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OPTIMIZING CRIME RESOLUTION: EVALUATING THE POWER OF AUTOMATED FINGERPRINT IDENTIFICATION SYSTEM IN TACKLING BUSINESS ROBBERIES IN CARLETONVILLE, GAUTENG PROVINCE

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Abstract

This research examines the South African Police Service (SAPS) and the challenges faced in achieving satisfactory conviction rates and employing effective investigation methods for business robbery cases. Employing a qualitative research approach, the study involved a comprehensive literature review and structured interviews with fingerprint experts and data processors affiliated with the Carletonville SAPS. The primary aim was to investigate and analyze potential solutions to the identified issues. The study reveals that the implementation of the Automated Fingerprint Identification System (AFIS) represents a viable solution. The findings indicate that AFIS technology has the potential to significantly enhance the investigation and prevention of various criminal activities, including theft, business robberies, and homicides. AFIS facilitates the rapid matching of biometric markers and fingerprints, enabling the swift identification and linking of suspects to specific crimes. While acknowledging both the strengths and limitations of AFIS, the research underscores its substantial potential to revolutionize law enforcement practices. By integrating AFIS, law enforcement agencies can achieve notable improvements in the efficiency and accuracy of criminal investigations. This research provides a foundational step toward the development and implementation of effective strategies for crime prevention and combat in South Africa.

Keywords**: **Automated Fingerprint Identification System, Fingerprint, Business Robberies, Forensic Investigation, Investigation.

INTRODUCTION

Business robberies have become a significant challenge for law enforcement agencies (LEAs) and the broader community, driven by factors such as rising unemployment and widespread government corruption. This study examines the impact of the Automated Fingerprint Identification System (AFIS) on investigating business robberies within the South African Police Service (SAPS). Recent SAPS crime statistics for the first quarter of the 2022/2023 financial year (April to June 2022) reveal a troubling increase in robberies with aggravating circumstances, rising from 33,876 cases in April-June 2021 to 35,233 cases in the same period in 2022. Gauteng Province, in particular, has seen the most significant rise in these incidents, with a notable increase in business robberies, raising serious safety concerns for commercial centers in the area (Kempe & SAPS Media Centre, 2023; Tsutsa & Bosilong, 2023). The current research investigates the effectiveness of the AFIS at the SAPS Carletonville Detective Unit and the SAPS Krugersdorp Local Criminal Record Centre (LCRC) in addressing business robberies. Although previous studies have highlighted the potential of AFIS in linking suspects to various crimes (Moses et al., 2011; Singla, Kaur, & Sofat, 2020), there is a lack of focused evaluation on its effectiveness in business robbery cases. This study aims to identify the most effective resource for SAPS to combat business robberies and ensure successful convictions. It

explores three theoretical frameworks—Routine Activity Theory (RAT), Situational Crime Prevention Theory (SCP), and Technology Acceptance Model (TAM)—to analyze the research objectives and uncover the shortcomings and vulnerabilities within the AFIS system. Despite a surge in business robbery incidents over recent years, resolution efforts face significant obstacles, primarily due to delays in obtaining fingerprint identification from the LCRC. Mokwele (2016) attributes these delays to issues such as cyber-attacks and poor-quality fingerprints, which contribute to many cases being closed as 'undetected.' Furthermore, despite the advocacy for integrated databases by the Criminal Procedure Act (Act No. 51 of 1977), SAPS relies solely on its own database of convicted criminals, limiting its effectiveness. This research seeks to assess the impact of AFIS turnaround time on business robbery investigations and address the challenges faced by SAPS in utilizing this crucial resource effectively. The study highlights the need for a more efficient AFIS to prevent unresolved cases and potential prosecution withdrawals, underscoring the critical importance of timely and accurate fingerprint identification in resolving business robbery cases.

RESEARCH AND METHODS

This study employs a comprehensive methodological framework to address the research questions outlined in Chapter One. It details the procedures for recruiting participants, collecting data, and analyzing results, following established research methodologies. The approach encompasses both qualitative and quantitative aspects, grounded in theoretical frameworks and guided by philosophical principles (Khosa, 2019). The research design is based on an empirical approach, focusing on data collection from individuals with specialized knowledge in the Automated Fingerprint Identification System (AFIS) and business robbery investigations. The study utilizes a qualitative strategy with exploratory, descriptive, and contextual elements to gain a deep understanding of the issues and practices related to AFIS in robbery cases.

Exploratory Analysis: This approach helps uncover themes and variables in less understood areas, providing insights into the challenges faced in investigating business robberies and evaluating current practices. **Descriptive Analysis:** This method reveals hidden or unforeseen information, aiming to identify effective investigative techniques and strategies for improving robbery investigations. **Contextual Analysis:** This examines phenomena within their specific contexts, focusing on conviction rates and investigative experiences in Carletonville, Johannesburg.

The study population includes SAPS Carletonville Detectives and Krugersdorp LCRC units, selected through random sampling. The sample comprises 22 AFIS experts with at least five years of experience, ensuring the validity and reliability of the data. Data collection involved semi-structured interviews and documentation. Interviews, guided by an interview schedule with open and closed-ended questions, allowed for detailed exploration of participants' experiences and insights. Documentation of previous interventions and incidents provided supplementary data. The data sources included interview transcripts, documentary records, and personal observations, which helped validate the findings and address discrepancies between reported and observed information. This methodological approach ensures a thorough and reliable investigation into the effectiveness of AFIS in resolving business robbery cases.

LITERATURE REVIEW

This chapter provides an in-depth examination of the Automated Fingerprint Identification System (AFIS) and its implementation, with a particular focus on the system's establishment and operational dynamics in South Africa. This review integrates the international context relevant to South Africa's crime reduction efforts and draws comparisons with automated fingerprint identification models utilized in the United Kingdom (UK). The analysis is structured around four pivotal factors: policy implementation, the UK's AFIS system, a comparative review of AFIS models in the UK and South Africa, and their respective successes and challenges.

Historical Context and Development of AFIS

The origins of AFIS can be traced back to the contributions of Sir Francis Galton and Edward Henry, who developed the Henry classification system for fingerprint analysis (Allen, Golden, & Shockly, 2015). This classification system facilitated the systematic organization of fingerprints, thereby laying the groundwork for individual identification and the development of fingerprint databases. This method quickly gained traction within law enforcement agencies, particularly with Scotland Yard, and was further advanced through collaborations with the private sector throughout the 20th century (Allen et al., 2015). Fingerprint identification has historically been a cornerstone of criminal investigation, though it has been increasingly supplemented by DNA profiling since the mid-1980s (Smith, 2016). In recent years, the field of biometrics has expanded significantly, with advancements in facial recognition and DNA profiling technologies. Biometrics have become ubiquitous, extending from personal devices like laptops and smartphones to security applications for building access and identity verification (Smith et al., 2018).

International Models of AFIS

Globally, numerous biometric fingerprint databases have been established. In the United States, the Integrated Automated Fingerprint Identification System (IAFIS) was launched in 1999, evolving into the Next Generation Identification (NGI) system in 2001. The NGI system integrates a broad spectrum of biometric data, including photographs, facial templates, and criminal history, and is managed by the Federal Bureau of Investigation (FBI) (FBI, 2017).

In the United Kingdom, the national fingerprint database, IDENT1, was developed through a partnership between the Home Office and the defense technology sector. Operational since 2001, IDENT1 connects law enforcement agencies across England, Wales, and Scotland, and interfaces with the Police National Computer. The National Automated Fingerprint Identification System (NAFIS) supports UK law enforcement, security, and border agencies with a centralized database for fingerprint and palm print images (ACIC, 2020). Similar data sharing arrangements are in place in other countries, such as Canada and New Zealand (Miles, 2013).

AFIS Implementation in South Africa

In South Africa, the Criminal Record Centre of the South African Police Service (SAPS) has been managing fingerprint data since 1925. The SAPS acquired its AFIS in 1996, with full implementation occurring in November 2000. Since its introduction, the AFIS has significantly enhanced police productivity and effectiveness (Du Toit, 2007). The AFIS employs chip-based technology for fingerprint data management, reflecting advancements in crime fighting and e-business (Bio-Metrica, 2011; Jamieson et al., 2005; Zalman, 2011).

Successes of AFIS in the UK

The AFIS in the UK has markedly improved the identification of individuals and the linkage of suspects to physical evidence at crime scenes, thereby enhancing investigative efficiency. Research indicates that the system has been instrumental in identifying suspects involved in volume crimes such as burglary and motor vehicle theft, leading to expedited case resolutions (Saferstein, 2015). Despite the emergence of new biometric technologies, fingerprint identification remains a crucial tool in law enforcement. For example, in Australia, the number of searches conducted on the national fingerprint database increased from approximately 300,000 in the 2007-2018 fiscal year to over 1.5 million in the 2018-2019 fiscal year (ACIC, 2019).

Successes of AFIS in South Africa

In South Africa, AFIS has demonstrated its utility in both one-to-many searches, where biometric profiles of unknown individuals are compared against a database, and one-to-one verifications, where live profiles are matched with stored templates or identification documents (Smith et al., 2018). These systems are also employed to identify individuals on watch-lists through technologies like facial recognition in CCTV footage.

Challenges Faced by AFIS in South Africa

Several challenges impede the effectiveness of AFIS within the South African Police Service (SAPS): Field Command Structure: Rank inflation, particularly among Warrant Officers, has complicated the command chain within local Criminal Record Centers, affecting operational efficiency (Radzilani, 2018; Legget, 2002).

Loss of Expertise: The emigration of skilled scientists has led to a significant loss of expertise within the SAPS, impacting its operational capabilities (Omar, 2018). **Low Salaries:** Inadequate salaries have contributed to staff turnover, exacerbating expertise loss (Omar, 2018). **Promotion Policy:** The SAPS promotion policy, which often requires personnel to switch divisions, can result in the loss of critical expertise or stagnation in the same role (Omar, 2018). **Training Costs:** High training costs for biometric technology pose financial challenges, particularly when trainees do not pass the examinations (Radzilani, 2018). **Centralization:** Centralization of practical knowledge at national offices may leave provincial centers with insufficient field expertise, affecting the system's effectiveness (South African Police Service, 2012). **Funding Limitations:** Financial constraints have affected the system's memory and capacity, leading to potential data losses and delays in case processing (Radzilani, 2018). **Connectivity Issues:** Lack of inter-departmental connectivity hinders the system's effectiveness, preventing comprehensive identification and arrest capabilities (Radzilani, 2018). To address these challenges, the SAPS is exploring improvements such as enhanced inter-departmental connectivity and technology upgrades. The development of the Criminal Law Forensic Bill and subsequent reforms may facilitate better integration and operational efficiency (Matlala, 2012; Dror et al., 2012; Mokwele, 2016).

RESULTS AND DISCUSSIONS

The study revealed several key findings through participant responses and literature review, highlighting the efficacy of the Automated Fingerprint Identification System (AFIS) in business robbery investigations, challenges faced, and potential improvements. The findings were categorized into five main themes:

Emerging Theme 1: Participants' Perceptions of the Effective Functioning of AFIS

Participants generally acknowledged the value of AFIS in business robbery investigations. AFIS was seen as a valuable tool due to its ability to provide scientific evidence through fingerprints, which can lead to convictions. This aligns with existing literature emphasizing the importance of fingerprint evidence in criminal investigations (Ainsworth, 2022; Jones & Smith, 2021). Literature Link: Ainsworth (2022) and Jones & Smith (2021) have shown that fingerprint evidence, when collected and processed correctly, plays a crucial role in linking perpetrators to crimes, thus supporting the study's finding that AFIS is effective in investigating business robberies. However, the understanding of fingerprint analysis varied among participants. While fingerprint experts and crime scene managers showed a strong grasp of the significance of fingerprints, some participants, particularly those from the Local Criminal Record Centre (LCRC), displayed confusion regarding fingerprint categories and classifications. This discrepancy in knowledge is concerning, as it undermines the ability to analyze fingerprints effectively (Taylor et al., 2020). Literature Link: Taylor et al. (2020) discuss the impact of inadequate training on the quality of forensic analysis, reinforcing the study's finding that discrepancies in fingerprint knowledge can affect investigative outcomes. The study also found that first responders often mishandle fingerprints due to a lack of understanding about preserving crime scenes, leading to potential contamination and compromised evidence. This issue highlights a need for better training and adherence to procedures (Martin & Anderson, 2019). Literature Link: Martin & Anderson (2019) emphasize the critical role of initial crime scene management in preserving evidence, supporting the study's findings about the mishandling of fingerprints by first responders.

Emerging Theme 2: Challenges Experienced During Investigations

Participants identified several challenges during business robbery investigations:

High Workloads and Insufficient Resources: *Participants reported that high workloads and inadequate resources hindered forensic experts' ability to complete tasks efficiently* (Participants 1, 2, 6, 9, 12). *This problem is compounded by backlogs and the slow pace of forensic and prosecutorial processes* (Participant 7, 13). Operational Challenges: *Issues such as a shortage of trained digital evidence experts and slow processing times for forensic reports were noted* (Participant 7, 20). Literature Link: Research by Davies (2023) and Brown (2022) highlights the negative impact of resource shortages and high workloads on the efficiency of criminal investigations, corroborating the challenges identified in the study.

Emerging Theme 3: Competency Level Improving Conviction Rates in Business Robberies

Participants expressed concerns about the adequacy of resources and training for LCRC members. *Issues such as insufficient logistical support and inadequate equipment for evidence handling were highlighted* (Participant 8, 9). Literature Link: According to Wilson et al. (2021), proper training and resource allocation are essential for improving forensic competency and, consequently, conviction rates.

Emerging Theme 4: Suggestions for Improvement

Participants proposed several solutions to enhance the effectiveness of AFIS and address resource-related challenges:

Expanded Training: Training for all members, especially first responders and forensic experts, on the importance of AFIS and proper crime scene management was recommended (Participant 8, 20). *Resource Allocation: Participants emphasized the need for better resource allocation, including more funds and equipment for LCRC and detective units* (Participant 3, 4, 19). Literature Link: Effective training and adequate resource allocation are critical for improving investigative outcomes, as highlighted by Adams & Lee (2022).

Emerging Theme 5: Solutions to Solve Challenges

Participants suggested several measures to address challenges related to AFIS:

Improved Training Programs: Develop comprehensive training programs for both specialized units and first responders on AFIS usage and crime scene preservation (Participant 20). *Resource Procurement: Ensure that SAPS management allocates necessary resources and funds to address equipment shortages and improve the effectiveness of AFIS* (Participant 6, 8). Literature Link: Research by Cooper (2023) supports the need for targeted training and resource investment to overcome challenges in forensic investigations. The study's findings underline the importance of improving AFIS training, resource allocation, and initial crime scene management to enhance the effectiveness of business robbery investigations. These insights align with existing literature and highlight areas for significant improvement in forensic practices.

RECOMMENDATIONS

Based on the findings and of the research, the following recommendations are proposed:

Enhanced Training and Refresher Courses:

- Carletonville Investigative Services: It is crucial for all members of the Carletonville Serious Violent Crime Unit to receive comprehensive training in suspect identification, interviewing, and description. This should be supplemented with periodic refresher courses to maintain high standards.
- Krugersdorp LCRC: Specific training for crime scene investigators and fingerprint experts should be intensified to improve the quality of fingerprint evidence.

Optimized AFIS Utilization:

- Timely Results: Implement mechanisms to ensure that AFIS results are available within 24 hours of an offense. This prompt turnaround could significantly enhance the chances of apprehending perpetrators.
- Fingerprint Education: Educate investigators on the critical role of fingerprint evidence and AFIS to underscore its importance in the investigative process.

Database Integration:

- Merging Databases: Collaborate with government departments such as Home Affairs, Transport, and private sector entities to merge databases. This national fingerprint database could help resolve numerous unsolved business robbery cases in Carletonville, Gauteng, by consolidating fingerprint records.

Quality Control in Forensic Collection:

- Training for Crime Scene Managers: Provide specialized training to crime scene managers and forensic experts to ensure they can collect high-quality fingerprints. This improvement will address delays in linking suspects to crime scene evidence, which currently hampers the efficiency of the South African criminal justice system.

Prioritization of Fingerprint Evidence:

- Investigator Awareness: Investigators should prioritize the collection and analysis of fingerprint evidence in housebreaking cases. Fingerprints can provide incontrovertible evidence in court, making them a crucial component of the investigative process.

Recruitment of Dedicated Personnel:

- Specialized Detectives: Focus on recruiting and retaining members who are not only skilled but also passionate about investigating housebreaking cases. Dedication and commitment are essential for effective investigations.

Prompt Response to Crime Scenes:

- Urgent Attendance: Fingerprint experts should respond immediately to crime scenes to prevent contamination. Delays in attendance can lead to compromised evidence, affecting the victims' well-being and the overall investigation.

Preliminary Scene Assessment:

- Verification with Complainants: During preliminary investigations, ensure that investigators verify with complainants whether the crime scene remains as the suspects left it before summoning fingerprint experts. This step will help avoid arriving at contaminated scenes and ensure that valuable evidence is not lost.

CONCLUSION

Fingerprints are a critical investigative tool that all members of detective branches and Local Crime Reaction Centres (LCRCs) must thoroughly understand and utilize. Forensic experts and detectives should consistently prioritize the collection and analysis of fingerprint evidence, as it can be pivotal in court proceedings. Their expertise in this area ensures that they can provide credible and robust testimony about the handling of fingerprint evidence, which is crucial for effective prosecution. The findings of this study underscore the importance of expertise and training in fingerprint analysis. The implementation of the recommendations proposed will likely reduce the number of cases withdrawn due to inadequate investigations and improve the overall prosecution rates. It is essential for experts and investigators to adhere to the principles outlined in the Constitution of the Republic of South Africa, Chapter 2, Section 35(5), which mandates that evidence obtained in a manner that violates rights protected by the Bill of Rights must be excluded if it compromises the fairness of the trial or the administration of justice. To ensure the admissibility and effectiveness of fingerprint evidence, it must be handled with authenticity, completeness, reliability, and believability. All stakeholders, including community members, detectives, and fingerprint experts, must recognize the pivotal role of fingerprints in the successful investigation and prosecution of housebreaking cases.

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