Optimizing Technological Tools in Crime Investigation: A Study of Law Enforcement Practices in Kumasi

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ABSTRACT

This study was conducted to explore the role of technology in crime investigation and law enforcement in Kumasi, Ghana. It aims to identify the types of technologies used by the Ghana Police Service (GPS), the challenges associated with their use, and areas for potential improvement. Using a qualitative research approach, data were collected through interviews with 20 purposively selected participants. The findings were analyzed using content and thematic analysis techniques. The study reveals that while technology plays a crucial role in modern law enforcement, its use also raises ethical and legal concerns, particularly related to privacy, data protection, and due process. The key technologies tool employed include tools for digital forensics, cybersecurity, and data analysis. The study stresses on the need to maintain and ensure the long-term reliability of these tools to enable the GPS to adapt to emerging criminal threats.Ultimately, the research calls for a comprehensive and sustained strategy to enhance technological capabilities in policing, aiming to foster a safer and more secure society.

Keyword's: Modern Technology, Crime investigation, Crime Control, Prevention Ethical Use of Technology

INTRODUCTION

Technology has become a vital element of contemporary crime investigation and law enforcement across the globe, offering enhanced efficiency, precision, and effectiveness in combating criminal activities (Neiva, 2023; oğluMikayılov, 2023; Shevchuk, 2023). Modern technological innovations such as advanced forensic methods and sophisticated surveillance tools have transformed the way law enforcement agencies operate, enabling them to better respond to the complexities of modern security threats (Gund, Patil&Phalke, 2023). Globally, the integration of technological solutions into policing practices has progressed significantly, propelled by rapid advancements and the increasing complexity of criminal behavior. Law enforcement bodies in different regions now utilize diverse toolssuch as DNA profiling, digital forensics, predictive analytics, and real-time surveillance systemsto strengthen investigations and improve public safety outcomes (oğluMikayılov, 2023; Shevchuk, 2023; Syaufi, Zahra &Gholi, 2023).

In today's security landscape, the protection of cities and urban centresincluding those in Africa and Ghana has become increasingly critical (Alzahrani&Alfouzan, 2022). In more developed nations, urban policing involves deploying advanced security technologies such as surveillance cameras, biometric systems, access controls, and emergency alert mechanisms (Alam, 2022a). These technologies are embedded within integrated security frameworks designed to detect, monitor, and swiftly respond to emerging threats. Additionally, breakthroughs in artificial intelligence (AI) and data analytics have facilitated the rise of predictive policing and threat assessments, further strengthening urban security. However, the adoption of these technologies raises ongoing ethical and legal issues surrounding privacy, data protection, and responsible use, calling for a careful and balanced implementation strategy (Rehman Khan et al., 2022).

In Ghana, the application of technology in law enforcement presents both opportunities and challenges shaped by the country's socio-economic and institutional realities (Neiva, 2023). Although Ghana has made progress in integrating technology into sectors such as telecommunications and digital commerce, its implementation in the policing sector remains inconsistent and constrained (Amagnya, 2022). Key obstacles include limited financial

resources, inadequate technological infrastructure, and a lack of skilled personnel (Bashir & Bashir, 2022). In recent years, technological advancements have profoundly influenced many sectors of society, including law enforcement and criminal investigations in Ghana (Aubyn, 2022). The incorporation of technology into police operations holds the promise of enhancing efficiency, accuracy, and overall effectiveness in the fight against crime (Okafor&Obika, 2022; Milivojevic&Radulski, 2020; Amagnya, 2022; Twumheme, 2022; Raposo, 2023). This study specifically investigates how the adoption and use of technology impact crime investigation processes and improve law enforcement efficiency at the Kumasi Central Police Headquarters.

Although numerous global studies have explored the role of technology in policing, there remains a noticeable gap in literature focusing on the specific experiences, practices, and challenges faced by law enforcement agencies in Ghana (Okafor&Obika, 2022; Twumheme, 2022; Akwada et al., 2023). A significant limitation in the existing body of research is the lack of empirical evidence assessing the practical implementation of technology within Ghana's law enforcement system. Most prior studies have tended to focus on broader crime-related issues or general policing challenges, often neglecting the specific contribution of technological tools to investigative effectiveness and operational performance (Amagnya, 2022; Bashir & Bashir, 2022; Shevchuk, 2023). Moreover, the increasing reliance on technology in crime investigations raises important ethical and legal concerns, particularly around privacy, data protection, and due process rights. Yet, there is limited research addressing the regulatory frameworks governing technological deployment by police in Ghana, and how these influence both investigative outcomes and citizen rights (Okafor&Obika, 2022). To address these gaps, this study focuses on the contextual realities of law enforcement in Ghana, exploring the specific technological constraints, training needs, and ethical challenges faced. By doing so, it aims to offer evidence-based insights and actionable recommendations for policymakers, law enforcement authorities, and technology developers to enhance both the efficiency and accountability of crime investigation practices in Ghana justifying the necessity of this research. The aim of the study is to examine the effect of modern technology on crime investigation and law enforcement efficiency in the Kumasi Metropolis.

THEORETICAL PERSPECTIVE ON MODERN TECHNOLOGY AND CRIME INVESTIGATION

This study adopts John Watkins Chapman's postmodern hypothesis of technology as its theoretical framework. Chapman's perspective, rooted in postmodern thought, views technology not simply as a set of tools, but as a transformative force that reshapes social structures, norms, and perceptions. Postmodernism is characterized by skepticism toward absolute truths and dominant narratives, emphasizing pluralism, relativism, and the socially constructed nature of knowledge and reality (Okafor&Obika, 2022; Twumheme, 2022; Akwada et al., 2023; Maneli&Isafiade, 2022).

Chapman's hypothesis suggests that technology transcends its utilitarian function and fundamentally alters how society operates. In the context of law enforcement, this includes the ways technological tools such as surveillance systems and digital forensics affect public perception, influence policing strategies, and challenge traditional boundaries between public and private life (Bashir & Bashir, 2022). As Okafor and Obika (2022) argue, technology creates a new "hyperreality" in which mediated experiences distort the public's understanding of crime and security, pushing police toward more visible and immediate responses.

In Kumasi, Ghana's second-largest city, this theoretical perspective helps unpack how technological integration affects law enforcement. With the rise of digital media, crime events can be instantly circulated on social platforms, often exaggerating the perceived threat and prompting pressure on police to act swiftly (Milivojevic&Radulski, 2020). Tools like CCTV, body cameras, and social media monitoring blur the line between real and perceived crime, shaping both public sentiment and police practices.

Moreover, Chapman's framework highlights how technology decentralizes policing. In Kumasi, mobile applications and community-based platforms allow residents to report crimes and interact with the police directly, shifting from centralized systems to more participatory, grassroots methods (Amagnya, 2022; Akwada&Ameyaw, 2023). The growing use of privately owned surveillance cameras and collaborative data-sharing with law enforcement further blurs the distinction between public and private spheres, raising concerns about data governance and privacy.

Additionally, advanced technological tools such as cybercrime units, digital forensic labs, predictive analytics, and drone surveillance are being utilized in Kumasi to combat complex crimes. These innovations improve operational efficiency, enable data-driven decision-making, and support rapid communication among officers

and with the public (Akwada et al., 2023; Twumheme, 2022). However, they also introduce new challenges, such as increased vulnerability to cyberattacks and the ethical implications of mass surveillance. While these tools enhance public safety, they may also lead to unforeseen consequences, such as the erosion of privacy or the expansion of state surveillance without sufficient oversight. For instance, as private security systems and law enforcement become more interconnected, questions about data ownership, access, and accountability become critical.

In effect, through the lens of Chapman's postmodern theory of technology, this study examines how digital tools are transforming crime investigation and policing in Kumasi. Technology offers the potential for greater efficiency, proactive policing, and improved community relations. However, it also necessitates careful consideration of privacy, ethical governance, and unintended effects. The successful integration of technology in Kumasi's law enforcement hinges on balancing innovation with accountability, ensuring that security efforts are effective, inclusive, and respectful of civil liberties.

RESEARCH METHODS

In this study, a qualitative research strategy was adopted to explore and interpret non-numeric data through close observation and in-depth analysis. This approach enabled the researcher to uncover patterns, insights, and meanings from participants' experiences, particularly focusing on the role of technology in criminal investigations. A descriptive research design was employed to provide a detailed account of the relationships and characteristics of the phenomenon under study. The qualitative methodology allowed for a deeper understanding of law enforcement perspectives on technology use in investigative processes.

The study population comprised officers from the Ghana Police Service (GPS), specifically those stationed at the Kumasi Central Police Headquarters. A purposive sampling technique was used to select participants with direct, relevant experience in technological applications within police operations. This non-random method ensured that only individuals with the necessary knowledge and practical involvement were included in the sample. Consideration was given to the participants' ranks and years of service to ensure a diverse and representative group, providing a comprehensive view of the issue under investigation.

Face-to-face interviews were the primary data collection tool. This method allowed participants to freely express their perspectives and experiences. Interviews continued until data saturation was achievedthat is, when no new insights emerged and responses began to repeat. To enhance clarity, follow-up questions were asked whenever responses were ambiguous or unclear. Participants were also encouraged to use languages familiar to all group members, creating a comfortable environment for open communication.

The interviews were audio-recorded with consent, and subsequently transcribed verbatim. These transcripts underwent multiple readings to ensure accuracy, correct errors, and gain a deeper understanding of participants' contributions. The final transcripts served as the primary data source for the analysis. To maintain confidentiality and data security, all recorded and transcribed materials were securely stored and accessed only when necessary, preventing unauthorized access.

For data analysis, the study employed thematic analysis, a widely used method in qualitative research for identifying, analyzing, and reporting patterns or themes within data (Clarke et al., 2015). This analytical approach was suitable for capturing the depth and complexity of the participants' responses. Thematic analysis enabled the researcher to identify recurring ideas and categories that reflected real-world issues related to the adoption and impact of technology in policing. The identified themes served as a lens through which the research questions were explored and understood.

In addition to the rich primary data collected from interviews, authoritative secondary sources were consulted to provide context, support findings, and draw conclusions. These sources helped ground the participants'

experiences in existing literature and contributed to a broader understanding of the topic. Overall, the methodology adopted in this study ensured a rigorous and systematic exploration of how technology is utilized in crime investigations within the Ghana Police Service, particularly in the Kumasi Metropolis. It combined empirical evidence from practitioners with theoretical insights, thereby enhancing the credibility and relevance of the research findings.

Ethical Consideration

In this study, ethical considerations were carefully observed in accordance with widely recognized research ethics principles. Given the field-based nature of the research, particular attention was paid to addressing context-specific ethical concerns. To promote transparency and ensure informed participation, all respondents were provided with a detailed summary of the study. This summary clearly explained the research objectives, the significance of the study, and how the information gathered would be used.Before participating, individuals were required to sign a consent form confirming their voluntary agreement to take part in the study. Participants were fully informed of their rights, including the right to withdraw at any stage without any negative consequences. To uphold strict confidentiality and protect participants' privacy, no personal names or identifiable information were requested or recorded during the interviews or discussions. Additionally, all participants were assured that their responses would be handled with the highest level of discretion and used solely for academic purposes. These ethical safeguards were implemented to maintain participants' anonymity, foster trust, and ensure the integrity and credibility of the research process.

RESULTS

Types of Technologies Employ in Crime Investigation

From the respondents' views, some of the technologies used by the police in Kumasi central were digital forensics, surveillance technologies, biometric systems, communication and data management systems, geographic information systems (GIS) and cybercrime units and cybersecurity technologies.

Digital Forensics

The respondent argued that the Ghana Police Service (GPS) in Kumasi Central has increasingly integrated digital forensic tools to investigate cybercrimes, such as fraud, hacking, and cyberbullying. The use of these tools is critical in a context where mobile money fraud and online scams are prevalent. Additionally, rapidly evolving technology requires continuous training and updates, which can strain the GPS's capabilities. There was a report detailing a homicide investigation in Kumasi, where a lady was killed by her fiancé. One participant noted:

On May, 12th, 2021, a lady was found dead at her residence in Kumasi. Initial investigations revealed that her fiancé was the primary suspect. The suspect had attempted to dump the body at the victim's residence, but was unable to do so initially due to the presence of people in the area. The suspect eventually managed to dump the body and took the victim's keypad phone, deleting all call logs in an attempt to conceal evidence. (R17, Female, Deputy Superintendent).

Through digital forensics, investigators were able to recover the deleted call logs from the victim's phone. Further collaboration with MTN, the telecommunication provider, enabled investigators to obtain the suspect's call logs and ATM transaction records. Analysis of this data revealed a pattern of suspicious activity, including: multiple calls made from the suspect's phone to the victim's phone on the night of the incident. GPS data indicating that the suspect's phone was located at his residence, where the victim's body was initially found.ATM transaction records showing the suspect's transactions near the victim's residence (R17, Female, Deputy Superintendent).

The study revealed that evidence collected through digital forensics and telecommunication data analysis was instrumental in building a strong case against the suspect. The suspect has since been arrested, charged, and is currently facing prosecution in the Kumasi High Court.This case highlights the importance of digital forensics and collaboration with telecommunication providers in investigating and prosecuting crimes.

Surveillance Technologies

The participants argued that surveillance technologies play a critical role in the operations of the Ghana Police Service (GPS) by enhancing their ability to monitor, prevent, and investigate criminal activities. The first case involves the use of drones during the Otumfuor Anniversary Celebration, while the second case involves the use of Closed-Circuit Television (CCTV) cameras in a robbery case. Additionally, a third case is mentioned, involving the hacking of a pizza delivery service's website. One participant narrated how drones were used during Otumfour Anniversary:

During the Otumfuor Anniversary Celebration, drones were deployed to monitor the crowd for security reasons. The drones effectively captured footage of individuals engaging in pick-pocketing activities. As a result, the perpetrators were identified, apprehended, and arrested by the authorities (R20 Male, Sergeant).

A pizza delivery service's website was hacked, resulting in the theft of customers' mobile money wallets. However, through the use of technology, the authorities were able to retrieve the transaction numbers involved in the hacking incident. This led to the arrest of the hackers at Ash-Town (R12, MaleCorporal).

These cases demonstrate the effective use of technology in preventing and investigating crimes in Kumasi Metropolis. The deployment of drones, CCTV cameras, and digital forensic techniques has significantly enhanced the authorities' ability to detect, prevent, and prosecute crimes in Kumasi. As technology continues to evolve, it is essential that law enforcement agencies stay abreast of these developments to ensure public safety and security.

Biometric Systems

The study found that when armed robbers and other criminal are arrested, the police use biometric devices to record the criminal personal data for reference. For instance, a robber incident at Bantama Market, in 2022, was properly investigated using biometric system. It was found that the biometric system has become an important tool for the Ghana Police Service (GPS) in Kumasi Central in fighting crime and enforcing the law. These systems use unique biological traits, such as fingerprints, facial recognition, and iris scans, to identify individuals, track criminal records, and verify identities. One respondent noted:

I remember in 2022, there was a robbery incident at Bantama Market. It was the use of biometric system which aided the investigation. Biometric systems are used to identify and track individuals with criminal records in Kumasi Central Police Station. Fingerprints, in particular, are collected from suspects and stored in a central database. This allows the Police to cross-reference fingerprints found at crime scenes with those in the database to identify suspects quickly. When a crime scene investigation reveals fingerprints, the Police can run these prints through the biometric database to see if they match any known criminals. This has been instrumental in solving cases involving repeat offenders or linking suspects to multiple crimes in Kumasi (R10, Male, Assistant Superintendent).

The study found that the GPS collaborates with the National Identification Authority (NIA) and national ID card) into their systems in Kumasi. This integration helps in verifying the identities of individuals during police checks and investigations. One respondent noted:

During traffic stops or routine checks, PoliceOfficers can verify a person’s identity by scanning their fingerprints and matching them with the data from the Ghana Card. This reduces the likelihood of identity fraud and ensures that the person is who he/she claims to be. Biometric systems are used at border points to monitor and control the movement of people into and out of Ghana. These systems help in identifying individuals who may be on watchlists or have outstanding warrants in Kumasi (R11, Female, Corporal).

The study found that the Ghana Police Service in Kumasi Central utilizes biometric technology for criminal identification and verification, particularly in maintaining criminal records and tracking repeat offenders. The study found that the adoption of these technologies has made the work of GPS more efficient and accurate. The Police can now solve cases faster and with more confidence in the evidence we gather. It has also enhanced our ability to deter crime through increased surveillance.

Communication and Data Management Systems

The GPS in Kumasi employs modern communication tools, such as secure radio channels and digital communication networks, to coordinate operations across different regions. These devices are used by the police during patrol. For instance, the police in Kumasi Central Police Station use communication devices to communicate on the field. One respondent noted:

"There was a car which was snacked from it rightful owner at Suame Around About area, so the KNUST patrol team was contacted through their communication device(Gotters) and through that we were told the car was heading towards KNUST area of jurisdiction. Because of that quick radio communication, the KNUST police were able to arrest the suspect, even though one escaped and one was arrested. (R15, Female, Constable).

One participant stated;

As police in Kumasi, I use radio communication networks in the field. We the police in Kumasi use these networks for dispatching units, sharing intelligence, and managing emergencies. During patrols or emergency response situations, officers in Kumasi use radio communication to report incidents, request backup, and receive instructions from command centers. This ensures a quick and organized response to incidents such as robberies, traffic accidents, or public disturbances (R13, Female, Sergeant).

The respondent revealed that when the police are investigating a crime, officers can access the centralized database to review the suspect's criminal history, analyze patterns, and gather information that can assist in solving the case in Kumasi.

Geographic Information Systems (GIS)

The respondent noted that the GIS are employed to monitor crime trends and to plan patrol routes more effectively. This technology has been particularly useful in urban areas such as Adum, Batama, Airport road and Aboabo and areas where crime mapping can help allocate resources efficiently. GIS technology allows the police to visualize, analyze, and interpret data to understand spatial relationships and patterns related to criminal activities. One participant noted:

GIS is primarily used by the police for crime mapping, which involves plotting crime data on a map to identify patterns and trends. By visualizing where crimes occur, the police can detect hotspots areas with a high concentration of criminal activities—and deploy resources more effectively. If a neighborhood in Kumasi experiences a spike in burglaries, GIS can highlight this area as a hotspot. The police can then increase patrols in that specific area, set up checkpoints, or engage the community in crime prevention effortsin Kumasi (R16, Male, Constable).

The study again found that GIS helps the GPS in Kumasi Central allocate resources strategically by identifying areas that require more attention based on crime patterns. This includes deploying patrol units, setting up surveillance, or planning law enforcement operations. The participants argued that during special operations, such as crackdowns on armed robbery or drug trafficking, GIS can be used to map out the most affected areas, ensuring that resources like SWAT teams and surveillance units are deployed where they are most needed.

Cybercrime Units and Cybersecurity Technologies in Kumasi

The respondents argued that the GPS has established a Cyber Crime Unit that works with international partners to tackle cyber threats. The unit uses cybersecurity technologies to prevent, detect, and respond to cyber incidents. The participants were of the view that the Ghana Police Service (GPS) in Kumasi Central utilizes Cybercrime Units and Cybersecurity Technologies to combat the growing threat of cybercrime and to enhance their crime control, investigation, and law enforcement capabilities. One participant noted:

The GPS has established specialized Cybercrime Units within its Criminal Investigation Department (CID) to tackle crimes involving the internet, computers, and other digital devices. Cybercrime Units of the police in Kumasi Central police station handle a wide range of cases, including online fraud, identity theft, cyberstalking,

hacking, and the distribution of illegal content. They investigate reports of these crimes, gather digital evidence, and work to trace and apprehend perpetrators, often collaborating with international law enforcement agencies due to the global nature of cybercrimein Kumasi (R19, Female, Superintendent).The study respondents further argued that the GPS in Kumasi Central employs various cybersecurity technologies to protect their own digital infrastructure as well as to monitor and respond to cyber threats. These technologies include firewalls, intrusion detection systems (IDS), encryption tools, and secure communication platforms.

POTENTIAL AREAS FOR IMPROVEMENT AND OPTIMIZING THE INTEGRATION OF TECHNOLOGY INTO CRIME INVESTIGATION AND LAW ENFORCEMENT PRACTICES

The participants noted that the potential areas for improvement and recommendations for optimizing the integration of technology into crime investigation and law enforcement practices included; infrastructure development and modernization, capacity building and training, enhancing maintenance and support, addressing budgetary and resource constraints and combatting corruption and misuse of technology in Kumasi.

Infrastructure Development and Modernization

The participants argued that the police need to develop integrated platforms that allow different technologies to work together seamlessly. For example, linking CCTV networks, biometric databases, and communication systems can improve the efficiency of crime detection and response. An integrated system enables better data sharing and collaboration across various departments and agencies in Kumasi. One of the interviewees noted:

There is the need for upgrading communication infrastructure, such as radio systems, internet connectivity, and secure communication channels, allows for faster and more reliable information exchange between officers and departments in Kumasi. This improves coordination during operations, reduces response times, and enhances the overall efficiency of law enforcement activities in Kumasi. The police need to develop centralized, digital databases that are accessible through a modern IT infrastructure enables officers to quickly retrieve and share information. For example, a modern infrastructure can support the integration of criminal databases, case files, and biometric systems, allowing officers in Kumasito access critical data in real-time during investigations (R6, Female, Lance Corporal).

The study results showed that modernizing infrastructure to support high-quality, networked surveillance systems (CCTV, drones, etc.) increases the ability to monitor public spaces, detect suspicious activities, and gather evidence in Kumasi. The participants were of the views that these systems can be linked to centralized command centers, where data is analyzed in real-time to provide actionable intelligence. Most of the participated felt that infrastructure that supports the integration of smart technologies, such as AI-powered cameras and sensors, enhances the ability to monitor and analyze large volumes of data. They argued that these technologies can automatically detect patterns or anomalies, alerting officers to potential threats or ongoing crimes without the need for constant human monitoring in Kumasi. One interviewee noted:

With a modern infrastructure, law enforcement agencies can use technologies like Geographic Information Systems (GIS) to analyze crime data and optimize the deployment of resources. This allows for more strategic positioning of officers in Kumasiand equipment, leading to more effective crime prevention and faster response times. Infrastructure that supports the automation of routine administrative tasks, such as reporting, data entry, and record management, frees up officers to focus on core investigative activities. This streamlining of operations reduces administrative burdens and increases productivity in Kumasi(R7, Male, Assistant Superintendent).

The study results showed that infrastructure development and modernization are essential for optimizing the integration of technology into crime investigation and law enforcement practices. By investing in modern infrastructure, the Ghana Police Service in Kumasi can enhance operational efficiency, improve resource management, and adapt to new challenges, ultimately leading to more effective crime prevention and a safer society.

Capacity Building and Training in Kumasi

The study results further showed that comprehensive training programs with continuous training programs are essential to equip police personnel in Kumasi with the necessary skills to use new technologies effectively. The respondents noted that the police need to establish specialized units within the police force dedicated to handling technologically complex crimes, such as cybercrime, financial fraud, and digital evidence analysis. These units should receive targeted training and resources to address specific challenges in their areas of expertise. The study results demonstrate the respondents' argument on the need for capacity building and training which most respondents considered as fundamental to optimizing the integration of technology into crime investigation and law enforcement practices. One of the interviewees noted;

Training programs provide officers with the technical skills needed to operate and maintain advanced technological tools. Whether it's using digital forensics software, managing surveillance systems, or analyzing data from crime databases, comprehensive training ensures that officers can fully leverage these tools in their work. I think capacity building efforts can focus on developing specialized units with expertise in areas like cybercrime, digital evidence handling, and data analytics. Officers trained in these specialized skills can handle complex technological tasks that are beyond the scope of general law enforcement training in Kumasi(R7, Male, Assistant Superintendent).

Most of the respondents noted that training helps minimize errors in the use of technology, such as misinterpretation of data or improper handling of digital evidence. Reducing these errors ensures that investigations are more accurate and that evidence collected is admissible in court. One respondent noted;

Technology evolves rapidly, and law enforcement must keep pace with these changes. Ongoing training programs allow officers in Kumasi to stay updated on the latest technological advancements and best practices, ensuring that they can adapt to new tools and methods as they emerge. I think there is the need for data training system. Training in data analysis and predictive policing technologies enables officers to identify crime patterns and potential threats before they materialize. For example, officers trained in using data analytics can spot trends in criminal activity, allowing for proactive measures to prevent crime in Kumasi (R17, Male, Deputy Superintendent).

The study results showed that capacity building and training are essential for optimizing the integration of technology into crime investigation and law enforcement practices. The study found that officers need to be equipped with the necessary skills, knowledge, and expertise, law enforcement agencies can ensure that technology is used effectively and efficiently to enhance crime prevention, improve investigations, and build public trust.

Enhancing Maintenance and Support

The participants noted that proactive approach to maintenance will reduce the risk of system failures and ensure that tools are always operational. The respondent argued that the police should create dedicated technical support teams responsible for maintaining and troubleshooting technology used in law enforcement. These teams should be available to address issues promptly and ensure minimal downtime for critical systems in Kumasi. The study further showed that enhanced maintenance and support is crucial for optimizing the integration of technology into crime investigation and law enforcement practices. Proper maintenance and support ensure that technological tools remain functional, reliable, and effective over time in Kumasi. One interviewee noted;

I think there is the need for implementation of regular maintenance schedules for technological tools such as computers, surveillance cameras, forensic equipment, and communication devices ensures that these tools remain in good working condition in Kumasi. Preventive maintenance reduces the likelihood of unexpected breakdowns, ensuring that critical equipment is always available when needed. Regular maintenance and timely repairs should be provided as it extends the lifespan of technological equipment, reducing the need for frequent replacements. This is especially important for expensive or specialized tools, such as forensic analysis software or digital evidence management systems in Kumasi (R12, Male, Corporal).

The participants noted that effective maintenance and support include mechanisms for collecting feedback from users (officers) in Kumasi about the performance of technological tools. This feedback can be used to make ongoing improvements, customize tools to better meet operational needs, and address any recurring issues.

Combatting Corruption and Misuse of Technology

The respondents argued for regular audits, clear protocols for accessing and using technology, and strict penalties for unethical behaviour in the use of technology for criminal investigation. The participants noted that optimizing the integration of technology into crime investigation and law enforcement practices by the Ghana Police Service in Kumasi requires a multifaceted approach that addresses infrastructure, training, maintenance, collaboration, and ethical considerations. One of the interviewees noted;

I think combating corruption and misuse of technology is crucial for optimizing the integration of technology into crime investigation and law enforcement practices. Ensuring that technology is used ethically and responsibly enhances the effectiveness and credibility of law enforcement in Kumasioperations. When technology is misused or corrupted, there is a risk of tampering with digital evidence, which can compromise investigations and undermine the justice system. By combating corruption, law enforcement agencies can ensure that evidence collected through technology is reliable and admissible in court in Kumasi (R19, Female, Superintendent).

The study results showed that when technology is used ethically and corruption is actively addressed, it builds public trust in law enforcement in Kumasi. Transparency in how technology is used, such as body cameras and surveillance systems, helps reassure the public that their rights are being respected and that technology is not being misused.

The study results showed that most of the respondents agreed thatmisuse of technology can lead to legal consequences, including lawsuits, penalties, and damage to the agency's reputation. By adhering to ethical practices, law enforcement agencies in Kumasi can avoid these issues and maintain a strong legal standing. The results implied that ethical use of technology ensures that threat assessments and crime prevention strategies are based on accurate and reliable data. Misuse of technology can distort these assessments, leading to ineffective or misguided crime prevention efforts in Kumasi. One respondent noted;

Proper use of technology enhances the effectiveness of investigative techniques and improves the likelihood of solving crimes. Ensuring that technology is used responsibly and ethically contributes to more successful investigations and better crime outcomes. Ethical practices in technology use foster trust and cooperation between law enforcement agencies in Kumasiand external partners, such as technology providers, community organizations, and other government entities. This collaboration is essential for leveraging technology effectively and addressing complex crime challenges (R9, Male, Inspector).

The study results implied that combating corruption and misuse of technology is essential for optimizing the integration of technology into crime investigation and law enforcement practices. The participants noted that by ensuring ethical use, maintaining transparency, and addressing potential abuses, the police and other law enforcement agencies can enhance the effectiveness of their technological tools, build public trust, and achieve better outcomes in crime prevention and investigation in Kumasi. These efforts contribute to a more reliable, accountable, and efficient use of technology in law enforcement in Kumasi.

DISCUSSION OF RESULTS

The study highlights the importance of digital forensics in the GPS in fighting against cybercrime, reflecting global trends. Research indicates that digital forensics is an indispensable tool in modern policing, especially with the rise of cybercrimes such as fraud, hacking, and cyberbullying. For instance, Casey (2021) emphasizes that digital forensics allows law enforcement agencies to retrieve, preserve, and analyze data from electronic devices, providing crucial evidence for prosecuting cybercrimes. The role of surveillance technologies, including CCTV, body-worn cameras, and drones, in enhancing the GPS's operational effectiveness, echoes findings from international studies. The use of drones and body-worn cameras is also supported by studies, such

as those by Sandbrook (2015) and White and Malm (2020), which emphasize their utility in providing real-time monitoring and improving accountability during police operations. The study's findings on the use of biometric systems by the GPS in Kumasi align with broader research on the adoption of biometrics in law enforcement. According to Jain et al. (2021), biometric systems, including fingerprinting and facial recognition, have revolutionized criminal identification processes, enabling faster and more accurate identification of suspects. The use of GIS by the GPS in Kumasi for crime mapping and resource allocation is a well-established practice in law enforcement globally. According to Chainey and Ratcliffe (2023), GIS technology allows police forces to analyze crime patterns and optimize patrol routes, thereby improving the efficiency and effectiveness of their operations.

Finally, the study's discussion on the GPS's Cyber Crime Unit and the use of cybersecurity technologies in Kumasi is aligned with global trends in law enforcement. The study emphasizes the critical need for robust and modern technological infrastructure, echoing the scholarly consensus on the importance of infrastructure in law enforcement in Kumasi. According to Wilson and Dalton (2020), inadequate infrastructure is a common barrier that prevents police agencies from effectively using technology in crime prevention. The study highlights the need for continuous training programs to equip police personnel with the skills necessary to use advanced technologies. This aligns with findings from similar studies, which indicate that training is pivotal in ensuring that officers in Kumasi can effectively utilize digital forensics, cybersecurity tools, and data analytics in their work (Garcia & Ruiz, 2019).

The study's emphasis on the importance of maintenance and support for technological tools by the police in Kumasi resonates with the literature that highlights the need for reliable maintenance to ensure the longevity and effectiveness of law enforcement technologies (Manning, 2020). The study's findings regarding the impact of corruption on the misuse of technology in Kumasi are consistent with existing research, which indicates that corruption can severely undermine the effectiveness of technological integration in law enforcement (Pinto & Mendez, 2021). Misuse of technology can lead to ethical violations, legal consequences, and a loss of public trust. Pinto and Mendez (2021) suggest that establishing clear protocols for accessing and using technology, coupled with strict penalties for unethical behavior, can help maintain accountability and build public confidence in law enforcement practices.

The study's findings align with the broader empirical literature on the challenges and potential areas for improvement in integrating technology into crime investigation and law enforcement. By addressing issues related to infrastructure, training, maintenance, corruption, and funding, the GPS in Kumasi can enhance its technological capabilities, improve public safety, and build greater trust within the communities it serves.

CONCLUSION AND RECOMMENDATIONS

This study offers a detailed examination of how technology is integrated into crime investigation and law enforcement within the Ghana Police Service (GPS). The findings emphasize the need for modern technological infrastructure, continuous training, and ethical usage to build public trust. A comprehensive approach combining infrastructure upgrades, capacity building, system maintenance, and ethical governanceis deemed essential for effective technology use in policing. The study also stresses the importance of establishing robust systems and specialized units to tackle technologically advanced crimes, thereby improving operational efficiency. Ensuring the reliability and long-term functionality of these tools is highlighted as crucial for maintaining GPS's responsiveness to emerging threats.Additionally, the study contributes to theoretical insights by exploring the intersection of technology, ethics, and public trust, offering a framework applicable to broader law enforcement contexts. The study presents practical guidance for policymakers, practitioners, and developers on how technology is employed in crime investigation. In conclusion, the study calls for a strategic, long-term commitment to leveraging technology in law enforcement. The study concluded that through focused investment in technology, ongoing training, and ethical practices, the GPS in Kumasi can enhance its crime-fighting capabilities and contribute to a safer, more secure society.

The study recommended that the Ghana Police Service (GPS) should prioritize several strategic actions to enhance crime investigation and law enforcement. First, the police should upgradeany outdated systems and expand technological infrastructure, especially in rural areas. This should include integrating CCTV, biometric,

and communication systems to boost coordination and efficiency. Second, there should be continuous training in areas such as digital forensics, cybersecurity, and data analysis. Specialized units should be created to tackle complex crimes like cybercrime and financial fraud, with targeted training and resources.

Again, there should be regular maintenance and technical support to ensure the reliability of technological tools. The police should develop dedicate teams to manage repairs and software updates efficiently. Equally, there should be strong internal controls implemented to prevent corruption and misuse of technology. Lastly, the police should secure adequate funding for regular maintenance of the technology the police use in crime investigation. The government should increasefunds and should partner with the private sector and international organizations to ensure sustained technological advancement in crime investigation.

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