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Adequacy of fire/smoke detective and power backup devices in faculties of Ebonyi State University, Abakaliki

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Abstract
The study investigated into the adequacy of fire/smoke detective devices, and power backup devices in Ebonyi State University faculties. The study was led by two research questions. Twenty (20) faculty buildings from four university main campuses—CAS, PRESCO, Ishieke, and Permanent Campuses—were the study's target population. The study used a descriptive survey approach and did not use sampling. A validated Electrical and Electronics Protective and Safety Device Assessment Checklist of approved Edition of International Electrical Engineers (IEEE STD 3007) Electrical Power Distribution for Buildings was used for data collection. Data was analyzed using frequencies and percentages while Chi-square Goodness-Fit was used to test the null hypotheses. Findings indicated inadequacy of electrical and electronics fire/smoke detective and power backup devices in the faculties of Ebonyi State University. This reveals that the existing electrical safety infrastructure is not sufficient to guarantee optimal safety and protection of lives, equipment, and buildings as well as learning facilities which may expose the university environment to increased risks of electrical faults, fire disasters, equipment damage, and operational disruptions that can negatively affect academic productivity. The study therefore recommends that university management should conduct comprehensive electrical safety audits across all faculties to assess the availability, functionality, and compliance level of protective and safety devices.

Keywords: Adequacy, fire/smoke, power backup devices

Introduction

Achieving a positive sense of well-being among individuals in social and physical surroundings is the focus of the idea of safety. Every setting where electrical and electronic equipment is installed and used must prioritize safety. Even though they are necessary for daily use, electrical and electronic systems can present risks including electric shock, fires, equipment damage, and other mishaps if proper safety precautions are not taken. In order to prevent these hazards and guarantee the safety of people and property, electrical and electronic protective and safety devices must be present and perform properly.

The necessity for thorough safety frameworks has increased due to the complexity of university operations, which includes the use of sophisticated electrical and electronics systems in labs, workshops, libraries, and digital technologies (U.S. Fire Administration, 2021). Therefore, maintaining safety in an academic setting requires both administrative actions like safety training, signage, and routine inspections as well as technical measures like the use of power distribution and switching devices, surveillance and monitoring devices, fire/smoke detective devices, and power backup devices. Institutions that do not put safety first may be more vulnerable to electrical mishaps, equipment damage, fire outbreaks, and even fatalities (Ukim, 2021). In this context, safety is not just a compliance requirement but a strategic necessity for academic success, operational continuity, and the protection of institutional assets which can be achieved through the use of electrical and electronics devices for protection and safety.

The term "protection" describes the methods, tools, or activities used to reduce or eliminate possible risks in order to prevent loss, damage, or injury. "The use of relays and circuit-interrupting devices to detect abnormal conditions and isolate faulty sections in order to safeguard equipment and ensure continuity of supply" is the definition of protection in electrical systems. Furthermore, protection is defined by the International Electrotechnical Commission (IEC, 2017) as the use of devices and systems that are intended to identify errors and automatically start corrective measures to reduce risk and stop damage. It entails taking proactive steps to reduce or eliminate hazards and guarantee the security and well-being of people and infrastructures. In a university setting, protection refers to the deliberate application of systems, tools, and regulations designed to protect people, property, equipment, and data from a variety of threats, especially those resulting from electrical and electronic, environmental, and human-related dangers. Effective protective measures are essential for minimizing disruptions, preventing accidents, and ensuring administrative resilience in contemporary university settings where electrical and electronic devices are widely used in lecture halls, labs, libraries, and faculty administrative blocks in general. In order to maintain the safety of people and infrastructures, protection in university institutions must be approached as both a technical and administrative responsibility. This can be accomplished by using electrical and electronic safety and protective devices.

Electrical devices are equipment or gadgets that transform electrical energy into other forms of energy in order to carry out particular activities. Electrical devices, sometimes referred to as electrical appliances, are equipment that use electricity to carry out particular functions. To carry out their intended tasks, these gadgets transform electrical energy into other types of energy. They are essential to many facets of our everyday existence (Davis, 2018). Gregorio (2022) defines an electronic device as a device that

uses electronics components like resistors, inductors, capacitors, diodes, switches, transistors, and integrated circuits to control the flow of electrons or other electrically charged particles in circuits for information processing and system control. Electronics are designed to improve convenience, safety, and productivity in various sectors, including institutions, healthcare, communication, transportation, and residential environments. Electrical and electronics protective and safety devices play a critical role in ensuring the reliability, safety, and functionality of electrical systems social environments. These devices are designed to prevent electrical hazards such as shocks, fire outbreaks, equipment damage, and system failures by monitoring and controlling irregularities in voltage, current, and environmental conditions. Electrical and electronics protective and safety devices are essential components of any electrical installation, especially in modern buildings, industries, and institutional environments. Their primary role is to detect, prevent, and mitigate electrical hazards such as over current, overvoltage, ground faults, short circuits, electric shocks, and fire outbreaks. These devices are not just protective mechanisms, they are critical for the safe operation, maintenance, and longevity of electrical systems and electronics equipment (Williams, 2019). According to U.S. Department of Housing and Urban Development (2021), the effectiveness of such systems is measured not only by their presence but also by their proper installation, maintenance, adequacy and utilization.

In educational institutions, protection and safety devices such power distribution and switching devices, fire/smoke prevention systems, surveillance and monitoring devices, and power backup devices have become essential. Nevertheless, many institutions continue to struggle with the sufficiency, knowledge, and routine upkeep of these devices despite technical advancements. Accordingly, Ukim (2021) highlighted that staff and student adherence to safety regulations and the sufficiency and regular assessment of safety infrastructures are critical to institutional safety. The degree to which electrical and electronics protective and safety devices are accessible, operational, suitably installed, and able to offer the anticipated degree of protection against electrical faults, hazards, and failures is referred to as their adequacy. In institutional settings, these technologies—which include power distribution and switching devices, fire/smoke protection systems, surveillance and monitoring devices, and power backup devices—are crucial for reducing threats to people, property, and structures (Williams, 2019). The efficiency of a protective system is determined by how well it responds to abnormal electrical circumstances such overcurrent, short circuits, overvoltage, ground faults, and electrical surges. Many buildings in developing nations have antiquated or poorly maintained defensive electrical installations, which leaves them susceptible to equipment damage and fire outbreaks (Okezie and Ogbuagu, 2020). For instance, inadequate shielding can cause serious disruptions and safety issues in educational institutions where electrical equipment is constantly in use. Ukim (2021) emphasized that the level of safety in built environments depends largely on continuous assessment, upgrading of protective systems, and proper risk management strategies. Institutions that prioritize these factors often experience fewer electrical accidents and enjoy a more reliable power infrastructure. As noted by Adewuyi and Okafor (2020), electrical and electronics safety is a shared responsibility that combines engineering control, administrative action, and individual awareness. Therefore, the adequacy of protective devices should be viewed as an integral part of a broader safety culture that aims to safeguard human lives and institutional assets.

A crucial component of institutional safety and infrastructure dependability in a university context is the sufficiency of electrical and electronic protection and safety equipment. It is impossible to overstate the importance of suitable, effective, well-installed, and maintained protection devices in a rapidly growing institution like Ebonyi State University (EBSU), where a variety of academic and administrative activities largely rely on electricity and electronic equipment. When these devices are used appropriately, the university faculty's vital spaces—including libraries, labs, lecture halls, offices, and auditoriums—are shielded from electrical risks that could cause harm or property damage. Adewuyi and Okafor (2020) state that an effective protective system is evaluated based on its functioning, correct installation, accessibility, and adherence to safety regulations in addition to its availability. In Ebonyi State University, while there is evidence of electrical safety devices across several faculties and departments, the adequacy of these devices varies. For instance, some buildings are equipped with modern fire alarm systems and surge protectors, while others rely on outdated or insufficient protective infrastructures. Okezie and Ogbuagu (2020) argue that one of the major issues facing Nigerian public institutions is the inconsistency in the installation and maintenance of protective devices. This inconsistency often results from limited funding, poor safety culture, and lack of periodic audits.

Frequent power spikes at EBSU not only interfere with academic operations but also put delicate equipment like projectors, computers, and lab and workshop equipment at risk. Additionally, staff and student knowledge of safety has an impact on the effectiveness of EBSU's protective mechanisms. Ukim (2021) highlighted the importance of human behavior in maintaining institutional safety, arguing that even the best-installed technologies may malfunction if users are not instructed to react to alerts or follow safety procedures. As a result, EBSU protection needs to be seen as a whole framework that incorporates proper device installation, routine maintenance, and safety instruction. In order to protect people, institutional property, and academic infrastructure from the risks of electrical malfunctions, fires, power surges, and system failures, electrical and electronic protection and safety measures are crucial. According to Williams (2019), electrical safety systems like surge arresters, fire alarms, and isolation/disconnect switches are intended to detect and mitigate electrical hazards before they escalate. The adequacy of these protective measures is crucial for uninterrupted academic operations, data protection, and physical safety in the context of a growing tertiary institution like Ebonyi State University (EBSU). But these instruments alone are insufficient. Their effectiveness also depends on how well they are distributed among university faculty buildings and how quickly they can respond to emergencies.

Recurrent fire occurrences at Nigerian universities in recent years have prompted questions regarding the suitability of electrical and electronic safety and protective equipment in higher education. Electrical problems, shoddy wiring, circuit overloading, and the lack of safety and protective measures

like surge protectors, isolators, working fire alarms, etc. have all been connected to a number of these fire outbreaks. A recent example of this is the University of Ibadan's Queen Elizabeth II Hall, which was completely destroyed by fire in December 2024. According to eyewitness accounts, the outbreak was caused by an electrical malfunction (Punch, 2024). Similar to this, the Senate building of Ahmadu Bello University in Zaria was destroyed by fire in December 2023, which was allegedly caused by a poorly labeled electrical distribution board (Daily Trust, 2023). The University of Jos also had a significant fire in 2016 that destroyed its faculty building and library complex, interfering with exams and resulting in resource loss (Vanguard, 2016). The institution's susceptibility and the need for context-specific evaluation are highlighted by previous reports of fire scares at Ebonyi State University that were linked to the lack and insufficiency of safety and protective equipment (Nwankwo, 2022). Equally, devices like computers, servers, laboratory instruments, digital projectors, and communication systems are highly sensitive to electrical disturbances such as voltage fluctuations, power surges, overloads, and lightning strikes. Without adequate electrical and electronic protective and safety devices, these disturbances can easily damage equipment and lead to the loss of valuable data.

There is little empirical research that specifically assesses the sufficiency of electrical and electronic protective and safety devices within university faculties, especially in Ebonyi State, despite the increasing reliance of universities on electrical and electronic systems for teaching, research, and administration. The types and deployment of protection devices in faculty buildings are not thoroughly evaluated in the majority of current studies. Therefore, the lack of thorough empirical data regarding the sufficiency of electrical and electronic safety and protective equipment at Ebonyi State University faculty buildings is the gap that this study aims to close. By systematically examining the presence, condition, and sufficiency of these devices, the study will provide data-driven insights that can guide university management in improving electrical safety standards, protecting lives and equipment, and ensuring a safer academic environment.

Statement of the problem

The context in which Nigerian universities, such as Ebonyi State University in Abakaliki, operate is one in which investments in electrical and electronic safety and protection infrastructure are not commensurate with the rising demand for power and electronic equipment. Due to poor maintenance procedures, outdated installations, a lack of safety awareness, and a lack of funding for device purchases, many higher education institutions, especially those in developing nations, suffer from inadequate device provision. Recurrent fire occurrences in Nigerian universities in recent years have prompted questions about the suitability of electrical and electronic safety and protective equipment. The National Fire Protection Association states that one of the main causes of building fires in academic buildings is electrical malfunctions and the lack of electrical and electronic devices. The lack of protective and safety devices may also expose users to the risk of electrocution, damage of valuable laboratory equipment, loss of data, disruption of academic activities, and significant financial losses to the institution. The adequacy of electrical and electronic protective and safety devices within institutions is sometimes overlooked, despite the significance of electrical safety in academic settings. The efficiency of various current devices in preventing electrical disasters may be diminished in certain situations due to their obsolescence, insufficiency, or poor maintenance. Thus, the uncertainty around the suitability of electrical and electronic safety and protective devices at the faculties of Ebonyi State University is the study's concern. The institution may continue to be susceptible to electrical dangers that could endanger lives, cause property damage, and interfere with academic operations if these safety devices are not properly evaluated. Therefore, the purpose of this study is to ascertain whether the faculties of Ebonyi State University have adequate electrical and electronic safety and protective equipment.

Objectives of the study

The study determined:

1. the adequacy of fire/smoke detective devices in faculties of Ebonyi State University.
2. the adequacy of power backup devices in faculties of Ebonyi State University.

Research questions

The following research questions guided the study:

1. How adequate are the fire/smoke detective devices in faculties of Ebonyi State University?
2. How adequate are the power backup devices in faculties of Ebonyi State University?

Hypotheses

The following hypotheses were tested at 0.5 level of significance.

$H0_3$: The adequacy of fire/smoke protective and safety devices in faculties of Ebonyi State University did not deviate significantly from the approved standard number of devices.

$H0_4$: The adequacy of power backup devices in faculties of Ebonyi State University did not deviate significantly from the approved standard number of devices.

Methodology

The descriptive survey research design was used in the study. Because the study aims to gather comprehensive data regarding the current state of electrical and electronic safety equipment without changing any variables, a descriptive survey approach was suitable. Twenty (20) faculty buildings from the four main campuses of the university—CAS, Ishieke, Presco, and Permanent Site—make up the study's population. These faculty buildings included all of the rooms and halls found on the main university campuses, including 129 lecture halls, 652 offices, 35 labs and workshops, 13 auditoriums, and 27 libraries. The population was not sampled by the researcher. The researcher discovered that it was more practical and accurate to examine every unit within the population, thus all of the faculty buildings that made up the population were examined in their entirety. This made sampling unnecessary and guaranteed that all pertinent data was recorded. The Electrical and Electronic Protective and Safety Device Assessment Checklist (EEPSDAC) has been verified. The EEPSDAC checklist was created to gather pertinent data regarding the suitability of electrical and electronic safety

and protective devices installed in the several buildings of the faculties of Ebonyi State University that are the subject of the study. Percentages were used to classify, categorize, and summarize the completed checklists. The total number of buildings and number of devices were used to determine the percentage of adequacy of electrical and electronic protective and safety devices. In the sense that percentages close to 100% and above indicate adequacy and compliance with IEE safety standards while percentages below 50% indicates inadequate provision of electrical and electronic protective devices. The chi-square of independence was employed to test the hypotheses at a 0.05 level of significance.

Results

Research Questions

Table 1: Percentage analysis of adequacy of fire/smoke detective devices in faculties of Ebonyi State University

Items	N0 of Buildings	N0 of Expected Devices	N0 of Observed Devices	% of Availability	Decision
21.SmokeDetector	20	400 – 600	30	6%	Inadequate
22.Heat Detector	20	60 – 100	0	0%	Nil
23.Flame Detector	20	20 – 60	0	0%	Nil
24.Fire Alarm System (Panel & Sirens)	20	300 – 500	17	4%	Inadequate
25.Manual Call Point (Break Glass Unit)	20	200 – 300	0	0%	Nil
26. Fire Sprinkler System	20	800 – 1600	0	0%	Nil
27.Fire Extinguisher	20	500 – 800	151	23%	Inadequate
28.Fire Blanket	20	80 – 120	0	0%	Nil
29.Emergency Exit Sign / Light	20	300 – 500	17	4%	Inadequate
30.Gas Leak Detector	20	60 – 120	0	0%	Nil

Source: Researcher's field work (2026)

Table 1 revealed that fire/smoke detective devices in faculties of Ebonyi State University were inadequate with items 21 to 30 ranked below benchmark such as smoke detector ranked 6%, heat detector 0%, flame detector 0%, fire alarm systems 4% manual call point 0%, fire sprinkler system 0%, fire extinguisher 23%, fire blanket 0%, emergency exit sign/light 4% and gas leak detector ranked 0%.

Table 2: Percentage analysis of adequacy of power backup devices in faculties of Ebonyi State University

Items	N0 of Buildings	N0 of Expected Devices	N0 of Observed Devices	% of Availability	Decision
31.Uninterruptible Power Supply (UPS)	20	120 – 200	49	31%	Inadequate
32.Inverter	20	20 – 60	12	30%	Inadequate
33.Generator (Standby or Portable)	20	20	22	110%	Adequate
34.Battery Bank	20	20 – 40	10	33%	Inadequate
35.Solar Power System (with Battery Storage)	20	20	5	25%	Inadequate
36.Automatic Transfer Switch (ATS)	20	20 – 40	20	67%	Inadequate

Source: Researcher's field work (2026)

Table 2 revealed that power backup devices in faculties of Ebonyi State University were inadequate with only item 33(standby or portable generator) ranking 110% which indicated adequate and compliance with IEE safety standards while items 31(uninterruptable power supply), 32(inverter), 34 (battery bank), 35(solar power system with battery storage) and 36 (automatic transfer switch) ranking 31%, 30%, 33%, 25% and 67% respectively showed inadequate provision of devices.

Hypotheses

Table 3: Chi-square result of the adequacy of fire/smoke detective devices in faculties of Ebonyi State University compared to the approved standard number of devices

Items	*O*	*E*	*(O – E)*	*$(O-E)^2$*	*$\frac{(O-E)^2}{E}$*	*X^2. Cal.*	*df*	*X^2. Crit.*	*Decision*
21.Smoke Detector	30	500	-470	220900	441.80	3218.32	9	16.92	Reject H0
22.Heat Detector	0	80	-80	6400	80.00				
23.Flame Detector	0	40	-40	1600	40.00				
Fire Alarm System (Panel & Sirens)	17	400	-383	146689	366.72				
25.Manual Call Point (Break Glass Unit)	0	150	-150	22500	150.00				
26.Fire Sprinkler System	0	1200	-1200	1,440,000	1200.00				
27. Fire Extinguisher	151	650	-499	249,001	383.08				
28.Fire Blanket	0	100	-100	10,000	100.00				
29. Emergency Exit Sign/ Light	17	400	-383	146689	366.72				
30.Gas Leak Detector	0	90	-90	8,100	90.00				

Source: Researcher's field work (2026)

The result in Table 3 above indicated that $X^{2.}$ Cal. value of 3218.32 was higher than X^2Crit. Value of 16.92at 0.05 level of significance and degrees of freedom 9 revealed that fire/smoke protective and safety devices significantly deviated from the approved standard number of devices.

Therefore, the null hypothesis which stated that adequacy of fire/smoke protective and safety devices in faculties of Ebonyi State University did not deviate significantly from the approved standard number of devices was rejected.

Table 4: Chi-square result of the adequacy of power backup devices in faculties of Ebonyi State University compared to the approved standard number of devices

Items	*O*	*E*	*(O – E)*	*(O – E)²*	$\frac{(O-E)2}{E}$	*X². Cal.*	*df*	*X². Crit.*	*Decision*
31.Uninterruptible Power Supply (UPS)	49	160	-111	12,321	77.01	124.72	5	11.07	Reject H0
32. Inverter	12	40	-28	784	19.60				
33.Generator (Standby or Portable)	22	20	2	4	0.20				
34. Battery Bank	10	30	-20	400	13.33				
35. Solar PowerSystem (with Battery Storage)	5	20	-15	225	11.25				
36. Automatic Transfer Switch (ATS)	20	30	-10	100	3.33				

Source: Researcher's field work (2026)

The result in Table 4 above indicated that $X^{2.}$ Cal. value of 124.72 was higher than X^2Crit. Value of 11.07 at 0.05 level of significance and degrees of freedom 9 revealed that power backup devices significantly deviated from the approved standard number of devices. Therefore, the null hypothesis which stated that adequacy of power backup devices in faculties of Ebonyi State University did not deviate significantly from the approved standard number of devices was rejected.

Discussions

The finding that fire and smoke detection devices in the faculties of Ebonyi State University are inadequate indicates a significant weakness in the institution's fire safety and emergency preparedness infrastructure. Fire and smoke detection systems are essential components of building safety because they provide early detection of combustion products and trigger alarm notifications that enable timely evacuation and emergency response (Ali, Singh, Sharma, Shadab & Ahmed, 2023; Society of Fire Protection Engineers (SFPE, (2023). These systems typically consist of detection sensors (e.g., smoke and heat detectors), alarm notification systems, and control panels that coordinate fire safety responses across the university facility. The inadequacy of these devices implies that some faculty buildings may lack sufficient detector coverage, functional alarms, or properly maintained systems. Poor coverage or malfunctioning detection devices can create blind spots where fires develop unnoticed and significantly increases the risk of fire spread. Similarly, aging or poorly maintained fire detection systems may fail during emergencies, which can have devastating consequences in densely occupied environments such as lecture halls and laboratories. From a safety and risk-management perspective, early fire detection is critical because it allows occupants to evacuate quickly, reduces property damage, and enables faster emergency response. Research shows that university buildings equipped with fire detectors and automated fire safety systems experience lower fire spread and injury risk compared with buildings without such systems. The inadequacy observed in EBSU faculties may also reflect broader trends seen in other public institutional buildings where fire safety equipment is insufficient, non-functional, or poorly maintained. Similarly, empirical studies of building fire safety compliance have shown that large proportions of facilities operate with missing or non-functional smoke detectors and alarm systems, resulting in serious safety and emergency preparedness risks. Furthermore, global fire safety frameworks emphasize that functional fire detection systems significantly reduce fire-related fatalities. According to fire safety research supported by the National Fire Protection Association (NFPA) (2024), working smoke alarms can reduce fire-related death risk by approximately 60%, highlighting the life-saving importance of these devices. In the context of Ebonyi State University, the inadequacy of fire and smoke detection devices suggests potential exposure of staff, students, and infrastructure to fire hazards. This condition may result from factors such as aging infrastructure, insufficient funding for safety upgrades, lack of routine inspection and maintenance, or weak enforcement of fire safety regulations. If not addressed, these deficiencies could compromise teaching, research operations, and overall campus safety. Therefore, this finding implies an urgent need for installation of adequate fire detection coverage, periodic inspection and maintenance, staff safety training, and strict compliance with fire safety standards and codes. Strengthening these systems will enhance life safety and improve institutional resilience to fire emergencies.

The inadequacy of power backup devices in the faculties of Ebonyi State University indicates a gap in ensuring continuity of electrical supply required for effective academic, research, and administrative operations. Power backup devices such as standby generators, uninterruptible power supply (UPS) systems, battery storage systems, and hybrid solar backup systems are designed to maintain electricity supply during grid outages and protect sensitive equipment from power disturbances. The inadequacy of these devices suggests that some faculty buildings may lack sufficient backup capacity, functional systems, or properly maintained equipment to support academic activities during power interruptions. Reliable backup power systems are essential in educational institutions because uninterrupted electricity supply is necessary to sustain teaching, research, and institutional operations. Studies on backup generator performance in educational institutions emphasize that backup systems are necessary to prevent disruption of academic activities and operational processes during outages. Furthermore, research on power supply reliability in Nigerian universities shows that frequent outages significantly affect academic performance, project completion, and overall productivity. For instance, studies found that a high percentage of students' experience regular outages that negatively affect academic outcomes and increase stress and project delays, demonstrating the critical importance of reliable backup and alternative power systems in tertiary institutions (Alshaalan, 2024). From an engineering perspective, backup power devices such as UPS systems are particularly important for sensitive and critical loads, including laboratory equipment, workshop facilities etc. Even brief disturbances in electricity supply can lead to equipment malfunction, data loss, or costly operational interruptions, highlighting the necessity of backup systems to stabilize supply and ensure continuity. Additionally, emergency backup generators are widely recognized as essential for maintaining uninterrupted operations in critical facilities. Poor maintenance or inadequate backup capacity

can result in total operational failure during outages, leading to financial losses, equipment damage, and service disruptions. In the broader Nigerian context, unreliable electricity supply has been shown to negatively affect staff productivity, research development, and service delivery in universities. This reinforces the importance of adequate backup power infrastructure as part of institutional performance and operational sustainability strategies. In relation to Ebonyi State University, the inadequacy of power backup devices may be linked to insufficient funding for electrical upgrades, increasing load demand due to expansion of facilities, or inadequate maintenance practices. If left unaddressed, this condition may result in frequent academic disruptions, reduced lifespan of electrical equipment, compromised research output, and increased operational costs. The finding implies an urgent need for capacity upgrade of backup systems, installation of modern backup technologies, periodic maintenance, load assessment studies, and integration of renewable backup solutions. Strengthening backup power systems will improve reliability, enhance safety, and support sustainable academic and research activities within the university environment.

Conclusion

It can be concluded that the current electrical safety infrastructure is insufficient to ensure the best possible protection of people, equipment, buildings, and educational materials based on the findings showing inadequate electrical and electronics protective and safety devices in the faculties of Ebonyi State University. The university environment is more vulnerable to electrical problems, fire outbreaks, equipment damage, and operational disruptions due to the insufficiency of vital devices like fire/smoke detectives, power backup devices, surveillance, and monitoring devices. The situation suggests gaps in installation standards, maintenance practices, system capacity planning, and safety compliance. Inadequate protection measures can have a detrimental impact on academic productivity, raise operating costs, and jeopardize institutional safety in an academic setting where electrical systems support teaching, research, laboratory experimentation, and digital learning infrastructure. Comprehensive electrical safety upgrades, routine inspection and maintenance programs, appropriate device selection and installation, and rigorous adherence to pertinent electrical safety standards and regulations are therefore necessary. By fixing these flaws, Ebonyi State University will increase system dependability, strengthen safety culture, safeguard institutional assets, and promote long-term academic and research endeavors.

Recommendations

1. The university management should conduct comprehensive electrical safety audits across all faculties to assess the availability, functionality, and compliance level of protective and safety devices. This will help identify faulty, obsolete, or missing devices and guide replacement and upgrade plans.
2. There should be systematic upgrading and standardization of electrical and electronics protective devices such as power distribution and switching devices, surveillance and monitoring devices in line with recognized national and international electrical safety standards.
3. The university should establish structured preventive maintenance schedules for all electrical installations and protective devices. Regular testing, servicing, and calibration will ensure continuous functionality and reduce unexpected system failures.
4. Management should invest in adequate backup power systems (such as generators, UPS systems, and renewable energy backup solutions) integrated with protective devices to ensure continuity of power supply and protection of sensitive equipment during outages.
5. Regular training programs should be organized for technical staff, laboratory personnel, and facility managers on electrical safety practices, operation of protective devices, emergency response procedures, and hazard identification.
6. The university should develop and enforce strict electrical safety policies, including mandatory compliance checks during installation, renovation, and expansion of faculty buildings. Regulatory compliance monitoring units should be established to ensure adherence to electrical safety standards.

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