MODERATING EFFECTS OF WEATHER CONDITIONS ON THE RELATIONSHIP BETWEEN ELECTRICITY SUPPLY RELIABILITY AND SME SUSTAINABILITY

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ABSTRACT

This paper aims to investigate the moderating effects of weather conditions on the relationship between electricity supply reliability and SME sustainability within the context of a developing country. The method used for analysis is a hierarchical regression with the use of SPSS AMOS 24 and slope analysis. SPSS 23 was used to test the assumptions for parametric analysis. Survey data was collected from a sample of 54 owners and managers of SMEs in the Fako Division of Cameroon. Findings revealed significant positive relationships between electricity supply reliability and SME sustainability and an insignificant positive relationship between weather conditions and SME sustainability. Furthermore, the results indicated that weather conditions moderate the relationship between electricity supply reliability and SME Sustainability in the Fako Division of Cameroon. The study found that the electricity utility company of Cameroon has the daunting task of ensuring a robust electricity supply network capable of withstanding harsh weather conditions to ensure regular electricity. The implications of the findings of the study are that prevailing weather has an influence on the reliability of electricity supply, which affects the operations of businesses. Furthermore, when the business operations of SMEs are affected, the economy of the country suffers significantly. The study recommends the involvement of the government and policymakers to institute measures to ensure the obligation of the electricity utility company to maintain minimal interruptions of electricity supply. This study's contribution to the body of knowledge is embedded in developing a theoretical model that explains electricity supply reliability in Cameroon from a weather perspective.

Keywords: Electricity, Interruptions, Sustainability, Small and Medium Size Enterprises, Electricity interruptions, Economic growth.

JEL CLASSIFICATION: F63, Q01, Q02.

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INTRODUCTION

Small and medium-sized enterprises (SMEs) constitute the backbone of economies around the world, especially as about 85% of businesses fall under their category (Ana et al., 2022). On the one hand, many governments benefit from their taxes, and on the other hand, they offer the majority of employment to people, ranging to about 60% (Mukete et al., 2021). In the African continent, according to Mukete et al. (2021), the proportion of SMEs is estimated at 80%, which offers employment to an estimated 70% of the

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population and contributes about 45% of the GDP. The case of Cameroon stands unique, where the proportion of SMEs among businesses stands at about 90%, which offers employment to above 60% of the population, as well as contributes an estimation of 36% to the country's GDP (Foretia Foundation, 2020). By implication, SMEs are of paramount importance in the drive towards accelerating the economic growth of countries.

There are a number of pillars responsible for the sustainability of every SME. In the case of Cameroon, there is a serious problem with the pillar of the reliability of electricity supply, which is known to involve recurring interruptions ranging from durations of one hour to three days (Ngounou et al., 2017). Besides SMEs, the pillar of reliable electricity supply is generally a necessity in modern life (Rousseau, 2022). SMEs, being major drivers of economies, can only be sustainable in the presence of reliable electricity supply (Hussain et al., 2022). Furthermore, Nyemb & and Olga (2019) emphasized the difficulties in social progress in communities from SME survival if the fundamental pillar of a reliable supply of electricity is absent. In reality, the increase in the demand for electricity on upgraded electricity networks results in network breakdown and interruptions that greatly affect businesses (Arman et al., 2022).

However, the reliability of the electricity supply is affected by many other factors, one of which is greatly dependent on weather conditions that lead to sporadic interruptions that occur suddenly during weather storms with long durations, associated with huge economic impacts for businesses (Qin, Tatjana & Mladen, 2016).

This research aims to investigate the moderating effects of weather conditions on the relationship between electricity supply reliability and SME sustainability within a developing country context. In this regard, our research concerns whether the reliability of electricity supply, moderated by weather conditions, can sufficiently propel SMEs towards achieving sustainability. This will be based on the following research questions (RQs):
RQ1: What is the impact of electricity supply reliability on the sustainability of SMEs?
RQ2: What is the impact of weather conditions on the sustainability of SMEs?
RQ3: What is the moderating effect of weather conditions on the relationship between electricity supply reliability and the sustainability of SMEs?

The structure of this paper consists of six sections. It begins with an introduction to lay a foundation on which the study of the moderation effects of weather conditions on the relationship between electricity supply reliability and SME sustainability is built. The next section of the study is the theoretical background which discusses the theories that inform the study. Next is the empirical literature review that analysis published works of other researchers in this study area. This is followed by the section of the research methodology which describes the philosophical underpinnings of the study, the study design, population, sampling technique, sample size, data collection source, data cleaning, reliability and validity measurements, as well as the test for parametric assumptions. The results section reveals the findings of data analysis, which is followed by the section of discussions that elaborates on the findings before drawing conclusions in the conclusions section.

1 THEORETICAL BACKGROUND

Our study is informed by two theories: the resilience theory (Francis & Bekera, 2014) and the control theory (Doyle et al., 1990).

1.1 The resilience theory

Resilience is all about the ability of a system to overcome disturbances within a short interval of time (Haimes, 2009). This theory was built with the premise of resistance, flexibility and recovery of system elements with provisions for preventive measures that mitigate any possible breakdown in the system (Francis & Bekera, 2014). Within the framework of the resilience theory, systems have: absorptive abilities that enable them absorb system disturbances, adaptive abilities that enable them adapt to system disturbances and recovering abilities that enable them recover from system disturbances (Vugrin et al., 2011).

1.2 The control theory

The control theory is based on the ability of the system in sending back control signals that are compared with reference signals from which modifications and adjustments can be made (Doyle et al., 1990). The theory is about bringing stability to a system by correcting the causes of disruptions (Nyangwaria & Munene, 2019). This is very applicable to electricity networks that are vulnerable to disruptions and abnormalities and adjusted when abnormalities occur (Glad & Ljung, 2014)

The theories can be summarized with the help of the theoretical gap matrix represented in table 1.

Table 1 **Theoretical Gap Matrix**

Variables	**Resilience theory** (Francis & Bekera, 2014)	**Control theory** (Doyle et al., 1990)
System flexibility	√	√
Recovery capacity	√	√
Absorptive capacity	√	x
Adaptive capacity	√	x
Anticipate consequence	√	x
Minimize consequence	√	x
Withstand consequence	√	x
Feedback	x	√
Corrective	x	√

(*Source*: Adapted from Francis & Bekera (2014); Doyle et al. (1990) The theoretical gap matrix above reflects the resilience theory as more applicable to this study)

2 EMPIRICAL LITERATURE REVIEW (HYPOTHESIS DEVELOPMENT)

2.1 Electricity supply reliability and impact on Business Sustainability

Although electricity is important to every consumer of electricity, many countries still face challenges with a continuous supply of it. In most parts of Africa particularly, the quality of electricity supply is even worse due to persistent interruptions (Adeoye, 2021). According to Tzvetkova (2021), these interruptions are either planned due to maintenance works, or unplanned due to unforeseen faults. Many causes account for the interruption of electricity supply, one of which stems from significant supply & demand imbalances on electricity networks (Elie & Assad, 2016). Selective supply of electricity is very linked to chronic interruptions and large system collapse scenarios (Akpeji et al., 2020). This finding fits squarely with the way chronic interruptions are managed in many other countries. Furthermore, according to Otcenasova et al. (2019) interruptions occur as a result of imbalances on the network that generate losses. By implication, electricity companies suffer financially, when the root causes of interruptions are not attended to.

The impact of electricity interruptions affects not just individual businesses, but also households in the area of safety and food supply, as well as the economies of countries in a larger scale (Nduhuura et al., 2021). Besides its negative impacts in business organizations, even medical equipments used in hospitals fail in their operations and thus compromise treatments or survival of patients (BeanId, 2020). Akpeji et al. (2020) also augured that high impact events like power system collapse affect large numbers of customers, often for extended periods. According to Mathewman & Hugh (2014), modern societies and businesses are dependent on an uninterrupted supply of electricity as the continuing sophistication and prevalence of electrical appliances only serves to increase dependence on it, especially as in the digital world, interruptions and disturbances of less than 1 cycle (1/60th second) can have catastrophic effects (Mathewman & Hugh, 2014).

Electricity interruptions come along with severe cost impact. The relationship between the economic impact of electricity interruptions and the costs of the interruptions at the utility and customer level has not been investigated widely. However, in the case of Cameroon (an African country), Dipoma & Tamo (2013) found that the cost of electricity outages is high with average outage cost that varies from €3.62/kWh to €5.42/kWh for electricity shutdowns that last for up to one hour and from 1.96/kWh to €2.46/kWh for shutdowns that last for up to four hours respectively. According to Oseni & Pollitt (2015), financial losses resulting from unmitigated interruptions in Sub Saharan Africa were estimated at US$2.01–23.92 per kWh for firms that mitigated interruptions with alternative ways of generation and from US$1.54-32.46 per kWh for those without alternative ways of generation. These financial losses reflect the situation of most other African countries that suffer from dilapidated electricity networks. In other non-African countries like Lebanon, the losses on the economy of the country resulting from electricity interruption over the period from 2009 to 2014 were estimated at 23.23 billion USD, which began to decline with installation of two supplementary power plants in 2013 as alternative measures to boost electricity supply (Bouri & Assad, 2016). The analysis of Linares & Rey (2013) showed that the cost for the Spanish economy of one kWh of electricity that is unsupplied during interruptions was above €4/Kwh.

There are some possibilities in preventing electricity interruptions. The most important approach lies in energy policies, especially to balance electricity supply intensity that triggers electricity network saturation which leads to network breakdown and interruptions (Deichmann et al., 2019). This requires investments by electricity utility companies to upgrade the electricity networks (Minnaar et al., 2017). Upgrading networks is coupled with strategies to help identify recurrent faults on the network that must be maintained without much delay to prevent subsequent breakdowns (Eikeland et al., 2022). Also, according to Chagas et al. (2017), preventive maintenance demands keen attention to obtain reliable electricity networks that will serve customers satisfactorily. According to Lehmann et al. (2018), the use of renewable energy sources can be used as alternatives to generate electricity, and at same time reduce harmful emissions to the atmosphere. In this regards, Kefale et al. (2021) opined that solar photovoltaic systems are suited to improve electricity reliability by integrating them to networks, while Gupta et al. (2019) underscored the addition of batteries to solar system to boost supply at night when there is no sunshine. Furthermore, according to Kunaifi & Reinders (2018), backup generators can be incorporated in solar hybrid systems to have a more robust electricity supply system with higher reliability.

Therefore, this study hypothesizes that electricity supply reliability is positively associated with the sustainability of SMEs in the Fako Division of Cameroon.

2.2 Weather conditions and impact on SME Sustainability

Extreme weather conditions have significant influences on business operations around the world in a number of ways. Increased frequency of extreme weather events and natural disasters poses a great threat to the sustainability of businesses (Sinan, 2015). As a result of such weather conditions, for instance, sporadic electricity outages occur, which affect businesses by spoiling perishable materials and food, damaging equipment, causing production loss, income loss, health impact, and extra expenses (Qin et al., 2016). Also as underscored by Klinger et al. (2014), it was premised that extreme events (e.g. flooding) in western countries threaten critical infrastructure, including power supplies and that many interlinked systems in the modern world depend on a reliable power supply to function effectively.

Qin et al. (2016) pointed at severe weather conditions as the foundation that brings damages to delivery systems and infrastructures, leading to operational interruptions of businesses. Since sporadic business operational interruptions is now an accepted reality, further studies have been necessary to understand how they apply to consumers, governments and utility companies, as well as how they could be contained and minimized. According to Sinan (2015), the economic worth of a continuous and uninterrupted flow of business operations due to extreme weather events needs proper consideration and analysis. As posited by Abdelgani (2020), extreme weather conditions caused utility companies to adapt so as to be able to withstand extreme conditions. Ricky & William (2001) found that extreme weather conditions bring about damages to businesses, including structural and legal failures, inefficiencies, and diseconomies in power production and distribution that continued to plague California and other areas of the USA.

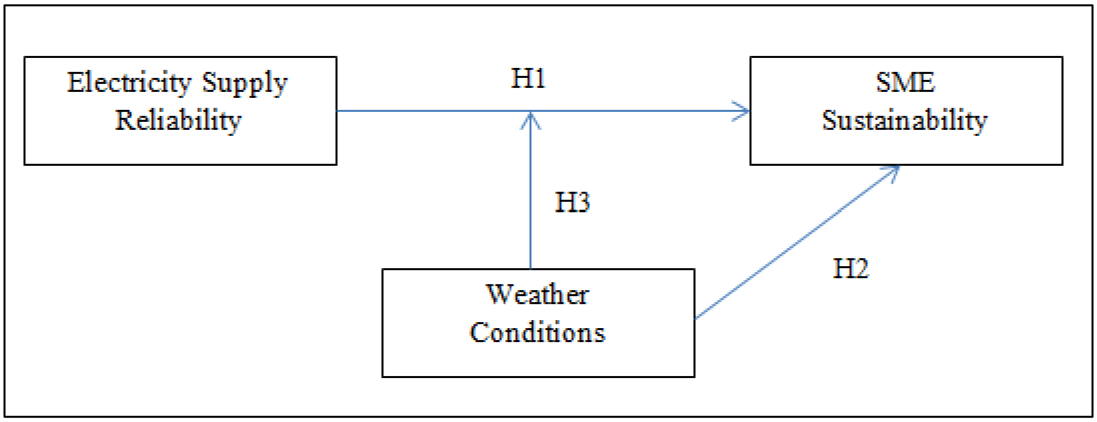
Extreme weather conditions are sometimes associated with thunderstorms and ground flashes that cause damage to networks that supply electricity to homes and businesses (Abdelgani, 2020). Furthermore, Klinger et al. (2014) whether storms were found to impact health at many levels within diverse settings, where the recurrent themes included the difficulties of accessing healthcare, maintaining frontline services and the challenges of community healthcare with 52 power outages identified in 19 countries that were the direct consequence of extreme events during the first three months of 2013.

The study, therefore, hypothesizes that:

- Weather conditions have a moderating effect on the relationship between electricity supply reliability and SME Sustainability in Fako Division of Cameroon.
- Weather conditions are positively associated with the sustainability of SMEs in Fako Division of Cameroon.

Figure 1 illustrates the hypothesized moderating effect of weather conditions on the relationship between electricity supply reliability and SME Sustainability in Fako Division of Cameroon. Moderating effect refers to a situation where an observed variable strengthens, weakens or negates the association between two other variables. The study sought to test the hypothesis that weather conditions affect the sustainability of SMEs, even when there is electricity supply reliability.

Figure 1 **Conceptual model**



(*Source:* own research)

Hypothesis 1 (H1): Electricity supply reliability is positively associated with the sustainability of SMEs in the Fako Division of Cameroon
Hypothesis 2 (H2): Weather conditions are positively associated with the sustainability of SMEs in the Fako Division of Cameroon.
Hypothesis 3 (H3): Weather conditions have a moderating effect on the relationship between electricity supply reliability and SME Sustainability in the Fako Division of Cameroon

3 METHODOLOGY

The source of knowledge accepted for the phenomenon in this study is positivism epistemology (Marti & Fernandez, 2013). The approach of the research is deductive, coupled with a value-free axiology (Gonzalez, 2013). The study employed a descriptive design that adopted a survey strategy to provide answers to the research questions deemed necessary to achieve the objectives of the research. The sampling technique used for the study was purposive and stratified, with a sampling size of sixty five participants, who are managers and owners of SMEs in Fako Division of the south west region of Cameroon.

The questionnaire used for the study was composed of closed ended statements with five (5) Likert scale measurement that ranged from Strongly Agree (SA), Agree (A), Neutral (N), Disagree (D) and Strongly Disagree (SD) (Boone & Boone, 2012). The form of the questionnaire included four sections: a section with the research title, a section with description of the researcher, a section to capture demographic characteristics of respondents and finally, a section with questions which contained fifteen questions. Reliability of the indicators of the research constructs was checked using the Crombach alpha test, with the goal of ensuring that for all constructs, Crombach alpha value $\alpha > 0.6$ (Cronbach, 1951). In order to clean the data and reduce redundancy, both the EFA and CFA analysis are performed (Hurley et al., 1997). Also, the validity of the constructs were tested with the goal of ensuring that the Average Variance Extracted (AVE > 0.5). Furthermore, the assumptions for parametric analysis were tested. This included a test for outliers for the linearity assumption through the boxplots method, the test for Multivariate normality assumption through Q-Q plots, the test for Multicollinearity assumption through the Variance inflation

Factor – VIF /and Tolerance–T and finally, the test for homoscedasticity assumption through scatter plots. The data was analyzed using SPSS and SPSS AMOS by using Statistical inferences and modeling.

4 DATA ANALYSIS AND RESULTS

This study was carried out in 2023 and data was collected between April and June.

4.1 Participants

Participation was voluntary and out of 65 selected participants, 54 responses were received for analysis, representing a response rate of 83%. As seen in table 1, out of the sample, 33 were male (61%) and 21 were female (39%); 37 were married (69%), 16 were single (30%), 01 was divorced (2%). 06 participants were below 25 years (11%); 18 participants were between 26 - 35 years (33%); 06 participants were between 36 - 45 years (11%) and 24 participants were above 45 years (44%)

Table 1 **Demographic characteristics of sample.**

Variable	Count	Percent	Cumulative percent
Gender			
Male	33	61%	61%
Female	21	39%	100%
Marital status			
Married	37	69%	69%
Single	16	30%	98%
Divorced	1	2%	100%
Widowed	0	0%	100%
Age bracket			
Below 25 yrs.	6	11%	11%
26 - 35 yrs.	18	33%	44%
36 - 45 yrs.	6	11%	56%
Above 45 yrs.	24	44%	100%

(*Source:* own research)

Measurement of variables

The instrument used in measuring the three variables and their latent constructs was a survey questionnaire: Electricity supply reliability (Chronic electricity supply interruptions, momentary electricity supply interruptions), weather conditions (thunder storms and ground flashes) and SME sustainability (economic growth). The measurement items for electricity supply reliability were deduced from the different categories of electricity interruptions caused by different origins (Adeoye, 2021) According to Abdelgani (2020), weather conditions are measured by the of occurrence frequencies of thunder storms and ground flashes. SME sustainability is measured through economic growth of the company which is considered to be the increase in the company's value due to profits the business makes in terms of increase in real income (Roser, 2021).

4.2 Data cleaning

Dimension reduction

Exploratory Factor Analysis (EFA) was performed to clean the data through dimension reduction. The retained and rejected indicators are shown in table 2.

Table 2 **Retained and rejected indicators**

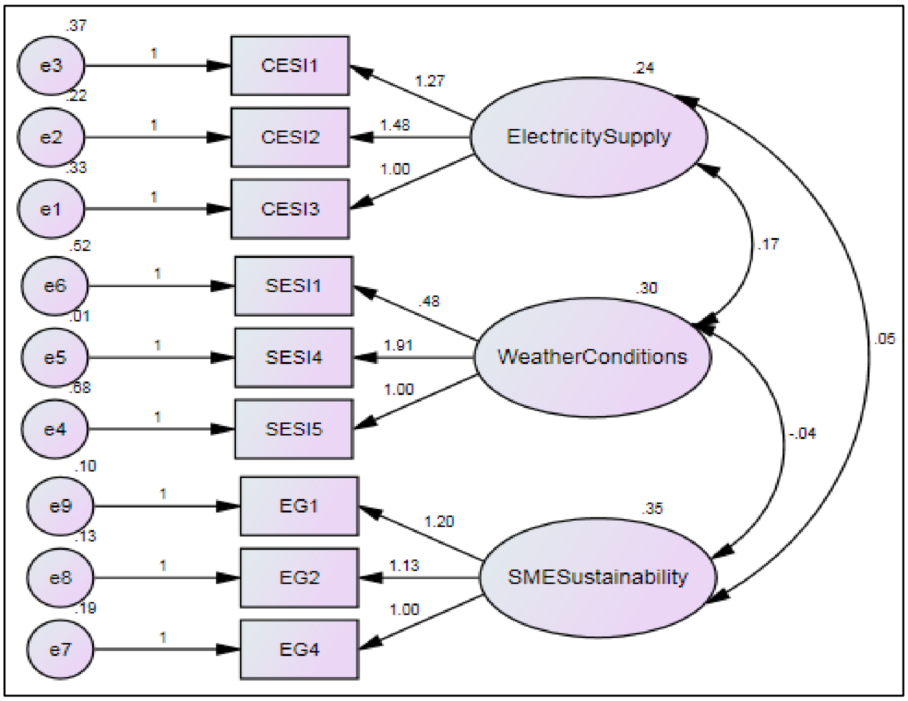
Latent Construct	**Retained Indicators and Factor Loadings**		**Rejected Indicators**
	Retained Indicators	**Factor Loadings**	
WC: Weather Conditions	**WC1:** There are seasons of heavy rains every year that affect electricity supply	0.539	**WC2**: Heavy rains are associated with thunder storms always
	WC4: When utility services are interrupted during heavy rains, it usually takes too long to be reinstated	0.811	**WC3**: During heavy rains electricity supply is always interrupted
	WC5: Interruption of utility services due to heavy rains takes more than one day for it to be reinstated	0.893	
ESR: Electricity Supply Reliability	**ESR1**: It is observed that most wooden poles in the electricity network of are rotten	0.727	**ESR 4:** It is observed that cables burn too often
	ESR2: It is observed that the wooden poles in the electricity network fall too often	0.922	**ESR5:** It is observed that circuit breakers mounted on poles burn too often
	ESR3: It is observed that transformers get bad too often	0.785	
SMES: SME Sustainability	**SMES1:** Electricity interruption impacts business negatively	1.044	**SMES3:** Due to the impact of electricity interruptions, business profit is low
	SMES2: Due to the impact of electricity interruptions, business does not go on smoothly	0.871	**SMES5**: Due to the impact of electricity interruptions on business, its difficult to recruit more workers
	SMES4: Due to the impact of electricity interruptions, some business products always get bad	0.753	

(*Source:* own research)

Confirmatory Factor Analysis

In order to confirm the factor loadings of the retained indicators from the EFA, a Confirmatory Factor Analysis (CFA) model was performed with the use of SPSS AMOS. As it is shown in figure 2, all the regression paths are statistically significant.

Figure 2 **Confirmatory Factor Analysis (Source: SPSS AMOS)**



CHI SQUARE=33.66, DF=24, GFI=0.894, IFI=0.953, TLI=0.924, CFI=0.950, RMSEA=0.087

(*Source:* own research)

Reliability and validity assessment

The indicators of the questionnaire were tested for reliability and validity in order to ensure that the research results were credible. For reliability, the Crombach alpha test was used, with the goal of ensuring Chrombach alpha α > 0.6 for all constructs (Cronbach, 1951). Regarding validity, the Average Variance Extracted (AVE) test was used with the goal of ensuring that the value for AVE > 0.5.

Table 3 **Reliability and validity**

Constructs	**Retained Indicators**	**Factor loadings (EFA)**	**Factor loadings squared**	**Validity(AVE)**	**Reliability**(α)
Electricity supply reliability (ESR)	ESR1	0.727	0.53	AVE = 0.7 > 0.5	α – Cronbach = 0.77 > 0.6
	ESR2	0.922	0.85		
	ESR3	0.785	0.62		
Weather Conditions	WC1	0.639	0.41	AVE = 0.62 > 0.5	α – Cronbach = 0.75 > 0.6

(WC)	WC4	0.811	0.66		
	WC5	0.893	0.80		
SME Sustainability (SMES)	SMES1	1.044	1.09	AVE = 0.81 > 0.5	α – Cronbach = 0.89> 0.6
	SMES2	0.871	0.76		
	SMES4	0.753	0.57		

(*Source:* own research)

Table 3 shows that the reliability test were all within acceptable thresholds for all the study variables since the values for Crombach alpha (α > 0.6). It also shows that the validity test was acceptable since the values for the Average Variance Extracted (AVE >0.5) for all the variables of the study.

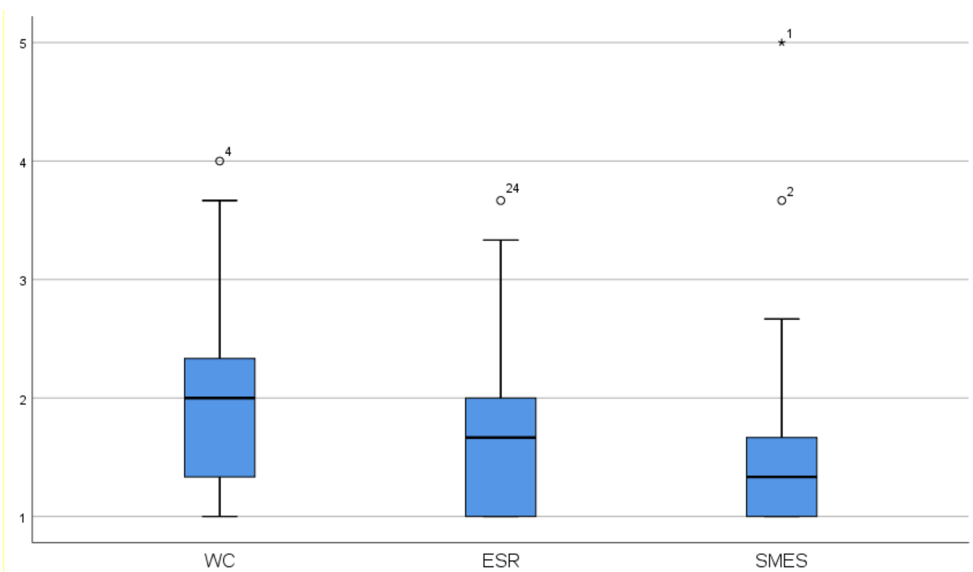
4.3 Regression Analysis

Analysis for Parametric assumptions

In order to ensure reliable results of the hypothesis developed for this study, the tests of all parametric assumptions were first of all carried out.

The assumption for linearity was tested by checking for outliers through the box plots method. Figure 3 shows the presence of outliers for all the variables of the study, which violates the assumption for linearity.

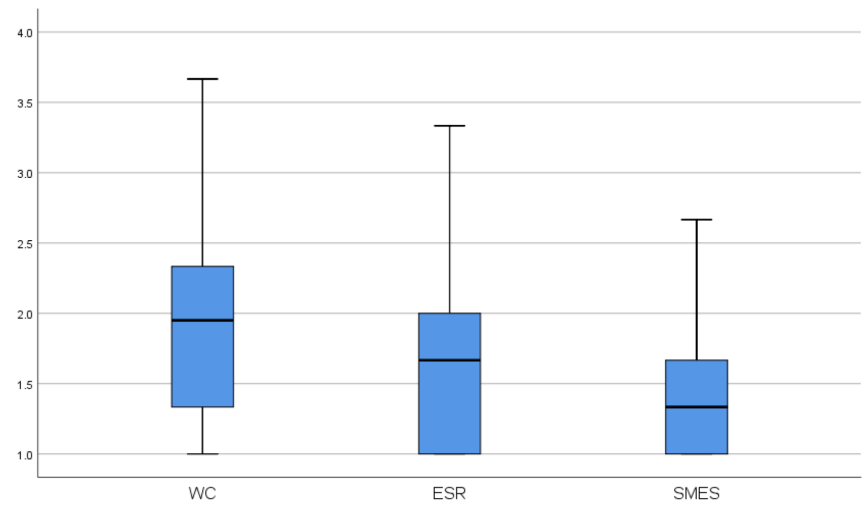
Figure 3 **Identification of outliers through box plots (Source: SPSS)**



(*Source:* own research)

The outliers of all the variables in figure 2 were replaced by their respective means (mean of WC=1.9, mean of ESR=1.7 and mean of SMES=1.4 respectively). Figure 4 shows no more outliers, after their replacements with respective mean in the data distribution.

Figure 3 **Outliers treated through box plots (Source: SPSS)**



(*Source:* own research)

The test for the assumption for Multicollinearity was done through the Tolerance test and the test for the Variance Inflation Factor. The goal was to ensure that the Tolerance [T > 0.1] and the Variance Inflation Factor [VIF < 10]. Table 4 shows that the results were all acceptable

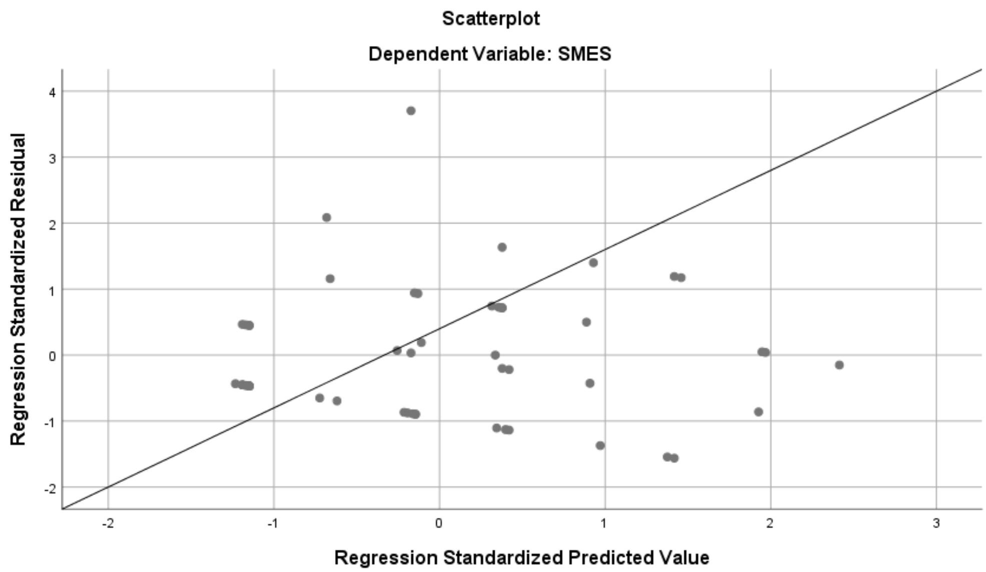
Table 4 **Test of Multicollinearity (Source: SPSS)**

Coefficients[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	0.934	0.168		5.557	0.000		
	WC	-0.010	0.085	-0.017	-0.114	0.910	0.747	1.339
	ESR	0.246	0.090	0.406	2.734	0.009	0.747	1.339
a. Dependent Variable: SMES								

(*Source:* own research)

The homoscedasticity assumption was tested through the method of scatter plots. The goal of this test was to ensure that the variance of the error term is similar across the independent variables which are seen by the distance between the points to the straight line and the shape of the scatter plot.

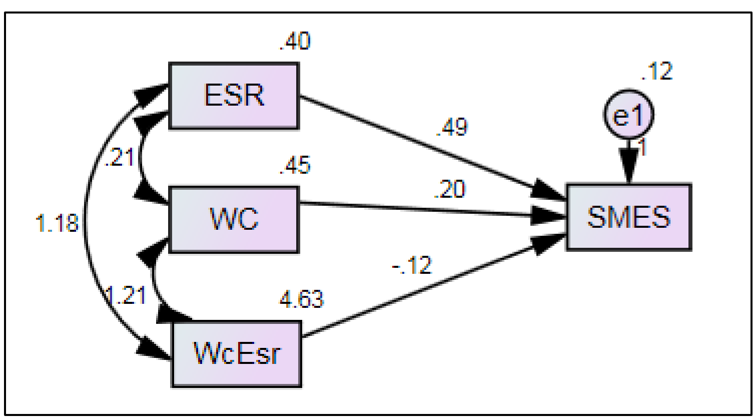
Figure 5 **Test for homoscedasticity (Source: SPSS)**



(*Source:* own research)

As seen in figure 5, the distance between the points and the straight line almost the same and the shape of the scatter plot is tube-like. This criterion presumes that the assumption for homoscedasticity is satisfied.

Figure 6 **Path for moderation analysis (Source: SPSS AMOS)**



(*Source:* own research)

Test of hypotheses

The hierarchical regression analysis was used with the help of SPSS AMOS to test the hypothesis of the study. Structural equation modeling (SEM) was used due to its unique advantage over traditional techniques in the assessment of measurement error. In the first model, electricity supply reliability, weather conditions in the second model and the product of electricity supply reliability and weather conditions in the third model. Beta coefficients from were captured from the regression model and entered into the Mod graph tool to present the relationship between the variables in the form of a graph.

The path for the moderation analysis is shown in figure 6, which includes the path from the independent variable (ESR), the moderation variable (WC) and interaction variable (WcRsr) to the dependent variable.

4 RESULTS

The study assessed the moderating role of weather conditions (WC) on the relationship between Electricity Supply Reliability (ESR) and SME Sustainability (SMES). The results of the hierarchical regression to test the moderating effect are represented in table 5. Firstly, the control variables were entered into the first model, after which the study constructs were added into subsequent regression models until the final model with the interaction term (product of electricity supply reliability and weather conditions) were added.

Table 5 **Moderation Analysis Summary**

Relationship			Beta	S.E.	C.R.	P-Value
SMES	<---	ESR	0.488	0.242	2.016	0.044
SMES	<---	WC	0.197	0.21	0.94	0.347
SMES	<---	WcEsr	-0.12	0.112	-1.073	0.283

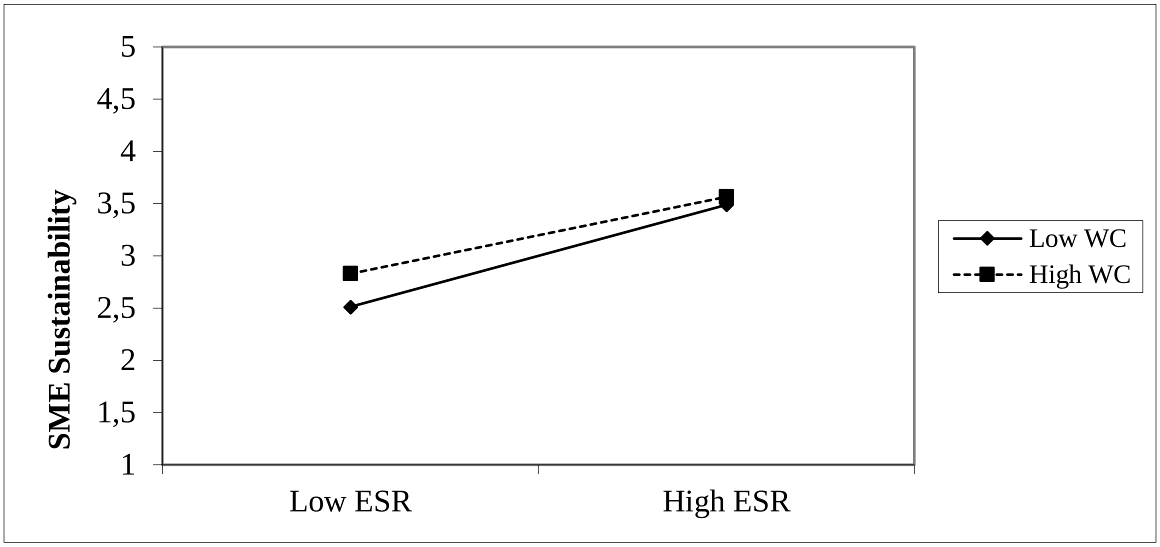
(*Source:* own research)

It was noted in the first model that electricity supply reliability is a significant predictor of SME sustainability (P_value = 0.04 <0.05, β = 0.488), which supported the hypothesis that electricity supply reliability is positively associated with the sustainability of SMEs in Fako Division of Cameroon. In the second model, weather conditions was not a significant predictor to SME sustainability (P_value = 0.34 >0.05, β = 0.197). It was noted that in the third model with the addition of the interaction term, an insignificant impact on SME sustainability was observed (P_value =0.283 > 0.05, β = - 0.12). With the interaction term, the results revealed a negative insignificant moderating impact of WC on relationship between ESR and SMES (Beta = - 1.20, t= -1.073, P-Value = 0.283). Therefore the study supports the hypothesis that "weather conditions have a moderating effect on the relationship between electricity supply reliability and SME Sustainability in Fako Division of Cameroon."

Furthermore, to explore the moderating effect, a graphical illustration through slope analysis was generated (Figure 7).

As seen in figure 6, the dotted line is much steeper for high weather conditions (WC) which shows that at high level of WC, the impact of the independent variable (ESR) on the dependent variable (SMES) is much stronger in comparison to low WC. As the level of WC is increased, the strength of the relationship between ESR and SME Sustainability is decreased. So whether there is high WC or low WC, the strength of the relationship between ESR and SME sustainability is changing.

Figure 6 Slope analysis (Source: www.jeremydawson.co.uk/slopes.htm)



(*Source:* own research)

5 DISCUSSIONS

Consistent with the objectives of this study to investigate the moderating effects of weather conditions on the relationship between electricity supply reliability and SME sustainability in the Fako Division of Cameroon, three findings emerged:

Firstly, the study established significant statistical evidence to suggest that there is an effect of electricity supply reliability on SME sustainability in the Fako Division of Cameroon. This is consistent with the findings of Adeoye (2021), which underscored poor quality of electricity supply with persistent interruptions that hamper the operations of businesses in most parts of Africa. The implication is that SMEs in the Fako Division are able to carry out their operations well when the supply of electricity is reliable. It means also that when the supply of electricity becomes irregular due to interruptions caused by a poor electricity network, the operation of SMEs will be affected negatively, which in turn will negatively affect the economy of the region and Cameroon as a whole. Therefore, to support the operation of businesses in Fako Division and Cameroon in general, the electricity utility company of Cameroon is expected to maintain a regular supply of electricity by ensuring the network does not break down through the existence of overloaded transformers, saturated cables, wrongly sized circuit breakers, rotten wooden poles, etc. which lead to faults that cause interruptions.

Secondly, the study established no significant statistical evidence to suggest that there is an effect of weather conditions on SME sustainability in the Fako Division of Cameroon. The implication is that businesses in the Fako Division operate normally, irrespective of the prevailing weather. It means that both during the sunny and rainy seasons, business operators still go on with their businesses as usual. This is, however in contradiction to realities because, according to the findings of Qin et al. (2016), during harsh weather conditions, some businesses do not operate normally since extreme weather conditions cause sporadic interruptions of utility services that damage equipment and cause production loss, income loss, health impacts, and extra expenses.

Thirdly, the study found that weather conditions were not a significant moderator in the relationship between electricity supply reliability and SME sustainability. Notably, the study found that higher levels of weather conditions weakened the relationship between electricity supply reliability and SME sustainability. In comparison, lower levels of weather conditions strengthened the relationship. In order words, electricity supply reliability in Fako Division is lower when there are high weather conditions like storms and heavy rains and higher when there are low weather conditions. Therefore, the electricity utility company of Cameroon has the task of ensuring a robust electricity supply network capable of withstanding harsh weather conditions to ensure electricity supply during harsh weather. This also calls for the involvement of the government and policymakers to institute measures in ensuring the obligation of the electricity utility company to maintain minimal interruptions of electricity supply through high-quality of electricity network construction on one hand, and on the other hand, through effective preventive and curative maintenance of the networks.

CONCLUSIONS

This study examined the extent to which weather conditions may moderate the relationship between electricity supply reliability and SME sustainability. The study established that in high weather conditions, the relationship between electricity supply reliability and the sustainability of businesses is weakened. This finding is in line with Qin et al. (2016), who found that sporadic electricity interruptions occur during extreme weather events and natural disasters that affect businesses by spoiling perishable materials and damaging equipment, thereby causing heavy losses for companies. Furthermore, the findings of the study are consistent with Sinan (2015), who considered the importance of economic impact on business operators from interruptions caused by extreme weather events. The study's contribution to knowledge is embedded in developing a theoretical model that explains electricity supply reliability in Cameroon from a weather perspective. The study also contributes to the body of knowledge through the moderating role of weather conditions in the relationship between electricity supply reliability and SME sustainability in the Fako Division of the South West Region of Cameroon. The study contributes to the electricity supply reliability discourse that enhances business operations by adopting resilience and control theories to complement models of a regular supply of electricity that are often used. This provides a better theoretical and empirical understanding of SME sustainability in the Cameroonian context. The limitations of the study lie in its methodology. The study involved only a quantitative approach and had no qualitative aspect to deepen the understanding of the quantitative results. Therefore, future research should exploit the strength of mixed methods research to have a holistic understanding of the study phenomenon.

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Felix Tapang: Conceptualization, investigation, methodology, analysis, writing- Original draft preparation.
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