretical, methodological and empirical gaps. Table 1 provides the summary of the empirical studies on load shedding and operations of SMEs.

Table 1: Summary of empirical studies on load shedding and operations of SMEs

Author (s)	Main Aim	Research Design/Methodology	Measurement of Impact	Impact type
Ajibola *et al.* (2021)	Impacts of electricity supply on performance of SMEs in Nigeria	Quantiative descriptive survey research design	ANOVA, correlation and regression analyses	Positive
Olatunji and Umukoro (2018).	Electricity insecurity and performance of SMEs in Nigeria	Descriptive survey research design where electricity insecurity was measured by duration of electricity supply to SMEs	Regression analysis	Negative
Adanlawo and Vezi-Magigaba (2021)	Effects of electricity outages on operations of Small-Scale enterprises in Nigeria	Quantitative survey research design where electricity outages was measured by frequency of power outages	Chi-square analysis	Negative
Cissokho and Seck (2013)	Electricity outages and productivity of SMEs in Senegal.	Quantitative research where power outages measured by duration and frequency of power outages	Regression analysis	Negative
Njiraini (2021)	Effects of electric power outages on performance of manufacturing firms in Kenya	Quantaitve descriptive survey design where power outages were measured by duration and frequency of power outages	Regression and correlation analyses	Negative
Mbobvu *et al.* (2021)	Load shedding and its effect on South African SMEs' profitability, efficiency, liquidity and solvency	Qualitative	Qualitative	Negative
Olajuyin and Mago (2022)	Effects of load-shedding on performance of SMEs in Gqeberha, South Africa	Qualitative research design	Qualitative	Negative
Mohammed (2017)	Impact of load shedding on SMEs in Johannesburg, South Africa	Quantitative research where load shedding was measured by duration and frequency of load shedding	Cross-tabulations	Negative
Schoeman and	Impact of load shedding on SMEs in Johannesburg, South	Quantitative research where load shedding was measured by	Univariate descriptive	Negative

Saunders (2018)	Africa	duration and frequency of load shedding	statistics	
Banda *et al.* (2020)	Effects of load shedding on the Small-Scale entrepreneurs in Zambia	Mixed-method research where load shedding was measured by whether Small-Scale enterpreneurs faced load shedding or not	Analysis of Covariance	Negative

Source: Researcher

3.0 CONCLUSION

In summary, the reduction of electricity load poses significant challenges to the growth and sustainability of small and medium enterprises in developing countries. Business disruptions, and their negative impact on economic growth require urgent attention from governments, policymakers and stakeholders. By investing in infrastructure and promoting energy efficiency, it is possible to reduce the harmful effects of power loss and create an enabling environment for the growth of small and medium enterprises.

In respect of mitigation strategies, Governments and relevant authorities should prioritize the enhancement of power generation and distribution infrastructure (Fagbenle et al., 2020). This involves upgrading power plants, expanding transmission networks, and adopting modern technologies to improve overall system efficiency. Further, SMEs can adopt energy-efficient practices and technologies to reduce their dependence on the grid (Mabhena & Nhamo, 2019). Governments can incentivize such initiatives through policy frameworks and financial support mechanisms.

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