iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 12 **Issue:** X **Month of publication:** October 2024

DOI: https://doi.org/10.22214/ijraset.2024.64493

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 12 Issue X Oct 2024- Available at www.ijraset.com

The Effects of Loadshedding on Small and Medium South African Enterprises Using Statistical Analysis

Keeletse Katlego Kepadisa[1], Gan Yin[2]
School of Data Science, Zhejiang University of Science and Technology

Abstract: ***Load shedding is now occurring in South Africa due to power outages. One of the most important issues facing the nation is still load shedding, which has a negative impact on daily business operations and forced some small enterprises to close. Numerous companies were impacted by the power irregularity issue. This was the beginning of the end for a number of enterprises. To stay afloat, several businesses were forced to close or cut back on staff and inventory. Despite warnings about the frequency of load shedding, some businesses were nevertheless severely impacted since they could not afford other options. The decline in South Africa's economy had an impact on these firms. Because of their low turnover, load shedding created a hostile work climate for a number of enterprises, which in turn led to dissatisfied employers. Since big franchises are having trouble, micro, small, and medium sized businesses are having much greater trouble. Thus, comprehending the perceived psychological, social, and economic effects of load shedding on workers at particular small, medium, and micro businesses in South Africa was the main goal of the study.***

Keywords: Small and medium enterprise, Eskom, Technology, Electricity , Load shedding , Local economic development, Municipality, South Africa.

I. INTRODUCTION AND BACKGROUND

Development agendas such as the Sustainable Development Goals, African Agenda 2063, and South Africa's National Development Plan 2030 emphasize the role of small enterprises, particularly in rural areas, as drivers of job creation and revenue generation. Small enterprises are seen as vital for regional economic growth (Rohini et al., 2018). In the past decade, the number of small businesses in Limpopo and the Collins Chabane Local Municipality (CCLM) has significantly increased, signaling healthy economic growth (General Household Survey, 2018). Many of these small businesses, especially those in tourism and agriculture, rely heavily on prepaid electricity for daily operations (Community Survey, 2016).However, CCLM depends on Eskom for energy distribution, as it lacks the license to manage its own power supply (CCLM Integrated Development Plan, 2019). Since 2019, South Africa has faced worsening stages of load shedding, which intensified to stage 6 and even higher stages are anticipated (Business Tech, 2023; eNCA, 2023). The main causes of this energy imbalance include power plant failures, cable theft, and electricity theft (Ateba et al., 2019). Additionally, Eskom's efforts to address historical inequities from apartheid by expanding energy access to previously under served Black communities have contributed to the imbalance (Jain & Jain, 2017; Botha, 2019).Load shedding has negatively impacted the country's economy, especially small and medium-sized enterprises (SMEs), which rely on a stable energy supply. The performance and economic contributions of SMEs are closely linked to the quality of energy they receive (Nkwinika & Munzhedzi, 2016).

II. LITERATURE REVIEW

Recent research highlights that electricity plays a crucial role in social life, economic growth, living conditions, productivity, sustainable development, and poverty reduction (Emovon et al., 2018; Gehringer et al., 2019). However, many developing countries, especially in sub-Saharan Africa, such as South Africa, struggle to provide reliable energy. Load shedding, the intentional suspension of power, has been a recurring issue in South Africa over the past decade (Amadi, 2015; Boakye et al., 2016; Schoeman & Saunders, 2018). According to Head (2019), load shedding in South Africa is primarily caused by unexpected conveyor belt failures, leading to turbine breakdowns. This energy shortage impacts the economy, especially the growth of small and medium enterprises (SMEs), which operate in an open system where market forces drive supply and demand (Prabowo & Noegraheni, 2019).

©IJRASET: All Rights are Reserved

The limited electricity supply hinders production and service delivery in industries that drive economic and socio-economic development (Boakye et al., 2016; Steenkamp, 2016). Goldberg (2015) found that South Africa lost R13.72 billion in revenue during the first half of 2014 due to an unstable electricity supply, which reflects the broader negative economic impact of load shedding. Similarly, Schoeman and Saunders (2018) observed that power outages in Johannesburg shopping centers led to revenue loss, customer decline, and increased operational costs. Botha (2019) found that load shedding in Nelson Mandela Bay significantly reduced restaurant productivity.

Internationally, similar issues are observed. In Ghana, Boakye et al. (2016) reported that unstable power negatively impacts the hotel industry, while in Lebanon, Bouri and Assad found that power outages continue to harm both the economy and society. Research in Port Harcourt by Amadi (2015) cited inadequate gas supplies and outdated infrastructure as primary causes of blackouts. Politano (2019) highlighted how consumers use social media during outages, showing how blackouts disrupt daily routines and businesses. Haes Alhelou et al. (2019) attributed global blackouts to human error and faulty equipment.Various studies, including those by Baker and Phillips (2019) and Inglesi-Lotz and Pouris (2016), agree that electricity production and consumption directly impact business inputs and outputs. However, much of the energy research focuses on Zimbabwe and Nigeria, with Paris et al. (2016) calling for more studies on South Africa's energy issues. This current study aims to fill the gap by exploring how load shedding affects SMEs in the Collins Chabane Municipality.

A. Conceptual Framework of The Study

This study's conceptual framework on load shedding focuses on four key aspects: reduced productivity, increased operational costs, disrupted communication, and small business strategies. The framework suggests that load shedding is the main cause of electricity shortages, which in turn reduces the productivity of small businesses. Electricity is essential for manufacturing and producing high-quality goods and services, so power cuts disrupt this process. Load shedding also hinders communication between businesses and their stakeholders, particularly by interrupting online transactions, leading to decreased productivity and lower sales volumes. This not only harms the company's brand and customer retention but also negatively affects the customer's perception of the business. Furthermore, disruptions to security systems can lead to operational risks such as theft, fire, and poor inventory control, all of which can further reduce productivity.

B. Empirical Review Of Literature On Electricity Load Shedding In SelectedDeveloping Countries Across The Globe

The following sections presents some of the empirical studies done across selected developing countries across the globe positively correlated with a decline in productivity as a result of power rationing (Mchopa et al., 2014).

C. Electricity Load Shedding and Business Operations of Small Scale Enterprises in South Africa

Since 2007, load shedding has been witnessed in South Africa. Over the previous 15 years, the energy crisis has been more persistent and prolonged as a result of a growing supply and demand imbalance (Tembe & Hlengwa, 2022; Mutambo, et al., 2002). The national grid's stability is seriously jeopardized by this condition. Small scale businesses in South Africa are also greatly impacted by load shedding.

A prior study by Mbobvu et al. (2021) shown that load shedding had a negative impact on the sustainability of small and medium sized firms (SMEs) in South Africa. 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.

Furthermore, the results of the earlier study by Mohammed (2012) were supported by the findings of Makgopa and Mpetsheni (2022), Olajuyin, and Mago (2022). The effects of load shedding on SMEs in Johannesburg, South Africa, were the main subject of Mohammed's (2012) study. Examining the degree to which specific industries were impacted by the load shedding issue was the secondary goal. Structured questionnaires were used to collect data for the study, and analysis of variance (ANOVA) and the student's test were used to assess the results. The data indicated that small businesses were more affected than medium sized businesses. According to the study, load shedding hurt SMEs by lowering operational earnings, having an adverse effect on service delivery, and lowering sales turnover and competitiveness. However, the study findings were confined to the SMEs in Johannesburg in South Africa.

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 surveyresearch design	ANOVA, correlation and regressi onanalyses	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 toSMEs	Regression analysis	Negative
Adanlawo and Vezi Magigaba (2021)	Effects of electricity outages onoperations of Small Scale enterprises in Nigeria	Quantitative survey research design where electricity outageswas 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 andfrequency of power outages	Regression and correlation analyses	Negative
Mbobvu et al. (2021)	Load shedding and its effect onSouth African SMEs' profitability, efficiency, liquidity and solvency	Qualitative	Qualitative	Negative
Olajuyin and Mago (2022)	Effects of load shedding onperformance 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 byduration 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 loadshedding	statistics	
Banda et al. (2020)	Effects of load shedding on theSmall Scale entrepreneurs in Zambia	Mixed method research where load shedding was measured bywhether Small Scale enterpreneurs faced load shedding or not	Analysis of Covariance	Negative

Source: Researcher

D. Theoretical Framework

Around the world, numerous models and theories have been created and put to use for understanding small business structures (Maziriri & Chinomona, 2016). Nevertheless, in order to understand the degree to which the loadshedding has impacted small enterprises in the Collins Chabane local government, this study applies complexity and resource based perspective theory. In order to better understand how small firms interact and how load shedding affects those interactions, complexity theory was helpful. The resources that SMEs may access to maintain their competitiveness and viability, on the other hand, as well as the ways in which loadshedding impacts these resources and reduces their advantages over competitors, were ascertained through the application of resources based theory.

E. Complexity Theory

According to complexity theory, organizations consist of interconnected elements where actions in one area affect others (Park & Jo, 2017). This theory aims to understand how system components interact, change over time, evolve non-linearly, and how feedback influences their development (Rosenhead et al., 2019). It can predict both internal and external influences (Cairney & Geyer, 2017), which helps explain how small businesses interact and how load shedding impacts those interactions. The study confirms that organizations operate within complex internal systems, such as input, transformation, and output processes, and external systems involving government (at all levels), suppliers, Eskom, consumers, and society. Small businesses interact with these groups to remain competitive and drive local economic growth. Governments offer institutional, financial, and policy support, while municipalities provide services like waste removal and issue operating permits. Small businesses rely on suppliers for raw materials and Eskom for electricity, with power disruptions from load shedding affecting manufacturing, leading to delayed deliveries, reduced customer trust, and hampered economic contributions, such as job creation and poverty alleviation. Decisions made in one part of the system impact the entire system, with load shedding disrupting small businesses' role in addressing socioeconomic challenges (Lai & Lin 2017; Rosenhead et al., 2019).

F. The Influence Of Load Shedding On The South African

Hospitality Industry

In the context of the hospitality sector, load shedding has had a negative impact on pertinent corporate units. The following are the effects of load shedding on businesses in the hospitality sector (The Capital Hotel School and Training Academy, 2015; Von Ulmenstein, 2014). Examples of the latter type of situation are as follows:

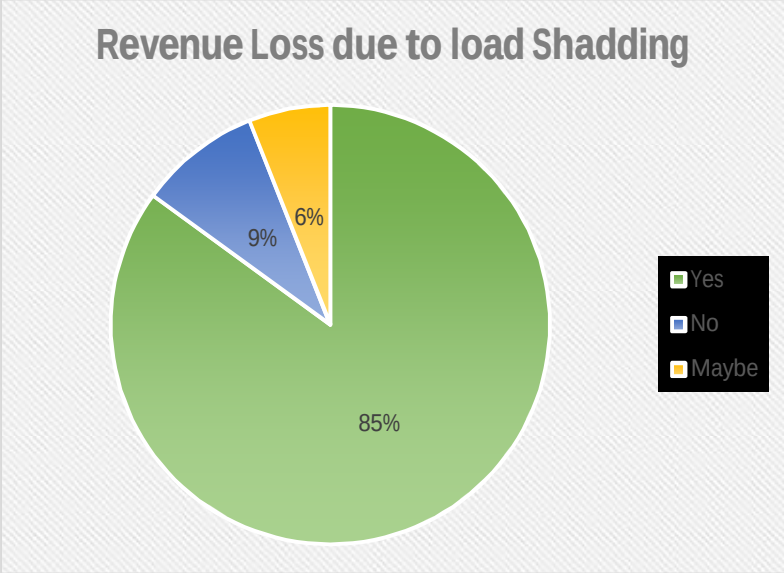
- It is not possible to programme electric door locks to grant hotel key card access.
- If visitors become stuck in lifts, emergency services may respond slowly.
- The reduction in the availability of frozen and chilled meals.
- The exhaustion of fire systems' backup batteries and
- The cessation of fire system functions.

The above issues are placed in better perspective by Muirhear (2014) who states that smaller hospitality establishments are greatly affected by load shedding as the vast majority of these businesses do not have any type of secondary power generating device and/or back up facility.

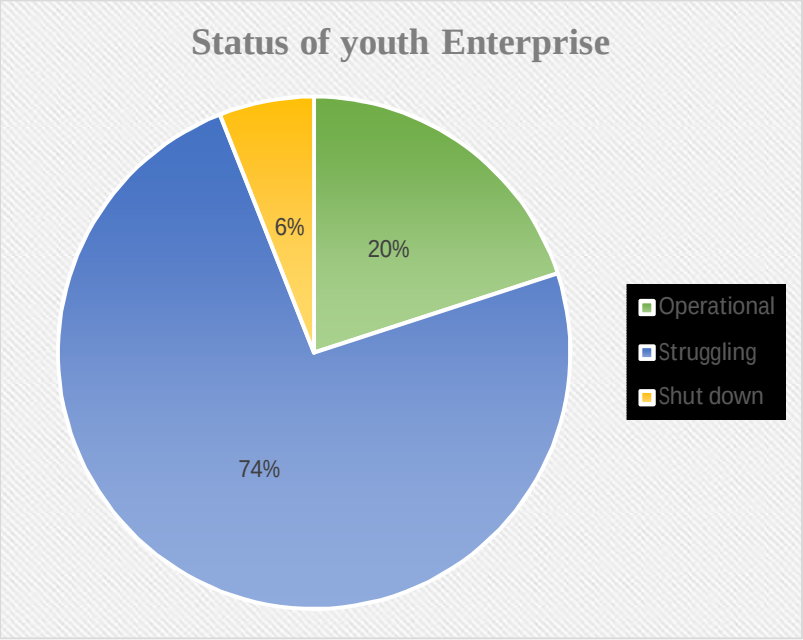
Table 2 How loadshedding affected youth enterprises

Thematic Explanation	Responses
Poultry Farming	• High chicken mortality rate. • Chicken farming need constantelectricity to function effectively. • Agro processing environment cannotfunction without electricity. • Incubator hatcher machinery producesless during load shedding.
Retail Trade, Construction, Transport and Wholesale.	• Most of daily work and production useselectrical equipment. • Low Productivity. • Employees must be paid even whenproductivity is low. • Increased crime particularly theftduring load shedding. • Perishable goods and items disposed due to load shedding.

Manufacturing,Agriculture	• difficulties operating in the dark andcleaning of equipment. • Delays in supply.
ICT	• Usage of generator as an alternative but petrol is extremely expensive.
Tourism	• Drop in sales



(Figure 1) There has been a significant revenue loss on youth enterprises with 85% indication due toloadshedding.



(Figure 2) Survey indicated a huge showing of youth enterprises that are currently struggling due toloadshedding sitting at 74% and 6% that have shut down because of load shedding.

Table 3 Responses on how load shedding impacted on youth enterprises.

Thematic Explanation	Responses
Operational Aspects	• Young people have indicated how their business couldn't operate without electricity and some of them struggled to make deliveries on time due to load shedding. Some outlined how difficulty it has been to make deliveries in the dark. • Those who use high tech industrialized machines struggled as they needed electricity to operate.
	• Some indicated that without generators their food items were damaged. Other respondents also outlined how they failed to meet customer demands and consequentlylost clientele. Some had o close and shutdown their businesses due to load shedding.
Revenue Loss	• Respondents highlighted that load shedding made businesses very slow in terms of productivity and poultry farming chickens were greatly affected wen heaters were off. • Some businesses cannot make revenue when power is off. • Ice machine not operating to full capacity consequently products are damaged. • When the store system is often ofine it becomes difficult to recover even when electricity comes back. • Incubation facility relies on electricity and chicken mortality rate very high. • Inability to complete orders.
Working Hours	• Forced to work outside normal hours due to regular power cuts. Additional working hours to recover lost revenue. Working unusual hours which kills employee morale.
Network	• No network when there is load shedding and working online becomes extremely difficult whenthere is no electricity. • Internet connection becomes difficult when there is load shedding. • ICT businesses struggle to maintain operations when there is power cut.

Table 3: Short, immediate, and long term solutions to load shedding

Thematic Explanation	Responses
Power Generation and Capacity	• Load shedding should be suspended until later hours to allow businesses to operate fully during the day. • Provision of solar energy. • Eskom must maximize capacity. • Generators are a short term solution. • Stabilize the situation at Eskom to minimize harmful effects of load shedding. • Give the provision of electricity to competent corporates.
	• The government should providealternative power supply. • Introduce gas as an alternative. • Build new substation. • Effective maintenance at Eskom. • Build environmentally friendly powerplants. • Proper leadership and privatize Eskom. • Fix electricity blackouts and reducehours of load shedding. • Government should offer free solarpanels to business owners. • Try reducing load shedding stages by80%.

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 12 Issue X Oct 2024- Available at www.ijraset.com

III. RESEARCH METHODOLOGY

Utilizing a mixed method approach, the triangulation research design was used in order to effectively address the study's research goals. By providing the researcher with contrasting yet complimentary facts on the same subject, this method helped the researcher to fully comprehend the research challenge. The study's sample was chosen from the intended audience. According to Asia mah et al. (2017), the population that includes every unit of analysis about which the researcher wants to draw particular conclusions is known as the ideal target population. According to the Collins Chabane Local Municipality Integrated Development Plan (2021–2022), the population of the municipality is roughly 347,975. After then, the population was shrunk to satisfy the research criteria. To better address the research objectives of the study, a mixed method approach was employed, utilizing the triangulation research design. In order to fully comprehend the research subject, this strategy provided the researcher with contrasting yet complimentary data on the same topic. From the target population, the study's sample was chosen. As per Asia mah et al. (2017), the optimal target population is characterized by its ability to encompass the entire collection of all units of analysis that the researcher wants to draw particular conclusions about. Based on the Collins Chabane Local Municipality Integrated Development Plan for 2021–2022, the approximate population of the municipality is 347,975. To meet the study criteria, the population was then shrunk.

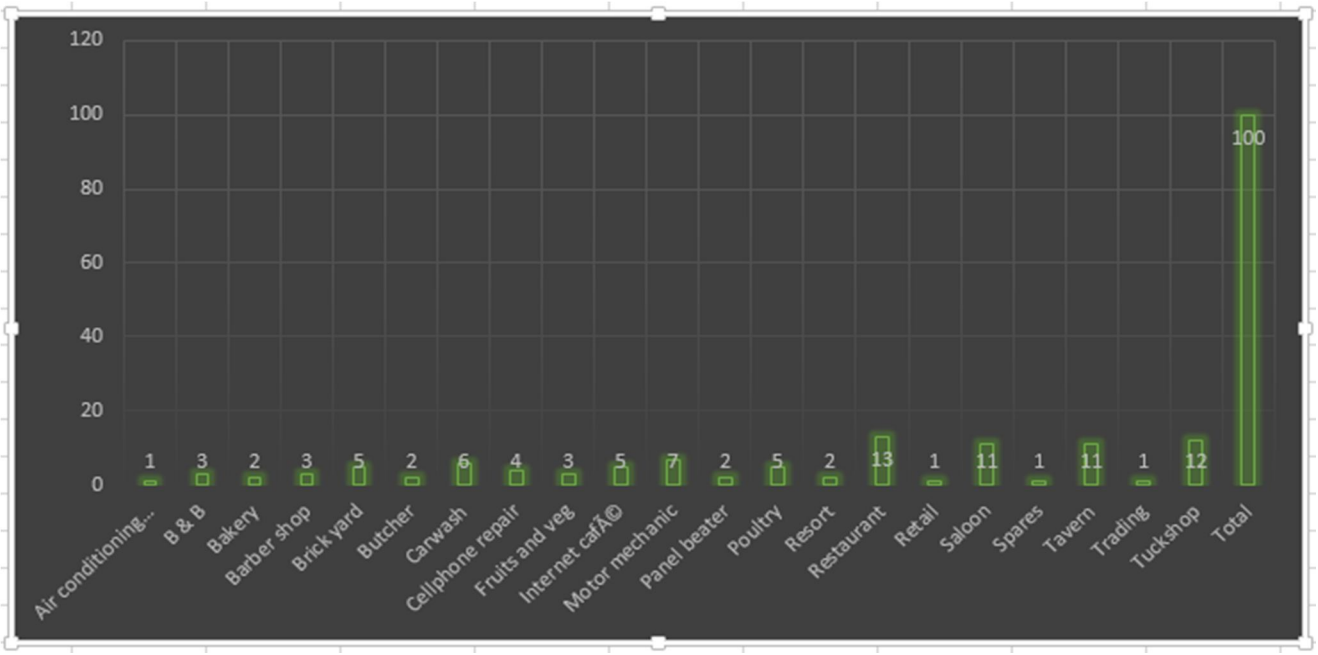


Fig. 3.1 Type of business consulted

A sample size of 100 out of 125 was drawn to participate in the quantitative study through the guidance of the Raosoft sampling size calculator, and the samples used in previous studies conducted on similar issues were also considered. Therefore, this study consisted of 76 owners and 24 managers of small businesses who participated in the completion of questionnaires. Fig.3 shows the different kinds of small enterprises that were consulted. Through in person, semi structured interviews, a total of 25 people were chosen to take part in the qualitative study, and saturation was attained. Among them were 22 small business owners affiliated with CCLM, an electricity supply manager, an electrical technician, and a manager from the municipality's local economic development division. The majority of the 122 small enterprises in this survey were modest ones. The general rule of thumb for phenomenological research, as this study is, and concerns about enhancing data trustworthiness, credibility, transfer ability, and were taken into consideration while determining the sample size (, 2015). Probability cluster sampling and non probability snowball sampling were used to choose the respondents who took part in the quantitative investigation. Purposive non probability sampling was utilized to pick the interview participants since it focused on knowledgeable individuals who could offer rich and thorough information about their experiences with the topic. The Statistical Package for the Social Sciences was used to examine the information gathered from surveys (SPSS). As a result, the data were analyzed using descriptive statistics like frequency counts, percentages, and means, and the relationships between the variables were examined using inferential statistics like Chi square and linear regression. Inductive theme analysis was used to analyse the interview data.

©IJRASET: All Rights are Reserved | SJ Impact Factor 7.538 | ISRA Journal Impact Factor 7.894 |

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 12 Issue X Oct 2024- Available at www.ijraset.com

IV. STUDY LIMITATIONS

This study was restricted to the electricity crisis or loadshedding in South Africa, focusing solely on the impact of loadshedding on SMEs in the Collins Chabane Local Municipality, because loadshedding is a national problem. In order to get the opinions of SME owners and managers as well as pertinent respondents within CCLM in the Limpopo Province of South Africa, data were gathered using mixed methods research approaches. Owing to limitations in finances, transportation, and time, the study included a sample of only 125 participants. The results are not applicable to South African towns in general when it comes to small company growth. However, the findings can be transferred to other small businesses in municipalities that portray similar economic environments while facing similar loadshedding challenges, thereby contributing to the effectiveness of addressing this problem.

V. QUALITATIVE RESULTS

A. The Effects Of Loadshedding On Small And Medium□Sized Businesses

Empirical data shows that load shedding disrupts cash flows, business strategies, information flows, communication, and production equipment. Moreover, loadshedding affects a company's revenue, people, service delivery, and operating resources, which includes technology utilization and security systems. We go into further detail about these issues below.

1) Interruption Of The Production Machines

Companies like brick yards, bakeries, salons, and butcheries all rely on machines such as bread makers, hair dryers, and refrigerators. However, many SMEs lack backup power sources like generators due to limited funding, causing production halts and operational closures during power outages.Business owners reported substantial losses due to spoiled stock, damaged equipment, and interrupted services. For example, a fast-food business suffered from spoiled food and damaged appliances, adding repair costs and lost revenue. Other businesses, like cell phone repair shops and motor mechanics, also experienced financial losses and delays, affecting customer satisfaction and long-term operations. One motor mechanic reported losses between R400,000 and R600,000 due to delays caused by load shedding.

2) Interrupted Business Plan

The findings demonstrate that small enterprises, like fast food restaurants, frequently adhere to a predetermined schedule for food preparation and delivery. However, the frequency of load shedding causes delivery delays and stops perishable products from being transported. Suppliers and SMEs both lose money as a result of this. According to another owner, we frequently find ourselves unable to serve our patrons because, when they come in for lunch, they discover that we haven't finished cooking the food because of load shedding. As a result, they end up visiting other stores, such as Shoprite, which costs us patronage. Plans for poultry company delivery were disrupted since some stocked chickens per ished because of loadshedding, which resulted in the delivery of less than what was agreed upon to the customers. Additionally, businesses that provide goods and services face frequent interruptions, leading to missed deadlines.

3) Interrupted Financial, Communication, And Information Ows

Load shedding severely impacts small businesses' financial transactions, communication, and information exchange. Payment processing devices like ATMs and tills require electricity, so when power outages occur, businesses without backup power are unable to complete transactions, leading to lost sales. Despite this, businesses still face fixed expenses like rent, which are unaffected by the frequency of load shedding. Network issues during load shedding also prevent businesses from accessing emails and digital platforms, disrupting communication with suppliers.

The financial performance of businesses declines due to fewer customers, increased costs, and spoiled goods, particularly for food businesses that require refrigeration. One business owner mentioned fruit spoilage during outages, which led to wasted stock and the need to reduce staff due to financial strain. Additionally, rental businesses suffer from blocked sewage systems during load shedding, leading to extra maintenance costs and customer dissatisfaction.

4) Interruption To Security Systems

Alarm systems are used by certain small businesses to protect their property. Since many security systems rely on energy for power, they are impacted by load shedding. SMEs' security is compromised as a result of their systems' subpar performance. As a result, load shedding puts SMEs at risk for theft, ineffective inventory control, and other criminal activities.

©IJRASET: All Rights are Reserved

And further proprietor stated: When loadshedding occurs regularly, it can quickly deplete backup batteries in alarm systems and other devices, such as electronic gates. This poses risks to the business because the failure of security systems allows theft to occur. Also, loadshed ding damages electronics when one forgets to turn it off because when the electric ity comes back, it comes with power with such force, electronics can be irreparably damaged.

5) Interruption On The Use Of Tecnologies

IT businesses are unable to provide online services, assist schoolchildren with research, print, scan, or perform any other internet required activities. This is because the IT and technology infrastructure are heavily reliant on electricity. Which discouragesthe use of technological devices..

B. Quantitative Results

The quantitative results demonstrate the level of dependence on electricity by small businesses and the impact the loadshedding has on small companies in the Collins Cha bane Local Municipality.

Table 3.3.1 Whether the business depends on electricity

Does your business depend on electricity to operate?	Freq	Percent	Cum
Yes	100	100.00	100.00
Total	100	100.00	

Table 3.3.2 Whether loadshedding is experienced

Do you experience loadshedding	Freq	Percent	Cum
Yes	100	100.00	100.00
Total	100	100.00	

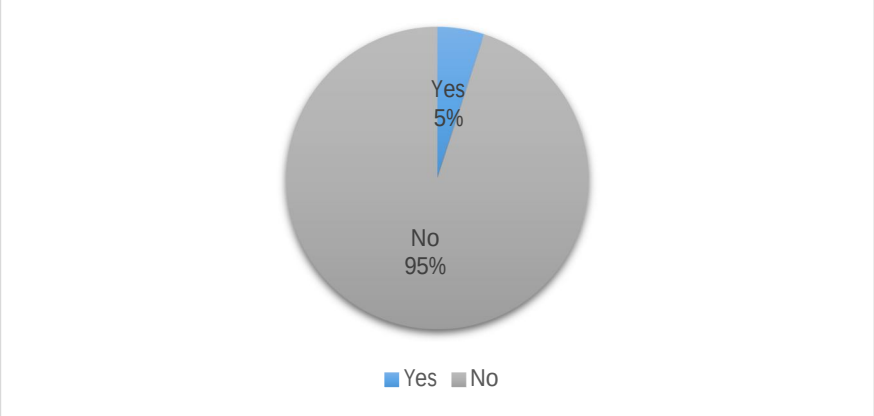


Fig. 3.3.1 Alternative source of power

The purpose of the inquiry was to find out how reliant small businesses in the Collins Chabane Local Municipality were on energy. Table 1's findings indicate that all small enterprises in the Collins Chabane Local Municipality depend on electricity for their operations. A questionnaire was also utilized in the study to look at how water loadshedding affected small enterprises in the Collins Chabane Local Municipality. Table 2's findings indicate that loadshedding occurred in the Collins Chabane Local Municipality for 100% of the subjects. In order to ascertain whether the experience of load shedding is influenced by factors such as gender, age group, race group, educational attainment, marital status, respondents' status, years in business, business area, type of business, number of employees, working hours, additional income, status of business premises, and dependence on electricity, Chi square test of association was also used.

The results show that everyone has encountered load shedding consistently, regardless of their business demographic and demo graphic standing. Thus, the experience of load shedding was not significantly impacted by any of the demographic categories indicated.

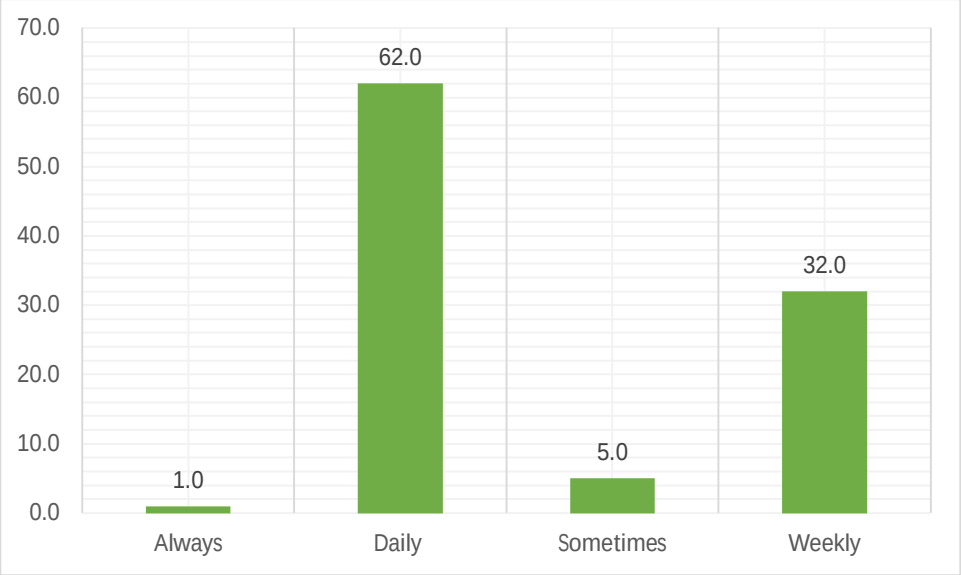


Fig. 3.3.2 How often loadshedding is experienced

Table 3.3.3 Descriptive statistics of averages

		Minimum	Maximum	Mean		Std deviation
	Stat	Stat	Stat	Stat	Std error	Statistic
Av. working hours in a day of loadshedding	100	0	11	4.62	0.253	2.526
Av turnover when there is no loadshedding	100	80.00%	100.00%	99%	0%	3%
Average turnover in a day with loadshedding	100	0.00%	100.00%	39%	2%	25%
Average estimated loss due to power outage	100	0.00%	100.00%	61%	2%	25%
Valid N (listwise)	100					

•The purpose of the investigation was to determine if the small businesses in the Collins Chabane Local Municipality had a backup power source that they could use in the event of load shedding. Figure 3 indicates that whereas 5% of these enterprises have an alternative power source, 95% of these businesses do not.

•The small businesses were also questioned over the frequency of load shedding. According to the results , the majority of these businesses 62 percent experience loadshedding on a daily basis, with the remaining 32 percent experiencing it on a weekly basis. While the lowest number (1%) constantly experienced it, the remaining 5% just very infrequently did. These findings indicate that, as loadshedding impacts most SMEs on a regular basis, it has a negative impact on them.

• To ascertain the degree to which small businesses in the Collins Chabane Local Municipality have been impacted by load shedding, descriptive statistics were conducted on the average working hours of load shedding in a day, average turnover in a day with load shedding, turnover when there is no load shedding, and estimated loss due to a power outage. Table 3 presents the findings.

©IJRASET: All Rights are Reserved | SJ Impact Factor 7.538 | ISRA Journal Impact Factor 7.894 |

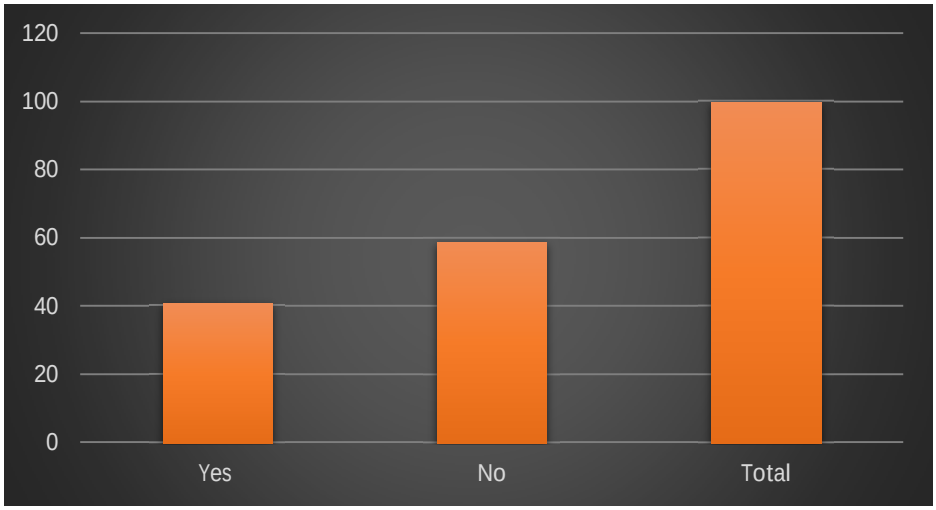


Fig. 3.3.3 Loss of employees due to loadshedding

Table 3.33 demonstrates that on a load shedding day, the maximum number of hours worked was 11, some people worked none at all, and the average working hour was five. In a day without load shedding, the average turnover was 99%; the highest was 100%; and the minimum was 80%. The average turnover on a load shedding day was 39%, however there was one with a maximum turnover of 100%, most likely from and other power source, and a minimum turnover of 0%, most likely from those without one. An average loss during a power outage is 61%, which is noteworthy due to its size.

It was also determined weter te business ad lost employees due to loadsed ding. Figure 3.3 shows that majority (59%) of small businesses lost their employees due to loadsedding, compared to the 41% that did not lose their employees. Considering that the number of businesses that lost employees is can be concluded tat loadshedding results in employee layoffs in tCollins Chabane Local Municipality and that loadsedding as impacted employment growt in Souht Africa at large.

C. The Impact of Load Shedding on Staff Productivity

Every respond er concurred that load shedding had a significant negative impact on Hotel X. Only 58.00% of respondents who were asked if Hotel X had alternative power sources said "yes"; it is highly likely that the 42.00% of respondents who said "no" had only recently started working there when the data was collected. Table 2 the alternative power sources that were found.

Table 3.4.1. Examples of alternative power sources at Hotel X

Description of power source
Battery operated lamps in all rooms
Emergency power (for selected equipment)
Gas stove
Generators
Torches (with batteries) in all departments
Uninterrupted power supply units (for certain computers)

Source: Authors' fieldwork, 2015

Taking the above into account, respondents were asked about the safety and security procedures which were in place to mitigate the negative inuence of load shedding on Hotel X. Apart from having alternative power sources available (see Table 2), respondents provided the following information:

"Power surge plugs are used for equipment that are used by the front office and administration" – Respondent A.

"Security patrols are intensified during load shedding and the stairway is lighted as much as possible" – Respondent B

"An emergency lift is operational during load shedding which is connected to a generator" –

Respondent C

"Emergency lights are turned on when load shedding occurs" – Respondent D.
"Pamphlets are handed out to guests with important information on what to do in the case of load shedding" – Respondent E.
From the above responses it is clear that there were reasonable control measures in place to ensure the safety and security of relevant stakeholders. Although these control measures do not optimally cover all load shedding related risks, they do help mitigate safety and security risks when load shedding occurs.
Even through Hotel X made use of alternative power sources and had both safety and security measures in place to combat risks in the event of load shedding, respondents were asked to expand on the impact of load shedding on Hotel X. The following information was provided:
"Only one computer is connected to a red plug, so during load shedding there is no productivity and it causes a backlog of work" – Respondent A.
"Workloads build up extensively, especially from an administrative side. Not all reservations made can be processed" – Respondent C
"We are not able to tend to e mails, check guest accounts or make and receive phone calls during load shedding since our computers are not plugged into a red outlet (emergency power)" – Respondent F.
"My computer is one of the few in the hotel that is powered by a backup generator due to the nature of my work (e.g. deadlines with salaries and certain payments and reports). Load shedding also has an impact on the fingerprint clock in and out access machine, mainly for staff who work over the weekend at an hourly wage" – Respondent G.
"Card machines are not working which means that guests should pay by means of cash, which is not always possible" – Respondent H.
"I cannot vacuum rooms, meaning that no new guests can be checked in to dirty rooms" –
Respondent I
"The kitchen is in complete darkness so little food (if any) can be prepared" – Respondent J "The laundry cannot operate at all. No rooms can be prepared with clean beddings" –
Respondent K
Stemming from the above, it appears that load shedding has a direct inuence on all operational aspects of Hotel X, as well as the productivity of its staff members. When the operations of Hotel X are disrupted through load shedding it can have a destructive inuence on its overall sustainability (the attainment of relevant objectives). Although Hotel X makes use of alternative power sources, it appears that there is very limited alternative power sources made available to all operations.
To understand the impact of load shedding on the productivity of staff members, respondents were asked how exactly load shedding inuences their productivity at work. A summary of the responses are provided below:
"I am unable to do any work" – Respondent A
"I cannot provide any service delivery" – Respondent C
"I become lazy and it decreases my morale" – Respondent F
"I have to spend time on catching up lost time which is not good for my health; I becomes stressed" – Respondent H
"I cannot meet my deadlines" – Respondent L
"I cannot prepare food quickly enough to keep customers happy" – Respondent M "I must reschedule reservations made which upsets customers" – Respondent N
The responses above validates the previous inference made that load shedding has an adverse inuence on the productivity of staff members at Hotel X. This is especially the case since most operational tasks are delayed and/or cannot be performed by members of staff.

D. Implemented Strategies to Combat Load Shedding

Respondents were asked whether Hotel X has implemented relevant load shedding strategies to combat load shedding. A total of 66.00% of respondents replied "yes", with the following additional answers provided as justification:
"More emergency power outlets are to be installed" – Respondent B
"The security and safety measures put in place (torches, lamps, emergency lights, etc.) are quite helpful" – Respondent E
"The Hotel is in talks to get a generators to power the entire hotel and relevant equipment" – Respondent H

VI. DISCUSSION OF THE RESULTS

Electricity is crucial for small businesses in the Collins Chabane Local Municipality (CCLM), as confirmed by both qualitative and quantitative data. All small enterprises in the area rely on electricity for production and operation. This supports broader research that emphasizes the critical role of electricity in modern economies, particularly in developing nations, where it drives economic growth (Phiri, 2017; Chishimba, 2017; Nyoni, 2019).Load shedding significantly impacts these businesses, with 100% of small enterprises in the CCLM affected, and 62% experiencing daily disruptions. These outages disrupt cash flow, business operations, information exchange, and the functioning of machinery. The financial strain from increased operating costs and reduced profit leads to layoffs, with 59% of businesses forced to let employees go. This financial loss is starkly highlighted by a 61% reduction in income on load shedding days, as businesses earn just 39% of their average income during such times.

Previous studies also highlight that the lack of reliable electricity and internet access, both intertwined, contributes to the failure of small businesses. Load shedding drives financial losses, threatens business sustainability, and has caused South Africa's small and medium enterprises (SMEs) to have one of the highest failure rates globally, with 75% failing within three years. Ultimately, the study concludes that load shedding severely hinders the growth and survival of small businesses.

VII. CONCLUSION AND RECOMMENDATIONS

Small and medium-sized businesses in emerging nations face significant challenges due to power outages, which hinder their growth and sustainability. Governments, politicians, and stakeholders need to address these disruptions urgently. Investing in infrastructure, promoting energy efficiency, and upgrading power plants and transmission networks can mitigate the effects of load shedding. Encouraging SMEs to adopt energy-efficient technologies and providing financial support through policies can also help.

Key recommendations include:

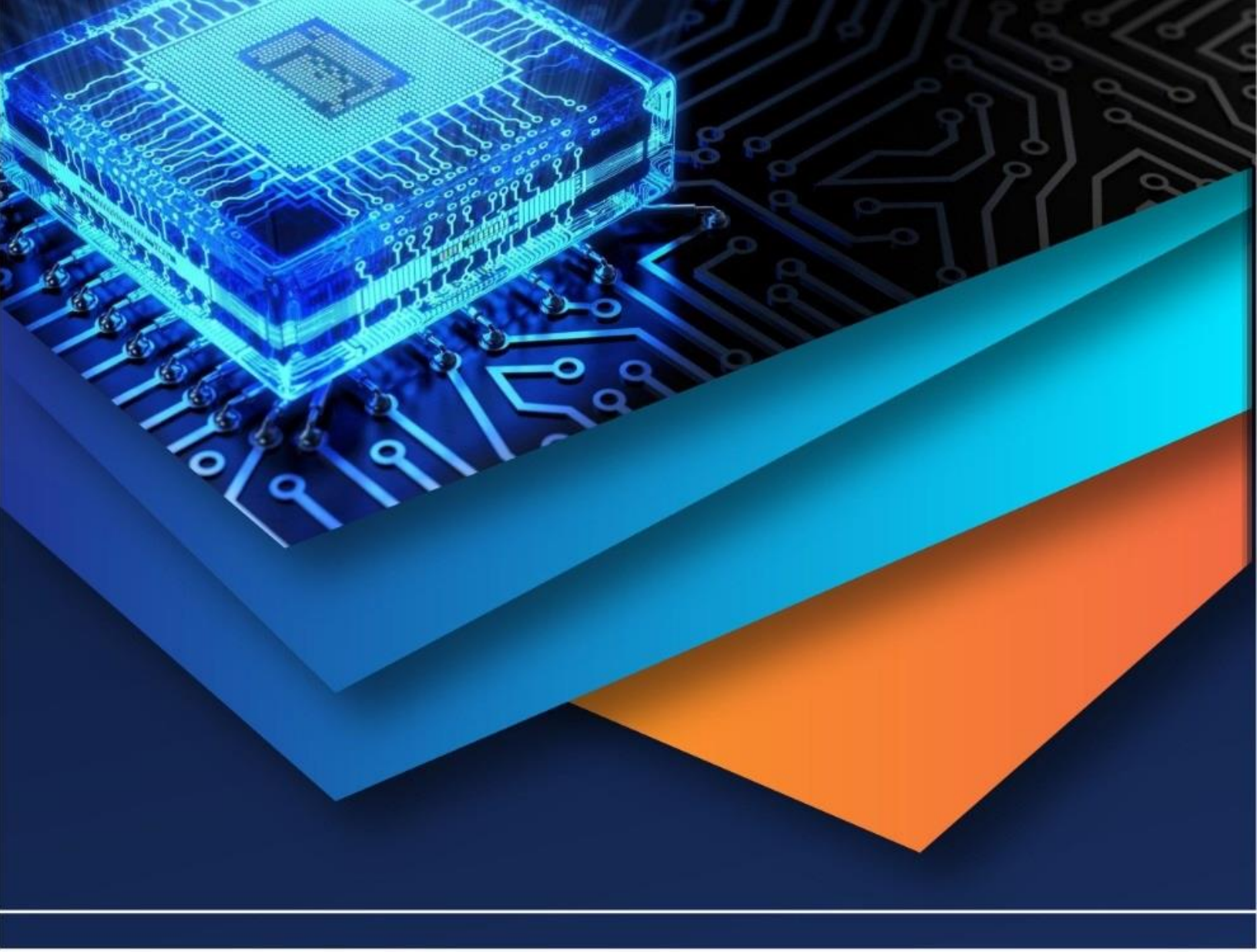
1) The South African government should subsidize alternative power sources, like generators and solar panels, for small businesses in Collins Chabane Municipality.
2) Funding support should be provided for SMEs to engage in renewable energy production, and partnerships with successful renewable energy producers should be encouraged.
3) Electricity tariffs should be lowered to help small businesses manage costs related to power outages and equipment damage.
4) Businesses, particularly restaurants, should adopt gas-powered appliances.
5) The Collins Chabane Municipality should be given authority to generate its own electricity, reducing reliance on Eskom

REFERENCES

[1] Martin, P. D., & Daniels, F. M. (2014). Application of Lazarus's Cognitive Transactional Model of stress appraisal coping in an undergraduate mental health nursing programme in the Western Cape, South Africa: theory development. African Journal for Physical Health Education, Recreation and Dance, 20(sup 1), 513 522.
[2] Masule, D. (2022). Situational analysis of the effects of load shedding on dairy milk production industry in Zambia: a case of Finta farms, 2013–2016 (Doctoral dissertation, The University of Zambia).
[3] Mthanti, T. M., & Ojah, K. (2018). Determinants of Entrepreneurship in South Africa. International Journal of Entrepreneurial Behavior & Research, 24(1), 44 65.
[4] Mazikana, A. T. (2019). The Effect of Automating Customs Systems on Performance of Zimbabwe Revenue Authority (ZIMRA). Research Journal of Finance and Accounting, 8(18), 22 34.
[5] Mbolonzi, W. K. (2016). Operations management practices and performance of schneider electric Kenya (Doctoral dissertation, University of Nairobi).
[6] Mbomvu, L., Hlongwane, I. T., Nxazonke, N. P., Qayi, Z., & Bruwer, J. P. (2021). Load shedding and its inuence on South African small, medium and micro enterprise profitability, liquidity, efficiency and solvency. Business Re Solution Working Paper BRS/2021/001. Available online: https://papers. ssrn. Com/sol3/papers. Cfm.
[7] Mchopa, A., Moshi, J. & Kazungu, I. (2014). Power Rationing Dilemma: A blow to Small and Medium Enterprises (SMEs) Performance in Moshi Municipality, Tanzania. International Journal of Economics, Commerce and Management, 2(7), 1 14.
[8] McMillan, J. H. (2012). Educational research: Fundamentals for the consumer. Harper Collins College Publishers.
[9] Mensah, J. T. (2016). Bring back our light: Power outages and industrial performance in sub saharan africa (No. 333 2016 14636).
[10] Mkala, M. D., Wanjau, K. L., & Kyalo, T. N. (2018). Operations management and performance of manufacturing small and medium enterprises in Kenya. International Journal of Research in Business and Social Science (2147 4478), 7(2), 1 13.
[11] Mohammed, E. (2012). The Impact of Load Shedding on Small and Medium Enterprises in the City of Johannesburg. (Unpublished Master's thesis, University of Johannesburg).

©IJRASET: All Rights are Reserved

[12] Mohammed, E. (2017). The Impact of Load Shedding on Small and Medium Enterprises in the City of Johannesburg. (Unpublished mini thesis, University of Johannesburg).
[13] Moyo, B. (2012). Do power cuts affect productivity? A case study of Nigerian manufacturing firms. International Business & Economics Research Journal (IBER), 11(10), 1163 1174.
[14] Moyo, B. (2012). Do Power Cuts Affect Productivity? A Case Study of Nigerian Manufacturing Firms. International Business & Economics Research Journal, 11(10), 1163 1173.
[15] Mukherjee, S., Nateghi, R., & Hastak, M. (2018). A multi hazard approach to assess severe weather induced major power outage risks in the us. Reliability Engineering & System Safety, 175, 283 305.
[16] Munasinghe, M. (1979). The Economics of Power System Reliability and Planning Theory and Case Study. The JohnsHopkinsUniversity Press: Baltimore.
[17] Muthuswamy, S. (2022). Role of Microfinance Institutions on the Financial Performance of Small and Medium Enterprises in Lusaka, Zambia: A Case of Kalingalinga Compound, Zambia. Bulletin of Social Sciences (ISSN: 2348 7992), 7(1), 22 28.
[18] Amadi, H. N. (2015). Impact of power outages on developing countries: Evidence from rural households in Niger Delta, Nige ria. Journal of Energy Technologies and Policy, 5, 27–38.
[19] Asiamah, N., Mensah, H., & Oteng Abayie, E. F. (2017). General, target, and accessible population: Demystifying the concepts for effective sampling. The Qualitative Report, 22(6), 1607–1621.
[20] Ateba, B. B., Prinsloo, J. J., & Gawlik, R. (2019). The significance of electricity supply sustainability to industrial growth in South Africa. Energy Reports, 5, 1324–1338.
[21] Ayandibu, A.O. & Houghton, J. (2017). The role of Small and Medium Scale Enterprise in local economic development. Journal of Business and Retail Management Research, 11(2).
[22] Baker, L., & Phillips, J. (2019). Tensions in the transition: The politics of electricity distribution in South Africa. Environment and Planning c: Politics and Space, 37, 177–196.
[23] Boakye, N. A. B., Twenefour, F. B., & McArthur oyd, M. (2016). The impact of power outage "Dumsor" on the hotel industry: Evidence from Ghana. Journal of Energy Technologies and Policy, 6, 39–47.
[24] Botha, T. (2019). The impact of 'load shedding' within the Nelson Mandela Bay restaurant industry. The IIE.
[25] Bouri, E., & El Assad, J. (2016). The Lebanese electricity woes: An estimation of the economical costs of power interruptions. Energies, 9(8), 583.
[26] Bruwer, J. P., & Van Den Berg, A. (2017). The Conduciveness of the South African Economic Environment and Small, Medium and Micro Enterprise Sustainability: A Literature Review. Expert Journal of Business and Management, 5(1), 1–12.
[27] Businesstech. (2023b). Government to challenge loadshedding exemptions for hospitals and schools. https://businesstech. co.za/news/government/686173/government to challenge load shedding exemptions for hospitals and schools/. Accessed: 2023b/06/17
[28] Businesstech. (2023a). Eskom is running out of loadshedding stages fast. https://businesstech.co.za/news/energy/669443/ eskom is running out of load shedding stages/. Accessed: 2023a/06/17
[29] Cairney, P., & Geyer, R. (2017). A critical discussion of complexity theory: How does 'complexity thinking' improve our under standing of politics and policymaking? Complexity, Governance and Networks, 3(2), 1–11.
[30] Collins Chabane Local Municipality. (2019). http://www.collinschabanem unicipality .gov.za/docs/idp /FINAL%20IDP%202018 19%20FY.pdf/2019/06/08. Accessed: 2019/06/08
[31] Collins Chabane Local Municipality. (2022). Integrated Development Plan (IDP) 2021/2022. https://www.collinschabane.gov. za/?q idp_21_22. Accessed: 2022/10/03 =
[32] Community Survey. (2016). Community survey. Chrome extension://efaidnbmnnnibp cajpcglcle findmkaj. http://cs2016.stats sa.gov.za/wp content/uploads/2016/06/CS 2016 Metadata.pdf. Accessed: 2021/10/11
[33] Chron Contributor. (2020). The importance of company manpower. https://smallbusiness.chron.com/importance company manpower 23763.html. Accessed: 2022/04/06
[34] Creswell, J. W. (2015). Revisiting mixed methods and advancing scientific practices. Oxford University Press.
[35] Department of Small Business Development. (2019). Revised Schedule 1 of the National Definition of Small Enterprises in South Africa.
[36] https://www.gov.za/sites/default/files/gcis_document/201903/423041gon399.pdf. Accessed 2020/10/23
[37] Emovon, I., Samuel, O.D., Mgbemena, C.O. & Adeyeri, M.K. (2018). Electric power generation crisis in Nigeria: A review of causes and solutions. International Journal of Integrated Engineering, 10.
[38] eNCA. (2023). Eskom 'proposes' up to Stage 16 blackouts. https://www.enca.com/news/eskom preparing stage 16 blackouts. Accessed:2023/06/17
[39] Esu, B. B., & Ufot, J. A. (2017). Operational factors affecting service delivery in Margaret Ekpo international airport, Calabar, Cross River state, Nigeria. Australian Academy of Business and Economics Review, 3(3), 146–165.
[40] Gehringer, C., Rode, H., & Schomaker, M. (2019). The effect of electrical loadshedding on pediatric hospital admissions in South Africa. Journal of Epidemiology, 29(6), 841–8



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)