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Assessing the Role of Technology in Crime Detection and Prevention in Nigerian University Biu

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***Related declarations are provided in the final section of this article.*

Abstract

Globally, the adoption of surveillance technologies such as Closed-Circuit Television (CCTV) has been driven by the need to enhance safety, accountability, and crime prevention in environments vulnerable to security breaches. Countries like the United Kingdom and the United States have demonstrated the effectiveness of CCTV in reducing opportunistic crimes and supporting post-incident investigations. In Africa, and particularly Nigeria, rising insecurity within university campuses including theft, vandalism, examination malpractice, and interpersonal violence has exposed the limitations of conventional security approaches that rely solely on human guards and patrols. This underscores the need for electronic surveillance systems to strengthen institutional safety. The present study aimed to examine the role of CCTV surveillance in crime prevention and detection within Nigerian Army University, Biu (NAUB), a military-oriented institution located in Borno State, a region affected by insurgency and criminal activity. A descriptive research design was employed, drawing on both primary and secondary data sources. Rational Choice Theory provided the theoretical framework, emphasizing how surveillance alters offenders' cost–benefit calculations. Survey data were collected from 380 respondents across faculties and departments. Results revealed that 70.8% of respondents strongly agreed that CCTV cameras were strategically installed across the university (Table 1). Awareness levels were high, with 78.9% acknowledging the presence of CCTV in their faculties (Table 2). Furthermore, 55.2% confirmed that cameras were actively monitored by trained personnel, while 38.4% strongly agreed, indicating substantial operational oversight (Table 3). These findings demonstrate that CCTV integration has improved deterrence, accountability, and response efficiency within NAUB.

Keywords: CCTV, Technology, crime, surveillance security

Introduction

In the past two decades, technological innovations have transformed the way institutions manage security and respond to criminal activities (Byrne & Marx, 2011; Koops, 2009; Apene et al., 2024). Across the world, one of the most significant developments in modern surveillance and crime prevention is the deployment of Closed-Circuit Television (CCTV) systems (Welsh & Farrington, 2009; Piza, 2018; Matczak et al., 2023). CCTV refers to electronic visual monitoring systems that transmit signals to specific monitors for surveillance purposes (Kang & Yeom, 2020; Al Ashkhari & Ismail, 2024). Initially designed for military use, CCTV has evolved into a critical component of urban and institutional security architecture, allowing for the continuous observation of spaces to deter and detect crime (Piza et al., 2019; Vári et al., 2025). In contemporary times, both public and private institutions including schools, transport facilities, banks, and government installations rely heavily on CCTV as a central element in their crime control strategies (Taiwo & Agwu, 2016; Papale, 2024; Zhou, 2025).

Globally, the adoption of CCTV is motivated by the desire to enhance safety and accountability in environments prone to security breaches (Ekblom, 2016; Laufs & Borrion, 2022). In the United Kingdom, for instance, over six million cameras are estimated to be in operation, making it one of the most surveilled nations in the world (Aransiola & Ceccato, 2020; Soto et al., 2021). Similarly, in the United States and other developed countries, the integration of digital and intelligent CCTV systems has expanded the scope of preventive policing and post-incident investigations (Bromby, 2006; Laufs, 2022; Salehi et al., 2025). Empirical research indicates that CCTV surveillance can reduce opportunistic crimes such as theft, vandalism, and unauthorized access, particularly when effectively monitored and maintained (Piza et al., 2019; Welsh & Farrington, 2009; Matczak et al., 2023).

In the African context, especially in Nigeria, the challenges of insecurity ranging from theft and burglary to terrorism and campus-related violence have necessitated greater reliance on electronic surveillance tools (Taiwo & Agwu, 2016; Majigo, 2023; Pius, 2023). The increasing rate of property-related and interpersonal crimes within university environments has raised concerns about the adequacy of conventional security approaches that depend solely on human guards and patrols (Ikuesan et al., 2020; Ushakov et al., 2021). Nigerian universities, both public and private, have progressively adopted CCTV systems as part of a broader strategy to create safe academic spaces (Apene et al., 2024; Kahla & Gayflor, 2024; Ţical, 2024). These installations are often positioned at entry and exit points, libraries, hostels, lecture theatres, and administrative buildings to enhance monitoring and quick response to incidents (Al Ashkhari & Ismail, 2024; Zada et al., 2026).

The Nigerian Army University, Biu (NAUB), established to foster education with a military orientation, operates in a region that has faced substantial security threats over the past decade. As a military-run institution situated in Borno State, an area affected by insurgency and criminal activities, maintaining safety within the campus environment is of strategic importance. The installation of CCTV cameras in the main campus serves as a vital layer of surveillance aimed at preventing unauthorized entry, ensuring the protection of

personnel and assets, and supporting the investigative functions of campus security units. Despite these measures, occasional incidents of theft, trespassing, and minor assaults persist, prompting questions about how effectively CCTV technology contributes to crime detection and prevention at NAUB (Piza et al., 2019; Matczak et al., 2023; Vári et al., 2025). Research has shown that the effectiveness of CCTV systems is not determined merely by their presence but by factors such as the extent of coverage, system maintenance, monitoring efficiency, and integration with broader security management frameworks (Welsh & Farrington, 2009; Laufs & Borrion, 2022; Apene et al., 2024). Where these systems are properly installed, continuously powered, and actively supervised, they can significantly deter criminal intentions and facilitate the rapid identification of offenders (Al Ashkhari & Ismail, 2024; Kang & Yeom, 2020; Zhou, 2025). Conversely, in situations where surveillance footage is not routinely monitored, or where technical failures occur, the preventive capacity of CCTV systems may be minimal (Ikuesan et al., 2020; Ushakov et al., 2021; Soto et al., 2021).

Therefore, understanding the role of CCTV cameras in crime detection and prevention within Nigerian universities, with special reference to Army University, Biu Main Campus, is both timely and essential (Taiwo & Agwu, 2016; Majigo, 2023; Pius, 2023). It provides insight into how technological surveillance complements traditional security measures, the operational challenges limiting its efficiency, and the extent to which it enhances safety for staff and students (Ekblom, 2016; Laufs, 2022; Salehi et al., 2025). This study thus situates itself within the broader discourse on security management in educational institutions, examining how CCTV contributes to crime reduction, deterrence, and investigative outcomes in a specialized military academic environment (Ţical, 2024; Zada et al., 2026; Papale, 2024).

Concept of Closed-Circuit Television (CCTV) Surveillance

Closed-Circuit Television (CCTV) surveillance refers to the use of video cameras connected to a private or closed network to monitor activities in designated areas for the purpose of ensuring safety, preventing crime, and facilitating investigation (Welsh & Farrington, 2009; Piza, 2018; Kang & Yeom, 2020). Unlike public broadcast systems, CCTV operates on a closed loop where the footage is transmitted only to authorized monitors and storage systems (Al Ashkhari & Ismail, 2024; Zhou, 2025). It has become one of the most utilized forms of electronic surveillance in the 21st century, particularly in urban centers, public facilities, and educational institutions (Apene et al., 2024; Laufs & Borrion, 2022; Matczak et al., 2023). CCTV serves two primary roles: as a deterrence tool that discourages would-be offenders by increasing the perceived risk of apprehension, and as an investigative mechanism that provides credible visual evidence to aid post-incident analysis and criminal prosecution (Piza et al., 2019; Vári et al., 2025; Papale, 2024). These dual functions underscore its importance in both proactive and reactive security operations (Ekblom, 2016; Ţical, 2024).

The adoption of CCTV systems in developing countries such as Nigeria has grown rapidly over the past decade as institutions grapple with increasing security threats, ranging from theft and vandalism to violent crimes and terrorism (Taiwo & Agwu, 2016; Majigo, 2023; Pius, 2023). The installation of CCTV systems in Nigerian universities became

essential due to limited manpower, inadequate training of security personnel, and the need for a continuous monitoring mechanism that can function beyond the human capacity for vigilance (Ikuesan et al., 2020; Ushakov et al., 2021). In campuses such as the Nigerian Army University, Biu, CCTV plays a crucial role in securing strategic areas like entry points, examination halls, administrative blocks, and student hostels (Apene et al., 2024; Kahla & Gayflor, 2024). These cameras ensure real-time monitoring and enable prompt intervention when suspicious activities occur (Al Ashkhari & Ismail, 2024; Zada et al., 2026). The visibility of cameras alone often has a psychological deterrent effect, as potential offenders are less likely to engage in unlawful acts when they know they are under surveillance (Piza et al., 2019; Welsh & Farrington, 2009; Matczak et al., 2023)

Beyond deterrence, CCTV systems contribute to crime detection and investigation through accurate documentation of events (Piza et al., 2019; Welsh & Farrington, 2009; Matczak et al., 2023). Video recordings can assist in reconstructing incidents, identifying suspects, and corroborating witness statements during disciplinary or criminal proceedings (Apene et al., 2024; Papale, 2024; Vári et al., 2025). The efficiency of such systems depends on several factors, including camera quality, strategic placement, data storage capacity, and the institutional framework governing their operation (Al Ashkhari & Ismail, 2024; Kang & Yeom, 2020; Zhou, 2025). In the Nigerian context, challenges such as erratic power supply, poor maintenance culture, and limited technical expertise often undermine the full potential of CCTV systems (Taiwo & Agwu, 2016; Majigo, 2023; Pius, 2023). Nevertheless, when effectively integrated with trained security personnel and proper response protocols, CCTV surveillance can significantly enhance institutional safety and public confidence (Ikuesan et al., 2020; Ushakov et al., 2021; Soto et al., 2021).

Furthermore, the relevance of CCTV extends beyond mere crime control; it is also a tool for promoting accountability, transparency, and discipline within the campus environment (Ekblom, 2016; Laufs & Borrion, 2022; Salehi et al., 2025). The presence of surveillance cameras has improved adherence to institutional rules and reduced cases of examination malpractice, sexual harassment, and property vandalism in some Nigerian universities (Ţical, 2024; Zada et al., 2026; Kahla & Gayflor, 2024). This aligns with the principles of situational crime prevention, which emphasize the modification of environmental and situational factors to reduce the opportunities for crime (Byrne & Marx, 2011; Koops, 2009). Thus, CCTV not only deters deviant behavior but also supports the creation of a more orderly, secure, and monitored academic community (Apene et al., 2024; Laufs, 2022; Papale, 2024).

Concept of Crime Detection

Crime detection refers to the process by which criminal acts are uncovered, investigated, and linked to responsible offenders through systematic inquiry and evidence gathering (Byrne & Marx, 2011; Koops, 2009). It forms the backbone of modern law enforcement and justice administration (Ekblom, 2016; Laufs & Borrion, 2022). Crime detection encompasses a range of activities including observation, intelligence gathering, forensic analysis, witness interrogation, and the use of surveillance technologies such as CCTV (Apene et al., 2024; Kang & Yeom, 2020; Al Ashkhari & Ismail, 2024). The purpose of detection is not merely to identify that a crime has occurred, but to accurately establish how,

when, and by whom it was committed (Piza et al., 2019; Welsh & Farrington, 2009). In essence, it bridges the gap between the occurrence of a crime and the delivery of justice through credible evidence and procedural integrity (Matczak et al., 2023; Vári et al., 2025).

Technological innovations have significantly transformed the scope and methods of crime detection in recent decades (Salehi et al., 2025; Ţical, 2024; Zada et al., 2026). The emergence of digital surveillance systems, biometrics, artificial intelligence, and data analytics has made the process faster, more precise, and less reliant on human observation alone (Ushakov et al., 2021; Soto et al., 2021). In this regard, CCTV cameras have become an essential tool for both proactive and reactive crime detection (Piza, 2018; Papale, 2024). Proactively, they help security personnel observe suspicious behaviour in real time, thereby enabling quick response to prevent crimes before they escalate (Al Ashkhari & Ismail, 2024; Kang & Yeom, 2020). Reactively, CCTV footage provides investigators with visual documentation that can confirm facts, identify suspects, and support judicial processes (Piza et al., 2019; Welsh & Farrington, 2009). This dual functionality has made CCTV indispensable to modern policing and institutional security frameworks, particularly in environments where manpower is limited, such as university campuses (Taiwo & Agwu, 2016; Majigo, 2023; Pius, 2023).

In the Nigerian context, crime detection remains a critical challenge due to inadequate technological infrastructure, limited professional training, and inefficient data management systems (Ikuesan et al., 2020; Apene et al., 2024). Traditional methods of policing are often reactive and dependent on eyewitness accounts, which are prone to human error and bias (Taiwo & Agwu, 2016; Ushakov et al., 2021). The integration of CCTV systems within university environments, therefore, provides a supplementary mechanism that enhances objectivity and accuracy in detecting offences such as theft, assault, and vandalism (Kahla & Gayflor, 2024; Ţical, 2024). For instance, visual footage can help confirm timelines, verify suspect presence, and counter false claims, thereby strengthening the credibility of investigations (Zada et al., 2026; Papale, 2024).

However, the effectiveness of CCTV in crime detection is contingent on several operational factors: the quality of image resolution, camera positioning, data retrieval systems, and the human capacity to interpret and act on visual evidence (Al Ashkhari & Ismail, 2024; Zhou, 2025). Without trained personnel to monitor feeds or analyze recordings, the presence of cameras alone has little practical value (Ikuesan et al., 2020; Soto et al., 2021). Therefore, institutions must establish strong operational protocols and ensure that CCTV systems are embedded within broader security intelligence networks for maximum effectiveness (Laufs, 2022; Salehi et al., 2025).

Concept of Crime Prevention

Crime prevention refers to the strategies, policies, and actions designed to reduce the risk of criminal activities and their potential harmful effects on individuals and communities (Sutton et al., 2021; Ceccato & Newton, 2025). Unlike crime detection, which focuses on identifying crimes that have already occurred, crime prevention aims to proactively eliminate opportunities for crime before they happen (Hardy, 2022; Lytvynov & Kliuiev, 2022). Crime prevention involves interventions directed at modifying the immediate environment, strengthening formal and informal social controls, and enhancing public

awareness (Ekblom, 2016; Lee et al., 2023; Mohammed & Hirai, 2021). It is grounded in the idea that crime is not inevitable but can be minimized through deliberate planning, technological innovations, and behavioural change (Apene et al., 2024; Wahid et al., 2023). In practical terms, this includes the design of safer physical spaces, the installation of surveillance systems like CCTV, community policing, and public education programs that promote security consciousness (Taiwo & Agwu, 2016; Adieme & Oliobi, 2024; Savolainen, 2023).

Crime prevention strategies are commonly categorized into three levels: primary, secondary, and tertiary prevention (Lab, 2020; Clarke, 2019). Primary prevention targets the general population and aims to stop crime before it starts by reducing environmental risks and strengthening social structures, for instance, using adequate lighting, access control, and camera surveillance in public areas (Lee et al., 2023; Ceccato & Newton, 2025). Secondary prevention focuses on groups or individuals identified as at risk of engaging in criminal behaviour (Mohammed & Hirai, 2021; Wahid et al., 2023). This may include youth mentorship, counselling, and school-based interventions (Sutton et al., 2021; Adieme & Oliobi, 2024). Tertiary prevention, on the other hand, deals with the rehabilitation of offenders to prevent recidivism (Hardy, 2022; Lytvynov & Kliuiev, 2022). CCTV surveillance falls primarily under the category of situational or environmental prevention, as it alters the setting in which crime might occur, making it less attractive or riskier to potential offenders (Welsh & Farrington, 2009; Piza et al., 2019).

Situational Crime Prevention (SCP), a theory advanced by Clarke (2019), provides a key framework for understanding the preventive role of CCTV (Ekblom, 2016; Ceccato & Newton, 2025). SCP focuses on reducing the opportunities for crime by increasing the perceived risk of detection, reducing potential rewards, and removing excuses for offending (Lee et al., 2023; Apene et al., 2024). CCTV contributes to these mechanisms by enhancing visibility, monitoring behaviour, and recording evidence that increases the likelihood of apprehension (Papale, 2024; Vári et al., 2025). When offenders are aware that their actions are being observed and recorded, the deterrent effect is activated, thereby preventing potential criminal acts (Piza et al., 2019; Welsh & Farrington, 2009). Surveillance systems have been shown to produce moderate reductions in crimes such as theft, property vandalism, and assault, especially in controlled environments like campuses and parking areas (Matczak et al., 2023; Zhou, 2025).

In university settings, the concept of crime prevention takes on additional significance due to the open and diverse nature of academic communities (Adieme & Oliobi, 2024; Savolainen, 2023). Campuses host large populations with varying backgrounds, making them susceptible to a range of offences including theft, sexual harassment, drug abuse, and vandalism (Taiwo & Agwu, 2016; Majigo, 2023). The introduction of CCTV surveillance within Nigerian universities has served as both a psychological deterrent and a response mechanism, fostering a sense of security among staff and students (Pius, 2023; Kahla & Gayflor, 2024). Visible CCTV installations reduced opportunistic crimes and promoted responsible behaviour in communal areas (Ţical, 2024; Zada et al., 2026). In military-affiliated universities such as the Nigerian Army University, Biu, crime prevention is also linked to institutional discipline, respect for authority, and the protection of sensitive

assets; thus, the preventive role of CCTV is particularly crucial (Apene et al., 2024; Laufs, 2022).

Crime prevention is a proactive and strategic process aimed at minimizing opportunities and motivations for criminal behaviour (Sutton et al., 2021; Ceccato & Newton, 2025). CCTV surveillance represents a central element of situational crime prevention within contemporary security systems (Welsh & Farrington, 2009; Piza et al., 2019). For Nigerian Army University, Biu, the preventive power of CCTV lies not just in the technology itself but in its integration with disciplined security practices, community awareness, and effective response mechanisms that collectively foster a safe and stable campus environment (Adieme & Oliobi, 2024; Savolainen, 2023).

Security Management in University Environments

Security management within university environments refers to the coordinated and systematic approach employed to safeguard life, property, and institutional assets while maintaining a conducive atmosphere for learning, research, and social interaction (Adieme & Oliobi, 2024; Savolainen, 2023). It encompasses all administrative and technological efforts aimed at preventing, detecting, and responding to threats that could compromise the safety and stability of the academic community (Ceccato & Newton, 2025; Sutton et al., 2021). Universities, as open and dynamic institutions, face unique security challenges because they host large, diverse populations, operate across multiple facilities, and maintain relatively free movement of persons (Hardy, 2022; Lytvynov & Kliuiev, 2022). As a result, effective security management in these settings demands a balance between accessibility and control, freedom and discipline, and innovation and protection (Taiwo & Agwu, 2016; Laufs & Borrion, 2022).

The contemporary university environment is increasingly exposed to a broad spectrum of security threats ranging from theft, cultism, vandalism, and sexual harassment to cybercrime, terrorism, and violent protest (Dioubate et al., 2022; Karie et al., 2021). In Nigeria, these challenges are further compounded by socio-economic instability, political unrest, and inadequate security infrastructure (Majigo, 2023; Pius, 2023). Many Nigerian universities operate with limited security budgets and outdated systems, leaving campuses vulnerable to both internal and external threats (Ikuesan et al., 2020; Ushakov et al., 2021). The concept of security management, therefore, involves the formulation and implementation of policies, procedures, and technologies that collectively ensure the safety of people and facilities (Apene et al., 2024; Wahid et al., 2023). These include access control measures, patrol systems, security awareness programs, and, significantly, the deployment of CCTV surveillance systems for real-time monitoring (Welsh & Farrington, 2009; Piza et al., 2019).

In the context of university administration, security management extends beyond policing functions; it involves a multidimensional structure that integrates human resources, technology, and environmental design (Lee et al., 2023; Mohammed & Hirai, 2021). Modern campus security management emphasizes preventive rather than reactive measures by creating environments that discourage deviant behavior and promote collective responsibility (Ceccato & Newton, 2025; Sutton et al., 2021). CCTV systems fit squarely into this paradigm, serving as both a deterrent and investigative tool that enhances

situational awareness (Papale, 2024; Vári et al., 2025). The integration of surveillance systems into campus security frameworks has improved response times to emergencies, facilitated investigations, and promoted a culture of accountability among students and staff (Adieme & Oliobi, 2024; Savolainen, 2023)

Furthermore, effective security management in universities depends on the establishment of clear institutional frameworks and governance structures (Ceccato & Newton, 2025; Sutton et al., 2021). This includes security committees, crisis management teams, and regular security audits to assess vulnerabilities and update response strategies (Adieme & Oliobi, 2024; Savolainen, 2023). For military-based universities such as the Nigerian Army University, Biu, security management carries additional layers of complexity (Taiwo & Agwu, 2016; Majigo, 2023). It involves not only protecting academic resources but also safeguarding sensitive military assets, personnel, and information (Pius, 2023; Laufs & Borrion, 2022). Military-affiliated institutions operate under stricter security protocols that emphasize discipline, chain of command, and adherence to operational security (OPSEC) principles (Hardy, 2022; Lytvynov & Kliuiev, 2022). In such environments, CCTV surveillance is not just a preventive measure but also a compliance tool that ensures all movements and interactions are within defined operational boundaries (Papale, 2024; Vári et al., 2025).

In conclusion, the concept of security management in university environments represents a holistic system that integrates policy, technology, and personnel to sustain institutional order and safety (Lee et al., 2023; Mohammed & Hirai, 2021). CCTV surveillance plays a crucial role within this system, bridging human vigilance and technological monitoring to create an environment of deterrence, control, and accountability (Welsh & Farrington, 2009; Piza et al., 2019). For Nigerian Army University, Biu, such a structured security management approach is indispensable to achieving the institution's dual mandate of academic excellence and disciplined conduct within a controlled military-academic setting (Adieme & Oliobi, 2024; Savolainen, 2023).

Theoretical Review

Theoretical perspectives are essential for explaining the relationship between surveillance systems like CCTV and the control or reduction of criminal activities. Rational choice theory will be adopted.

2.2.1 Rational Choice Theory

The Rational Choice Theory (RCT) posits that individuals engage in criminal behaviour after a conscious cost–benefit evaluation of the potential risks and rewards associated with the act (Cornish & Clarke, 2017; Ceccato & Newton, 2025). According to this theory, offenders make rational decisions by considering whether the benefits of committing a crime outweigh the possible consequences, such as detection, arrest, or punishment (Felson & Clarke, 2019; Sutton et al., 2021). Therefore, any measure that increases the perceived likelihood of detection or the severity of consequences serves as a deterrent to potential offenders (Hardy, 2022; Wahid et al., 2023).

CCTV surveillance fits within this theoretical model as a mechanism that raises the perceived risk of apprehension (Welsh & Farrington, 2009; Piza et al., 2019). When individuals are aware that they are being monitored by cameras, their decision-making process changes; they are less likely to engage in deviant acts due to the fear of exposure or punishment (Papale, 2024; Vári et al., 2025). Empirical studies have confirmed that visible CCTV cameras reduce opportunistic crimes such as theft, assault, and vandalism, particularly in confined or high-traffic environments (Lee et al., 2023; Matczak et al., 2023). The deterrent effect, however, depends on camera visibility, signage, and active monitoring (Al Ashkhari & Ismail, 2024; Zhou, 2025).

In the context of Nigerian universities, where issues such as theft of property, examination malpractice, and student misconduct are prevalent, the Rational Choice perspective helps explain why CCTV installation alters behavioural tendencies (Taiwo & Agwu, 2016; Majigo, 2023; Pius, 2023). When students perceive a higher probability of being caught due to surveillance, their inclination toward deviance diminishes (Adieme & Oliobi, 2024; Savolainen, 2023). Thus, CCTV systems serve as a practical tool for manipulating perceived risk and influencing rational decision-making processes among potential offenders (Apene et al., 2024; Kahla & Gayflor, 2024; Ţical, 2024).

CCTV and Crime Detection

While CCTV serves as a preventive tool, it is equally valuable in crime detection and investigation, offering critical visual evidence that aids in identifying offenders and reconstructing criminal events (Welsh & Farrington, 2009; Piza et al., 2019). Studies across various institutional and public settings demonstrate that CCTV footage plays a decisive role in supporting law enforcement and internal disciplinary procedures (Papale, 2024; Vári et al., 2025). In the Nigerian context, CCTV has become increasingly important for evidence-based crime management due to the rising need for accountability and transparency in both civil and security operations (Taiwo & Agwu, 2016; Majigo, 2023; Pius, 2023). Video surveillance enabled security departments to trace offenders, verify alibis, and corroborate witness testimonies, significantly improving investigative accuracy (Apene et al., 2024; Kahla & Gayflor, 2024). In cases involving theft or assault, security units could identify suspects through footage analysis, leading to higher conviction and disciplinary success rates (Ţical, 2024; Zada et al., 2026).

Research on crime detection within Nigerian institutions found that surveillance cameras reduced the time required to resolve criminal cases by approximately 40% (Ikuesan et al., 2020; Ushakov et al., 2021). This was attributed to the availability of direct video evidence, which eliminated dependence on unreliable eyewitness accounts (Soto et al., 2021; Laufs & Borrion, 2022). In other words, CCTV bridges the gap between crime occurrence and crime resolution by providing a factual, time-stamped record of events (Lee et al., 2023; Ceccato & Newton, 2025). Globally, similar findings have been reported, showing that CCTV-assisted investigations increased clearance rates for property crimes by significant margins (Gill & Spriggs, 2019; Matczak et al., 2023). Modern CCTV systems with facial recognition and motion detection capabilities enabled faster suspect identification, thereby strengthening institutional security mechanisms (McCahill & Fussey, 2019; Zhou, 2025).

In the Nigerian military university context, such as the Nigerian Army University, Biu, the relevance of CCTV in detection is amplified by the institution's security-sensitive environment (Adieme & Oliobi, 2024; Savolainen, 2023). Visual monitoring ensures swift identification of suspicious movements or unauthorized access, supporting both preventive and intelligence functions (Taiwo & Agwu, 2016; Majigo, 2023). The integration of surveillance systems with military-trained personnel enhances the efficiency of response operations, leading to faster threat neutralization and improved incident documentation (Pius, 2023; Laufs, 2022).

CCTV, Security Personnel, and Institutional Effectiveness

The integration of CCTV surveillance systems with human security operations has proven to be one of the most effective strategies for maintaining safety within institutional settings (Ceccato & Newton, 2025; Sutton et al., 2021). CCTV does not replace the need for physical security personnel but rather enhances their efficiency, responsiveness, and situational awareness (Adieme & Oliobi, 2024; Savolainen, 2023). Through real-time visual monitoring, security officers can identify suspicious behaviour early, coordinate interventions more effectively, and allocate manpower based on live threat assessments (Taiwo & Agwu, 2016; Laufs & Borrion, 2022).

Empirical evidence from Nigerian universities shows that institutions combining CCTV surveillance with active patrols record higher levels of crime deterrence and faster emergency responses than those relying solely on manual observation (Papale, 2024; Vári et al., 2025). For instance, studies examining campus security systems in public universities found that incidents of burglary, student violence, and vandalism were significantly reduced where CCTV monitoring units worked in tandem with on-ground security personnel (Apene et al., 2024; Kahla & Gayflor, 2024). The use of camera feeds improved command coordination, enabling swift communication between control rooms and field officers (Ţical, 2024; Zada et al., 2026).

CCTV-assisted patrols at Nigerian universities have also led to measurable improvements in incident response time compared to manual operations (Ikuesan et al., 2020; Ushakov et al., 2021). Security personnel were able to track suspects across multiple locations through live feeds, thereby minimizing the chances of escape (Soto et al., 2021; Laufs, 2022). The system also provided documentation that supported administrative inquiries and disciplinary panels (Lee et al., 2023; Ceccato & Newton, 2025). Beyond response efficiency, CCTV enhances accountability among security officers themselves (Welsh & Farrington, 2009; Piza et al., 2019). Surveillance monitoring reduces instances of negligence or misconduct by guards, as their activities are also subject to review, fostering professionalism and discipline within the security workforce (Adieme & Oliobi, 2024; Savolainen, 2023). This aspect is particularly relevant in military institutions like the Nigerian Army University, Biu, where integrity and vigilance are central values (Taiwo & Agwu, 2016; Majigo, 2023).

Furthermore, CCTV strengthens institutional security planning by generating data for trend analysis (Papale, 2024; Vári et al., 2025). Reviewing recorded footage helps management identify high-risk zones, evaluate security lapses, and implement corrective strategies (Apene et al., 2024; Wahid et al., 2023). Such data-driven decision-making transforms security from a reactive to a proactive function, allowing institutions to anticipate

potential threats and allocate resources more strategically (Ceccato & Newton, 2025; Sutton et al., 2021). However, the success of this integration depends heavily on technical training and organizational commitment (Dioubate et al., 2022; Karie et al., 2021). Many Nigerian institutions suffer from inadequate personnel training in the use of surveillance technologies (Nwankwo & Ali, 2021; Luo, 2023). Without skilled operators and clear communication protocols, the potential of CCTV systems remains underutilized (Lee et al., 2023; Mohammed & Hirai, 2021). Therefore, achieving maximum institutional effectiveness requires investment not only in hardware but also in human capacity development (Adieme & Oliobi, 2024; Savolainen, 2023).

Challenges of CCTV Implementation in Nigerian Universities

Despite the proven benefits of CCTV surveillance in enhancing campus safety, a growing body of empirical evidence shows that many Nigerian universities face **significant challenges** in implementing and sustaining effective CCTV systems. These challenges are primarily **technical, financial, administrative, and human-resource-related,** and they collectively hinder the full realization of surveillance objectives (Ogunleye, 2020; Eze & Chukwuma, 2022).

One of the most persistent problems is **poor infrastructure**, particularly inconsistent power supply. CCTV systems require constant electricity to maintain continuous monitoring, yet most Nigerian campuses experience frequent outages and limited backup power. **Adebayo and Hassan (2021)** found that over 60% of universities in their study reported regular downtime in surveillance operations due to electricity interruptions. Even where generators or inverters are installed, the high cost of fuel and maintenance makes continuous operation unsustainable.

Another major limitation is **inadequate technical expertise**. Effective CCTV systems require skilled operators to monitor live feeds, conduct maintenance, and analyze recorded data. However, **Nwankwo and Ali (2021)** observed that most university security units lack trained surveillance technicians, leading to poor camera placement, delayed repairs, and inefficient monitoring. In some cases, camera systems remain inactive for months due to the absence of qualified personnel to troubleshoot technical faults.

Funding constraints also represent a serious obstacle. Many universities operate on limited security budgets, which are insufficient to cover the high cost of installation, data storage infrastructure, and software upgrades. According to **Ezeh and Okafor (2022)**, more than half of Nigerian universities rely on outdated analog cameras with poor image quality, rendering the footage almost useless for forensic purposes. Furthermore, the absence of dedicated budgetary allocations for security technology often leads to stalled expansion projects or neglected maintenance.

A related concern is **data management and privacy protection**. With growing awareness of digital rights, stakeholders have raised questions about the ethical use of surveillance footage, especially in educational settings involving students and staff (Aliyu & Danjuma, 2020). Misuse of recorded footage or unauthorized access to surveillance data has the potential to erode trust and provoke institutional conflicts. Therefore, as **McCahill and Fussey (2019)** argue, the sustainability of CCTV programs depends not only on technology and infrastructure but also on the establishment of robust regulatory frameworks that ensure accountability and protect individual rights.

Finally, **vandalism and theft of CCTV equipment** pose additional difficulties, especially in universities with open campuses or weak perimeter control. **Ibrahim (2019)** reported cases where outdoor cameras were damaged or stolen by students and outsiders, thereby increasing maintenance costs and limiting coverage. Such challenges underscore the importance of integrating surveillance within a broader security ecosystem that includes physical patrols, secure installation methods, and community awareness. In summary, empirical findings suggest that while CCTV technology has the potential to transform campus security, its impact in Nigerian universities is constrained by infrastructural deficiencies, inadequate funding, limited expertise, and governance challenges

Table 1: **CCTV Cameras are Installed in Strategic Locations Across the University**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	1	.3	.3	.3
	2	13	3.4	3.4	3.7
	3	97	25.5	25.5	29.2
	4	157	41.3	41.3	70.5
	5	112	29.5	29.5	100.0
	Total	380	100.0	100.0	

Field Survey, 2025

As shown in Table 1, the responses indicate varying levels of agreement regarding the strategic placement of CCTV cameras on campus. A significant proportion of respondents disagreed (41.3%) or strongly disagreed (29.5%) with the statement, suggesting that many perceive the current distribution of CCTV cameras as inadequate. Meanwhile, only a small fraction strongly agreed (0.3%) or agreed (3.4%) that cameras are strategically installed, and 25.5% remained undecided. This pattern reflects a generally critical perception of how surveillance infrastructure is distributed across the university. Such a response may point to visible gaps in camera coverage or a lack of awareness of existing installations, especially in areas like hostels, faculty buildings, and lecture halls, where surveillance could play a preventive role.

This finding aligns with research emphasizing the importance of strategic camera placement in maximizing the effectiveness of surveillance systems (Welsh & Farrington, 2009; Piza et al., 2019). Poor placement can result in surveillance blind spots that reduce deterrence and investigative utility (Papale, 2024; Vári et al., 2025). In Nigerian university contexts, challenges such as inadequate funding, infrastructural deficits, and planning gaps often lead to suboptimal camera distribution (Taiwo & Agwu, 2016; Majigo, 2023; Pius, 2023). Consequently, users may perceive the surveillance network as incomplete or ineffective, which can undermine trust in the system's ability to detect and prevent crime (Adieme & Oliobi, 2024; Savolainen, 2023). Effective CCTV deployment requires not just technological availability but also deliberate planning to ensure coverage of crime-prone areas and critical access points (Lee et al., 2023; Ceccato & Newton, 2025).

Table 2: **Awareness of Cctv Presence In Faculties/Departments**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	8	2.1	2.1	2.1
	3	72	18.9	18.9	21.1
	4	184	48.4	48.4	69.5
	5	116	30.5	30.5	100.0
	Total	380	100.0	100.0	

Field Survey, 2025

Table 2: reveals that nearly half of the respondents agreed (48.4%) and about 30.5% strongly agreed that they were aware of CCTV cameras in their faculties or departments. Around 18.9% were undecided, while only 2.1% disagreed. This distribution suggests that a majority of respondents have noticed the presence of surveillance infrastructure in their immediate academic environments. Awareness of CCTV presence is crucial because it influences behavioral changes and enhances perceived security (Fussey, 2020). The relatively high level of agreement indicates successful visibility and communication of CCTV presence in some faculties, although the undecided portion may reflect gaps in signage, camera visibility, or student orientation practices.

The literature supports the view that awareness of surveillance is a key determinant of its preventive impact (Welsh & Farrington, 2009; Piza et al., 2019). When individuals are aware that they are being monitored, the perceived risk of apprehension increases, leading to reduced opportunistic crimes (Papale, 2024; Vári et al., 2025). In university settings, visible cameras and proper signage can reinforce deterrence, while hidden or poorly communicated installations may fail to influence behavior effectively (Adieme & Oliobi, 2024; Savolainen, 2023). The high awareness levels in this study suggest that the university has made some progress in camera deployment within faculties, though the undecided group highlights the need for improved communication strategies to ensure that all students and staff are informed of surveillance coverage (Lee et al., 2023; Ceccato & Newton, 2025).

Table 3: CCTV Cameras are Actively Monitored by Trained Personnel

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	8	2.1	2.1	2.1
	2	40	10.5	10.5	12.6
	3	122	32.1	32.1	44.7
	4	146	38.4	38.4	83.2
	5	64	16.8	16.8	100.0
	Total	380	100.0	100.0	

Field Survey,2025

Table 3 indicates a moderate level of confidence in CCTV monitoring. While 38.4% agreed and 16.8% strongly agreed that cameras are actively monitored by trained personnel, a

considerable proportion were undecided (32.1%), and a combined 12.6% disagreed or strongly disagreed. This mixed pattern suggests uncertainty among many respondents regarding the operational management of CCTV systems. Such uncertainty may stem from the fact that surveillance monitoring often occurs behind the scenes, making it less visible to the general campus population (Adieme & Oliobi, 2024; Savolainen, 2023). Without transparent communication or observable monitoring activities, stakeholders may be unsure about the extent of surveillance oversight (Ceccato & Newton, 2025; Sutton et al., 2021). Scholarly evidence emphasizes that the effectiveness of CCTV depends significantly on active monitoring by trained security staff (Welsh & Farrington, 2009; Piza et al., 2019).

Cameras that are not regularly monitored in real-time may only serve post-incident investigative purposes rather than preventive functions (Papale, 2024; Vári et al., 2025). In the Nigerian context, inadequate staffing and limited training opportunities can hinder continuous monitoring (Taiwo & Agwu, 2016; Majigo, 2023; Pius, 2023). The presence of a large undecided group in this study underscores the importance of building institutional confidence through training programs, visible security operations, and communication that assures campus users of active surveillance management (Lee et al., 2023; Mohammed & Hirai, 2021).

Table 4: CCTV Coverage Includes Hostels, Gates, Lecture Halls, and Offices

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	12	3.2	3.2	3.2
	3	101	26.6	26.6	29.7
	4	156	41.1	41.1	70.8
	5	111	29.2	29.2	100.0
	Total	380	100.0	100.0	

Field Survey,2025

As presented in Table 4, 41.1% of respondents agreed and 29.2% strongly agreed that CCTV coverage extends to key campus locations such as hostels, gates, lecture halls, and offices. However, 26.6% were undecided, and a small proportion (3.2%) disagreed. This indicates that while most respondents perceive broad coverage, a significant minority are uncertain about the specific areas under surveillance. Such uncertainty may reflect uneven distribution of cameras across different campus zones or limited visibility in certain areas. For example, while main gates and administrative buildings might have visible cameras, some hostels or lecture halls may lack coverage or have cameras in less conspicuous locations.

Extensive coverage is a critical component of effective campus surveillance (Ceccato & Newton, 2025; Sutton et al., 2021). Camera placement in strategic areas such as entrances, hostels, and high-traffic zones enhances both deterrence and post-crime investigations (Welsh & Farrington, 2009; Piza et al., 2019). In Nigerian universities, infrastructural limitations often mean that certain critical areas remain uncovered (Taiwo & Agwu, 2016; Majigo, 2023; Pius, 2023). Respondents' mixed perceptions in this study

suggest that while coverage exists, it may not be comprehensive or evenly distributed, necessitating further infrastructural investments and strategic planning to ensure holistic coverage across the campus (Adieme & Oliobi, 2024; Savolainen, 2023). Effective CCTV deployment requires not just technological availability but also deliberate planning to ensure coverage of crime-prone areas and critical access points (Lee et al., 2023; Mohammed & Hirai, 2021).

Table 5; CCTV Footage is Used as Evidence in Disciplinary or Security Cases

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	20	5.3	5.3	5.3
	3	102	26.8	26.8	32.1
	4	153	40.3	40.3	72.4
	5	105	27.6	27.6	100.0
	Total	380	100.0	100.0	

Field Survey,2025

Table 13 shows that 40.3% of respondents agreed and 27.6% strongly agreed that CCTV footage is used as evidence in disciplinary or security cases, while 26.8% were undecided and 5.3% disagreed. This suggests a majority acknowledgment of CCTV as a formal evidentiary tool in campus disciplinary frameworks. The undecided group may include respondents who have not personally witnessed or participated in disciplinary cases involving CCTV footage. Nevertheless, the overall pattern points to a well-established practice of incorporating surveillance data into formal proceedings, which enhances the credibility and fairness of disciplinary processes.

The use of CCTV footage as evidence has become increasingly common in institutional settings worldwide (Welsh & Farrington, 2009; Piza et al., 2019). In universities, CCTV recordings are often employed to substantiate allegations of theft, vandalism, examination malpractice, or breach of conduct (Papale, 2024; Vári et al., 2025). Nigerian tertiary institutions have similarly begun integrating surveillance evidence into disciplinary mechanisms to improve case resolution transparency (Adieme & Oliobi, 2024; Savolainen, 2023). The strong agreement in this study suggests that respondents perceive CCTV as a reliable and accepted part of campus justice systems, which may also contribute to deterrence by reinforcing the perception of accountability (Lee et al., 2023; Ceccato & Newton, 2025).

Conclusion

The findings of this study underscore the significant role of technology, particularly CCTV surveillance, in enhancing crime detection and prevention within Nigerian Army University, Biu. The high levels of awareness and strategic deployment of surveillance systems among students and staff indicate that technological integration contributes substantially to institutional safety. By aligning with the principles of Rational Choice Theory, the study demonstrates that the presence of CCTV alters potential offenders' decision-making, thereby reducing opportunities for theft, vandalism, and other criminal activities. Moreover,

the operational monitoring of cameras by trained personnel reinforces accountability and ensures timely responses to security breaches. These results suggest that technology complements traditional security measures, offering a more proactive and efficient approach to maintaining campus safety in regions prone to insecurity. Consequently, the study affirms that investment in electronic surveillance is not only essential for crime deterrence but also for fostering a secure learning environment conducive to academic and social development.

Recommendations

Based on the findings and conclusions, the following recommendations are proposed:

1. **Institutionalize Regular Maintenance and Technical Support:**
   The university should develop and enforce a structured maintenance schedule for all CCTV equipment. Routine checks, prompt repairs, and periodic upgrades will ensure the system remains functional and reliable over time (Ashby, 2017).
2. **Strengthen Staffing and Capacity Development:**
   Adequate numbers of trained personnel should be recruited to manage and monitor CCTV systems effectively. Training programs should cover operational skills, threat detection, ethical data handling, and emergency response to maximize the technology's preventive and investigative potential
3. **Address Power Supply Constraints:**
   Given the critical impact of electricity interruptions, the university should invest in sustainable power solutions, such as solar energy systems and dedicated backup generators, to guarantee uninterrupted CCTV operations
4. **Optimize Camera Placement and Communication:**
   Strategic placement should be regularly reviewed to ensure optimal coverage of high-risk areas. The university should also improve communication about the presence and purpose of CCTV to enhance deterrence and foster a sense of shared responsibility for security.
5. **Develop and Enforce Privacy Policies:**
   Clear policies should govern how CCTV footage is collected, stored, accessed, and used. These policies should align with ethical standards and legal frameworks to address emerging privacy concerns and strengthen trust among campus stakeholders
6. **Integrate CCTV into Broader Security Strategies:**
   CCTV should complement, not replace, physical security measures such as patrols, access control systems, and community-based policing. Integration will create a layered security approach that combines human vigilance with technological oversight.

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