An Investigation of The Effects of Load Shedding on the Performance of Small Scale Businesses-A Case of Lusaka Markets

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ABSTRACT

Background: The aim of the research was to establish the effects of load shedding on small scale businesses in terms of productivity and profitability in Lusaka markets, it sought to explore other alternative sources of energy that can be used to mitigate the situation. Ultimately, the goal of the study was to integrate risk management techniques in the use of other alternative energy sources. The study mainly based on the Keynesian theory which offers useful insight to the understanding of the effect of government intervention in term of regulating the supply of electricity to the SMEs.

Methodology: The research utilized a mixed methods approach. In-depth interviews were conducted and questionnaires were administered to small scale business owners in Lusaka markets. Descriptive statistics were employed to analyze data for the study.

Findings: The research findings disclosed that load shedding negatively affects the performance of small scale businesses through productivity and profitability. Furthermore, it was discovered that the only cheaper alternative energy sources that marketers are aware of is solar energy and the use of inverters. Despite their awareness, the results had shown that the business men and women face challenges in raising finance to effectively use them. Besides this, they lack knowledge of the other sources of energy that generate power. Additionally, it was found that there are risks that are associated with the use of alternative energy sources and political and social risks were ranked the highest.

Conclusion and Recommendations: A number of recommendations were given of which one of them was that government should focus on diversification of the energy sector rather than rely on one source of energy production to ensure that load shedding is reduced. Furthermore the government should also provide a conducive environment for small businesses to thrive by creating policies that will enable them to access credit facilities to access cheaper alternative sources. Apart from this, government should also educate small business on other alternative sources of energy to enable them have a variety of coping strategies to mitigate the repercussions of load shedding. A risk register was formulated by the researcher to be adopted in Zambia in the use alternative sources of energy.

Keywords: Load shedding, Small scale businesses, Alternative sources of energy, ZESCO ,Performance.

INTRODUCTION

Energy provision remains a fundamental pillar for national development, particularly in emerging economies. The reliability of energy infrastructure significantly affects productivity, economic growth, and human welfare. According to Ziba and Simukonda (2022), dependable and continuous energy supply is essential for both social and economic activities, especially among vulnerable groups and entrepreneurs in Zambia. For small and medium enterprises (SMEs), energy is a critical resource for operations, not only for powering manufacturing equipment but also for enhancing workforce efficiency and preserving final products. Uninterrupted electricity supply enables these businesses to meet customer needs consistently and maintain competitiveness in dynamic markets.

SMEs globally are central to sustainable economic development, job creation and GDP growth. Recent findings show that SMEs contribute between 50–60% to GDP in many industrialized and developing economies (World Bank, 2023). In countries such as China and Germany their economic contribution remains substantial while in Africa SMEs contribute approximately 80% of employment and over 50% of GDP (OECD, 2022). In Ghana for instance SMEs contribute up to 70% of GDP and provide about 85% of jobs in the manufacturing sector (Mensah et al., 2021).

In the Zambian context SMEs represent 97% of all businesses contribute 70% to the country's GDP and provide 88% of employment (International Trade Centre, 2023). However, frequent power outages and persistent load shedding have severely impacted their ability to operate efficiently. Chileshe and Mulenga (2023) argue that the unreliable energy supply in Zambia leads to increased production costs reduced output and business uncertainty. Load shedding continues to disrupt operations especially for SMEs in urban centres like Lusaka, forcing many businesses to invest in expensive alternatives such as diesel generators or solar energy systems.

Furthermore, unreliable energy supply exacerbates youth unemployment and limits opportunities for vulnerable groups, particularly women-led enterprises. Enhancing the competitiveness and resilience of SMEs especially through reliable energy access would not only improve their productivity but also advance Zambia's progress toward achieving the United Nations Sustainable Development Goals (SDGs), particularly SDG 7 on affordable and clean energy and SDG 8 on decent work and economic growth (UNDP Zambia, 2022).

Despite the significance of this issue, earlier academic discussions often rely on outdated sources. A notable shortcoming in previous analyses is the use of literature published as early as 2016 or earlier, which does not reflect the current realities of Zambia's energy sector. Recent research underscores that load shedding persists as a major threat to the growth of SMEs, with major cities experiencing daily outages in 2022–2023 due to drought-related hydroelectric power shortages (ZESCO, 2023; Ministry of Energy, 2023). The failure to incorporate updated sources diminishes the validity and timeliness of the analysis. Thus, it is imperative for researchers and policymakers to draw from current literature that accurately reflects ongoing challenges facing SMEs, particularly in the energy sector.

LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

Performance of Small scale businesses

Recent research underscores the significant impact of electricity supply on the performance of small-scale businesses, particularly in Sub-Saharan Africa. A systematic review of 102 studies from 2010 to 2023 highlights that frequent power outages reduce productivity, lower income, and limit employment opportunities for micro, small, and medium enterprises (MSMEs), thereby perpetuating poverty (PubMed, 2024). In Ghana, for example, unreliable electricity has been shown to severely hinder operations, with smaller firms unable to afford backup generators facing the greatest challenges (Energy for Growth Hub, 2023). Unstable power supply can reduce a country's GDP by up to 2.1%, and some firms report sales losses of up to 31% due to outages (Energy News Africa, 2025). While specific data on Zambia remains limited, similar patterns have been observed, especially during periods of drought when hydropower sources like Lake Kariba are depleted. Scholars suggest that improving electricity access through renewable and off-grid solutions could significantly boost the performance and sustainability of small businesses (ScienceDirect, 2024). Reliable electricity, therefore, is not only vital for day-to-day business operations but also a key driver of national economic growth and development. It is therefore clear that electricity is a pre requisite for the success of any business operations trickling down to the performance of the economy of any country at large. Lack of it can cause adverse effects in cases where business owners have no alternatives or completely do depend on electricity for development and growth. Therefore, the role of electricity cannot be overemphasized.

Exploring other sources of energy to mitigate load shedding

Renewable energy is pivotal in addressing the world's escalating energy demands while aligning with sustainable development goals. The International Energy Agency (IEA) projects that global electricity demand

will rise significantly by 2030, driven by factors such as the proliferation of AI data centers, which alone are expected to quadruple their energy consumption (IEA, 2024; The Guardian, 2024). Relying solely on fossil fuels to meet this demand poses serious environmental challenges, including increased greenhouse gas emissions and global warming. Consequently, there is an urgent need to transition towards sustainable, carbon-neutral energy systems. While hydropower has long served as the cornerstone of renewable energy, diversification into other sources such as solar, wind, biomass, and geothermal is essential. Biomass energy, in particular, is highly versatile, as it can be converted into electricity, heat, and various forms of fuel. Feedstocks such as agricultural residues, forest waste, and organic municipal waste are increasingly utilized to produce bioenergy, making biomass the second-leading renewable energy source after hydropower, with a capacity exceeding 7,000 MW globally (REN21, 2023). Countries like Brazil, China, and India have enacted strong policies to support renewable energy adoption. Brazil, for instance, initiated the Program to Foster Alternative Sources of Electric Power (PROINFA) in 2002, aiming to expand wind, biomass, and small hydropower contributions to its energy mix; wind power alone is expected to surpass 44 GW by 2028, representing 13.2% of the national electricity matrix (IEA, 2024). China has committed to having 80% of its total energy mix derived from non-fossil fuels by 2060, and is on track to achieve 1,200 GW of solar and wind capacity by 2030, while also heavily investing in bioenergy (IEA, 2024). India, meanwhile, mandated 5% biomass co-firing in all coal-fired plants as of October 2022 and is targeting the production of 15 million tons of biogas/bio-CNG by constructing 5,000 commercial biogas plants (Ministry of Power India, 2023). In contrast, Russia and South Africa have made limited progress in expanding their renewable energy portfolios, although biomass generation has shown some growth in both countries (IEA, 2024). Overall, the global transition to renewable energy is driven not only by environmental imperatives but also by the strategic goals of energy security and economic resilience. By embracing diverse renewable sources, countries can significantly reduce their carbon footprints and promote sustainable growth.

The theoretical and conceptual framework

From a study carried out by Modi and Adamu (2016) titled 'impact of power (electricity) supply on the performance of small and medium scale enterprises in Adamawa state: Case study Mubi north local government area,' discussed extensively on the importance of the Keynesian theory. The theory is considered to be more appropriate in this study. This theory offers useful insight to the understanding of the effect of government intervention in term of regulating the supply of electricity to the SMEs.

Alan Blinder underpinned that Keynesian economics is a theory of total spending in the economy (called aggregate demand) and of its effects on output and inflation. It is a theory that proposes the use of government intervention to regulate the economy so as to protect the citizens from unscrupulous activities of business men. The policy message in the Keynesian Theory of government intervention is to sustain the level of investment, but this should be interpreted more in the sense of “stabilizing business confidence” (Bateman ,1996) than as a plea for debt-financed public works (Kregel 1985). In stabilizing business confidence, Bateman meant long term investment in critical infrastructures such as electricity, road and accessibility of finance which are critical to the survival of businesses. Thus, the implication that Keynes was in favor of large and growing public expenditure such as was experienced since the Second World War.

The genesis of the government intervention to boost welfare are that welfare derives from other sources besides state activity, and there are various modes of delivery of the services made available to citizens. Some are funded but not produced by the State, some publicly produced and delivered free of charge, some bought by the private sector, and some acquired by individuals with the money handed on to them by the State. Although its boundaries are not well defined, the Welfare State is used as “shorthand for the state’s activities in four broad areas: cash benefits; health care; education; and food, housing, and other welfare services which increases household welfare, and investors’ confidence in businesses in the economy” (Barr 2004).

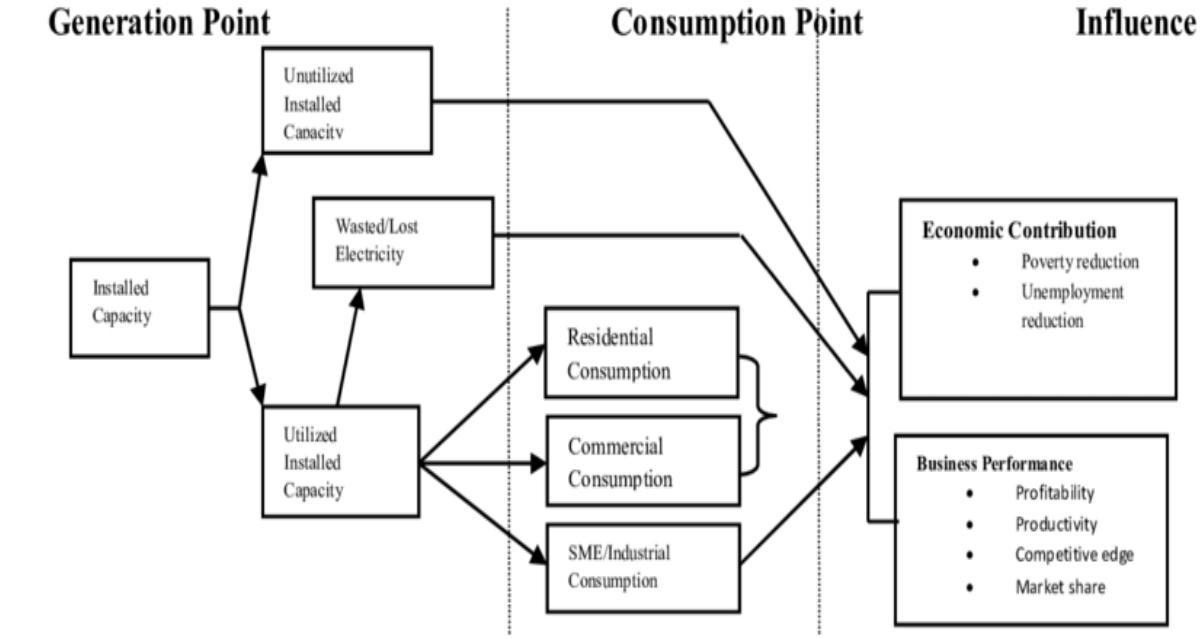
The Keynesian theory of government intervention explains the role of the government in ensuring the smooth running of businesses in an economy. Of recent, the small and medium scale enterprises constitute the larger part of business in any country of the world, therefore the need for government intervention in the provision of infrastructures necessary for the smooth operation of SMEs in the country. This research adopts this theory

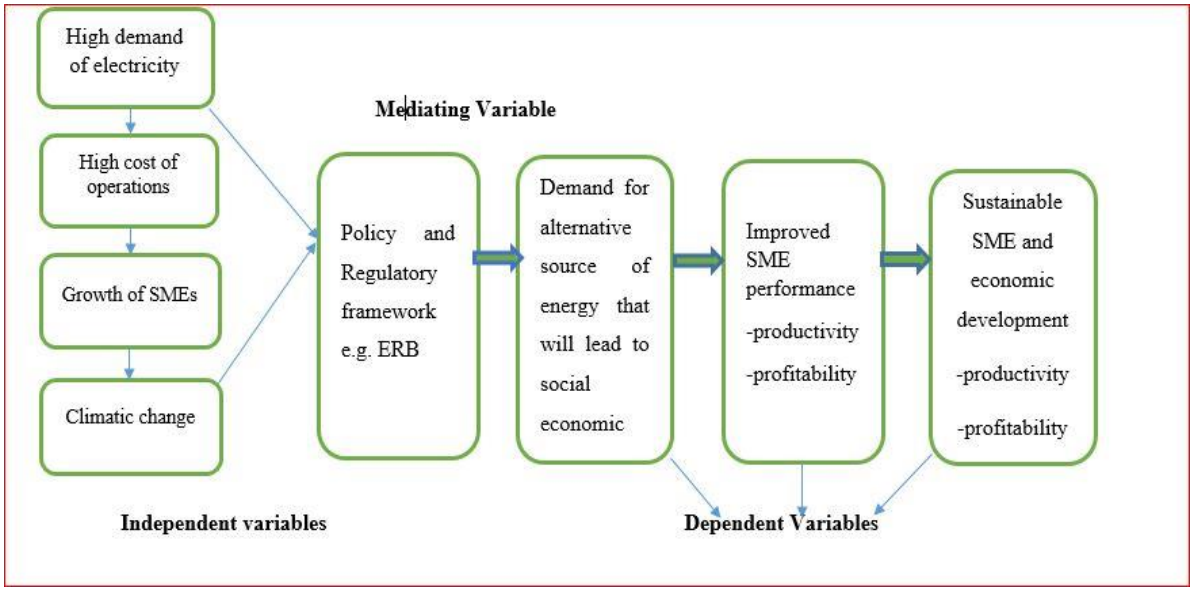
because it helps the researcher understand government's responsibility in ensuring that there is an enabling environment for businesses to flourish.

Framework Basis for Export Performance

A Conceptual framework denotes to sketch of independent and dependent models/variables together with their assumed relationships. It portrays an outline of concepts/variables that the researcher employs to enable them to respond to research objectives (Rajablu et al., 2017).

Table 1: Proposed Conceptual Framework: Relationship between independent and dependent variables.





Source: Author (2025)

The study hypotheses were formulated as follows:

Alternative hypothesis (Ha): Load shedding negatively impacts performance of SMEs.

Null hypothesis (Ho): Load shedding positively impacts performance of SMEs.

RESEARCH METHODOLOGY

In this study, a mixed methods approach was employed to identify trends and relationships between variables. Both primary and secondary data collection methods were utilized, and the collected data was carefully analyzed and interpreted to highlight the key research issues. The choice of using stratified random sampling technique in this study was due to specific research objectives and the characteristics of the population being studied. Stratified sampling is a method of sampling that divides the population into subgroups or strata based on certain characteristics or variables that are of interest to the researcher. Within each stratum, a random sample is then selected. This approach offers several advantages over simple random sampling. The Researcher distributed questionnaires according to the table above: Tailors (10), Welders (10) Salon owners(8), Barbershop owners(8) and Restaurant owners (8) a total of 52 respondents.

Reliability and Validity

Ensuring reliability and validity is crucial in research as it ensures the collection of high-quality and dependable data. These features enhance transparency and minimize the potential for researcher bias in qualitative research (Singh, 2019). To achieve this, the study employed rigorous methods and measurement techniques that precisely measured the variables relevant to addressing the research questions.

Analysis of the Results

Firm Characteristics

In this study, the response rate represents the total number of questionnaires that were completed and submitted by the participants. A total of 79 questionnaires were received from the manufacturing SMEs representing 85.9% as shown in table 1.

Table.1: Participants' Response Rate

Respondent	**targeted**	**obtained**	**response rate**
SME Entrepreneurs	52	50	96 percent

Source: Own Survey Results

The table above shows the respondents who wererespondents who owned business enterprises.The study targeted, the number of questionnaires and guidessuccessfully got a 96 percent response rate. This was obtained and the response rate of the study. The studyaccredited to the proper field preparation done.
targeted a total of 52 respondents which included 50

Descriptive Statistics

As can be seen in Table 2 below, is summary, the means being above 2.5 (which represents the neutral point on a Likert scale) indicate that the participants in the study agreed with the challenges mentioned in the survey. This means that the participants perceived these challenges as existing issues faced by manufacturing SMEs in the context of exporting, according to the study's results. The study likely aimed to assess the extent to which these challenges are perceived by the participants and understand their impact on the export performance of SMEs.

Table 2: Descriptive Statistics on average business operating Hours before Load shading

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Under 5 Hours	7	14.0	14.0	14.0
	5 Hours to Under 10	23	46.0	46.0	60.0

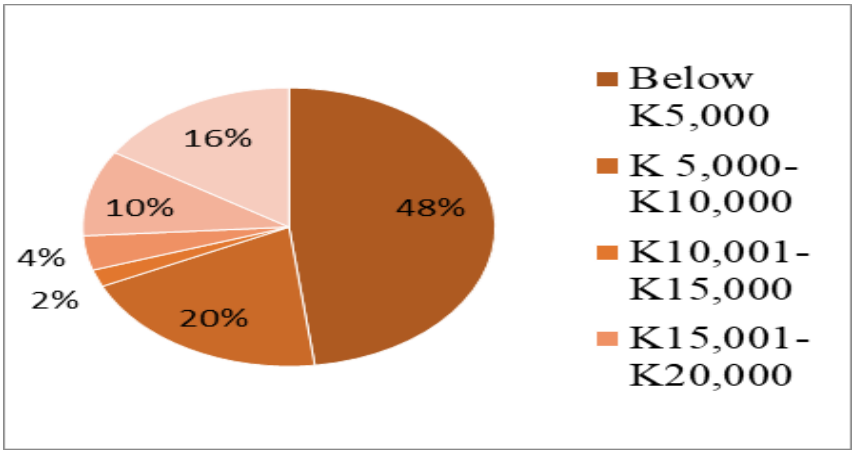
	Hours				
	10 Hours or more	19	38.0	38.0	98.0
	99	1	2.0	2.0	100.0
	Total	50	100.0	100.0	

The frequency distribution table shows the respondents views towards average operating hours per day. It is evident from above that 14 percent of the respondents said that they operate under five yours, 46 percent of the respondents said they operate between 5 and 10 hours , 38percent said they for more than 10 hours. Therefore majority of the respondents indicated that the they operate between 5 and 10 hours.

Turnover a during period of Load shedding

The chart above shows monthly turnover during when the entrepreneurs are load shaded .As seen from 48 percent respondents earned below k5,000 , 20 Percent of respondents earned between k5,000-k10,000, 2 percent of respondents reported that they earned between k10,000-k15,000, 4 percent earned between k15,000-k20,000 , 10 percent earned above k20,000 and 16percent of respondents did not give any response.

Table 3: Monthly turnover during Load shedding



The hypothesis of whether Load shading Influences the profitability of business

Table 4: whether Load shading influences the productivity of business or not

Count							
		How do you experience load shading on during the day?					Total
		Under 2 Hours	2 Hours to Under 5 Hours	5 Hours to under 10 hours	10 hours or more	Non response	
Kindly rate your response regarding effects of load shading on your business? Negatively affects profitability	Strongly agree	3	4	10	1	2	20
	agree	2	7	3	0	0	12
	Neutral	0	1	3	0	0	4
	disagree	3	2	0	0	0	5
	Strongly disagree	0	0	0	1	0	1

	Non response	1	3	3	0	1	8
Total		9	17	19	2	3	50

Whether Load shading influences the productivity of business or not

Table 5 shows the result whether load shading influences profitability of businesses , two questions were cross tabulated with that is one indicating the respondents experience of load shedding in terms of time and the other one the effect of load shading on business. To test the hypothesis, a Pearson's chi-square value was used to check for the relationship between the two variables and the finding were statistically significant with a Pearson's value of 41.486 and probability value of 0.003, Implying that load shading regardless of how long it take place does affect profitability of businesses.

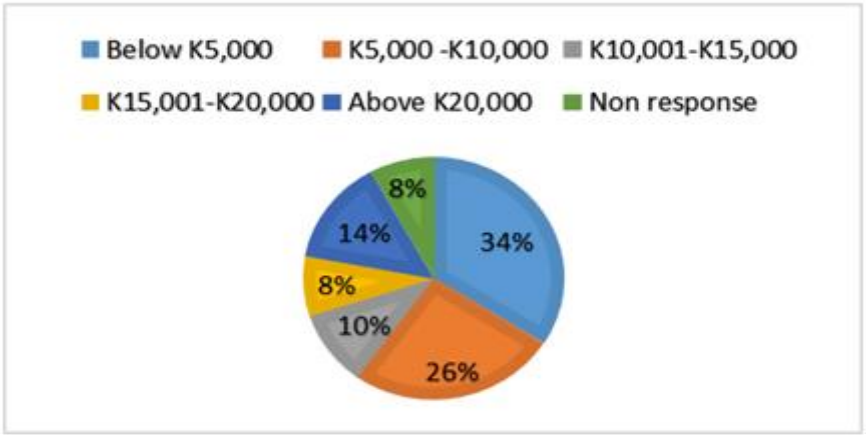
Table 5: Whether Load shading influences the productivity of business or not

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	41.486[a]	20	.003
Likelihood Ratio	26.400	20	.153
Linear-by-Linear Association	.644	1	.422
N of Valid Cases	50		
a. 28 cells (93.3%) have expected count less than 5. The minimum expected count is .04.			

Entrepreneurs' monthly turnover

The table above shows respondents view regarding their monthly turnover before load shading. As seen from the figure above, 34 percent respondents earned below k5,000 , 26 Percent of respondents earned between k5,000-k10,000, 10 percent of respondents reported that they earned between k10,000-k15,000, 8 percent earned between k15,000-k20,000 , 14 percent earned above k20,000 and 4 percent of respondents did not give any response.

Table 6: Entrepreneurs' monthly turnover

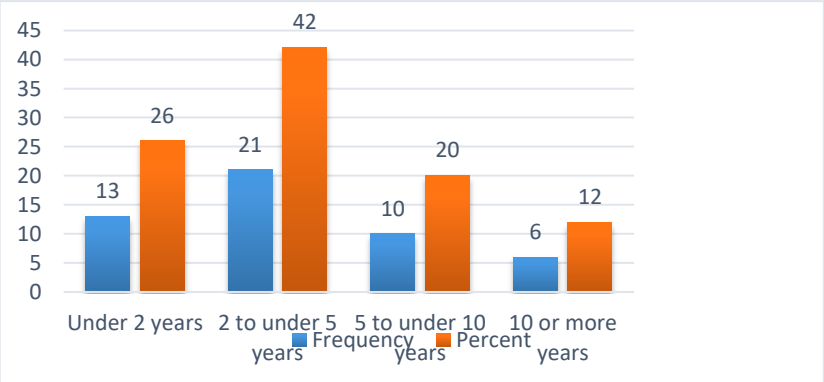


how long entrepreneurs have been in business

The coefficients results in table 5.24(c) show a negative standardized Beta coefficient equal to -0.540 for the competition challenge variable which supports the results from the hypothesis that competition challenges can

have a negative effect on export performance. Thus, the export performance of manufacturing SMEs can reduce by 0.540 units for every unit increase in competition challenges.

Table 6: how long entrepreneurs have been in business



DISCUSSION

Discusion of results

The discussion of findings in this research provides valuable insights into the effectively assess the effect of load shedding on profitability small scale business as a measure of performance of business. The study used cross tabulation in which two questions were cross tabulated with one being respondents` experience of load shedding and another one being the effect of load shading on business. To test the hypothesis, a Pearson's chi-square value was used to check for the relationship between the two variables and the finding were statistically significant with a Pearson's value of 41.486 and probability value of 0.003. Furthermore, the study revealed that majority of the respondent s pointed out that load shedding does have an effect on business performance through profitability. The results conform to Cissokho and Seck (2019) who highlighted that since electricity was an important component of virtually any production process, limited supply has the potential to directly and indirectly affect the economic activities of firms. It is therefore clear that electricity is a pre requisite for the success of any business operations trickling down to the performance of the economy of any country at large and that lack of it would cause adverse effects in cases where business owners have no alternatives or completely do depend on electricity for development and growth. The study revealed that Load shedding affects productivity of the businesses. This was checked using two key questions which were cross tabulated that is average operating hours per day when businesses are load shaded and monthly turnover when there is load shading. The findings were found to be statistically significant with a Pearson's chi square value of 29.228 and a probability value of 0.015, this result in line with Doe and Emmanuel (2018) who demonstrated that poor electricity leads to decline in output, revenue and firm's profit in Ghana; Abotsi (2019) also shows that power failure reduces the production efficiency of firms in most African countries; additionally , Mensah (2018) also found power failure to have a negative effect on manufacturing output in Sub-Saharan Africa (SSA). The results are also in tandem to Fisher-Vaden et al (2019) who analyzed the effects of electricity shortages on firm productivity in China and shows significant output and revenue losses due to outages. Nonetheless, industry type also matters when assessing the impact of outages as some activities are more impacted than others, as shown by Alam (2018) in India.

Objective 2 to explore other energy sources to mitigate the situation. The results reviewed that most business people were only particularly familiar with solar energy as a coping strategy followed by generators. However, it was established that most of the people engaged in business lacked the knowledge of other renewable sources of energy that could be used to cushion load shedding. Additionally, it was also revealed that entrepreneurs lack the credibility of accessing funds to own alternative energy sources and so this worsened the situation.

The findings were concurred with (Scott et al., 2018a) who established in his research that the use of standby generators, was a major practice adopted by SMEs to moderate the consequences of power insecurity.

Around 33% of SMEs in the third world use a generator and in countries with very undependable power supply the estimate is higher, reaching 86% in Nigeria. However, there is inadequate indication of the sharing of generator among SMEs, but strong indication from stakeholders that facilitating further generator-sharing would be beneficial. Additionally, it was established that despite the SMEs being aware of renewable energy there is inadequate information of its use as an alternative to grid electricity currently, and on its use and finance to access it

Apart from that this has been supported by a study that was conducted by (Phiri, 2020) who observed in his research that lack of affordable and reliable energy sources resulting from load shedding impacted on business growth negatively. It was found that lack of affordable and reliable energy sources acted as a hindrance to business and service diversification, resulted in businesses closing down, resulted in inefficiencies in processes, resulted in compromised quality of products and services, resulted in businesses operating for few hours, resulted in increased operation and production cost, and made communication with service providers and other partners inefficient. In this regard, lack of affordable and reliable energy sources acts as a barrier and disincentive to businesses growth and entrepreneurship.

Finally, Objective 3 To integrate risk management techniques in the use of other alternative energy sources by the entrepreneurs. The findings indicated that According to (Crane et al., 2019) a risk can be defined as the chance of loss or an unfavorable outcome associated with an action. Risk Management on the other hand is "a systematic way of looking at areas of risk and consciously determining how each should be treated. It is a management tool that aims at identifying sources of risk and uncertainty, determining their impact, and developing appropriate management responses"(Srinivas, 2018).

Overall, the study's findings validate the importance of dominate renewable energy technologies' have made it the largest producer of wind turbines and solar panels in just a few years (Bradsher 2017), while at the same time have increased the energy, economic, and environmental risks for its American competitor.

Gatzert & Kosub (2020) agrees that in some Brazilian states, the smoke pollution produced by the burning twice a year of sugar cane fields before manual harvesting continues to be a major problem. Other environmental risks include: Risks linked to water scarcity (expected to increase in some areas as the biomass energy production process is water-intensive).Risks related to excessive or inappropriate use of fertilizers and pesticides. - Risks to aquatic ecosystems from nutrient overloading; and - Risks of loss of biodiversity and increases in invasive specie.

CONCLUSIONS AND RECOMMENDATION

The study concluded that load shedding negatively affects productivity and profitability of small businesses in markets in Lusaka because the study found a significant relationship between load shedding and business performance. This was attributed to the low probability values found in the study. The p- value for profitability was 0.03 and the p-value for productivity was 0.015 respectively.

The study disclosed that business men and women in the market place are affected by load shedding because it reduces the number of employees to perform the business operations thereby reducing the level of output expected as compared to a day when power is readily available.

It is vital to note that we cannot find a solution to mitigate if we have not discovered the causes of the problem therefore, it was disclosed by the business men and women in the market place concerning their perception on what has caused load shedding and they indicated that high domestic demand of power by households, climate change, cost of power generation, high risk in lower generation and capacity of power generation have led to the situation. Generally, climate change and high risk of lower generation were highly ranked by them.

However, the study found that the marketers where aware of cheaper alternative energy sources particularly solar energy followed by the use of inverters to mitigate the situation. Despite their awareness, it was concluded that respondents face challenges in coping with other energy alternatives as it was obtained from the

general findings in the interview guide that marketers face difficulties in raising finance to effectively use the alternative sources. Furthermore, they lack knowledge of the other sources of energy to generate power.

It was concluded that there are a number of risks associated with the use of alternative energy sources such as political risks that arise that are linked to change in regulations or laws and unstable security circumstances. This is because 50 percent of respondents confirmed the risk factor. Additionally, unstable security circumstances had a response rate of 38percent .Furthermore ,economic factors were also key risk factors as was seen through the increase in cost of projects which gave a 42 percentage as well as interest rate and inflation which represented 40 percent and credit risk which represented 38 percent followed by exchange rate fluctuation with 34 percent. Other risk factors were social risks which represented 50 percent as well as technical risks which represented 28 percent and defective design which reflected a 30 percent response rate. Environmental risk factors through pollution showed 38 percent and lastly legal risk through new regulation 48 percent.

To address these effects of load shedding on the performance of small scale businesses, the research suggests the following recommendations:

The government should focus on diversification of the energy sector rather than rely on one source of energy production to ensure that load shedding is reduced. Furthermore the government should also provide a conducive environment for small business to thrive by creating policies that will enable small business to access credit facilities to access cheaper alternative sources.

Besides this, the government through Zesco should ensure that market areas are load shaded at night in order to avoid affecting them during business hours when they are very productive. Apart from this, government should also educate small business on alternative sources of energy to enable them have a variety of coping strategies to mitigate the repercussions of load shedding. Small business owners also need to be educated on risk management in order to assist them to effectively manage the risks associated with the use of alternative renewable sources of energy.

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