INTERNATIONAL JOURNAL OF ENTREPRENEURIAL KNOWLEDGE
Issue 1, volume 11, ISSN 2336-2960 (Online)
www.ijek.org

INVESTIGATING THE IMPACT OF ELECTRICITY SUPPLY INTERRUPTIONS ON THE EXPANSION OF SMALL AND MEDIUM SIZE ENTERPRISES (SMEs): A SYSTEMATIC LITERATURE REVIEW

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Received: 20 April 2023. Revision received: 28 May 2023. Accepted: 10 June 2023

ABSTRACT

This paper aims to investigate the factors that impact electricity supply interruptions on small and medium-sized enterprises (SMEs) in Cameroon and the theories used by researchers in preventing electricity supply interruptions. The method used is a systematic literature review of empirical studies on factors responsible for various forms of electricity supply interruptions and their impact on businesses worldwide. The author of this study examined 70 publications from 2012 to 2022 within the scope of the subject and analyzed the factors responsible for interruptions and prevention techniques used to curb the interruption of electricity supply. The results revealed that human factors, technological factors, and atmospheric & environmental factors have impacts on the interruption of electricity supply. Further, the study found that most of the publications on the subject were case studies (74%), while the remaining studies comprised Quantitative studies (19%), Qualitative studies (7%), and 0% for mixed studies research. It was also revealed that technological, human, atmospheric, and environmental factors are more responsible for electricity supply interruptions in developing countries than in developed countries. The results imply that electricity network designers need to mitigate electricity interruptions by employing modern techniques. The study recommends that alternative electricity supply sources could be used to help reduce interruptions, especially using other renewable energy sources like solar electrification systems and generators as backup or supplementary systems to enhance the electricity supply.

Key words: electricity interruptions, electricity networks, interruption prevention

JEL Classification: F63, Q01, Q02

Reference: Tapang, F.N. (2023). Investigating the Impact of Electricity Supply Interruptions on the Expansion of Small And Medium Size Enterprises (SMEs): A Systematic Literature Review. *International Journal of Entrepreneurial Knowledge*, 11(1), 84-101. doi: 10.37335/ijek.v11i1.191

INTRODUCTION

A regular supply of electricity is a basic requirement in modern life. The breakthrough in electricity generation occurred in 1831 when Michael Faraday (a British scientist) discovered the basic principle of inducing an electric current through moving magnets inside coils of copper wire to generate electricity (Rousseau, 2022). Today, modern technologies are used in electricity generation. In most developed countries, steam turbines use fossil fuels, nuclear, and biomasses to generate electricity, while solar photovoltaic and wind turbine sources are also gradually becoming popular (Yong et al., 2013). In developing countries, hydro and thermal gas turbines are the principal sources used in electricity generation (Zulfiqar et al., 2021).

Electricity supply interruptions are becoming a great concern for electricity consumers in many parts of the world, and it is affecting the growth of enterprises, especially in Africa, where electricity supply interruptions are frequent and of long duration (Nduhuura, 2018). Electricity supply interruption means loss of electricity supply to one or more consumers. On average, African businesses experience electricity supply interruptions for about 13% of the time, which is twice as long as in the second-ranked region, South Asia (7%) (Larossi, 2009). Furthermore, on average, the duration of electricity supply interruptions in Africa was estimated at 90.9 days (World Bank, 2019). This implies significant financial losses for electricity consumers, especially the expansion and sustainability of small and medium-sized enterprises (SMEs). This is a great concern because SMEs make up most of the businesses operating worldwide (Ana et al., 2022). In the case of Africa, the impact of electricity interruptions on SMEs needs to be given keen attention because SMEs constitute about 80% of firms and contribute substantially to national economies through taxes, as well as employment creation for about 70% of the population (Mukete et al., 2021).

Electricity supply interruption is a term that has been well understood by consumers of electricity around the world, and it is especially experienced frequently in developing countries. The interruption of the electricity supply can be momentary, sporadic, or chronic. According to Sinan (2015), momentary electricity supply interruptions last very short, typically some seconds. Sporadic electricity supply interruptions are caused by harsh weather conditions such as thunderstorms or floods, which pose a great threat to electricity networks since they cause long-lasting interruptions associated with significant economic losses for the consumers, while chronic electricity supply interruptions on the other hand, are mostly caused by poor electricity network planning and operation, insufficient power generation, overloading of the system components, poor quality materials used in electricity network construction, aging of network components that lead to very frequent occurrences of faults on the electricity networks (Sinan,2015).

Literature on electricity generation emerged as far back as the early 1990s, but in the scope of electricity supply interruptions and their impacts, research has been quite scanty, and hence, a comprehensive and accurate representation is clearly missing (Nduhuura, 2018). Though a few studies have emerged within the past ten years around the world, there is still a great research gap regarding the underlying causes of electricity supply interruptions, their impact, and prevention measures that can add to the body of knowledge and the scientific community.

For the purpose of this research, a systematic literature review of available literature on the causes and impact of electricity supply interruptions on electricity consumers that apply to SMEs will be researched and analyzed. This will be based on the following research questions (RQs):
RQ 1: What are the impacts of electricity supply interruptions on small and medium-sized enterprises (SMEs)?
RQ 2: What are the factors that affect electricity supply interruptions?
RQ 3: How do electricity supply interruptions affect the expansion of small and medium-sized enterprises (SMEs)?
RQ 4: How can electricity supply interruptions be prevented?

Addressing the above questions has the ultimate goal that policymakers would be able to exploit the research findings in developing future strategies that can help electricity utility companies compete

with the better performers in the electric utility sector in providing reliable electricity supply void of regular interruptions.

The paper is structured in six sections and begins with the introduction. It then continues with the theoretical background, where the theories that inform the study are presented. This is followed by the research methodology, after which the results are presented, discussed, and conclusions from the study are made.

1 THEORETICAL BACKGROUND

Theories are known to be a coherent group of assumptions put forth to explain the relationships between observable facts and valid to predict what could happen under certain circumstances (Tabi et al., 2021). The resilience, control, and lifetime theories have been found to be the theories that inform this study. However, the resilience theory stands out among these three theories because when an electricity network is resilient, it withstands possible disruption tendencies and continues to supply electricity.

1.1 The resilience theory

Resilience refers to both the process and the outcome of successfully adapting to difficult or challenging life experiences (Hurley, 2022). In relation to systems, resilience has been defined as the ability to withstand a major disruption within acceptable degradation parameters and recover within an acceptable duration (Haimes, 2009). According to Francis & Bekera (2014), the theory of resilience requires information regarding such as the expected impacts on the system in view of facilitating required resources to bring the system back to its normal operation. This also applies to electricity supply networks that are pruned to events that lead to faults that cause interruptions of the electricity supply to consumers. Specifically, its application to electricity networks is its ability to quickly recover from a major incident by getting as many customers as possible re-connected and minimizing the duration of the electricity supply interruption (Cainey, 2019).

Francis & Bekera (2014) opined that the resilience theory is concerned with an entity's resistance, flexibility, and recovery, emphasizing that certain preventive measures should be undertaken to mitigate any eventual break in the system. Furthermore, resilience theory involves a set of capacities that constitute the resilience triangle, including the absorptive, adaptive, and recovery capacities. According to Vugrin et al. (2011), the absorptive capacity of a resilient system is the extent to which a system absorbs the impacts of system perturbations, while the adaptive capacity is the ability of the system to adjust to disturbances on the system by carrying out some self-adjustments or changes that enable the system to continue its normal operation. Finally, the recovery capacity of a resilient system is the speed by which the system returns to its normal operation after a disturbance occurs in the system (Vugrin et al., 2011).

The most important capability of a resilient system is to anticipate, minimize and withstand the consequences of disturbances and interruptions, especially on electricity supply networks. Also, it is vital for resilient systems to have the capability to reconfigure undesirable occurrences and, most importantly, the capacity of speed and ease to bring a faulty system back to its original normal operation (Francis & Bekera, 2014).

It is, therefore, of great importance that electricity utility companies understand and adopt the resilient concept, as well as make them applicable in the operation of the electricity distribution networks in order to ensure that electricity supply interruptions are minimized. It implies that both the frequencies and durations of electricity supply interruptions need to be minimized to enhance customer satisfaction. In this respect, the electricity distribution networks will have encouraging indices like SAIFI (System Average Interruption Index) and SAIDI (System Average Interruption Duration Index) which are required to keep electricity consumers satisfied with good supply quality.

1.2 The control theory

Control theory is concerned with analyzing and designing a closed-loop control system. (Deng et al.,2022). The control theory is based on the feedback principle, whereby the controlled signal is compared to a desired reference signal, and the discrepancy is used to compute corrective control actions (Doyle et al., 1990). According to Nyangwaria & Munene (2019), the theory is concerned with estimations of solutions required to mitigate the corrective actions necessary to guarantee system stability. Glad & Ljung (2014), opined that every functional system has an input and an output related in a specific way to result in a specific product after processing and that within the framework of the control theory, the required inputs constitute the setting of goals, expenses and plans for a control system that brings in corrective actions to eventual faults that occur in the system.

The control theory is thus relevant to this study as it underscores necessary corrective actions to be undertaken by electricity utility companies when there is an electricity supply interruption to reduce the negative impacts on electricity consumers.

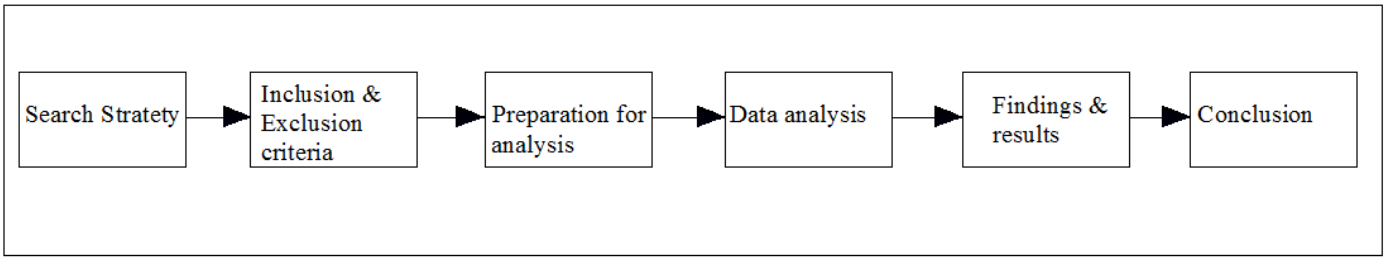
1.3 The lifetime theory

The lifetime theory is linked to aging, which is the gradual deterioration of any structure that results in an increased probability of permanent damage (Hanne et al., 2021). In relation to electricity networks, the lifetime of electricity network equipment accounts to a considerable extent for the interruption of electricity supply (Vaahedi, 2006). Regarding electricity networks, the lifetime theory underscores that equipment has both technical and economic functions and that there are three different concepts of lifetime for the system equipment: physical, technical, and economic (Vaahedi, 2006). Regarding the physical lifetime, a piece of equipment on the electricity network starts to operate from its brand-new state to a state where it can no longer be used in normal operations and must be replaced. In contrast, the technical lifetime is concerned is based on the premise that a piece of equipment on the electricity network may have to be replaced due to technical reasons. However, it may still be physically used (Chen et al., 2022). Regarding the economic lifetime, a piece of equipment on the electricity network is no longer valuable economically, although it still may be usable physically (Chen et al., 2022. When these three concepts are ignored, there is occurrence of damage of the network equipment, thus leading to electricity supply interruptions).

2 METHODOLOGY

The aim of the study is to investigate the factors that impact electricity supply interruptions on SMEs in Cameroon. The methods of data collection is through a systematic literature reviews as suggested by Fink (2005) was adopted which is a rigorous stand-alone review with a specific approach. The approach explains all the observed procedures in conducting the review within the scope of the study in a way that can be followed by other researchers in reviewing the study.
For the study, the review carried out made use of the flow chart represented in figure 1 below with six distinct steps.

Figure 1 **Flow chart of systematic literature review methodology**



(Source: own elaboration)

2.1 The search strategy

Within the search strategy, the process of review in an emerging field such as investigating the impact of electricity supply interruptions on the expansion of small and medium size enterprises (SMEs) was associated with challenges, especially, as very little research exists within the scope.

Articles were selected manually by searching two major online libraries (John B. Cade Library and Google Scholar) that index many journals and conference papers in the field of electricity which are highly valued outlets of electricity supply interruptions, their impacts, causes and prevention. This was done to identify articles through relevant keywords contained in the title of the research. The full text of retrieved articles was examined to select those to be included in the study. Articles that did not meet the inclusion criteria were excluded from the study. The key words in the search were "electricity supply interruptions", "electricity supply interruption causes", "electricity interruption prevention". The search process is shown in the table 1 below.

Table 1 **Article search process and description**

Search process	**Description**
Strategy	Peer reviewed articles downloaded from to major online libraries (Google scholar and John B. Carde Library)
Search key words	Electricity supply interruptions, electricity supply interruption

	causes, electricity interruption prevention
Outcomes	Articles were included if they examined electricity supply interruptions, electricity supply interruption causes, electricity interruption prevention
Date of publication	Limited to articles published between 2012 and 2022 (10 years)
Language of publication	The articles were limited to those published in the English language
Inclusion criteria for articles	Only peer- reviewed articles published in journals
	Only peer- reviewed articles published between 2012 and 2022
	Only peer-reviewed articles that examined electricity supply interruptions, electricity supply interruption causes, electricity interruption prevention
Exclusion criteria	Articles not published in journals
	Articles not peer-reviewed

(Source: own elaboration)

2.2 Inclusion and exclusion criteria

Articles selected for this literature review were based on the following criteria:

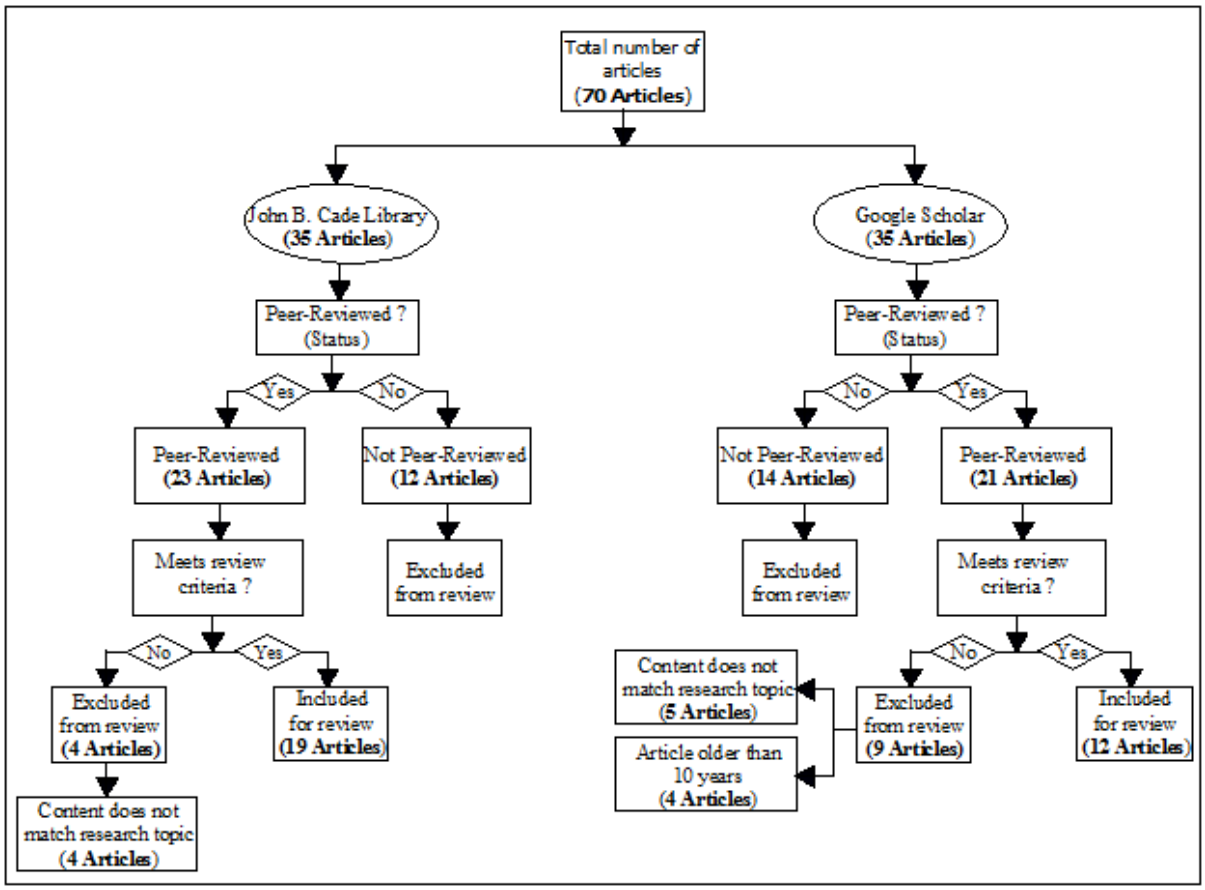
The selection included three major stages:

- Articles that were within the scope of electricity supply interruptions.
- Articles that were peer-reviewed and written in English language.
- Articles that were published 10 years or below.

All articles that did not meet the above inclusion criteria were excluded.

A set of search terms were used to help narrow the search to relevant articles for inclusion in the study. The initial search terms were "electricity", electricity interruptions", "electricity networks", "impact of electricity interruption", and "interruption prevention".

Figure 2 **Flow diagram for inclusion of articles for the systematic literature review**



(Source: own elaboration)

2.3 Preparation for data analysis

The objective of the study was to investigate the factors responsible for electricity supply interruptions and the impact on the expansion of SMEs. It also involved investigating the theories used by researchers in electricity supply interruption prevention. The data analysis stage involved identifying root causes of electricity supply interruptions as well as electricity supply prevention methods as guide to capture and report the findings of the literature review.
The preparation for the data analysis for identified articles that met the criteria was grouped into the following categories:

I- Year of publication.
II- Distribution of articles by regions.
III- Research methods approach (Qualitative, quantitative, mixed, case studies, etc.)

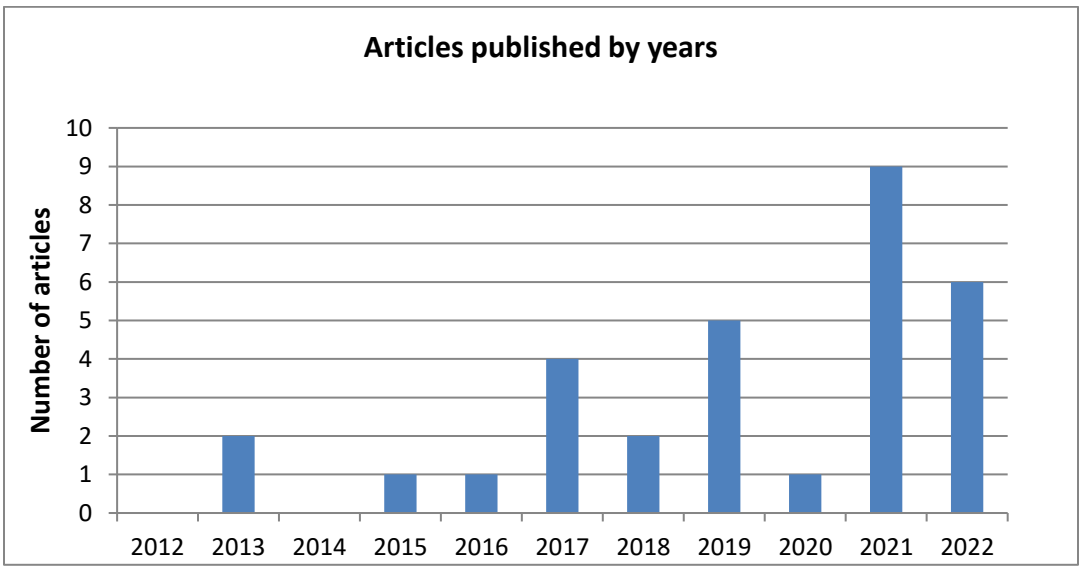
Following assessment of quality and appraisal, the papers were classified according to above groupings. A data extraction form through an organized spreadsheet was prepared to enter data categorized under the respective categories.

3 RESULTS

3.1 Data analysis

The analysis of data was done on the basis of the data collected for review. In this particular study, the year 2021 and 2022 had the highest number of publications as shown in figure. The reviewed papers revealed the factors that contribute to electricity supply interruptions around the world (Adeoye, 2021; Tzvetkova, 2021; Bassiouny, Shimy & Hamouda, 2017; Kefale, Getie & Eshetie, 2021; Garschagen & Zerga, 2021; Kefale, Getie & Eshetie, 2021). The figure also reveals that very few articles were published in the years 2015, 2016 and 2020, while no articles were published in the years 2012 and 2014.

Figure 3 **Representation of articles by years**



(Source: own elaboration)

Generally, figure 3 above reveals that over the past ten years there has been a gradual increase of published research articles in the area of the impact of electricity supply interruptions on consumers of electricity. The distribution of articles by region is shown in figure 4.

As seen in figure 4, many published articles had no specifications of the country, where the studies were carried. A total of two studies were found in Ghana, Nigeria and the United Kingdom, while only one study was found each in the following countries: Brazil, Cameroon, Egypt, Ethiopia, EU, Indonesia, Kenya, Lebanon, Norway, Poland, Spain, Sub Saharan Africa, Turkey, and Ukraine. However, from the articles that were reviewed, there was a near even distribution of countries were researchers carried out studies.

The distribution of reviewed articles by methodology is shown in figure 5. The review revealed that the majority of the studies about the impact of electricity supply interruptions on the expansion of SMEs were case studies. Specifically, the classification indicates that most of the studies reviewed

were case studies amounting to 74%, quantitative studies amounted to 19%, qualitative studies were 7%, while no study used the mixed methods research approach.

Figure 4 **Representation of articles reviewed by country**

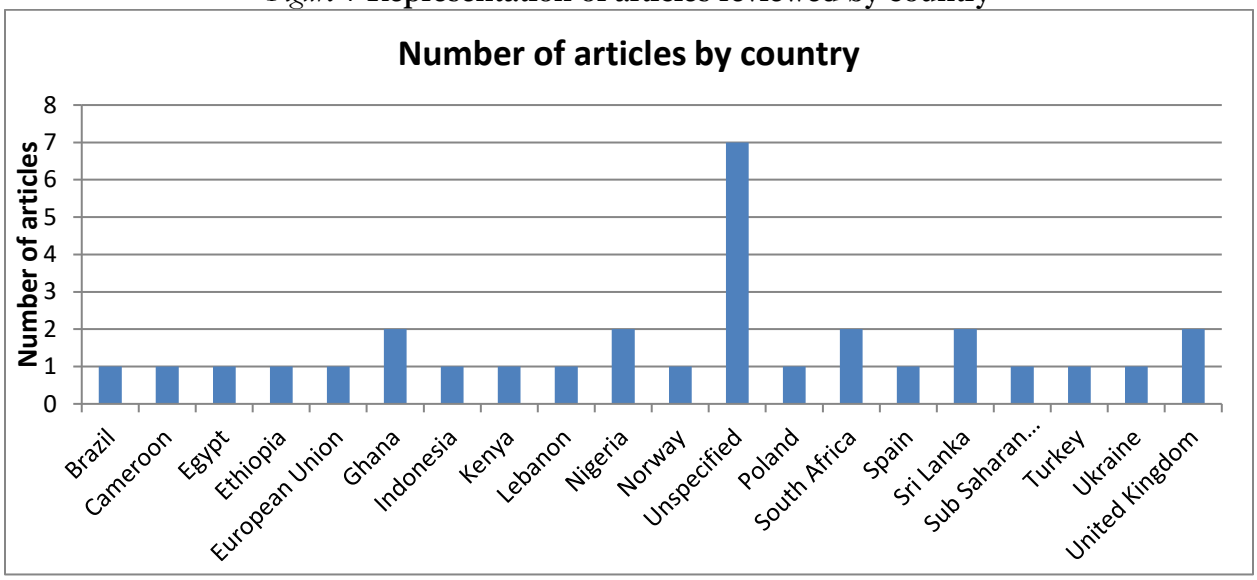


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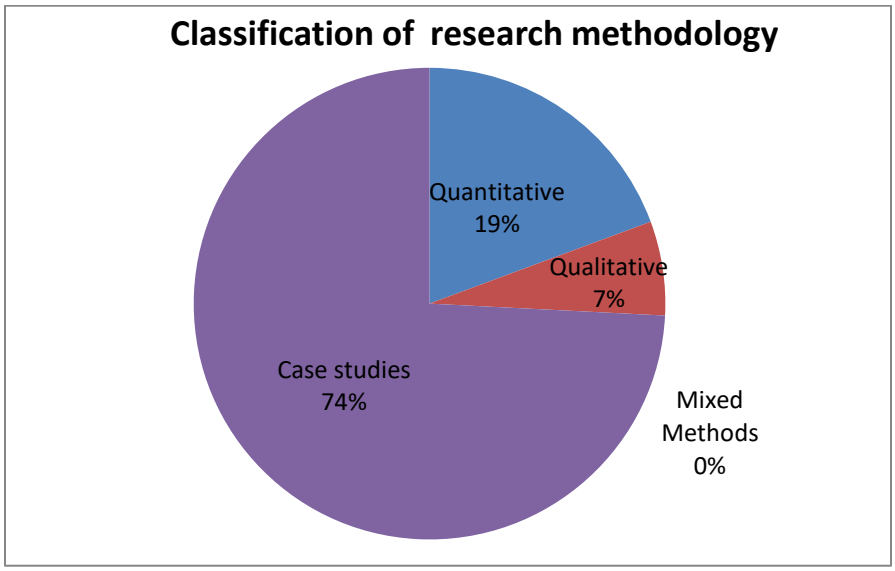
Figure 5 **Percentage classification of the methodology of the studies**



(Source: own elaboration)

By implication, although mixed method research is gradually becoming popular, they have not been used in the area of the impact of electricity supply interruptions on electricity consumers.

3.2 Findings from the review

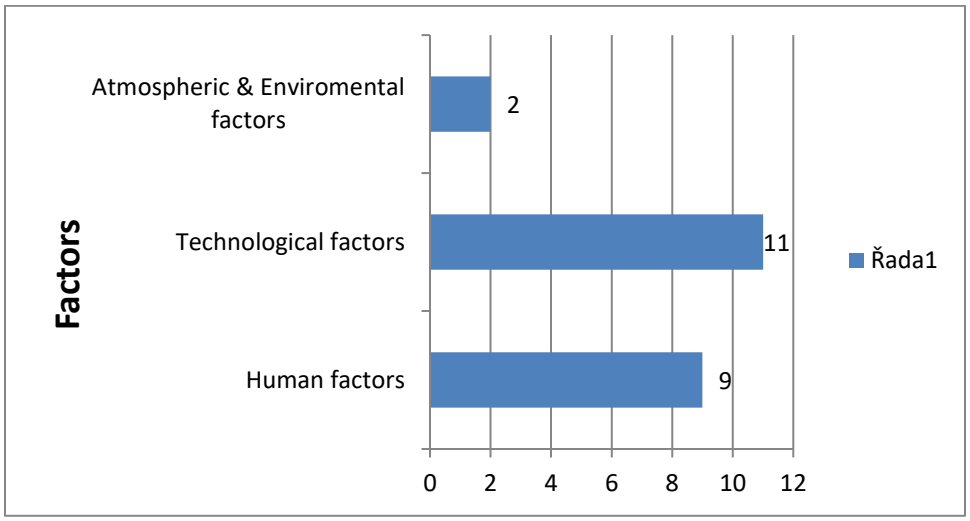
From the literature review, there are three main factors (human factors, technological factors and atmospheric & environmental factors) that determine electricity supply interruptions that affect electricity supply interruptions and subsequent implications extracted from the reviewed literature as illustrated in table 2 below.

Table 2 **Summary of factors that affect electricity supply interruptions**

AUTHOR (YEAR)	HUMAN FACTORS	TECHNOLOGICAL FACTORS	ATMOSPHERIC & ENVIROMENTAL FACTORS	IMPLICATIONS
Tzvetkova (2021)	Increased loads on networks	Electricity networks not upgraded		Negative impact on business
Bassiouny, Shimy & Hamouda (2017)	Increase of industrial loads, agricultural loads, residential loads	No upgrade of electricity networks		Regular interruptions affecting customers
Onaolapo et al. (2022)		Structure of electricity networks	Varying weather conditions	Negative impact on utility and customers
Kefale ,Getie & Eshetie (2021)	Overloading		Trees that grow tall and touch electricity lines	Interruptions affecting supply to customers
Nduhuura , Garschagen & Zerga (2021)	Poorly trained personnel	Undersize of network equipments		Negative impact to household safety and security, access to food and access to social services.
Otcenasova et al. (2019)		Imbalances on the network		Technical loses that have serious financial impacts
Oseni & Pollitt (2015)		Networks not adapted to loads		Financial losses
Diboma & Tatietse (2013)		Poor network materials		Huge losses
Linares & Rey (2013)				Financial losses
Deichmann et al. (2019)	Inefficient energy policies	Electricity supply intensity		Regular interruptions
Minnaar et al.(2017)	Lack of decision for investment	Quality of equipments below standards		Serious interruptions
Chagas et al.(2017)	Lack of investment in preventive maintenance	Low quality network materials installed		Unsteady supply

The statistics of the factors in Table 2 are represented in Figure 6 below.

Figure 6 **Statistics of factors that affect electricity supply interruptions**



(Source: own elaboration)

In this review of previous studies, atmospheric & environmental factors had less academic attention. The majority of the studies where the countries were specified by the authors were Ghana, Nigeria, South Africa, Sri Lanka and the United Kingdom. The studies were a mixture of case studies, quantitative and qualitative studies. Most of the studies conducted in developing countries such as Ghana, Nigeria, Cameroon and Kenya revealed that technological factors were the major factors responsible for electricity supply interruptions (Nduhuura et al., 2021; Diboma & Tamo, 2013; Numbere, Idoniboyeobu & Braide, 2022; Okoree et al., 2021; Adeoye,2022; Nyangwaria & Munene, 2019). In this study, the researcher is curious to investigate and find out why technological factors had less academic attention during the review of previous studies in the developing countries. The study found that human factors contributed also to the problems of electricity interruptions to a significant extent while atmospheric & environmental factors have less impact on the interruption of electricity supply. These factors are elaborated more as found in the review in detail in the next section.

Human factors:

According to Nduhuura, Garschagen & Zerga (2021) there is little attention by most electricity utility companies to improve the reliability of the electricity supply. By implication, electricity supply interruptions also increase when adverse weather conditions increase.

In Ghana, according to Nduhuura, Garschagen & Zerga (2021), electricity interruptions were responsible for serious negative impacts to household safety & security, food access, and social services. In addition, following a case study by Otcenasova et al. (2019), these interruptions as well as imbalances in the network, generate technical losses that have serious financial impacts on electricity utility companies. It follows that when interruptions are not mitigated, huge financial

losses usually become the consequence. Since electricity interruptions do not usually have a periodic and regular pattern, estimating their economic impact becomes difficult. However, according to Colambage (2022), the cost of unserved energy is a basic parameter of economic evaluation in the process of increasing the power system's reliability.

As pointed out by Minnaar et al. (2017), since undistributed energy due to interruptions needs to be minimized, it is required that decisions for electricity power system investment be taken seriously and applied in order to meet the needs of planning and regulatory applications. Therefore in electricity supply networks, in order to prevent interruptions, it is critical for electricity utility companies to quickly identify and localize the source of faults on the grid (Eikeland et al., 2022). This falls in line with the findings of Chagas et el. (2017) in their study titled *"Embedding resilience in the design of the electricity supply for industrial clients"*, which indicated that effective investments in preventive maintenance of electricity networks could enhance the robustness of electricity networks serving consumers.

Technological Factors:

The interruption of electricity supply is one of the indicators for the quality of an electricity distribution system to consumers of electricity which can either be planned or unplanned (Tzvetkova, 2021). There are a number of underlining causes to electricity supply interruptions like increased loads on networks that are not upgraded that cause faults. As pointed by Bassiouny, Shimy & Hamouda (2017) in their study titled *"Impact of Power Transformer Failures on Customer Interruptions Costs Using Customer Damage Functions"* conducted in Egypt, loads on electricity networks were classified into industrial, agricultural, commercial, governmental, and residential loads which all affect electricity networks when increased on networks that are not upgraded, thus resulting into Customer Interruption Costs (CICs) depending on the interruption durations. Onaolapo et al. (2022) underscored the role played by the structure of an electricity supply network on the network reliability, especially, when the network is exposed to varying weather conditions that mostly lead to faults.

There are technical methods in preventing electricity supply interruptions. According to Izadi & Safdarian (2017), electricity interruption can be prevented through several technologies aimed at enhancing supply efficiency and reliability at the distribution level, especially through remote controlled switches (RCSs). As a possible remedy, Onaolapo et al. (2022) opined that Artificial Neural Networks (ANN) have a robust structure that can predict electricity interruptions caused by harsh weather, and thus provide utility companies the possibility for preventive measures against eventual interruptions. Also, as Lehmann et al. (2018) opined, electricity shortages and interruptions can be enhanced through alternative renewable energy sources that reduce harmful. According to Kefale, Getie & Eshetie (2021), another remedy to improve electricity supply efficiency and interruption reduction can be achieved by the interconnection of solar photovoltaic system in radial electricity supply feeders that have no other source of supply. Also the use of generators has become a common backup source of electricity during interruptions from utility supply. According to Kunaifi & Reinders (2018) in their study titled "*Perceived and Reported Reliability of the Electricity Supply at three urban locations in Indonesia",* the findings revealed that about 14% to 65% of the users own a backup generator and that households are willing to pay $3 to $8 extra per monthly electricity bill or $1c–$3c per kWh for improved reliability.

Atmospheric & environmental factors:
According Onaolapo et al. (2022), the change in climate observed today leads to more adverse weather conditions that affect the reliability of electricity networks which is associated with interruptions. In the study on the reliability of electricity supply networks in Ethiopia by Kefale, Getie & Eshetie (2021), it was argued that the interruption of electricity supply is fundamentally a result of overloading and external forces, like trees, that grow close and touch electricity lines, especially in radial distribution networks that have no alternative supply source.

4 DISCUSSION

The need to review published research within the scope of the impact of electricity supply interruptions is important not only for electricity consumers but also for electricity utility companies and governments. This is because, according to Bamkole & Ibeku (2022), countries' economic growth is very dependent on the private sector, which is mostly controlled by SMEs and recognized worldwide as an important tool for economic growth and development. This falls is in line with the findings of Werekoh (2022), underscoring that revenue collected through taxes from SMEs often determines the economic growth and development of countries, which also continue to be one of the most important constituents in managing nationwide income in emerging and developed nations. When SMEs face challenges with a regular supply of electricity due to faults that cause supply interruptions, their productivity gets affected negatively, affecting their growth. Now, the negative growth of enterprises implies negative growth of the private sector and hence negative economic growth of the country. It means, therefore, that electricity consumers, especially, SMEs, are greatly affected in the sense that their businesses cannot easily expand.

The review shows that technological, human, and atmospheric & environmental factors greatly contribute to the interruption of electricity supply in many countries of the world. Regarding faults causing electricity interruptions through technological factors, Nafees et al.(2023) proposed Smart Grid (SG) networks to be the next evolutionary step of reliable and efficient electricity supply networks. Furthermore, according to Melnyk et al.(2020), the concern about unreliable electricity networks has sparked continuous research and interest to combine different renewable sources within Smart Grid networks to provide sustainable solutions. In the study of Tavakoli & Nafar (2020), human errors were found to be a critical factor contributing to unreliable electricity supply networks, leading to the argument of human reliability analysis as a serious element in industries. In line with human factors, Hussain et al.(2023) found in their study that the government's role is indispensable to develop policies that focus on all aspects of power disruption and the people involved, which will involve applicable sanctions. Atmospheric and environmental factors cannot easily be assessed, and their impact cannot be ignored (Coccia, 2021). However, when human and technological factors are well managed, the impact of atmospheric and environmental factors on electricity networks can be mitigated to minimal levels.

CONCLUSION

The study aimed to investigate the factors that impact electricity supply interruptions on SMEs in Cameroon. The study's main findings were that human factors, technological factors, and

atmospheric & environmental factors were responsible for electricity supply interruptions. Furthermore, these factors were found to impact businesses negatively and associated with serious financial losses.

The study's main limitation was that it is only from 2017 that studies started emerging in the area of the impacts of electricity supply interruptions, with the majority of the studies in the year 2021. As a result, very few studies were available before 2017 where factors could be documented in that period.

This study's results are significant to audiences like electricity utility companies and government regulators. From the results of this study, electricity utility companies can recognize the huge financial losses suffered by them and their customers, especially SMEs, and find ways to improve the reliability of their electricity networks. Also, government regulators can base on the results of this study to appreciate the economic impact on the country's economy caused by electricity supply interruptions and devise strategies to help reduce interruptions through policies. Therefore, future research is recommended to focus on electricity interruption prevention strategies by electricity utility companies and government regulators to help boost the sustainability of businesses and the satisfaction of electricity consumers.

DECLARATIONS

A. Funding

The project did not receive any funding.

B. Declaration of Competing Interest

The author declares that no known competing financial interests or personal relationships could have appeared to influence the work reported in this paper.

C. Credit Authorship Contribution Statement

The author: conceptualization, investigation, methodology, analysis, and manuscript writing.

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