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The effects of utilising drones in response to robbery at the residential premises within the Rietgat policing area.

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**THE EFFECTS OF UTILISING DRONES IN RESPONSE TO ROBBERY AT THE
RESIDENTIAL PREMISES WITHIN THE RIETGAT POLICING AREA**

By

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Submitted in partial fulfilment of the requirements for the degree of

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In the

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In the

FACULTY OF HUMANITIES

TSHWANE UNIVERSITY OF TECHNOLOGY

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2024

DECLARATION

I, Tebogo Norman Mononyane, declare that the study entitled “**The effects of utilising Drones in respond to robbery at the residential premises in the Rietgat Policing Area**” is my own work. I have acknowledged all the sources I have used or quoted in this study with complete references. I also declare that this study has not been submitted for any degree or examination at any other university before.

A handwritten signature in black ink, appearing to be 'T.N. Mononyane', enclosed within a large, hand-drawn oval shape.

MONONYANE T.N

DEDICATION

“Family is not an important thing. It’s everything.” Michael J. Fox

- I dedicate this study to
- My parents, Thios Makekwane Mononyane and Khesiwe Lizzy Mononyane;
- My Wife, Tshepang Bennerdictor Mogale;
- My siblings; and
- My nephew, Gontse Mononyane.

ACKNOWLEDGEMENT

"Before I formed you in the womb I knew you, before you were born I set you apart"

Jeremiah 1:5.

To he who knew me before I was formed, the Almighty. I give praise, for if he had not been with me, I would not have been where I am now. Thank God.

My Sincere thanks to the following:

- My supervisor, Prof K.A. Rakubu, for her valuable contribution to the study as a whole, for her guidance, her valuable comments, and for sharing his vast knowledge with me, and especially for her patience.
- My co-supervisor, Dr H.P. Motlalekgosi, for his contribution to this study.
- My Parent for believing in me.
- My wife, Tshepang Bennerdictor Mogale, for patience and unrestingly support on this study.
- My siblings, Nomvula Jane Mononyane, Tshepo Mononyane, Kgothatso Mononyane, and Gift Mononyane for being my extrinsic motivation, and for being continuously supportive throughout this study.
- Special thanks to my nephew, Gontse Mononyane, for being my pillar of strength.
- I appreciate the financial assistance by the South African Police Service.
- Finally and importantly, I will like to thank the participants. Their contribution was valuable to this study and to me.

If there is anyone whom I failed to mention in relation to this study, please know it is unintentional and that I do appreciate you.

ABSTRACT

There has been a rise in Robberies at residential premises, but the arrest of suspects of such criminals is less and sometimes successfully executed, but with no conviction attained. Most of the suspects leave no trace which may lead to successful prosecution. This research wishes to introduce drones to assist the police to arrest the locale within the vicinity of the occurrence.

This research sought to explore the effectiveness of drones in assisting the police to arrest suspects at crime scenes of Robbery at Residential Premises in the policing area in question. The research is more contributively to reactive policing. This research intends to attain an increase in the arrests of Robbery at residential property (House Robbery) suspects and ensuring an increase in convictions thereof.

The research will also help members to understand the use of drone technology in their daily duties. Especially, the use of such technology in operations. This research wishes to highlight the importance of drone technology in saving police members' lives and improving the investigation of Robbery at residential property.

The research objectives are; (1) to contribute in the apprehension of Robbery at residential property' suspects in the vicinity within the locale of the occurrence of the crime; (2) to improve the investigation of robberies at residential premises to ensure successful prosecution; and (3) to highlight the potential of drone footage evidence in linking suspect of robberies at residential premises to the crime. The use of drones in the SAPS organisation has just been introduced.

In this research, a qualitative approach was followed. The researcher used the non-probability sampling method and conducted semi-structured interviews, as the qualitative approach provides for, in order to attain the objectives of this research. The question were formulated in the means of descriptive and exploratory approach. It was then evident from the data collected that there is a need for air support to enable the SAPS to counter Robbery at residential premises. The use of drone in responding to the crime was highlighted as an important contributing tool in combating Robbery at residential premises.

ABBREVIATIONS

ASL	Air Services License
ATM	Automated Teller Machine
C of R	Certificate of Registration
DNA	Deoxyribonucleic acid
FBI	Federal Bureau Investigation
GMT	Ground Movement Track
GPS	Global Positioning System
ISIS	Islamic State of Iraq and Syria
NASA	National Aeronautics and Space
PFMA	Public Finance Management
RLA	Remotely Piloted Aircraft Letter of Approval
ROC	Remotely Piloted Aircraft System Operating Certificate
RPL	Remotely Piloted License
SACAA	South African Civil Aviation Authority
SAPS	South African Police Service
TAM	Technology Acceptance Model
TKP	Token Passing Protocol
UAS	Unmanned Aerial System
UAV	Unmanned Aerial Vehicle
UDS	Unmanned Aircraft System Traffic Management
US	United State
UTM	Unmanned Aircraft System Traffic Management
VTOL	Vertical Take-off and Landing Systems

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CHAPTER 1

GENERAL ORIENTATION

1.1. INTRODUCTION

It is the Duty of police to respond timeously whenever members of the community report crime. The detection of crime is based on the ability of the police to apprehend suspect and the successful prosecution of the accused. The researcher put forth that the response of the South African Police Service (SAPS) is very important at this regard. This is because the sooner the police arrive at scene, the better chance of arresting the perpetrators at the crime scene, and better the chance of linkage of the suspect to the crime committed.

Robbery at the residential premises has always been a problem. This category of crime is regarded as a violent crime because the victims of this crime are at home when it takes place, as compared to Housebreaking (Burglary), which occurs when the victims are not present in their homes (Stats SA, 2020). Suspects tend to be difficult to be traced by the police, when they are not arrested at the crime scene. Yet it is unlikely to make arrest at such scenes, but not impossible.

The National Development Plan 2030 (NDP 2030) (2011) emphasises that the community should have confidence in the criminal justice system to effectively apprehend and prosecute criminals who violate individual and community safety. Apprehension of the suspects is very important for this purpose. This brings light that the apprehension of suspects is part of the achievements of the country, arrest followed by unsuccessful prosecution would result a waste of time.

The South African Constitution (1996) mandates the police to be responsible in domestic policing. It states that the objects of the police service are to prevent, combat and investigate crime, to maintain public order, to protect and secure the inhabitants of the Republic and their property, and to uphold and enforce the law. Technology has always been part of policing. By taking advantage of technological developments, the

police might improve chances of apprehending suspects at the crime scene, thus enabling the police to have a *prema facie* case.

Rendering to Allworth (2011), Drones are here to stay, and will remain in the public eye for many years. With that being cited, the researcher believes that the use of drones in policing could be a big contribution in reduction of robbery at residential premise. "Once it has been determined that a crime has in fact taken place, the investigation process starts" (Stelfox, 2009). This means even the responding time is very important in the investigation of crime. Responding time increases the chances of arresting suspects at the vicinity of the scene.

"Drones, equipped with interchangeable payloads, are the next step in technological progress that can help law enforcement agencies in ways that were previously impossible. Observation by means of a drone equipped with a camera is an important, though not exclusive, focal point" (Geldenhuys, 2019: 16). With the above alluded, the researcher observed the need to investigate the effects of utilising of drones in responding to Robbery at the residential premise around Rietgat Policing Area.

1.2. STATEMENT OF THE PROBLEM

Affording to Chidi (2022), one of the Trio crimes (House robbery, Vehicle Hijacking, and Business robbery, also referred to as serious violent crimes, SVC) investigators at Rietgat SAPS, most of the robberies at the residential premises that occur around their policing area remains unsolved as perpetrators of the crime live no tangible evidence or possible leads. The arrest of such perpetrators is in some instances executed after a long time, when some of the victims might not remember the face of the suspect, thus defeating the chance of a successful Identification Parade. Even though the suspects might be arrested, case such as these might not successfully argued in court.

The police arrive when the suspect just fled the crime scene. Sometimes even when shown the possible directions the suspect could have fled, they still fail make the arrest at the scene or even surrounding the vicinity of the crime scene. It is therefore the

researchers desire to investigate the possibilities of successful respond time and arrest of suspect at the robbery at the residential premises crime scenes. Rietgat SAPS comprises of two units that have better chance of responding to already occurring crimes, which is the sector policing unit and crime prevention unit, yet they fail to make arrest on the arrival at the crime scene.

Operational strategies have been implement, but the problem of suspect of robbery at the residential premises fleeing remains. Researcher wishes to embark in this research for contributing in the investigation of robbery at the residential premises, by highlighting the importance of utilising drone in respond to the perpetration is such crime.

1.3. OBJECTIVES OF THE STUDY

Mouton (2009:103) stated that the aim of research is to establish facts, gather new data, and to determine whether there are new data, and whether the data contain interesting patterns. According to De Vos, *et al* (2011:108), the objectives of a research study explain the specific issues that the researcher intends to examine. This should be clearly stated and be specific in nature. De Vos, *et al* (2011: 108) further state that each objective should define only one issue.

The objectives of this research study are as follows:

- To contribute in successful apprehension of robbery at residential property' suspects at the vicinity within the locale of the occurrence of the crime;
- To improve the investigation of robberies at residential premises in order to ensure successful prosecution; and
- To highlight the potential of drone footage evidence in linking suspects of robberies at residential premises to the crime.

1.4. RESEARCH QUESTIONS

According to Paulsen (2010:1), research questions make explicit exactly what you want to investigate and George (2011:1) mentions that a research question expresses

what the research project aims to find out. It gives the structure and focus necessary to get meaningful and useful results.

This study research will seek to find answers to the following questions, which were set to guide the whole study:

- How can the drones increase the apprehension of suspects of robbery at residential premises?
- How can the drones be used to improve investigation of robbery at residential premises?; and
- How will the drones contribute in suspect linkage?

1.5. JUSTIFICATION OF THE STUDY

This study is important as it enhances investigation of Trio crime. The study will contribute to a broader understanding of police response to robbery at the residential premises. The NDP 2030 (2011), state that the government wishes to modernise, in an integrated and holistic way, all aspects of systems and equipment. It further state that the police should use technology in order to increase efficiency across the board, a Technology for preventing and investigating crime. Drones are exciting in terms of technology and could undoubtedly have a lasting and positive impact on a range of industries, including law enforcement (NDP 2030, 2011).

Technology for preventing and investigating crime should be prioritised to prevent it from happening in the first instance, and to expedite investigations through increased forensic capacity, better crime scene investigation and analysis of current and future threats to safety. Particularly to eliminate bottlenecks in the criminal justice system. (NDP 2030, 2011).

“The Cape Town Metro Police Department also used drones to help them during raids in the city. When arriving at the suspect's house, a drone with an infrared camera will be launched from nearby while a team can view the footage from a distance. If any suspects flee, hide or try to get rid of weapons or drugs, the drone will capture the evidence” (Geldenhuys, 2019: 17).

Geldenhuys quotes Dolley (2017) reporting that the police have started using drones to gather information that is usually beyond their reach, map out exactly where crimes

are being committed without police members who have to move around, and to identify who is behind illegal activities. This means it will likely become more difficult for criminals to conceal their activities as they will be monitored from above, without them necessarily knowing it. From the above stated, it is clear that the police have started to use drones, yet they have not been used to be the first responder at the robbery at the residential premises.

Geldenhuys (2019:13) quotes Naidoo (2018) supports the use of drones when reporting on the success they bring in policing. Geldenhuys further stated that after running anti-poaching drone operations in the Kruger National Park, in KwaZulu-Natal, Malawi and Botswana, the Unmanned Aircraft Vehicle and Drone Solutions Company was approached by a large mining company that was suffering major losses from crime. One of the mining sites had to deploy 160 additional security staff members at night, to protect their infrastructure in a 26 km radius. The use of drones enabled the mine to reduce an average of 150 criminal incidents a month to less than 1%. They achieved this even when they employed only eight reaction security officers. Based on the evidence of successful use of drones mentioned above, the researcher seeks to extend the use of drones in combating the robbery at the residential premises.

1.6. CONCEPTUAL FRAMEWORK

According to Grant and Osanloo (2014: 17), the conceptual framework offers a rational structure of connected concepts that help provide a picture or visual display of how ideas in a study relate to one another within the theoretical framework. It is not simply a string of concepts, but a way to identify and construct for the reader your epistemological and ontological worldview and approach to your topic of study. The conceptual framework also gives you an opportunity to specify and define concepts within the problem (Luse, Mennecke, & Townsend, 2012). The researcher developed a conceptual framework for a study before determining how the research will unfold.

According to De Vos, *et al*, (2005:32), a researcher should use definitions in order to facilitate communication and the argument. In order to eliminate ambiguity and vagueness, a researcher should use terminology that is specific or produced in a scientific field. On the other hand, Fox and Bayat (2007:140) Fox and Bayat

(2007:140) posit that it is crucial for a researcher to define terminologies in the title, the statement of the problem, and any sub-problems precisely. This is because without doing so, it will be impossible to assess the research's eventual findings and to determine whether the researcher has solved the research problem adequately. The researcher should define the word according to how it will be used in the research project; therefore, definitions of terms must reflect the significance the researcher desires to give them in the context of their particular research project.

Harding (2013:6) highlights that the meaning of several essential phrases that will be used in subsequent chapters, many of which are likely to cause confusion, are crucial to understand. Therefore, the researcher employed the following important ideas for this study's aims and are defined as follows: The researcher has included the following definitions to help the reader understand the major topics utilised in this study report:

1.6.1 Drone: Unmanned aerial vehicle (UAV) is any aircraft capable of initiating flight and sustaining controlled flight and navigation without any human presence on board (Springerlink, 2023).

1.6.2 Policing: Smit, De Minnaar and Schnetler (2004:11), defines policing as a set of processes with specific social functions. It is a universal requirement of any social order, and may be carried out by a number of different processes and institutional arrangements.

1.6.3. Investigation: “An investigation is a systematic, methodical, and detailed inquiry and examination of all components, circumstances, and relationships pertaining to an incident” (Pena, 1993: 1).

1.7. LITERATURE REVIEW

According to Mofokeng (2010:5), citing Hicks and Turner (1999), literature review indicates that the identification of an effective research problem is a cornerstone for any quality research.

However, Singhfffi (2006:37) argues that effective research is based on past knowledge to eliminate replication of studies that have already been conducted about the use of drones in policing. The process also entails synthesizing available knowledge in the field in a unique way in order to provide the rationale for the study. Moreover, it provides a framework for establishing the importance of the study as well as a benchmark for comparing the results of a study with other findings (Creswell, 2006:31).

The literature searches utilised the internet, the Tshwane University of Technology Library and various electronic databases available on the topic under investigation. For the purpose of this research proposal, the researcher provides South African literature study in an attempt for a reader to have a picture of the existing research that have been made to have a light on the success of apprehensions that can be achieved from the use of drones.

The effectiveness of rapid response policing seems self-evident. By arriving more quickly, police officers should be able to arrest any suspect and/or question any witness at the scene, as well as prevent the destruction or contamination of physical evidence (Vidal & Kirchmaier, 2017). The researcher desire to highlight the possible means of fast responding time at the scene with the use of Technology, which is drone.

Geldenhuys (2019: 10-11) states that patrolling high crime areas in major cities is costly and dangerous. This is because there are either no streets, or street names and these areas are poorly lit. It is in places like these where the real value of drones in law enforcement can be appreciated. Police departments can deploy drones to improve their ability to enforce the law and protect lives, to track down criminals on the run, and to improve patrols in high crime areas. Furthermore, research that was conducted by Geldenhuys (2019) dwells extensively on the use of drones for patrols, especially in places where it is difficult for the police to navigate or patrol on foot. This technology can also be applied in a situation where the police cannot reach the area on time, due to road directions.

Geldenhuys (2019: 10-11) further quotes Slatter (2018), eluting that drones can be deployed in or near target areas as a primary intelligence-gathering tool, with live video

feeds which can be relayed to a ground team from where ground operations can be directed. With its unique aerial perspective, various parties can simultaneously view live footage and communicate commands and intelligence to units and personnel involved.

This research take a different road by dwelling match on the drone crime combating. The researcher wishes to highlight the chances of apprehension in the use of drones in responding to robbery at the residential premises.

1.8. THEORETICAL FRAMEWORK

1.8.1. The Technology Acceptance Model

The Technology Acceptance Model (TAM), which was developed by Davis (1989), assumes that when users perceive that a type of technology is useful and easy to use, they will be willing to use it. Consequently, the more employees recognize that the systems will make their tasks easier to perform; the higher is the probability that they will use it and accept the new technology as being useful (Surendran, 2012).

The above theory is adopted because the researcher wishes to introduce a technological object (drone) in police work and Highlight the benefits of using drone in respond to robbery at residential premises.

1.8.2. The deterrence Theory

Thomas Hobbes (1651) articulates that proponents of deterrence believe that people choose to obey or violate the law after calculating the gains and consequences of their actions. There are two basic types of deterrence general and specific. General deterrence is designed to prevent crime in the general population. Specific deterrence is designed by the nature of the prescribed sanctions to deter only the individual offender from committing that crime in the future (Paternoster, 2010: 233).

As this study seeks to highlight the effects on the use of drones. The researcher will also adopt the deterrence theory because this study will also follow on the benefits of deterrence.

1.9. RESEARCH METHODOLOGY

1.9.1. Description of location of the study

The area of research is Soshanguve East. The area is policed by the Rietgat SAPS (Rietgat Police Station). The area has a satellite police station known as Phuthanong SAPS. The police station area is divided into five (5) policing sectors. Furthermore,

within this area, there are informal settlements namely; Marikana in Soutpan, Dalimpofu in Block Y, *Skirlek* and other three (3) unnamed informal settlements.

1.9.2. Research Approach

The researcher employed the qualitative research method in this study. White (2005:81) states that qualitative research is more concerned with understanding social phenomena from the perspectives of the participants. This happens through the researcher's participation in the daily life activities of those involved in the research. The other reason for following this approach for this study is that the core objective of the study is to identify the actual perception of the SAPS crime prevention unit, detective's unit and the community.

1.9.3. Research Design

According to Singh (2006:77), research design is a mapping strategy. It is an essential statement of the object of the inquiry and the strategy for collecting the evidences, analysing the evidences and reporting the findings. The research questions will be answered by means of a qualitative, descriptive and exploratory approach

1.9.4. Research Population and Sampling

The researcher will use the non-probability sampling method. Moreover, purposive and snowballing sampling will be used as the type of sample. This example of sample is regarded as the most important type of non-probability sampling. While utilising this type of sampling method, researchers rely on their experience, ingenuity and/or previous research findings to deliberately obtain units of analysis in such a manner that the sample they obtain may be regarded as being representative of the relevant population, points out Welman, Kruger and Mitchell (2005:69). In addition, this type of sampling will be used because it would ensure that the sample compose of the most characteristics and representative attributes of the population.

The Rietgat Police Station consist of 99 uniform police members, among the 99, 16 are crime prevention members and 80 are sector policing members. Sixteen crime

prevention members participated in this study. The station also has 52 detectives, of which Four (4) are dealing with TRIO crimes investigation and were selected to participate in this study. The total sample comprised of 20 participants. The reason to present this population rests on this reasons; the area is easily accessible economically and viable. This, however, has no negative effects on the quality of the research and the proximity of the main police station could make it easier for the researcher to access officials from the station.

1.9.5. Method of Data Collection

The researcher conducted semi-structured interviews, as the qualitative approach provides for, in order to attain the objectives of this research. Questions that relate to the participants' experiences, feelings and beliefs and convictions about the concept in questions were asked to all participants. Biographical information at the time the interviews were conducted and taken into consideration in order to validate the information provided by means of focus groups.

All relevant information regarding the title of the study was conducted by reviewing available literature, focus group interviews and docket analysis. According to McNiff, Lomax and Whitehead (2003:116), the use of data, regarding an event, from more than one source is called triangulation. McNiff, *et al*, (2003:69) suggest that the aim of triangulation is:

- To triangulate the data that is collected from more than one source to use as evidence to support a particular explanation; and
- To show how the data from these different sources all goes towards supporting the explanation given of one's situation.

1.9.6. Measuring instruments

The following measuring instruments and data collection methods were applied in this study:

- The use of documentation (literature study);
- Target population and sampling; and

- With an effort to complement data gathering method in addition to the literature study, two focus group interviews/ discussions, information sessions / workshops and solicited stakeholders' views was be conducted.

1.9.7. Data analysis

According to De Vos, *et al* (2005:333) data analysis includes reducing the volume of fresh information, sifting significance from trivia, identifying significant patterns and building a framework for communicating the essence of what the data reveal. Therefore, the collected data would be analysed so that structured, reliable, and valid conclusions could be reached. Furthermore, the research questions were answered by means of a qualitative, descriptive and exploratory approach. De Vos, *et al* (2005:251) state that this technique is used to report the circulations of a sample or population across a wide range of variables.

De Vos, *et al* (2005: 383) continues by stating that analysis can be valuable by providing an opportunity to bring new perspectives to existing data, to use elements of the data that have not been fully analysed or to form a base for comparison with newly collected data. The researcher therefore is intending to analyse the existing data and come with a new perspectives.

In this research, the data analysis used is Narrative analysis. Narrative analysis is “an approach taken to interview data that is concerned with understanding how and why people talk about their lives as a story or a series of stories. This inevitably includes issues of identity and the interaction between the narrator and audience(s)” (Gilbert, 2008)

1.9.8. Methods used to ensure validity and reliability

Welman and Kruger (2000:177) reveal that a good research must be both valid and reliable. For the purpose of this research project, qualitative processes to ensure that data collection methods meet the requirements of validity and reliability were adhered to. Methodological and disciplinary conventions and principles were applied to ensure validity, reliability, credibility, accuracy and generalization of the research findings.

Creswell (2009:190) state that qualitative validity means the researcher checks the correctness of findings through certain procedures.

1.9.8.1. Validity

Kruger (2006:28) states, "The validity of a measuring instrument is the extent to which the research findings accurately represent what is really happening in the situation. Coolican (1992), as quoted by Kruger (2006:28), mentioned that research errors, such as faulty research procedure, poor samples and inaccurate or misleading measurement, can undermine validity, thus this would be avoided by the researcher at all costs. In emphasise to the above, data validation is the process of ensuring that a programme operates on clean, correct, and useful data (Rose & Sullivan, 1996:19).

1.9.8.2. Reliability

Creswell (2009:190) pointed out that to render qualitative reliability; the researcher should be consistent and document the procedures when collecting data. For this study, data collection and analysis proceeded simultaneously. Rigorous attention was paid to every step of the research design, implementation of the research, checks and balances to ensure the accuracy of data and its interpretation (Katzner *et al*, 1998:104).

1.10. Ethical consideration

The research process and the motivation for the study were explained to all of the participants and informed consent will be obtained from the SAPS and relevant stakeholders prior to commencement of research in Rietgat Policing area, with confidentiality ensured. No ethical problems were expected to arise from this research (Research Methodology Study Guide / Manual, Tshwane University of Technology (TUT), 2010:115-116).

1.12. Conclusion

In this chapter, the researcher has introduced the back group of this research project. In the following chapter (chapter 2), the researcher will discuss the literature review, theories behind this research and the legislative framework that underpins the study.

CHAPTER 2

LITERATURE REVIEW ON THE USAGE OF DRONES IN POLICING

2.1. INTRODUCTION

In Chapter 1, the researcher introduced the concerns and challenges posed by the extremely fast-paced utilisation of unmanned aerial vehicles, or drones, which are available to practically any member of the public. The researcher introduced the problem, objectives and questions of the research. The planning of the research has also explained, on how the researcher will conduct this study.

In this chapter, the researcher presents a review of the literature collected from various sources on the subject into the Technology in Policing, in international context, and introduces the theory of the use of the drones in policing and the key concepts. The term unmanned aerial vehicle (UAV) and the unmanned aerial system (UAS) are used intertwined, due to the use of these terms by various authors. They both refer to a drone, as abbreviated by different authors.

Technological advances in recent years have transformed the nature of policing so significantly that many methods and tools from just a decade ago have become outdated and incompatible with current technology (Goodison, Davis, & Jackson, 2015). Some of these advances include:

- location-monitoring devices for the tracking of high-rate offenders,
- predictive analytics and crime mapping software for the deployment of officers into locations that cause or are likely to cause crime,
- crime scene technology that enhances the collection and processing of evidence, and
- Interoperable Web-based and other communication devices that facilitate connections between police and the communities they serve.

As discussed by Koper et al. (2015), research suggests that technological improvements have increased police effectiveness. However, it is not certain that the

technology have enabled law enforcement agencies to be effective (see Danziger & Kraemer, 1985; Ioimo & Aronson, 2004; Roman *et al.*, 2008; Roth, Koper, White, & Langston, 2000; Lum, 2010). For example, despite dramatic advances in Deoxyribonucleic acid (DNA) technology and computer databases for handling forensic data, clearance rates for violent and property crime have remained relatively stable since the mid-1990s.

In this chapter, as the information relating the research is limited, the researcher has used the sources of various countries and reduced it in the objects of this research. The literature review is broaden in technology and narrowed into the use of drones in policing with the purpose of contributing into investigation robbery at residential premise. The focus of this chapter is with the current benefits of technology in policing, the introduction in drones in policing, which also covers the drone patrol or the use of drones for surveillance.

2.2. EXPLORATION IN KEY CONCEPTS

De Vos *et al.* (2011:287) explained that important theoretical ideas are phrases that can serve as the focus of a research. Only relevant keywords should be included as keywords; that is, words that would advance the study and inform readers of what to anticipate from a report. Determining the key concepts employed in a research study serves two purposes. First off, giving readers a clear working definition enables them to comprehend each crucial topic. Secondly, the explanation of concepts focuses the researcher's observational strategy (Maxfield & Babbie, 2005:120).

2.2.1. Perspective on Technology in Policing

Technology has always been part of policing yet its development have been observed throughout many years. Weisburd and Braga (2019) support the statement by stating that most scholars have expressed their interest in the potential of the information technologies and technology in policing broadly overtime. One cannot ignore that advancements in policing technology is motivated by scholars. Several studies have explored the use of technology in policing worldwide (Weisburd & Braga, 2019).

Kania (2019) sustained the above authors' views and stated that, For China, the emphasis on leveraging science and technology to renew its military is central to the Party's powerful military objective in the new era and since. Some of the Technology use by the police agencies are those being used in military. Nunn (2001) has corroborated this view by stating that advanced technologies were originally developed for use by the military, but they are currently commonly applied to enhance urban public safety.

However, Custers and Vergouw (2015) state that police forces and law enforcement agencies in many countries are continuously trying to optimize the use of technologies in policing and law enforcement. Weisburd and Braga, 2019 (as cited from Byrne & Marx, 2011), in conjunction with the need for police to advance in technology, state that technological innovations are so important to policing that they are the driving force leading to reform of crime prevention and crime control strategies, both by individual citizens and concerned groups and by formal police agencies.

2.2.2. Policing and Military Technology

Weisburd and Braga (2019) state that research areas in support of technology in policing include computers, GPS (Global Positioning System) based Technologies, video recording of crime scenes, and forensic evidence, such as DNA (deoxyribonucleic acid) testing. Weisburd and Braga (2019) further state that Law enforcement is progressively becoming a profession characterised as a technologically advanced field, in part because it has great potential to do so. As referred above the advancement of such technology can be seen with the equipment used for effective communication in the police. Equipment including communication radios and navigators in patrol vehicles, etc.

According Kaplan and Miller (2019:419) the modern military has always included policing functions, and modern police forces have always drawn on military additional equipment and military practices, procedures, and personnel. The difference between the military and the police is one of the core structuring elements of the liberal nation-state yet this separation is not easy to can identify.

An argument has been raised by Kaplan and Miller (2019: 420) stating that messages and warnings about the technological sophistication of criminal groups has conditioned the public to accept technologies like video surveillance and facial recognition because they are needed to protect society from individuals who practice such violence.

2.2.3. Investigation of Crime

According to Gehl and Plecas (2017) the investigator, when responding to a crime scene, should apply either one of the investigative response means. The tactical investigative response or Strategic investigative response. Gehl and Plecas further makes a distinction between the two:

2.2.3.1. Tactical Investigative Response

The Tactical Investigative Response is comprises of operational officers who are engaged in the frontline response to criminal events. In these Tactical Investigative Responses, the responding officers often have no time to undertake the tasks of gathering information. They must rely on the information of a dispatched complaint, coupled with their own observations made once they arrive at the scene. If an officer takes the action of making an arrest or using force to bring the situation under control, they are accountable for the action they have taken, and they may be called upon by the court to articulate their discretion (Gehl & Plecas, 2017).

2.2.3.2. Strategic Investigative Response

According to Gehl and Plecas (2017), the arrival of the investigator at the scene of an incident, is followed by taking control of the crime scene. This could be either by making an arrest or by determining that the suspect has fled the scene and no longer endanger the life or safety of persons, the investigation becomes a strategic investigative response. With this conclusion of life and safety issues, also comes the conclusion of crucial circumstances and the additional authorities to detain persons suspected and to enter and search private property without a warrant (Gehl & Plecas, 2017).

From the two investigative response, it is clear that the arresting of suspect at the scene of crime, where it is possible is part of the initiation of the investigation. The detection of suspect at the scene of crime is depended on the first responder.

2.2.3.3. Evidence based policing

According to Vuma (2020: 09), as society has changed, policing also has to change. Hence, there is a need for scientific and evidence-based policing. New technologies, new methods and new ideas have brought significant change to the profession of policing, but at its core, evidence-based policing requires the same dedication to communities, the same sense of duty and sacrifice, and the same integrity as always. Vuma (2020: 06) further state that the changes requires that police work should be well planned, monitored and evaluated, and lessons learned and shared. Where evaluations suggest that practices are effective, they should be encouraged.

2.3. IDENTIFICATION PARADE

Ewulum (2019) states that generally, identification parade, known as 'line-up' is a police identification procedure in which a criminal suspect and other physically similar person are shown to the victim or a witness to determine whether the suspect can be identified as the perpetrator of the crime. Identification parade becomes necessary where the identity of the suspect is in issue. Robbery at the residential premises is also one of the offences that need the identification parade for identifying perpetrators by the victim.

Ewulum (2019) settles that according to the law, identification evidence show that the person who is charged for committing an offence is linked to the crime. Furthermore, it is submitted that an identification parade can be useful where a witness claims to have seen an unfamiliar person who escaped from the scene of crime in circumstances requiring putting to test the witness powers of recognition based on the physical features and or other individualities of the person the witness claims to have seen.

Mokonyama (2010) quotes Gilbert (2004:529) gives the following factors that can have impact in identification parade:

- internal perception factors that can affect perception include personal drives and interests, emotions, prejudices, past experiences; and
- Conditioning external perception factors such as weather conditions.

The above factors may have an effect on the memory of the victim or witness to point out the suspect. It is, therefore, important that the identification parade is conducted as soon as possible, which is determined by the arrest of the suspect of the committed crime. It is, therefore, important that the apprehension of the suspect is done as soon as possible. If the circumstance may allow, it should be at the scene of crime.

2.4. TYPES OF DRONES

Different types and sizes drones are of are used for various purposes. There are four main types of drones with strengths and weaknesses as discussed below,

2.4.1. Multi-Rotor Drone

According to AUAV (2022) multi-rotor drones, also known as quadcopter, hexacopter and octocopter (Davis, 2022), are the easiest and cheapest option for getting an 'eye in the sky.' They also offer greater control over position and framing, and hence they are perfect for aerial photography and surveillance. This multi-rotor drones are different from the rotors. By far, quadcopters are the most popular multi-rotor drones. These type of drones have the ability to take off from just about anywhere, including being launched by hand, multi-rotor drones have a huge advantage when space is limited (Davis, 2022), enabling them to fly much more closely to structures and buildings.



Picture 1: Multi-Rotor Drone (HD AIR STUDIO: 2022).

2.4.2. Fixed-Wing Drones

A fixed-wing drone has one unbending wing that is designed to look and work like an aeroplane, providing the lift rather than vertical lift rotors. Hence, this drone type only needs the energy to move forward and not to hold itself in the air. This makes them energy-efficient. Fixed-wing drones cover longer distances, map much larger areas, and loiter for long times monitoring their point of interest. This type of drone can be suitable for patrolling a larger perimeter of an area (AUAV, 2022).



Picture 2: Fixed-Wing Drones (Google image)

2.4.3. Single-Rotor Drones

Single-rotor drone types are strong and durable. They look similar to actual helicopters in structure and design. A single-rotor has just one rotor, which is like one big spinning

wing, plus a tail rotor to control direction and stability. A single-rotor helicopter has the benefit of much greater efficiency over a multi-rotor, which increases if the drone is gas-powered for even longer endurance (AUAV, 2022).



Picture 3: Single-Rotor Drones (Herrick, 2017).

2.4.4. Fixed-Wing Hybrid VTOL

Hybrid VTOL (Vertical Take-off and Landing systems) drone types merge the benefits of fixed-wing and rotor-based designs. This drone type has rotors attached to the fixed wings, allowing it to hover and take off and land vertically. This new category of hybrids are only a few on the market, but as technology advances, this option can be much more popular in the coming years. One example of fixed-wing hybrid VTOL is Amazon's Prime Air delivery drone (AUAV, 2022).



Picture 4: Fixed-Wing Hybrid VTOL (Fly dragon X-drone, 2013).

2.5. DRONES IN POLICING

Chung, *et al*, (2020) define a drone as a machine that can fly without the assistance of a human pilot on board, and it becomes very popular because of its capability and potentiality, bolstered by the latest development of information technology including the boom of machine learning. Jayaweera and Hanoun, (2022) refer a drone as an UAV (Unmanned Aerial Vehicle), Allen (2021) state that is also known as UAS (unmanned aerial systems), have many positive uses define it as an aircraft that are capable of flying without an on board pilot. Lightweight small size UAV are increasingly being used for leisure pursuits, such as for recreational purposes and hobby activities.

Jackman (2023) states that Scholars, worldwide, have begun to explore the drone is growing deployment beyond the battlefield in increasingly diverse applications at home. Ahmadian, *et al* (2022:2) state that although drones have been the subject of many studies. No studies have focused on the implementation of the application of drones in combating robbery at residential premise.

Ground movement track (GMTs) using UAVs is now possible in an attempt to provide tracking and aerial coverage. A UAV equipped with Light detection and ranging (LiDAR) and visual sensors can track the movement of a GMT ahead, or at an impact distance, as well as capture and transmit aerial information about the GMT's surroundings for further planning. Moreover, tracking GMTs with UAVs serves as the

foundation for investigation and surveillance, as well as cooperative helicopter operations (Anania, *et al*, 2019).

There has been a concern about sustaining the object of the use drones in targeting moving target. Anania, *et al* (2019) state that controlling UAVs to autonomously follow moving targets while fulfilling mission objectives, such as providing continuous coverage or maintaining non-deviant camera aim point under wind effects, is a challenging task. Anania, *et al* (2019) Attempted to only investigate support for law enforcement usage of UAS, and the factors affecting this support. One can image the use of such technology in an attempt to search for the fleeing suspect from a scene of crime. This would make it easy for the police to keep track of the suspect's movement on the ground and result in a successful arrest.

The drones are fitted with technology that can assist the police in pursuing suspects and, thus ensuring the arrest of perpetrator at the vicinity of the crime scene (Fox, 2022). Besides tracking of suspect, the benefits of the drone are different. The use of drone is in various way that can even assist police with communication in the ground, in reactive policing. Fox (2022) state that drones, as the radio-controlled aircraft can be called, have many potentialities, civilian. This would even increase the communication means of the police. From those in the field and the dispatcher.

According to Reisching and Cordes (2021), the rapid development of technical possibilities combined with simplicity of operation and attractive prices now makes drone technology accessible to non-experts. Previously, drone systems required considerable technical knowledge to set them up and operate. Now, highly integrated and portable systems are available that are easy to use and deliver professional quality video and photo material. Surveillance drones seem to work because they provide a persistent "eye in the sky" over a vast area and are difficult to detect, especially at night (Bergenas, *et al*, 2013).

2.6. Disadvantages of Drones

Although the drone can bring positive outcomes in policing, it can also bring an added challenge in crime combating. According to Geldenhuys (2019: 16) points out that

even criminal also use drones may come as a surprise, criminals use drones in various ways to commit crimes. Kaplan and Miller (2019: 420) state that criminals have become technologically proficient and make clever use of available technologies to augment criminal lifestyles and exploit new targets for crime. "Drones, in various countries, have experienced some of the following criminal acts;

- Filming of an (Automated Teller Machine) ATM: A drone has been used in the United Kingdom to film people at ATMs as they enter their PIN code. The unusual incident was one of hundreds involving drones;
- Drug and cell phone deliveries in prison: On 29 July 2015, they strapped 7 g of heroin, 57 g of marijuana and 142 g of tobacco onto a drone and sent the drugs flying over the walls of the Mansfield Correctional Centre in Ohio;
- Cross border smuggling: a 25-year-old man who piloted a drone carrying a lunchbox filled with approximately 6 kg of methamphetamine, from one side of the US-Mexican border to the other where an accomplice could retrieve the smuggled cargo;
- Burglaries: This led to suspicions that the drone was used to stake out potential homes to rob. The thieves knew exactly the best point of entry as they managed to break through a bathroom window and ransack the house;
- Voyeurism (Cremen iniuria in South Africa law): Police in the US have identified a drone that was peeping through windows of residences, it was taped shut so that it could fly without being noticed in the dark;
- Hacking: Geldenhuys (2019: 18) quotes Larson and Sherman (2018) found that hackers are turning drones into devices that steal personal information. Geldenhuys further state that drones are now taking the hackers where they are usually not allowed to go;
- Assassinations: In August 2018, someone tried to kill the Venezuelan President Nicolás Maduro, using a drone. The president's speech was interrupted by an explosion and;
- Warfare: The Islamic State military group, ISIS (Islamic State of Iraq and Syria) were able to import and construct inexpensive and portable drones, using them to terrorise their enemies on the battlefields of Iraq and Syria" (Geldenhuys, 2019:16-17).

As the use of drone is the threat to citizens, the wildlife is also in the threat. According to Bergenas, *et al* (2013) Central to US and African anti-poaching efforts is the need for countries to take a holistic approach to ensure that non-lethal drone technology is use in an effective manner, and that public and private sector partnerships are leveraged against the transnational criminals who kill defenceless animals and threaten African and US security.

Mohanta (2021) state that drones were utilised by the Armed Forces for military operations. However, in the last decade or so, the UAV technology has rapidly accelerated, and the application areas have quite literally multiplied. Drones are today delivering goods and medicines to people in remote and inaccessible areas, aiding in building healthcare infrastructure, and doing a lot more. Some commercially available UAVs do implement collision avoidance, but only for static obstacles. When UAVs are equipped with inter-UAV collision avoidance, it is normally to achieve a specialised task and, as such, is not applicable to independent UAVs performing individual tasks (Staff Writer, 2022).

2.7. Reduction of Danger

Pang and Pavlou (2019) examines the relationship between technology use by the police and the number of police killed or assaulted in the line of duty. Policing is one of the few professions that perform its duty under a constant threat of danger in peacetime. According to Urbina and Chaumont (2021), reflecting on the Federal Bureau of Investigation (FBI) statistic, more than 50,000 officers in the United States (U.S), each year, are assaulted, and as many as 50 police officers lose their lives in the line of duty. This study examined the role of Information Technology in the occupational safety of workers in organisations that operate in unpredictable, risky, and life-threatening environments. The study allows a gab for this study, as it does not touch to the drones as the source of information Technology in combat of robbery at the residential premises.

Silberglitt, *et al*, (2015) identified several other emerging technology used by law enforcement agencies from their research participants. These technologies include:

- the expansion of surveillance capacity as the number and location of cameras (including wearable ones) increases;
- the use of cloud computing to reduce the need for physical infrastructure in agencies;
- the use of advanced data collection, analytics, and information dissemination to increase situational awareness for officers in the field;
- the use of GPS technology to monitor officer location; and
- the increased use of military-style equipment, reflecting a trend toward militarization of police that can lead to difficulties in developing and retaining public support.

2.8. Aircraft Patrol

Patrolling is done in different ways. According to the South African Police Service (2016) provide types of patrols, which includes; Foot Patrols, Vehicle Patrols, Motor Cycle Patrols, Bicycle Patrols, Horse Patrols, Aircraft Patrols and Police Dog Handler Patrols. Aircraft patrol. According to Schafer *et al* (2012:202) state that Police patrol operations have been heavily conditioned by the technology of the day. Schafer further state that the technology used in patrolling emerged in centuries. For the purpose of this research, the Aircraft Patrolling will be discussed more, but focusing on the use of drones as the form of an aircraft.

2.8.1. Drone Patrol

The terms patrolling and on patrol generally refer to what officers do while not handling calls for service officers do this mostly in patrol cars, but sometimes on foot, on bicycles, on horseback (What-when-how, S.a). Police patrols play an important role in public service by responding to incidents, thereby deterring and preventing crimes. By assigning limited police presence to critical areas, patrols might be more efficient and crime prevention could be enhanced. The patrol problem for air-ground cooperation involves the drones and police vehicles patrol line and the achievement of patrol

objectives the deterrence of crime and the response of emergencies (Yang *et al*, 2021).

Due to their increasing popularity, drones are widely used for security purposes, such as patrols. There are two key issues in drone patrol, namely, showing the patrolling scene in a simple and spontaneous manner; detecting and highlighting objects of interest. To this end, there is a proposal of a UAV patrol system based on panoramic image stitching and object detection. Ahmadian, *et al* (2022: 3) Smart border patrol using small-size drones may provide significant help in patrolling areas inaccessible to patrol agents, reduce agent response time, and increase the safety of patrol agents working in dangerous regions.

According to Bereg, *et al.* (2022) Border Patrolling is one typical application of air surveillance systems where the deployment of drones has become a natural choice for providing monitoring, surveillance, and search and rescue services for the protection of human lives or natural resources. Bereg *et al.* (2022) further state that in practice, a team of UAVs can be deployed along the boundaries of a region to collect useful information, such as images or videos, and send it to the nearest control centre. There has been a need for the air surveillance. Ahmadian, *et al* (2022:3) state that drones can fill the gap in the current border surveillance system in the following ways:

- Improving coverage along remote sections;
- Providing real-time information to the control operator for quicker response; and
- Reducing the risk of agent endangerment.

Although the researches are encouraging the use of surveillance in border and nature resorts. The technology of drones can also be applied in urban policing.

2.9. Robbery at residential premises

Zinn (2019) defines robbery at residential premises (House Robbery) as a form of a robbery with aggravated circumstances as defined in the Criminal Procedure Act (Act no. 51 of 1977). This category of crime has aggravating circumstances. Moreover,

Robbery, as defined in terms of section 1 of the Criminal procedure Act (Act no. 57 of 1977), means:

- the wielding of a firearm or any other dangerous weapon;
- the infliction of grievous bodily harm; or
- a threat to inflict grievous bodily harm, by the offender or an accomplice on the occasion when robbery at residential premises is committed, whether before or during or after the commission of the offence.

The crime occurs when the perpetrators enters the house when there are people around and forcefully take their possessions. The force used might be by means of intimidation or even the use of weapon when appropriating any of their possessions in the house (Zinn, 2019).

According to Burger (2010) categorises of Robbery at residential premises, referred to as home invasions' in the international literature (Newham, 2008), as one of the aggravated robbery among seven subcategories (street robbery, car hijacking, truck hijacking, cash-in-transit robbery, bank robbery, house robbery and business robbery) and remains a significant crime threat to all sectors in South Africa. Kempen (2017) state that the majority of these Hijackings happened in Gauteng. Burger state that the crime has the impact on the victim experiencing it. It can either be direct or indirect impact on the victim. Direct impact can range from the loss of the stolen property, and indirect impact will be the costs suffered for enhancement of security and insurances.

The SAPS statistics show and increase in the perpetuation of Robbery at residential premises between 2021/2022 financial years, has shown the increase in robbery a residential premises. The released statistic shows 11 905 in the number of arrest in 2020/2021 and 5 142 in 2021/2022, while there is an increase in the crime of robbery at the residential premises. With this being published, is evident that failure to make an arrest within the vicinity of the crime scene, make it very difficult, if not possible, for the police to can arrest the perpetrator during further investigation. (South African Police Service, 2022)

Manna (2022) state that after six (6) years of the trial of the home invader, the case has been concluded and the one of the suspects have been convicted to a sentence of 30 years imprisonment. The responding time of the police to the scene of crime enabled them to pursue the suspects Thus, the police arrested on the same course of attempting to flee the scene. This support the fact that apprehending the suspect at the scene of crime, contributes a successful prosecution.

2.9.1. Quarterly statistic on robbery at residential premises 2022/2023

First Quarter Stats 2022-2023	Second Quarter Stats 2022-2023	Third Quarter Stats 2022-2023	Fourth Quarter Stats 2022-2023
0,4%	8,4%	8,6%	5,9%

Table 2: SAPS Quarterly statistics 2022-2023

The quarterly statistics depicts the increase in robbery at residential premises by 50,0% for the first quarter and by 11,8% in the second quarter 2022-2023. It is evident that during those quarters the reporting of robbery at residential premises incidents were declining. In the third quarter showed an increase in reported cases of robbery at residential premises by eight, 6% and then increased with 5, 9% in the Fourth quarter.

2.10. VIDEO AND DIGITAL EVIDENCE

Sukamto (2022) state that the metadata (used by the library and information science communities to describe, retrieve, and manage information in the digital environment) in handling digital evidence, there is an essential phenomenon known as chain of custody. Sukamto further this is referring to an effort to ensure integrity in digital evidence and procedures for documenting evidence chronologically since it was first found at the crime scene token passing protocol (TKP) to explain 5 characteristics (4W and 1 H) of Chain of Custody, namely:

- fingerprint of evidences (why);
- digital signing (who);

- time stamping (when);
- geo location (where) and;
- procedures (how).

2.11. LEGAL FRAMEWORK AND POLICIES

South Africa's transition has been accompanied by a determined focus on the use of the law as an instrument for addressing crime, as well as other social problems. This is hardly surprising given that the apartheid era state was itself defined by a particularly far-reaching set of laws. What the law provides is simply a legal framework for justice (Davis & Snyman, 2005:132).

The recent introduction of drones as a trending technology have its own issues that contravenes regulations and the privacy of civilians. There is also consensus about the manner in which drone should be regulated. One example of this dilemma is a recent incident at the Gatwick Airport (Spinks, 2018) where the British Government expanded the no-fly zone radius up to 3 miles after a remote pilot flew his drone that grounded multiple flights. Similar in South Africa, they are regulation preventing the flying of drone with specific air space. However, several major organisations advocate for privacy and want the United States lawmakers to enact stricter regulations on the use of drones that affects privately owned and government-owned remote pilots. In this essay, we will discuss five things that address pertaining to the use of drones: privacy, data management, licensing, government agencies, and legislations.

2.11.1 The Constitution of the Republic of South Africa, Act no. 108 of 1996

The South African Constitution (Act no. 108 of 1996) is the supreme law of the Republic. Any law or conduct that is inconsistent with the Constitution is invalid. Hence, obligations imposed by the Constitution must be fulfilled. Every empowering provision should, therefore be read in light of the Constitution. The supreme law mandates the police to be responsible in domestic policing. It mandates that the objects of the police service are to prevent, combat and investigate crime, to maintain public order, to protect and secure the inhabitants of the Republic and their property,

and to uphold and enforce the law. This legislation requires the police to perform its mandate within this changing environment.

2.11.2 The South African Police Service Act, no. 68 of 1995

The powers of the police are conferred by legislation that is consistent with the Constitution of the Republic of South Africa. Section 13 of the SAPS Act outlines the powers, duties and functions of the members of the police service. According to section 13(1), police officials may exercise the powers and perform the duties and functions conferred on or assigned to them by law. This may only be done subject to the Constitution and with due regard for the fundamental rights of every person. This means that the actions of the police officials must always align their duties in terms of the Constitution, especially in relation to upholding the rights of individuals when arresting suspects. The Act also makes provisions for the SAPS to develop National Instructions and Standing Orders.

2.11.3. South African Police Service Standing Orders and National Instructions

According to Joubert (2018: 10), the Standing Orders and National Instructions are the policies that give the internal assistance to the police. The National Commissioner of the SAPS issues these policies. Their primary purpose to direct the police about when and how to use their powers or to perform their duties. These policies are compiled by the experts in the SAPS to ensure that they comply with the law.

2.11.4. Criminal Procedure Act, no 57 of 1977

In the Republic of South Africa, section 40 of the Criminal Procedure Act 51 of 1977, Section 40 (1) (b) authorise the police a peremptory provision to can arrest suspect without a warrant of arrest, if such person has committed a Schedule 1. Mokonyama (2010) state that an arrest is a drastic act by authorities with broad implications Alternative measures are preferable, especially in the case of less serious or minor offences, and if there is no reason to believe that a perpetrator will not stand trial.

According to Joubert (2018: 292) the police can arrest the suspect even if the purpose is not only to secure the attendance to court. Joubert (2018) further outlines the exceptions to the general rule, stating that an arrest can only be effected when:

- Further investigation is required;
- There is a need to check name and address;
- Terminate an unlawful act;
- Protection is required; and
- Prevention of crime is necessary.

2.11.5. South African Civil Aviation Authority

The South African Civil Aviation Authority (SACAA) is a Schedule 3A public entity in terms of the Public Finance Management Act ("PFMA"). The South African Civil Aviation Authority Act, 2009 (no. 13 of 2009) provides for the establishment of a stand-alone authority mandated with controlling, promoting, regulating, supporting, developing, enforcing and continuously improving levels of safety and security throughout the civil aviation industry. It reflects the Government's priorities and is in line with international trends in the aviation world where more and more states implement this option (South African Civil Aviation Authority, 2017).

According to South African Civil Aviation Authority (2017), flying a Remotely Piloted Aircraft is legal in South African as long as the operator thereof complies with the applicable legislation. In the usage of the drone, it is important that the police adhere with the existing regulations in the use of drones. Allworth (2021) state that in 2013, the National Aeronautics and Space Administration (NASA) to enable diverse and routine operations for small commercial UASs introduced a concept of operations for UAS Traffic Management (UTM).

The legal requirements for the use of the drone in public space is illustrated on the table below:

	Type of Operation	Commercial	Corporate	Non-profit	Private
Required approvals					
ASL		<input checked="" type="checkbox"/>	N/A	N/A	N/A
ROC		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	N/A
RLA		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	N/A
RPL		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	N/A
C of R		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	N/A
Private operations Checklist		N/A	N/A	N/A	<input checked="" type="checkbox"/>
NOTE: Everyone needs to comply in some form and Private operations need to comply with the private operations checklist 100% or face being categorised as a illegal operation					

Table 3: Drone Legal regulation of South Africa (Enforcement Guide for Private use & Illegal Operations, 2022).

2.11.6. Offences in commercial use of Drones

The police are not above the law. In the usage of the drones they need to familiarise themselves with the transgression of the law when they which to perform their daily duties using the drones. Here are some of the offences that can be committed in the commercial use of drones:

- Operate remotely pilot aircraft system without possession of functioning air-band radio tuned to frequency/ Air Traffic Service Unit (ATSU) providing service/ control to such area/ airspace/ aircraft; and
- Failure by pilot of remotely piloted aircraft to pilot RPA in manner that minimizes hazards to persons/ property on ground/ other aircrafts in air (Enforcement Guide for Private use & Illegal Operations, 2022).

The use of drones by members of the SAPS must be compliant with legislature and prescribed policies. The following discussion emphasizes the use of a new technology by the employees. For this research, the theory of Technology Acceptance Model and the theory of Deterrence have been adopted.

2.12. THEORETICAL FRAMEWORK

According to Eisenhart (1991: 205), the theoretical framework is the “blueprint” for the entire dissertation inquiry. It serves as the guide on which to build and support a study, and provides the structure to define how a researcher will philosophically, epistemologically, methodologically and analytically approach the dissertation as a whole. Theoretical framework as “a structure that guides research by relying on a formal theory constructed by using an established coherent explanation of certain phenomena and relationships” Eisenhart (1991: 205). Thus, the theoretical framework consists of the selected theory (or theories) that undergirds your thinking concerning how a researcher understands and plan to research your topic, as well as the concepts and definitions from that theory that are relevant to your topic. Lovitts (2005) empirically defines criteria for applying or developing theory that must be appropriate, logically interpreted, well understood, and align with the research questions at hand.

2.12.1. Technology Acceptance Model (TAM)

According to Ajibade (2018) as quoted from Dillon and Morris (1996), the Technology Acceptance Model (TAM), which was developed by Davis (1989), assumes that when users perceive that a type of technology is useful and easy to use, they will be willing to use it. Consequently, the more employees recognize that the systems will make their tasks easier to perform; the higher is the probability that they will use it and accept the new technology as being useful. According to Díaz-Fernández and Del-Real (2021), Studies to date have analysed public support for the use of drones with various applications, although public acceptance of drones in specific contexts remains to be explored. Caran and Goh (2004) state that TAM was used to develop a basic theoretical model that would explain why patrol officers embraced or rejected new

computer technology In particular, the use of drones for beach rescues has proven beneficial in reducing response times, thus helping to save lives.

Chuttur (2010) quotes Davis (1985) suggesting that the motivation of the user can be explained by three factors: Perceived Ease of use, perceived usefulness, and Attitude toward using the system. He hypothesised that the attitude of a user toward a system was a major determinant of whether the user will actually use or reject the system. The attitude of the user, in turn, was considered to be influenced by two major beliefs: perceived usefulness and perceived ease of use, with perceived ease of use having a direct influence on perceived usefulness. Chuttur (2010) further defines perceived usefulness and perceived ease of use as follows:

- **Perceived usefulness**

The degree to which an individual believes that using a particular system would enhance his or her job performance.

- **Perceived ease of use**

The degree to which an individual believes that using a particular system would be free of physical and mental effort.

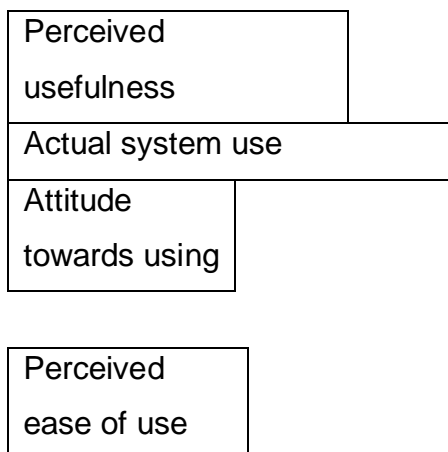


Figure 4: User' Motivation, Original TAM proposed by Fred Davis (Chuttur, 2009).

Ajibade (2018) argues that an employee's friends cannot influence the technology used in the working environment, but the company rules guides the behaviour of the employees. The use of drones in policing in this sense rely on the acceptance of the police in the usage of such technology. As stated above there is a need for the police to have certain attitude towards the use of drones. Which will determine the effectiveness of the technology in policing and ensure productivity. Below it the depiction of the original Technology acceptance model. Although Ajibade (2018) argue that they may not be will to use the technology, but the policies of the organisation may contribute to the employee's attitude.

Ajibade (2018) states that several authors suggested that this model is popular and easy to use to measure the degree of acceptance of employees to use a specific technology. "Despite this multipurpose usage and growing popularization, there is little knowledge concerning the drones' public acceptance. Public opinion is the main tool for democratic management of society and the development of its rules and regulations" (Sabino, *et al*, 2022). It objects of the police are subject to human rights. Aircrafts fly above residents premises and sometime violate privacy of others. In order for the results of the use of drones in policing, for the purpose if this study, in respond to robbery at residential premises to be fruitful depends on the employees' will to utilise such technology to perform their duties and also for the public to accept the usage of such technology in their area.

2.12.2. Technology Acceptance Model in Public Acceptance

In order for the police to be using the drone within the public environment, there should be an acceptance by the public for the usage of such technology within their neighbourhood, as required by the SAPS Act no 68 of 1995. The Act emphasise in the implementation of the community Policing and the establishment of community police forum and broads on different levels. The concept of community policing is simplified by South African Police Service (2016: 23) when it state that the community is valuable more than money or then the objects of the police.

Ahrendt (2020: 22) found that the use of drones more acceptable to the police than the civilians, including journalists. Ahrendt confirmed that, the finding were in support of her hypothesis that operator did have an influence on the acceptance of the drone.

Taylor (2011) found that when people apply reasons for the CCTV camera's presence that seemed logical to them such as preventing crime, they were less concerned with CCTV cameras being present than if they interfered implausible reasons such as thinking the purpose of the camera was there to watch them at any given point in time. These findings may predict that when people see a drone as monitoring them for security reasons, they are more likely to accept the drone than when feeling watched by the drone for commercial purposes or recreational fun.

2.12.3. Theory of Reason Action

In Davis (1985) as quoted by Chuttur (2010), it is stated that the actual behaviour of a person could be determined by considering his or her prior intention along with the beliefs that the person would have for the given behaviour. It is emphasised that the intention that a person has prior to an actual behaviour as the behavioural intention of that person, and define it as a measure of one's intention to perform a behaviour (Chuttur, 2010). The behaviour of the members in responding to the robbery at the residential premises is also important because even if the resource can be supplier, but with the negative behaviour, the result cannot be positive.

2.12.4. The Deterrence theory

According to Dutton (2019), deterrence theory predicts that the credible threat of punishment from a well-enforced criminal justice system will reduce crime. Carter (S.a) on the other side state that the proponents of deterrence believe that people choose to obey or violate the law after calculating the gains and consequences of their actions. Give two types of deterrence, which is General Deterrence and Specific deterrence. Both the types of deterrence suggest that the delinquent behaviour may be limited by the punishment imposed for criminal act.

General deterrence is designed to prevent crime in the general population. Examples include the application of the death penalty and the use of corporal punishment. Specific deterrence is designed by the nature of the prescribed sanctions to deter only the individual offender from committing that crime in the future. Proponents of specific deterrence also believe that punishing offenders severely will make them unwilling to reoffend in the future. A drunk driver, for example, would be deterred from drinking and driving because of the unpleasant experience he or she suffered from being arrested, or having his or her license taken away or his or her car impounded (Carter, S.a)

Deterrence theory works on these three key elements: certainty, celerity, and severity, in incremental steps. First, by making certain, or at least making the public think that their offenses are not going to go unpunished, then there will be a deterrent factor. As Beccaria relates, this is the most important of these three elements within deterrence theory. The celerity, or swiftness of punishment, is a secondary factor in rationalizing for the offender. If they know how swift the punishment will be, they will not offend (Carter, S.a).

This theory is Important for this research because when there is an elimination of the precipitating factor to commit crime, by the means of threat of being caught, it becomes a general deterrence. When people know that there is a high chance of being caught, they tend to be deterred to commit crime.

2.13. Conclusion

This chapter dealt with the literature review, growing use of technology in policing, robbery at residential premises, legal framework and theoretical frameworks. The researcher discuss legislation that is regarded to be most relevant to this study. The Constitution of the Republic of South Africa (Act no 108 of 1996), notably section 205, which outlines the responsibilities of the SAPS. On the other, the SAPS Act (no. 68 of 1995), the Criminal Procedure Act (no 57 of 1977), which provides for the criminal procedural powers, and the South African Civil Aviation Authority Act no 13 of 2009,

which regulates the use of aircraft. This research is also supported by three related theories; namely, the TAM, the Theory of Reason Action and the Deterrence Theory.

In the following chapter, the researcher will discuss design, methodology, location of the study, population and sampling, method of data collection, measuring instrument, data collection, methods adopted in validating the research, and ethical consideration.

CHAPTER 3

RESEARCH METHODOLOGY

3.1. INTRODUCTION

In the previous chapter (Chapter 2), the focus was on consolidating the information pertaining to drones (as a source of technology) in policing. In chapter 3 the researcher emphasis on the methods used in collection of data. The researcher used the focus group interviewing method to collect data in order to augment the knowledge gained from the literature. This chapter dwells on the methodology used on this research. The methods used for data collection are comprehensively explained in this chapter. Moreover, the researcher explains how the data was collected and analysed in the current chapter. Finally, limitations, relating to the problems encountered during the data-collection process, the reliability and validity are also presented in this chapter.

3.2. RESEARCH DESIGN

According to Singh (2006:77), research design is a mapping strategy. It is an essential statement of the object of the inquiry and the strategy for collecting the evidences, analysing the evidences and reporting the findings. The research questions were answered by means of a qualitative, descriptive and exploratory approach.

3.3. RESEARCH METHODOLOGY

According to Denzin and Lincoln (2011), a research methodology or strategy is determined by the nature of the research question and the subject being investigated. As a result, the research format used in an investigation should be regarded as a tool to answer the research question. This dissertation aimed at exploring and understanding the meanings constructed by the participants. The study did not aim to provide the ultimate truth about the research topic but rather to investigate a particular way of looking at and deriving meaning on the phenomenon under investigation. This study was guided by the following research questions:

- How can the drones increase the apprehension of suspects of robbery at residential premises?
- How can the drones be used to improve investigation of robbery at residential premises? and
- How will the drones contribute in suspect linkage?

A qualitative research approach was chosen as the methodology because the researcher intended to highlight human interaction with a technological object. Qualitative research was considered suitable for this research project, as the purpose of this study was to explore the views of a group of the people face with the daily experience of the robbery at the residential premises. The researcher aimed to interpret the data that was collected as indicated in the research methods by means of an exploratory approach and to describe the gap that can be close in the use of drone in respond to robbery at residential premises.

3.4. Research approach

This study used a qualitative research methodology. Grossoehme (2014:109) states that qualitative research is “the systematic collection, organisation, and interpretation of textual material derived from conversation”. The reason for using qualitative research was that the researcher wanted to explore the opinions and experiences of the crime prevention members and TRIO investigators to appraise the need for the use of drones in Policing. The aim of this research method was to investigate the effect of the drones in responding to robbery at residential premises. White (2005:81) indicates that qualitative research is often concerned with the understanding of a social phenomenon from the perspectives of the participants.

According to Hesser-Biber (2016:6), “the aim of qualitative research approach is to get subjective meaning”. However, Creswell (2014:187) indicates that qualitative research is interpretative research, where the inquirer ensures a sustained and intensive interaction and experience with participants. Researchers tend to know and understand what to expect if they are in advance aware of what they are looking for from the research that they seek to conduct (Shakouri, 2014:676).

Qualitative research is more general and, in most cases, involves a rich collection of data from a diversity of sources in order to gain a deeper understanding of individual participants, which includes their opinions, perspective and attitudes (Nassaji, 2015:129). According to Mohamed (2017:83), a researcher is required to choose a qualitative research design due to the purpose of study. According to Levitt, *et al*, (2018:27), a researcher uses qualitative research in order to describe an established of approaches that analyse data in the form of experience and expressions (Shakouri, 2014:676). In this context, qualitative research allowed the researcher to have a better understanding the experiences of responding to crime of robbery at residential premises.

Jameel, Shabeen and Majid (2018:1) assert that by engaging with people, studying their behaviour, and taking into account how the sensitivities of an environment may influence their perspective and experiences, qualitative research develops the narratives of individuals and communities. Qualitative research is used when the research aim is to investigate a complex phenomenon that is difficult to measure quantitatively, to generate data necessary for a comprehensive understanding of a problem, to gain insight into potential causal mechanism, to develop sound quantitative measurement processes and to study special population (Curry, Nembhard & Bradley, 2009: 1443).

According to Kumar (2014:133), in qualitative research, little attention is paid to study designs or the other structural aspects of a study; hence, the replication of the study design and its findings becomes almost impossible. Kumar further state that the three most common qualitative methods are participant observation, in-depth interviews, and focus groups. Each method is particularly suited for obtaining a specific type of data:

- Participant observation is appropriate for collecting data on naturally occurring behaviours in their usual contexts;
- In-depth interviews are optimal for collecting data on individuals' personal histories, perspectives, and experiences;
- particularly when sensitive topics are explored; and

- Focus groups are effective in eliciting data on the cultural norms of a group and in generating broad overviews of issues of concern to the cultural groups or subgroups represented.

The types of data these three methods generate are field notes, audio (and sometimes video) recordings, and transcripts (Muijs, 2010:1-2).

3.4.1. Advantages of qualitative research

Qualitative research plays a role in assisting the researcher to access the thoughts and feelings of research participants, which enabled proper understanding of the meaning that people ascribe to their experiences (Sutton & Austin, 2015:226). Qualitative researchers are interested in meaning in terms of how people make sense of their lives, experiences and their structure of the world (Atieno, 2009:14). The reason that the researcher used qualitative research was that the researcher wanted to collect information on and appraisal of SAPS members in Apprehension of offenders of robbery at residential premises (Rahi, 2017:2). Such investigation includes the recommendations that may accrue from the study on how the crime prevention respond to robbery at residential premises and understand the need for drone video footage evidence in the investigation of robbery at residential premises. According to Ragab and Arisha (2018:5), qualitative research helps a researcher to understand and describe the phenomenon under investigation. In this context, the researcher described police officer's personal experiences of crowd management.

Qualitative research is aimed at producing in-depth information to understand the different dimensions of the research problem under study (Queiros, Faria & Almeida, 2017: 370). It was very useful in exploring the opinions of the police members that are difficult to measure with quantitative research (Kalu & Bwalya, 2017:43). According to Sutton and Austin (2015:226), Findings from qualitative study are utilised to understand how police officers feel and think about crowd control. Qualitative research seeks to answer questions such as "why" and "how" of a phenomenon as opposed to "what" and "how much" (Jameel, Shabeen & Majid, 2018:1).

3.4.2. Disadvantages of qualitative research

According to Mohajan (2018: 20), some of the disadvantages of qualitative research are that the researcher's influence can have negative effects on the data collected. This means that there is a high possibility that data can get lost. Askarzai (2017:30) state that findings generated through qualitative research cannot be used to predict quantitative issues. Furthermore, the findings cannot be generalised to a broader population, as is the case with quantitative research (Atieno, 2009:17). The process of collecting and analysing data in qualitative research is time-consuming. There is also a possibility for the researcher to influence the study qualitative research (Choy, 2014:102). Furthermore, the quality of qualitative research depends on the research skills of the researcher (Anderson (2010:2).

According to Kumar (2014; 68), the aim of qualitative analysis is a complete, detailed description. No attempt made to assign frequencies to the linguistic feature, which are identified in the data, and rare phenomena receives or should receive the same amount of attention as a frequent phenomenon. Qualitative analysis allows a reasonable distinction to be drawn. This is because it is not necessary to shoehorn the data into a finite number of classifications. The main disadvantage of qualitative approach to corpus analysis is that their findings cannot be extended to wider population with the same degree of certainty that quantitative analysis can. This is because the findings of the research are not tested to discover whether they are statistically significant or due to chance (Bryman, 2012).

In terms of qualitative research approach, it is largely impossible to escape the subjective experience, even for the most seasoned researchers. If a researcher is working with one person, or even a small group, the results are likely to be valid for that particular person or focus group. Therefore, one could not make a generalisation from the results as one could with the results of a quantitative research study. Another disadvantage of qualitative research is the accuracy of the interpretation of the researcher, because the researcher is a person like the participants. It is possible that the researcher has personal biases to overcome or consider when carrying out inductive reasoning processes (Creswell, 2014).

3.5. LOCATION OF THE STUDY

According to Masogo, *et al.* (2014), Soshanguve originated its name from a specific acronym that reflects the town's multicultural character, as follows: SO – Sotho, SHA – Shangaan (Tsonga), NGU-Nguni (which include Swazi, Zulu and Xhosa) and VE– Venda (City of Tshwane Metropolitan Municipality Geomatics 2004). The township mainly comprises of historically disadvantaged Black Africans organised into distinct alphabetical residential blocks. Soshanguve is situated 30 km north of the city of Pretoria and one of historically designated township settlement during the apartheid administration in South Africa. It forms part of the city of Tshwane Metropolitan Municipality.



Picture 5: Soshanguve Map (Google maps).

Tshwane is the authentic Setswana name for Pretoria, which means, “we are together” or “we are one because we live together” (City of Tshwane Metropolitan Municipality, 2004). The City of Tshwane Metropolitan Municipality (CTMM) was formed at the end of 2000, where fourteen local authorities were amalgamated to form the new municipality as listed in the (City of Tshwane Metropolitan Municipality, 2004). The research focused was at the east of Soshanguve, which is the Rietgat policing area.

3.6. SAMPLING

This study consisted of Purposive sampling and snowball sampling. Purposive sampling allows for the selection of individuals the researcher feels are able to contribute key information and a rich understanding of the problem based on their professional expertise. Snowball sampling, is a type of sampling where the researcher gets help from one participant to another. The choice of the participant is guided by the aims and objectives of the study. This method was used to select members of the crime prevention and detective unit. Due to the possibility of a relatively low number of accessible subject matter experts. Interviews (and informal discussions) were planned, scheduled and conducted with the member who come across the incidents of robbery at residential premises. The positive aspect to this was that more validity and internal reliability could be obtained with regard to this study, which in turn meant the more reliable and trustworthy the study would be.

The population of the study included members of the SAPS, stationed within the two police stations, namely Rietgat Police Station and Phuthanong satellite police station. A total sample of 20 participants were selected from a population of 99 uniform police members, among the 99, 16 are crime prevention members and out of 52 detectives in the station, 4 are specifically dealing with TRIO crimes investigation were the participants. The total of the whole population was 20 participants. The selection of the community on the study is because the researcher also wants to highlight the effect the use of the drone may have on the community. Community members' knowledge was used to add to the data required in policing areas where it could be lacking

Relief A	Relief B	Detectives
Captain	Lieutenant Colonel	Sergeant
Warrant officer	Sergeant	Sergeant
Sergeant	Sergeant	Sergeant
Sergeant	Sergeant	Constable
Sergeant	Sergeant	
Constable	Constable	
Constable	Constable	

Constable	Constable
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Table 3: Rank structure of the sample.

3.7. METHODS OF DATA COLLECTION

Data gathering is a continuous process that starts at the anticipatory design stage of quantitative research. It proceeds after the initial interview stage. It is emergent and dynamic because the data gathered at one point may be used in future (Gall, Jazayeri & Krajewski, 2003).

Gill, *et al*, (2018: 639) state that an interview is designed to capture and analyse people's thoughts, views, experiences, and ideas about pertinent subjects. Gill also state that in order to record and analyse people's opinions, experiences, beliefs, and thoughts on pertinent issues, interviewees must provide more in-depth information. Further state comparatively highlighting, this provides a better understanding of social issues than quantitative tools like surveys and questionnaires. Interviews are a convenient way to collect data when a study focuses on delicate issues that participants might not feel entirely at ease to discuss in a group setting. Ahuja (2015:36) confirms that in an interview the researcher might be required to ask questions of a large sample. This could be undertaken by means of direct interviews or through mass communication such as by the utilisation of cellular phones, telephones and/or mail. This method is by far the most common means of data gathering.

In order for the researcher to attain the objectives of this research, interviews were used to collect data. Moser and Korstjens (2018:13) define an interview as “an interaction between the interviewer and the participants based on the research questions”. The interviewer should establish an appropriate atmosphere through which interviewees feel free to talk (Alshenqueeti, 2014:41). The researcher conducted semi-structured interviews with the participants.

A semi-structured interview could be defined as a dialogue between the researcher and participants. In order to achieve this, the researcher use an interview schedule, which is supplemented by follow-up and/or probing questions (DeJonckheere &

Vaughn, 2019:1). An interview schedule was used, which consist of open-ended questions. According to Kabir (2016: 347), an interview schedule is defined as a structure of a set of questions on the chosen or given topic by the researcher asking the participants personally, the language and sequence that was used in the schedule did not changed. A schedule was administered in cases where the questions created some confusion in the mind of the participants, and therefore required further explanation.

Questions that related to the participants' experiences, feelings and beliefs and convictions about the concept in question were asked to all participants. Biographical information at the time the interviews were conducted and taken into consideration with an attempt to validate the information provided by participants in the study. All relevant information regarding the title of the study were conducted with available literature and focus group interviews.

Ahuja (2015: 36) states that in open-ended questions, the participant will have a greater freedom in giving her or his response and close-ended questions limit a respondent's response to choose from. The open-ended questions allowed the participants to answer freely without fear.

The Focus group interviews was guided by a set of pre-determined questions, and additional probing with open-ended questions. According to Welman, *et al*, (2012:251) the Focus group approach prevented the interview from becoming too rigid, enabled the interviewer thoroughly to explore the participant's responses, and give the interview a conversational feeling.

According Hoyle, Harris and Judd (2012:328) in Focus group method of collection of data, a limited number of participants (5 or more) are selected from the targeted market. The main objective of the focus groups is to find the answers to how and what questions. The main advantage of this method is that the researcher does not have to interact directly with the group of participants. The participants were grouped into five or more, based on the shift that was on duty at the station at the time of the interview. Hoyle, Harris and Judd (2012:329) further states that the Focus group method most extensive processes when compared to other data collection methods. It is mostly implemented to explain complex situations in detail. Focus groups are particularly

helpful during the testing of the new concepts or market research while launching a new product. The interviews were recorded with prior permission from all participants.

Nyumba, *et al*, (2017:20) indicate that a focus group is an approach to gain an in-depth understanding of social issues and to obtain data from a purposeful selected group, rather than from a statistically representative sample of a bigger population. Researchers use focus groups to gather information in a group setting, either through predetermined interview questions that the moderator asks of participants in turn, or through a script to stimulate group discussion (Paradis, *et al.*, 2016:263). Walliman (2011:100) indicate that a focus group is a type of group interview that researchers use to collect on a particular theme in-depth.

Moser and Korstjens (2018:14) indicate that a Focus group discussion is a way to gather people together to discuss a specific topic of interest. Taylor, Eley and McKenna (2017:693) indicate that a focus group ranges in sizes from five or more persons and capitalize on group dynamics to stimulate discussion. The larger the group, the more challenging it is to moderate the group (Eaton & Brown, 2017:8).

A focus group serves as a confirmation technique that increases the validity and reliability of the whole research (Ngozwana, 2018:23). According to Fusch and Ness (2015:1410), a focus group is one way to elicit a number of perspectives on a specific topic in order to reach data saturation. Focus group discussions can be recorded in one of the three ways: using audio, video or field-notes (Eaton & Brown, 2017:11). Walliman (2011:100) states that a focus group is often comprises of respondents who have particular experience and/or knowledge about the subject of the research. According to Queiros, Faria and Almeida (2017:377), a focus group is regarded as a useful method to investigate complex behaviour, where the researcher is able to interact with the participants.

Focus group interviews are sufficient when used in a semi-structured manner when collecting data (Adhabi & Anozie, 2017:90). According to Gill, *at el* (2008:293), focus groups are used for generating more information from a group than from an individual. In a Focus group, attitudes, opinions towards responding to robbery at residential premises were explored through a free and open discussion between the researcher

and the Rietgat SAPS members. It is important to note that information obtained through an Focus group is of a more qualitative nature than information obtained from an individual (Oun & Bach, 2014:254).

According to Grosseohme (2014:110) state that a fantastic technique to document the in-depth discussions between the researcher and study participants is through focus groups. When participants engage in a group context, it acts as a catalyst to produce a special knowledge of the individuals' experiences. Fantastic technique to document the in-depth discussions between the researcher and study participants is through focus groups. When participants engage in a group context, it acts as a catalyst to produce a special knowledge of the individuals' experiences of the participants (Curry, Nembhard & Bradley, and 2009:1445). Barrett and Twycoss (2018:63) state that a focus group is a technique for gathering data in which a moderator converses with a group of participants about crowd control based on the research questions under investigation. The research consisted of two Focus group of six members each. The researcher was the moderator of the groups. In total, the researcher interviewed 18 members.

3.7.1. Interviews

Robson (2000:90) identifies three different types of interviews, namely structured, semi-structured and unstructured interviews. The researcher used the semi-structured interview because the questions asked were predetermined and the same for every participant. The questions were derived from the research questions and the aim of the study. The semi-structured interviews also allowed for both open-ended and closed-ended questions during the interview (Robson, 2000:90). Dantzker and Hunter (2012:126) highlight that the most used type of interview in criminal justice research is the semi-structured interview. This requires the use of closed-ended questions that every individual interviewed must be asked in the same order. The advantages to this type of interview are that:

- It can be easily administered;
- has high response rate; and

- Makes data processing much easier.

The researcher used one interview schedule, which comprised all the questions that were posed to and answered by all participants. One interview schedule was used for all participants to maintain uniformity and consistency, thereby providing all participants fair and equal opportunity in responding to the research questions without bias and or favouritism. The questions were derived to address the identified research problem and guided by the research aim and the objectives.

During the research study, the researcher adhered to, and used the guidelines for conducting a productive interview as outlined by Leedy and Ormrod (2005:159), by adhering to the following aspects:

- Safe location: Making sure that there was a suitable location for conducting the Interview;
- Establish rapport: Conducting an icebreaker exercise to put the participants at ease and to make them feel comfortable, by first asking how the workload was at their offices and asked them to share the highlights of working as forensic analysts. This exercise helped to establish and maintain rapport;
- Obtain permission: Written permission was obtained from the SAPS prior to conducting interviews with the participants, and a copy was always available for any participant who wanted to see it seek consent: Prior informed consent was obtained from each participant and a consent form was signed;
- Keep records: Making notes of the participants' responses without interrupting them.

The participants' responses were written down on the answer sheet by the researcher and were read back to them (participants) for verification. Audio recordings of the interviews were made; and No undue influence. This ensured that the participants were not unduly influenced during the interview. The participants voluntarily agreed to participate in the research interview without being pressurised or coerced. In addition, Leedy and Ormrod (2010:149-152) are of the view that the following aspects should be complied with during research interview: Identify questions in advance:

- The researcher made use of a semi-structured interview schedule, which prevented the interview from drifting away from the topic;
- Consider how participants' cultural backgrounds could influence their responses: The interview questions were not culturally-based, as they focused on the subject matter which the participants were doing daily, without cultural interference;
- Make sure that participants are representative of the group: only crime prevention were interviewed in groups, and it was expected of them to have insight into the topic in question;
- Focus on the actual: The researcher made sure that the questions on the interview schedule were answered without losing focus of the research aim;
- Do not put words into participants' mouths: The researcher made sure not to put words in participants' mouths, by not assisting them in answering the questions;
- Record the answers: The answers provided by the participants were written on the answer sheet, and were read back to each participant for verification;
- Keep your reactions to yourself: The researcher kept his reactions to himself, without expressing approval or disapproval of the answers provided. This was done by avoiding head nodding and other facial expressions;
- Be perceptual: Always treat all responses as perceptions rather than as facts; and
- Take the group dynamic into account: The researcher took the group dynamic into account by conducting all the interviews between the researcher and the participant in private. This practice helped to eliminate the impact of group dynamics. Any research study involving human beings must respect participants' rights to privacy.

Under no circumstances should a research report, either verbal or written, be presented in such a way that other people become aware of how a participant has responded or behaved unless, of course, the participant has specifically granted permission in writing for this to happen. Consent to, and confidentiality of, the interview, together with the information received, were prioritised during this research

project. Interviews were conducted at the interviewee's place of comfort, and the interviews were controlled and conducted in a private office or boardroom with limited access, allowing the participants to express their feelings without fear of being out of scope or unduly influenced (Leedy & Ormrod, 2015:123).

According to Denscombe (2007:173), interviews should not be conducted with secret recording of discussions, or the use of casual conversation as research; however, it should be made clear that it is an interview intended to gather information for the purposes of the study. The researcher kept a record of all the relevant data of each interview, such as the date of the interview, the consent forms, the responses provided, and the participants' numbers, for example, Participant 1. As a matter of personal safety, comfort, and to maximise the output of an interview, it is important for the interviewer to ensure that all distractions were removed, interruptions were guarded against, and the participants were not accompanied by other members, especially in case of one-on-one interviews. It was also important to select a neutral location in which participants felt free and comfortable. Special care was taken to avoid the "principal's office syndrome" by selecting a location that was not likely to be intimidating to the participants (Goetsch, 2014:163).

The use of Focus group interviews was of great value in eliminating the "principal's office syndrome" as the participants were responsible for choosing a place with which they preferred to conduct this research interview from. Mason (2009:63) submits that interviews are one of the most recognised forms of the qualitative research method. Interviews are the most prominent data collection tool in qualitative research and are very effective for accessing people's perceptions, meanings, definitions of situations and personal experiences, thus, a very powerful tool we have for understanding others (Punch, 2014:144).

3.7.2. Open-ended questions

Tran *et al* (2016:1) note that the use of open-ended questions allows the participants to describe with nuance and detail how they perceive the concept under investigation. Open-ended questions are types of questions that are designed to provide the participants with an opportunity to answer the research questions (Sabilah & Manoy,

2017:1074). One of the advantages of open-ended questions is that the participants are able to answer the research questions in their own words (Brayda & Boyce, 2014:320).

The researcher asked the participants questions that did not limit them to express their views. Open-ended questions provided participants with an opportunity to indicate if they do not understand a question, or in case they do not have an idea about the issue. They provide information about different thoughts. This allowed the researcher to get an understanding of the true feelings of the participants on the topic. This form of questions gave the participant an opportunity to can express their view and expand freely on the topic.

3.7. DATA ANALYSIS

Qualitative research produces mainly semi-structured text-based data. Maxwell (2012) state that qualitative data analysis is the process of explaining, grouping, and interconnecting occurrences with the researcher's theories. These textual data could be interview transcripts, observation notes, diary entries, or medical and nursing records (National Library of Medicine, 2008).

Data collected for this research was analysed using unconditional procedures and presented in accordance to fit the two (2) police unit, the crime prevention unit and the TRIO investigators. The research includes two categories of variables; namely independent and dependent variables. The independent variables comprised the following on the questionnaire:

- The gender of the participant;
- The language they speak;
- Education level;
- The qualification of the respondent (the internal course they have); and
- The rank.

The dependent variables were derived from the various opinions on the state of investigating and responding to robbery at residential premises. The participants were

asked to respond to the current need of the drones in assistance with the apprehension of robbery at residential premises suspects, within the vicinity of the crime scene. The following were included, after gathering relevant literature on the subject:

- The state of house robbery cases;
- The importance of effective respond to a crime scenes; and
- The need for digital evidence.

3.8. STUDY LIMITATIONS

There is alike written about the drone in policing in South Africa. This statement is supported by Allworth (2021: 124) stating that there are limited publications available on the South African case relating to drones. Research publications available in South Africa with regards to a unique perspective and challenges within the South African context are still lacking, a gap worth further exploration. Research on this topic is a relatively new phenomenon in South Africa and allows for much more (future-directed) research.

At the detective unit, their work is mostly outside. It was not easy for the researcher to get access to the participants as they kept on postponing the focus group discussions, as the aim was to interview them as a group. The interview was strictly voluntarily, those who did not have an interest in participating in the research they were excused. At the crime prevention unit, most participated. Their duties require them to respond as soon as possible whenever a contact violence crime is reported and despatched. Interviews with crime prevention members were conducted only at night because they only work night shifts.

Some member feared management, even when the whole process of getting approval from research division was explained. Nevertheless, during the interviews, the researcher informed the group about their rights and that they can withdraw from the interview if they wished to do so. Within the SAPS environment, information on sensitive information relating to robbery at residential premises, which could have been extremely educational, could not be used as one would expect as with the policies of the SAPS' protection to information policies reasons.

3.9. ETHICAL CONSIDERATION

Research ethics is of critical importance to researcher conduct, emphasised by a variety of professional codes of practice as well as the law (Coliandris, 2021: 73). To undertaking the research, ethical approval was granted by the Faculty Humanities Committee for Research Ethics of the Tshwane University of Technology.. The researcher and supervisors throughout routinely reviewed ethical approval to ensure standards were maintained.

At all stages of the research, informed consent was sought from each participants following the provision of written information about the project. Participants were furnished with the following information:

- A summary of the research study;
- Researcher information, i.e. contact details, University and supervisors' details;
- The aims and objectives of the project;
- How the information provided was to be used;
- Participant rights, i.e. the right to withdraw; and
- Anonymous and confidential treatment of information.

Participating in the study remained a free-will decision, which could have been revoked at any time when the participant no longer inclined to proceed based on any personal reasons which was not be interrogated. Furthermore, the participants were not penalised or referred to any terms, which negatively affected them when not participating or those who pulled out from the study.

On the overturned side, those that were participating, they also did not get any special treatment because of their participation in the study remains confidential. Participant's privacy was not violated, and anonymity/ confidentiality was maintained as requested. Participants were granted the freedom, if they so wish, to withdraw from the project at any time. Honesty is demanded from the researcher and should be reflected in the research process and the results (Neuman, 2006: 9).

3.9.1. Confidentiality and anonymity

Confidentiality refers to the extent to which the information; the identifying data; about the participants is safeguarded and accorded protection (Devlin, 2006:162). According to Anderson (2009:75) confidentiality can simply be defined as the guarantee given to participants that the data gathered will not be shared with unauthorised persons.

Devlin (2006:162) states that anonymity has to do with whether the identity or the identifying information about the participants is known. According to Anderson, (2009:74) anonymity refers to the extent to which the identity of the participants cannot be known and the writer further asserts that this consideration remains a key issue to consider. Anderson (2009:75) further states that closely linked to the issues of privacy is the matter of data storage and mentions that participants will thus need to be assured that arrangements have been made for a secured storage of the data gathered.

The researcher, have in the participation information sheet and informed consent document given a guarantee to the participants that their privacy, interests, confidentiality and identities will be protected and further that their participation in the study will be handled on the basis of anonymity.

3.9.2. Trustworthiness

Trustworthiness is a concept that has been offered as an alternative to the traditional notions such as validity and reliability and covers credibility, transferability, dependability and conformability (Hammond and Wellington, 2013:175). Hammond and Wellington (2013:175) further state that trustworthiness is sometimes referred to and utilised in a general sense to cover the aspect of interconnectedness between the researcher and the researched.

According to Wisker (2008:322), validity is central to the issue of cohesion between the conceptual framework methods, questions and findings of the study. Shenton (2004:64) refers to the term credibility when discussing the truth-value criterion and asserts that certain provisions should be made with the objective of promoting the

confidence that the phenomenon under study or scrutiny has been accurately recorded. Trustworthiness or confidence of a study can be enhanced by the adoption of research methods that are well established and proven successfully utilised in previous comparable projects (Shenton, 2004:64).

According to Shenton (2004:64) there can credibility of the study which can be enriched by:

- the development of an early familiarity with the culture of participating organisations;
- random sampling of individuals to serve as informants;
- triangulation;
- tactics to ensure honesty of informants when contributing data;
- iterative questioning; negative case analysis;
- frequent debriefing sessions;
- peer scrutiny of the research project;
- the researcher's reflective commentary;
- background, qualification and experience of the investigator;
- member checks;
- thick description of the phenomenon under scrutiny and;
- examination of previous research findings.

The study utilised an adopted structured questionnaire, which comprises of iterative questions and the participants have been allowed to request additional briefing sessions if a need arose. The validity of the study is enhanced by the provision; on the participation information leaflet and informed consent document contain; of my contact details and those of my supervisor. Peer scrutiny of this research study has been ensured and the scrutiny is done through the sharing of information between a group of fellow researchers and arranged presentations of the research projects to the stated group.

According to Wisker (2008:322) reliability refers to how well the research has been carried. A research will be considered reliable if another researcher conducting the same research activities with the identical kind of group would be likely to replicate

similar although not identical findings (Wisker, 2008:322). It is as well contended by Wisker (2008:323) that where the researcher's methods, approaches and techniques really fit and measure the issues researched the findings are likely to be valid.

Reliability refers to the degree of consistency of a technique that measures the concept that it is intended to measure, allowing other researchers to repeat the study and attain similar findings (Hammersley as cited by Silverman, 2005:210). Reliability therefore depends on the consistency of the measuring instrument to produce the same results repeatedly. Consistency refers to the concept internal consistency and the concept of consistency over time (Punch, 2005:95).

3.10. CONCLUSION

In this chapter, the research has taken the reader through the methods and approaches used in this research. This chapter discussed the research instruments and data analysis. The researcher discussed the sampling and limitations of this research. Consideration was taken to the participants. Their consent was obtaining prior their participation. Participation was strictly voluntarily.

On the following chapter, the researcher will discuss the results of the data collected and the interpretation thereof. The focus on the chapter will be with the information collected from the participants for this project. The researcher interpret the collected data to present the research findings in order to provide recommendations.

CHAPTER 4

RESEARCH FINDINGS

4.1. INTRODUCTION

The previous chapter dealt with the methodology of this research. The discussion was on the design, research approach, data analyses, method of data collection and the instruments used in this research. In this chapter, the researcher will discuss the findings of the data collected for this research.

Research findings are important in finding solutions to the research problem. The researcher intends to investigate the gap that the drones can close in investigation of robbery at residential premises. This chapter helps to gather qualitative information about the issue of the impact of the lack of successful arrest made at the scene of robbery at residential premises and or with the vicinity of the occurrence.

This chapter reports on the effects of drones within the police area of Rietgat SAPS, in Gauteng province. The findings are based on the data that was obtained from semi-structured interviews. The interviews were conducted in April 2023 to May 2023, with crime prevention police members and Trio crime investigators who participated in the study. The findings are presented based on themes. This chapter focuses on presenting the findings based on qualitative data collected. In presenting the findings a graph of participants is firstly provided.

4.2. INTERPRETIVE PARADIGM

Analysis of the data of the current study was guided by an interpretive paradigm by means of which the researcher aimed to view the narrative against the context in which it was set and the subjective viewpoints of the participants. Participants of research have 'working theories' of their conduct and experiences which are based on 'local knowledge', which form part of the oral and written cultural texts of the group that they form part of, and which matter to them and give meaning to their problematic experiences (Geertz, 1983; Denzin, 1989:109)

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Participant	Number	Participant	Number	Participant	Number
Crime prevention member	1	Crime prevention member	09	TRIO crime Investigator	17
Crime prevention member	2	Crime prevention member	10	TRIO crime Investigator	18
Crime prevention member	3	Crime prevention member	11	TRIO crime Investigator	19
Crime prevention member	4	Crime prevention member	12	TRIO crime Investigator	20
Crime prevention member	5	Crime prevention member	13		
Crime prevention member	6	Crime prevention member	14		
Crime prevention member	7	Crime prevention member	15		
Crime prevention member	8	Crime prevention member	16		

Table 4: Participants.

4.3. PARTICIPANT INVOLVED

The table above illustrate the sample of the researcher, yet not all the selected sample participated in this study. The participation was strictly voluntarily. On those who

volunteered in participating were afforded chance to participate in this research. The participants on the table are arranged in reliefs. The first column is Relief A, second column is relief B and the last column is the TRIO investigator. On Relief A, only one crime prevention member (out of six) participated in the study. Whereas on Relief B, crime prevention member number nine to 12 participated. In terms of the TRIO investigators, participant number 17 and 18 participated. The participants in this research will be referred to as P1 up to P18.

The biography information of the participant reveals that the crime prevention members, who participated in this research, comprises constables, sergeants, warrant officer and captain. Most of the member of crime prevention unit do not have crime prevention course. Most of the participant were sergeants. In the SAPS, a sergeant is a member who has more than 10 years' experience, excluding those who applied external post and those

4.4. RESULTS AND EMERGING THEMES

According to Saldana (2011), a theme is defined as a topic or subject that is offered in a written work. A dominant theme shows what that particular work entails and can be of assistance in analyses. The following themes emerged for this research:

Theme 1: Strategy to combat robbery at residential premises

Theme 2: Technological equipment in improving the crime combating

Theme 3: The use of drones in suspect linkage

Theme 4: the contribution of digital evidence in the investigation

4.4.1. Theme 1: Strategy to combat robbery at residential premises

4.4.1.1. Responding to the scenes of robbery at residential premises

It is a daily thing that the crime prevention member have to respond to violent crimes that are immediately occurring. They do not see ahead what will occur on their arrival at the crime scene. They need to get the job done, no matter how dangerous it may be.

“We always fear for our lives, when responding to house robberies. That is why we always initiate PREP (Prepare) to minimise exposure to danger” (P1).

“The first thing that comes to mind when the crime of robbery at residential premises is reported, is to respond as fast as possible. The current allowed time in the SAPS is 10minutes.” (P1, P2, P3, P4, P5 & P6).

All crime prevention unit participants concur that it is their priority to respond in time at the scene of a reported robbery at residential premises and ensure the wellness of the victims. Pena (1993: 51) supports the output by stating that the initial thoughts and efforts of the first officer at the crime scene must be directed to the welfare of the victim. The participants state that the current way used in dealing with this problematic crime is failing them in arresting suspect. Their response to the scene depends on the time at which they receive the report of the scene. When a complaint is reported, it goes straight to the 10111 centre, located in Midrand. It is received at the 10111, and then dispatched to the vehicles posted in different sectors.

“When crimes are reported, they are sent to the emergency centre, located in Midrand (10111 centre). By the time the complaint reaches us the crime is long occurred” (P1, P2, P3, P4, P5, P6, P11, P12, P13 & 15).

“I have never executed an arrest of a suspect of house robbery at the crime scene during my response.” (P1, P2, P3, P4, P5, P6, P11, P12, P13 & 15).

The calls prolong prior to getting to the members at the field. The arrival of the members at the crime scenes becomes late that when they arrive they find the scene long already occurred. Majority of their responses state that it is very rare that the suspect of robbery at residential premises would be arrested at the crime. They stated that since 2020 to date, they have not been any arrest that was done at the crime scene or with the vicinity of the scene. Even though they agree that it is possible to make an arrest at the crime scene, they still maintain that with the manner at which the crimes are reported, it is highly unlikely that an arrest can be executed at the crime scene.

4.4.1.2. Investigation of robbery at residential premises

“I have never had a docket with successful conviction for house robbery suspect, since 2020.” (P1, P2, P3, P4, P5, P6, P11, P12, P13 & P15).

The trio detectives also stated that most of the dockets of robbery at the residential premises are closed with the status of undetected (where he suspects cannot be traced). They stated that they depend on repetitive offenders to be able to link the suspect with the previous crimes. Where n the suspect did not live any forensic evidence (bodily feature, fingerprints). The investigator state that they depend highly on the first responder to ensure the protection of the crime scene and the arrest of the suspect if it warrants.

“I don’t have any docket of robbery at residential premises with conviction, since 2020” (P17& P18).

The detectives have stated that even though they are not receiving many docket when they are on standby duties, but the docket that are registered since 2020, do not have conviction. They state that those dockets mostly closed without any link of suspects. This is evident that the suspect of robbery at residential premises remain a big problem in to link with the crime. They state that most of the time those suspect do not leave any tangible evidence at the scene to can link them to the incident.

“With the limited resources we currently have, it is not easy that the suspect be apprehended or even link to the crime scene” (P17& P18).

4.4.2. Theme 2: Technological equipment in SAPS

4.4.2.1. Equipment current used to combat robbery at residential premises.

Majority of member have stated that the equipment they currently use at their disposal are hand radio and vehicle installed radio. They state that the equipment that they currently use are not competitive to the criminal world. There have devices that are installed in the police cars that assist them in locating hijacked vehicles. Unlike business robbery, house robbery occurs in private dwelling where the occupant does not even have a panic button.

“The only technological equipment we depend on is a hand radio and the radio fitted in the vehicle” (P1, P2, P3, P4, P5, P6, P11, P12, P13 &15).

Their depended on the dispatcher, delays their responding time to the crime scene. All participants are familiar with the drones; they believe that due to the delay that may arise in responding at the crime scene of such crime, that may range from traffic and location of the address, a drone can fly state to the crime scene and monitor the situation at the scene. Drones can have a GPS allowing the operator to direct to the specific location. Thus, that will allow the member to be prepared for the scene because everything that will be captured on the drone will be communicated to the member at the group.

“I know what a drone is, but don’t think it can be helpful in the area we are working at because it is too violent. The suspects will just shoot it down” (P6).

Although one out of all the participant have argued that the drone can be shot down if they disturb what the suspect will be doing, as the area is violent. The participant believe that the suspect can spot the drones and they will not be able to serve their purpose if they are utilised.

4.4.3. Theme 3: The use of drones in suspect linkage



Picture 6: The suspect virtualised by a Drone (Source: Google image).

The picture above shows the virtual from the drone, the arrow point at the suspect spotted by the drone. The picture illustrate how the drone can keep surveillance of the movement at the ground.

“The only depend on a helicopter that is called from Pretoria west. It takes time to arrive at the crime scene” (P1, P2, P3, P4, P5, P6, P11, P12, P13 &15).

4.4.3.1. Identification of victim from suspects

It is very important for the member to know who the victim is and who the suspect is. The standing off (arrival) of the drone at the crime scene could allow the members to be able to identify the victims from suspects. Some of the scenes occur simultaneously, even one after another. The arrived to such scenes requires a fast mode of response to enable the members to arrive at the scene while the suspect are still in the process of the robbery.

“We are unable to arrive on time, due to traffic. Even though we may rush, but we still have to comply with the road regulations” (P1, P2, P3, P4, P5, P6, P11, P12, P13 &15).

The participants, documents and literature identify the role of the first responder at a scene of crime as being:

- to assess and secure the crime scene;
- take care of the injured, arrest suspects;
- identify witnesses;
- preserve the scene;
- handle evidence according to the prescribed procedure;
- record any actions taken;
- report to superiors and give feedback and;
- hand over the scene to the relevant persons (Osterburg & Ward, 2010:97; Palmiotto, 2013:4; Pena, 2000:57; Lee, *et al*, 2007:51; Jackson & Jackson, 2008:22).

Investigators stated that it is important for the suspect to be apprehend at the crime scene. It allows the conducting of the identification parade while the occurrences are still fresh in the victim’s memories.

“There haven’t been any arrest at the crime scene since 2020, but if the suspect could be arrested at the crime scene, it would be beneficial to the investigation and enable identification parade while the victim’s memories are fresh” (P17& P18)..

“Some of the suspects are linked by Deoxyribonucleic acid DNA after a long time, when even the victims cannot even remember their identity, if they commit other serious crimes and get caught” (P17& P18).

4.4.3.2 Security and law enforcement

“I think drones can be help full as the source of a video footage of a crime scene. It can be an important evidence and in this instance drones can provide such evidence” (P17& P18)

According to Vikas, *et al* (2019: 77) drones are also used for maintaining the law. They help with the surveillance of large crowds and ensure public safety. They assist in monitoring criminal and illegal activities. In fact, fire investigations, smugglers of migrants, and illegal transportation of drugs via coastlines, are monitored by the border patrol with the help of drones. With this alluded, drone can be of a great use in crime scenes and would contribute in the reduction of crime.

4.4.4Theme 4: The contribution of digital evidence in the investigation

“In scene of business robbery, the use of video footage in linking the suspect is an important evidential tool.” (P17 & P18)

It is common in the members that when the first respond arrives at the scene of robbery at the residential premises, role players have to be organised to attend the crime scene. One of the role players is the member from the Local criminal record centre (LCRC) who will be taking the picture of the crime scene. Photo of such crime scene are then used as evidence at the court of law. Sonne (2006:9) state that although photography is the most commonly used medium at a crime scene, the use of video to augment (not replace) reproduction of the crime scene is also becoming commonplace.

“On arrival at the crime scene, if the suspect can be located fleeing the scene, I pursued the suspect” (P1, P2, P3, P4, P5, P6, P11, P12, P13 &15).

The arrival of the drones at the crime scene will allow a direct linkage of the suspects initial point location and the point at which the police would be effecting the arrest.

“In court they normally use Section 205 of the criminal procedure Act no 57 of 1977, to subpoena the expert in Tracker, when they are to prove the movement of a vehicle in a carjacking. The drone can be used similar to that process” (P17& P18).

4.4.4.1 Aerial video

“In most of business robbery the evidence that is mostly left behind by the suspect is the video footage from the CCTV” (P17& P18) (P1, P2, P3, P4, P5, P6, P11, P12, P13 &15).

The investigator stated that the use of drone at the crime scene of robbery at residential premises can be beneficiary to the investigation as the use of video footage have been used as evidence in crimes of business Robbery. They state that it can be admissible in court. The videos are prior taken to the forensic laboratory to confirm their originality. In this regard, their originality can be proven in court to assist in lining the suspect with the commission of crime.

Crime prevention stated that drones can also assist in vehicle hijack to assist the member to peruse the suspect. It will make it easy for them to locate he-stolen vehicles. The currently used air assistance is the helicopter that takes time to arrive at the required destination.

4.5. CONCLUSION

In this chapter, the researcher discussed the responses of the participants to the questions of this study. Not the entire selected sample participated in this research, but majority did participate. Out of 20, 12 contributed to the data collection.

The following chapter the researcher will be giving a summary and recommendation based on the findings.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1. INTRODUCTION

In the previous chapter, the research discussed the findings of this research, as per the responses made by the participants. The purpose of this concluding chapter is to provide a summary of the research study. The research problem is re-stated and objectives revisited to determine whether the study has accomplished these or not. The methodology is also reviewed. A summary of the major findings of the study is presented, from which conclusions are derived. Finally, the study presents recommendations , including recommendations for future studies .

5.2. MAJOR FINDINGS

The crime of robbery at residential premises problematic in Rietgat SAPS area is one of the problematic crimes. Members who respond and those who investigate are having difficulty in identifying, arresting and securing the conviction of suspect of the commission of this crime. For years, technology has been advancing but the police have not matched the advancements. Members of the service still use old technological equipment that are not competitive to the advanced criminal world.

It is essential for the suspect to be arrested as early as possible, making it possible for the investigation to attain successful conviction on the case, the use of drone, even though it will land in the problematic state of reporting crime, it will have a positive impact in respond to TRIO crime.

5.2.1 Contribution of drones to the apprehension of suspects of robbery at residential premises

According to Werner (2023), the drones can assist the police in operational duties in several ways. Werner (2023) further states that drones offer a priceless tool that may be utilised to search the landscape in locations that are too risky or challenging to access on foot. Additionally, drones can scan expansive regions faster than ground

searchers, and thermal optics can be used to detect and locate human heat signatures during both daytime and night-time operations. This is supporting the researchers finding that suspect can be apprehended in the aid of drones. The following can be achieved:

- **Pre-tactical deployment reconnaissance**

Pre-tactical deployment use of drones allows for early reconnaissance of dangerous scenes, for instance, providing information about a building before a drug raid entry, enhancing officers' understanding of the lay of the land and people in the area. Additionally, drone over watch can remain in place after the team enters, giving the incident commander a bird's-eye view while the operation unfolds. Many times a drone records a suspect fleeing out other doors or windows, changing their shirts, or throwing drugs and guns into bushes and on roofs. Suspects who think they have successfully escaped are surprisingly apprehended (Werner, 2023).



Picture 6: Police operating a drone (source: google image).

- **Rapid respond situation**

Rapid response operations (responding of the operational units) are extremely dangerous, as they often involve armed persons who have been involved in violent attacks. The drone provides over watch as the Rapid response team advances, and

its view can be streamed in real-time to Rapid response team members. This provides officers the ability to see around buildings, behind fences and into confined areas rather than moving forward blindly. The use of visual optics and thermal imaging provides versatile operations day or night (Werner, 2023).



Picture 7: The night use of a drone (source: Google image).

- **Hostage situation**

Situations involving hostages present an even more difficult and deadly problem. In this case, drones have been applied in a variety of ways. One is to place the drone so it can view through a window and determine the whereabouts of the suspect(s) and/or hostage(s). Police now have information on where and when to break in thanks to this. Numerous times, it has assisted in lessening the incident without causing harm (Werner, 2023).

The use of drones is supported by the SAPS Provincial commissioner stating that “using drone innovation will add to the compelling arrangement of resources and advance viable functional status in managing crime in areas of interest” (Masilela, 2023). Maluleka (2023) reported that Lesufi has supported the General by stating that

an advanced stage in the procurement of 180 state-of-the-art drones that will infiltrate areas that are difficult to patrol and police. (Werner, 2023).

- **Forensic Investigation**

Collecting data from locations that would have been missed from the ground and information from a top-down view, drones play a significant role in forensic investigations of incident scenes. In rare circumstances, criminals may have used rooftops as entry points or left behind evidence. Drones enable the generation of 3D models that give an overview of the entire area and can be studied later, much like traffic crash reconstruction. Traffic crash reconstruction is one of several promising options in this field, along with Pix4D, SkyeBrowse, and DroneDeploy. (Werner, 2023).

- **Sensors and Cameras**

According to Vikas, *et al* (2019: 77), Depending on the sensor and its intended use, the UAS contain sensors and cameras that may record pictures as well as other inputs, such temperature. Some sensors look at certain locations in a way that human sight cannot. The area of infrared light waves is widely used for different purposes, like measuring temperature and biomass. Sensors and cameras are becoming smaller and lighter, and this allows for more stability in the air and longer flight time. The pixel size also improves and provides an essential part of a precise reflection of the reality. Sensors that are commonly used for agricultural purposes are capturing light indifferent areas such as red, green or blue, near infrared, red-edge, multispectral, thermal infrared. This means that the drones can be used during the day and at night.

5.2.2. Investigation of robbery at residential premises by use of drone evidence

Drones can create advantages for small departments by helping them document crime and accident scenes, provide extra eyes on standoffs and barricades, and of course, with search and rescue (Dias, 2022). With the use of drones. The reliance to the CCTV footage is a past story and there can be a capture of the scene without a CCTV camera installed in the area of an incident.

- **Suspect linkage**

One of the most valuable resources any law enforcement agency can have is an understanding of how drones aid solve crimes. Researchers have written a lot about the thought that drones are employed mostly for surveillance when discussing their applications. The drones' capabilities to investigate the crime scenes can be utilised to accurately capture the information and recreating them into a 3D model (Karpowicz, 2016). This would allow a clear virtual of a crime scene, which will be viewing whatever would be transpiring at the scene.

Drones can give the Video virtual of the outer perimeter of the robbery at residential premises scene of crime. According to Marais & Van Rooyen, (1990:45), a single shot (or video) may capture the entire landscape, and this technique is frequently utilized in planning, drawings, and maps. Mokwena (2012: 61) state that although video is not popularly applied in crime scene investigation, it also serves a critical supplementary role "There are many benefits to the use of video cameras at the crime scene" (Lyman, 1999:59). The drone footage can be used as evidence in court.

5.2.3. Technology advancement

Members should be allocated with technological equipment that are competitive to the criminal advanced world. The current used resources make it difficult for the members to combat crime, as mandated by the constitution Act no 108 of 1996. Members have to be given cell phones so that it can enable them to communicate with reporters of the crime when they respond to the reported crime.

- **Drones**

Drones should be used in responding at the crime scenes. There should be members trained in operating drones at the station level. Those members must be equipped with drones that can be controlled from a far distance to minimise the danger of members

at robbery at residential premises crime scenes. Training for such technology will become a necessity.

“Remotely-piloted aircraft systems or drones have become a must have for photographers and videographers. A video or photo series just doesn't seem complete without aerial footage” (Western Cape Government for you, 2019). According to Vuma (2020: 09), Evidence-based policing, ‘Evidence is the finest available study (proof) on what police operations are successful and unsuccessful.

Vuma (2020: 09) state that evidence-based policing is not a "model" that should be used in place of other, Policing Models. Instead, it concerns a change in the way we see safety and policing. It is the understanding that there must be a direct link between an activity or approach and the anticipated consequences if they are to be used to accomplish a certain purpose. Evidence-based policing encourages us to, as much as possible, base our practice on research and shape our research through practice.

5.3 RECOMMENDATIONS

5.3.1. Tactical training for the Crime Prevention unit

The study make recommendations on tactical training for the members of the Crime Prevention unit, training for detectives, provision of resources, community relationship, Robbery at residential premises combating strategy, and additional air support.

5.3.2. Training for Detectives

Although all the members have the ROC (Resolving of crime) course. There is need for the investigator to receive a training in dealing with Drone evidence.

5.3.3. Provision of Resources

Members still use old equipment, which sometimes do not even work properly. Member should supplier with user-friendly equipment and human resources should be add. Drones should also be one of the technological advancements that the organisation should consider.

5.3.4. Community relationship

The Gauteng province has come with initiative of crime prevention warden. The SAPS and Provincial community safety should work together in combating house robbery.

5.3.5. Strategy to combat Robbery at residential premises

It would be best if each SAPS Tactical Response Unit in the selected Soshanguve areas could have designated drone technology experts working together. This will assist the TRIO investigator tremendously with their investigation of this crime. It can also be beneficial to the SAPS enough members of the service be trained in operating drones.

5.3.6. Additional air support

The SAPS in the Soshanguve area is dependent on only one helicopter that is deployed whenever there is a needed air support, which is not sufficient. It is recommended that the SAPS should increase the number of drone pilots and deploy them at the station level. This will in turn supplement the use of the helicopter in the area.

5.4. CONCLUSIONS

In this chapter, the researcher has closed the discussion of the researches by summarising the findings and making recommendations.

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Annexure A: Interview Guide for the crime prevention.

Interview Guide with crime prevention member

Section: A (Biography information)

1. Gender :
2. Age :
3. Home language :
4. Highest qualification :
5. Crime prevention course :
5. Rank :
6. Post Held :

Section: B (strategy to combat house robbery)

What do you do when you receive a dispatch of house robbery?

What challenges do you encounter when responding to the scene of crime?

What priorities do you normally attend to on your arrival?

In case of the suspect who just fled at the scene do you pursue or search for trace to pursue the suspect?

Do you think is possible to make an arrest at the scene of crime? Please motivate?

Section: C (Technological equipment currently used)

What technological equipment do you use in responding house robbery reports?

Since 2020 till to date, how many arrests of house robbery have you arrested at the scene?

What can the South African Police Service do to improve member's respond to the House robbery crime scene?

Section: D (drones in policing)

Do you know about drones?

Can there be helpful in responding to the house robbery scenes, from the sky?

Can the drone contribute in the arrest of suspects?

What type of assistance do you currently have at the sky when responding to scene?

How can drones be better assistance than the current used equipment/s?

Annexure B: Interview Guide for the investigators

Interview guide for TRIO crime investigators

Section: A (Biography information)

1. Gender :
2. Age :
3. Home language :
4. Highest qualification :
5. ROC course :
5. Rank :
6. Post Held :
7. Period of service and experience in TRIO cases :

Section: B (status of House robbery case)

How many house robbery dockets did you have and currently have in hand since 2020?

How many docket did you have and currently have with detected/arrested suspects?

How many dockets of House robbery have received convictions?

What is your view regarding the commencement of the investigation of the house robbery crime with no suspect arrested?

Section: C (first responder's contribution to the investigation)

How does the first responder at the scene of crime contribute to the investigation?

Do you think suspects of house robbery can be apprehended by the effective response at the scene of house robbery? Please motivate?

How did the cases, which had arrest of suspects at the scene, resulted?

What evidence contributed to the results?

Section: D (digital evidence)

What kind of digital evidence do you depend on at the scene of House Robbery?

Can the use of the virtual of the ground from above contribute to the investigation?

Do you have any knowledge about the drones?

Do you think drones can effort evidence to assist the investigation of House Robbery?
What are your recommendation in the Drone usage in Policing to combat TRIO crimes?

Annexures C: permission from SAPS to conduct research



Privaatsak
Private Bag X94

Pretoria
0001

Faks No.
Fax No

(012) 393 4333

Your reference/U verwysing:

My reference/My verwysing: **3/34/2**

THE HEAD: RESEARCH
SOUTH AFRICAN POLICE SERVICE
PRETORIA
0001

Enquiries/Navrae:

Lt Col (Dr) Smit
AC Thenga
(012) 393 4333
ThengaS@saps.gov.za

Tel:

Email:

APPROVED

**TN Mononyane
TSHWANE UNIVERSITY OF TECHNOLOGY**

**RE: PERMISSION TO CONDUCT RESEARCH IN THE SOUTH AFRICAN POLICE SERVICE:
TSHWANE UNIVERSITY OF TECHNOLOGY: MASTERS DEGREE: THE EFFECTS OF
UTILISING DRONES IN RESPOND TO ROBBERY AT THE RESIDENTIAL PREMISES
WITHIN RIETGAT POLICING AREA: RESEARCHER: TN MONONYANE**

1. The above subject matter refers.
2. You are hereby granted approval for your research study on the above-mentioned topic in terms of National Instruction 4 of 2022.
3. Further arrangements regarding the research study may be made with the following office:

The Provincial Commissioner: Gauteng:

- **Contact Person:** Colonel Peters
- **Contact Details:** (011) 547 9130
- **Email address:** PetersNS@saps.gov.za

- **Contact Person:** Constable Mokgetsi
- **Contact Details:** (011) 547 9130
- **Email Address:** MokgetsiM@saps.gov.za

4. Kindly adhere to paragraph 8 of our attached letter signed on **2022-12-15** with the same abovementioned reference number.

MAJOR GENERAL

**THE HEAD: RESEARCH
DR PR VUMA**

Date:

2023-02-10

Annexures D: Ethical Clearance from TUT



Faculty Committee for Research Ethics - Humanities [FCRE-HUM]

The TUT Research Ethics Committee is a registered Institutional Review Board (IRB 00005968) with the US Office for Human Research Protections (IDRG# 0004997) (Expires 30 Jan 2020). Also, it has Federal Wide Assurance for the Protection of Human Subjects for International Institutions (FWA 00011501) (Expires 22 Jan 2019). In South Africa it is registered with the National Health Research Ethics Council (REC-160509-21). The FCRE-HUM is a subcommittee of the Senate Committee for Research Ethics

14 SEPTEMBER 2022

Ref #: FCRE/SSM/STD/2022/47
Name: Mononyane, T.N.
Student #: 211183020

C/o Prof. K.A. Rakubu
Department of Safety and Security Management
Faculty of Humanities

Dear Ms./Mr. Mononyane, T.N.

Title: Effects of utilizing drones in respond to robbery at residential premises within Rietgat Policing Area

Investigator: Mononyane, T.N.
Qualification: Master of Policing
Supervisor: Prof. K.A. Rakubu
Co-supervisor: Dr. P.H. Motlalekgosi
Co-supervisor: None

Thank you for submitting your proposal for ethics clearance.

Decision: The application be recommended for approval

In reviewing the proposal, the following comments/notes, emanating from the meeting are tabled for your consideration/attention/notification:

- The study investigates effects of utilizing drones in respond to robbery at residential premises within the Rietgat Policing Area. It is an ethically low risk topic.
- The Ethics Checklist and Ethics Declaration have been submitted and are in order.
- The Information Leaflet and Informed consent documentation have been submitted and are in order, except that the contact details of the new FCRE Chairperson (Prof J Mofokeng) should be given
- The research proposal is in order.
- An interview schedule has been submitted and is in order



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- No draft letter asking for permission to conduct the research has been provided. As soon as an official letter grants permission has been received, it should be submitted to the FCRE for our records.
- A TURNITIN report has been submitted, and the 14% similarity index is acceptable
- Recommend: Approval

The Faculty of Humanities Research Ethics Committee reviewed the documents at its meeting on 08 September 2022. The study is **recommended for approval**

The Committee wishes you well with your research endeavours.

Signature

14 SEPTEMBER 2022



Chair / Deputy-Chair
Faculty Research Ethics Committee
[Ref#: FCRE/SSM/STD/2022/47]

Cc: Prof. K.A. Rakubu; Dr.
H.P. Motalakgosi



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Annexures E: Certificate of language editing

RLGM LANGUAGE SERVICES

CERTIFICATE OF LANGUAGE EDITING

This serves to confirm that I (**Ramolobi LG Matlala / the editor**) have proofread and language edited the masters dissertation authored by **TN Mononyane**, titled:

“The effects of utilising drones to respond to robbery at residential premises in Rietgat policing area”.

I have used track changes, and made suggestions to the author to further improve grammar, style and the readability of the text.

Nonetheless, it is up to the author to accept /or reject the suggested changes, and attend to other language editing suggestions that the editor has communicated.

The student paid for the academic editing services in full.

Kind regards,

R. MATLALA



Promoting excellence in editing

Ramolobi LG Matlala
Full Member

Membership number: MAT01
Membership year: March 2023 to February 2024

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www.editors.org.za

17/11/2023