

The value of crime mapping in crime prevention.

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DECLARATION

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Exact wording of the title of the dissertation as appearing on the copies submitted for examination:

THE VALUE OF CRIME MAPPING IN CRIME PREVENTION.

I declare that the above dissertation is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

MATSAUNG PM

2019-01-22

SIGNATURE

DATE

LIST OF ACRONYMS

CADS:	Computer-Aided Dispatch System
CAS:	Crime Administration System
CIAC:	Crime Information Analysis Centre
CJS	Criminal Justice System
COMPSTAT:	Comparison of Computer Statistics
CPA :	Crime Pattern Analysis
CPF :	Community Police Forum
CPTED:	Crime Prevention through Environmental Design
CRIM:	Criminal Records System
CSIR:	Council for Scientific and Industrial Research
CTA:	Crime Threat Analysis
DACST:	Department of Arts, Culture, Science and Technology
DSS:	Decision Support System
ELINT:	Electronic Intelligence
ENATIS:	Electronic National Traffic Information System
GACS:	Global Access Control System
GIS:	Geographical Information System
GPS:	Global Position System
HSRC:	Human Sciences Research Council
ICDMS:	Investigate Case Dockets Management System
ICT:	Information Communication Technology

ILP:	Intelligence Led Policing
IPID:	Independent Police Investigative Directorate
MISS:	Minimum Information Security Standards
NCCS	National Crime Combating Strategy
NCPS	National Crime Prevention Strategy
NIM:	National Intelligence Model
NIS:	National Intelligence Service
NSA:	National Security Agency referencing
RMS:	Records Management System
SAPS:	South African Police Service
SCA:	Station Commander of one Station
SCB:	Station Commander of the another Station
SCP	Social Crime Prevention
SITA:	State Information Technology Agency
TIGER:	Topologically Integrated Geographic Encoding and Referencing System

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DEDICATION

This dissertation is dedicated to my late grandmother Nakedi Mojapelo. I love you, my grandmother and I appreciate all the support and encouragement you gave to me to further my study. I call myself as a blessed one to having you in my life.

DECLARATION

I, Pieter Mantjie Matsaung, hereby declare that this dissertation, "The value of crime mapping in crime prevention", is my own work, and that all the sources that I have used have been indicated and acknowledged by means of references. I further declare that this study has not been submitted before for any degree or examination at any other University.

Date: 22 January 2019

DECLARATION

I, Maria Petronella Roodt, hereby declare that I have proofread and edited the dissertation by Pieter Mantjie Mantsaung, titled “**The value of crime mapping in crime prevention**”. My qualifications are as follows: BA with major in English, BA Hons in English, MA in English and MA in Higher Education studies. I have extensive experience in proofreading and editing and can be contacted at the following address mroodt@cut.ac.za. My telephone number is 0515073866 / 0822025167.

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SUMMARY

The aim of this study was to obtain information about the value of crime mapping in crime prevention. The SAPS uses crime mapping to manage and prevent crime effectively. A qualitative research design approach was used to determine the value of crime mapping in crime prevention.

This study provides recommendations to improve the use of crime mapping in crime prevention. The researcher conducted one-on-one interviews with participants to understand the value of crime mapping in crime preventions. The recorded interviews were transcribed and analysed by using Tesch's eight steps to analyse data.

The researcher used an open coding method to determine codes on the topic that are similar and grouped them into categories as themes. Five categories of themes emerged. The themes that were identified were described by using in vivo quotes from the transcribed data. The study concludes with a summary, recommendations and conclusion to the study.

North Sotho

KAKARETŠO

Maikemišetšo a thutelo ye ke go hwetša tshedimošo ka ga mohola wa go sekaseka bothata bja bosenyi lefelong go thibela bosenyi SAPS e diriša tshekatsheko ya bothata bja bosenyi lefelong go laola le go thibela bosenyi ka kgonagalo. Mokgwatebelelo wa nyakišišo ka go utolla mokgwa wa bophelo bja setšhaba se itšeng o dirišitšwe go šupa mohola wa go sekaseka bothata bja bosenyi lefelong go thibela bosenyi.

Thutelo ye e fa dikeletšo ka ga go kaonafatša tirišo ya tshekatsheko ya bothata bja bosenyi lefelong go thibela bosenyi. Monyakišiši o phethagaditše ditherišano le motho ka noši le batšeakarolo gore ba kwešiše mohola wa tshekatsheko ya bothata bja bosenyi lefelong go thibela bosenyi. Ditherišano tšeo di rekhotilwego di ngwadilwe le go sekasekwa ka go diriša magato a seswai a Tesch a go sekaseka datha.

Monyakišiši o dirišitše mokgwa wa tlhathollo ya datha ya mathomo go šupa dikgopolo tša datha yeo e lemogilwego ka ga hlogotaba tšeo di swanagao le go di hlopha go ya ka magoro bjalo ka dintlha tše go ka boelwago ka tšona. Magoro a mahlano a merero a tšweletše. Merero yeo e šupilwego e hlalošitšwe ka go diriša ditsopolwa go ya ka maitemogelo tša go tšwa go datha ye e hlathollotšwego. Thutelo e phethilwe ka kakaretšo, dikeletšo le bofelo bja thutelo.

STshivenda

MANWELEDZO

Ndivho ya ngudo iyi ho vha hu u wana mafhungo nga ha ndeme ya u vhupulani ha vhugevhenga kha u thivhela vhugevhenga. SAPSi shumisa vhupulani ha vhugevhenga u langa na u thivhela vhugevhenga nga ndila yone. Kusedzele kwa nyolo ya thodisiso ya ndeme, ku tea u topola ndeme ya vhupulani ha vhugevhenga kha u thivhela vhugevhenga.

Ngudo iyi i nekedza themendelo dza u khwinisa tshumiso ya vhupulani ha vhugevhenga kha u thivhela vhugevhenga. Muṭodisisi o ita inthaviwu dza muthu nga muthihimuthihi na vhadzheneleli u itela u pfesesa ndeme ya vhupulani ha vhugevhenga kha u thivhela vhugevhenga. Inthaviwu dzo rekhodiwaho dzo thiransikiraibiwa dza saukanywa nga u shumisa maga a malo a Tesch u sengulusa data.

Muṭodisisi o shumisa ngona ya khoudu dzo vuleaho u topola khoudu kha thoho dzi elanaho na u dzi kuvhanganya dza vha khethekanyo dza thero. Ho bvelela khethekanyo thanu dza thero. Thero dzo topolwaho dzo talutshedzwa nga u shumisa khouthu dza vivo u bva kha data yo thiransikiraibiwaho. Ngudo i khunyelela nga manweledzo, themendelo na khunyeledzo ya ngudo.

Key terms:

Geographical Information System, Manual pin mapping, Crime analysis, Crime prevention, Crime prevention through environmental design, Geographical profiling, intelligence-led policing, Crime displacement, Crime mapping, Geocoding.

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CHAPTER 1

General Orientation

1.1. Introduction

The use of crime mapping in preventing crime should be focussed on addressing crime risks for crime to be reduced. The mandate and the responsibility of the SAPS are crime prevention, combating and investigating crime to maintain public order, to protect and secure the inhabitants of the Republic of South Africa and their property by upholding and enforcing the law. This study introduces the value of crime mapping in crime prevention at the Mankweng and Polokwane Police stations.

In this chapter the background to the study is provided. The focus is on discussing the problem that persuaded the researcher to undertake this research project to identify gaps left by other research on similar topics. The crime statistics of both police stations will be described and explanations given for the crime fluctuations. The research aim and objectives of the study are mentioned to clarify the intention of the study and the research questions that were asked. The envisaged value of the study, key concepts, focus areas of study, as well as a summary of the chapter will be outlined.

1.2. The background of the use of crime mapping in crime prevention in South Africa

The use of GIS was introduced in South Africa in the 1990's, by the Chief Directorate of Surveys Mapping and the Chief Survey General of South Africa. The responsibility of these institutions is to ensure that growth and development of GIS in South Africa was developed in such a way that it would provide a basic geospatial framework of data (Zietsman, 2002:n.p). The use of GIS was discovered by the environmental field before it could be used by municipalities, social welfare, policing and health department as a tool to manage information and infrastructure (Schwabe, 2001:n.p). From the SAPS perspective, the use of GIS was a project undertaken by the consortium comprising three semi – privatized institutions namely, the Council for Scientific and Industrial Research (CSIR), the Human Science Research Council

(HSRC) and the Medical Research Council (MRC). The project took the form of a pilot study that started in November 1998 in Johannesburg and was funded by the South African Department of Arts, Culture and Technology (DACST). Their responsibility was developing and piloting innovative analytical methods as well as Decision Support System (DSS) tools (Stylianides, 2000:n.p).

The final outcome of the study was that the use of GIS applications was integrated in the database system at police station level country wide. More than 1100 police stations country wide was captured into GIS which was linked with crime statistics released by the SAPS starting from 1997 to 1999, together with socio-demographic information that was released from the 1991 to 1992 census. This outcome of the study allowed the SAPS to release crime statistics that would be linked with the police station level boundaries and help them to understand relationships between crime and socio-demographic variables through using multivariate statistical software (Schwabe & Schurink, 2000:n.p). The pilot study ended on 31 March 2000 and State Information Technology Agency (SITA) assisted SAPS for the rollout of a web-enabled GIS that is connected with information technology that was used nationally. The GIS assist the police with crime mapping and analysis (Breetze, 2008:59-65). The police use GIS to integrate large volumes of geographical data from different sources and it facilitates multi-criteria decision making (Lochner & Zietsman, 1998:61).

1.3. Research problem

Before the introduction of GIS in policing in the 1980s, the police were using manual pin mapping for crime pattern analysis and crime mapping. The use of manual pin mapping was problematic because these maps are complicated, confusing and impact negatively on crime reduction (Markovic & Stone, 2002:3). Kappeler and Gaines (2011:308) highlight that manual pin mapping shows the police a limited picture of the crimes and it was impossible for the police to follow crime trends. Horne (2007:115) argues that the manual pin mapping loses previous crime pattern analysis when they are updated, as they could not be manipulated. It is also difficult to read when several types of crimes represented by different coloured pins were mixed together. These manual maps are limited and manual pin mapping has been replaced gradually by virtual pin maps on desktop computers.

Mashiloane (2014:145), also highlights that other challenges were to update a manual pin mapping every month, they had to be removed, and in order to preserve the particular information, a photo had to be taken every month end which made monthly comparisons difficult. These maps became unreadable when they displayed large amounts of data because of the numerous pins and holes. According to Eloff and Prinsloo (2009:42), the SAPS faces serious challenges to educate their members to develop the necessary skills to apply the GIS into a workable crime prevention strategy to assist them in preventing crime. Since the introduction of the GIS in the SAPS, the computer crime has been helpful to plan crime prevention operations and to reduce crime to record criminal activities. Eloff and Prinsloo (2009:42), also indicate that the GIS can help the SAPS in developing strategies for crime analysis in a spatial context. These include the linking of crime, census information for crime mapping, as well as the alignment of the police precinct with official boundaries that will therefore assist on auxiliary data that can be spatially linked for the purpose of analysis.

Figure 1.1. Map indicating Polokwane direction



www.google.com. Polokwane map

The map on the figure 1.1. show the direction where Polokwane police station is situated in the Capital city of the Limpopo Province of South Africa and it is indicating the areas where Polokwane police station is policing. There are 239 police officials working at the Polokwane police station (Uchenna, 2014:n.p). The map on the figure 1.2. show the direction where Mankweng police station is situated in the Limpopo Province of South Africa and is next to the University of Limpopo and Mankweng Provincial Hospital. It is located 27 km east of Polokwane on the R71 road between Zion Christian Church (Moria) and Tzaneen. There are 192 police officials working at the Mankweng police station (Uchenna, 2014:n.p).

Figure 1.2. Map indicating Mankweng direction



www.google.com. Polokwane map (2016).

The tables below show the selected crime reported for the period 2013 to at the Polokwane and Mankweng police stations respectively.

Table: 1.1. Five years crime trend at Polokwane police station

Years	2013	2014	2015	2016	2017	Total
Crime types						
Murder	6	12	11	14	13	56

Robbery with Aggravating Circumstances	233	313	432	421	404	1803
Assault with intent to do Grievous Bodily Harm	185	184	175	144	129	817
Theft out of motor vehicle	853	1035	997	989	1008	4882
Sexual Offences	162	95	55	46	45	403
Total	1439	1639	1670	1614	1599	7961

Limpopo- Crime Stats SA- Crime Stats Simplified (2013)

The crime statistics illustrated in the table above show that there was a sharp increase in crime in Polokwane police station from 2014 to 2015. Thereafter, between 2016 and 2017, the crime slightly decreased. The increase in crime may be because of the lack of skills and shortage of staff amongst crime information officers. Therefore, if there is lack of skills and a shortage of staff amongst crime information officers, it is evident that some crimes cannot be pinpointed with the result that crime will increase. It is important to use crime mapping for the purpose of managing and preventing crime.

Table: 1.2. Five-years crime trends at Mankweng police station

Years	2013	2014	2015	2016	2017	Total
Crime types						
Murder	27	35	33	27	29	151
Robbery with Aggravating Circumstances	191	331	431	385	438	1776
Assault with intent to do Grievous Bodily Harm	732	608	758	713	654	3465
Theft out of Motor Vehicle	87	140	191	133	154	705
Sexual Offences	315	268	236	249	220	1288
Total	1352	1382	1649	1507	1495	7385

Limpopo- Crime Stats SA- Crime Stats Simplified (2013)

The crime statistics depicted in the table above show that there was a sharp increase of the crime from 2014 and 2015 in Mankweng police station. Thereafter, between 2016 and 2017 the crime slightly decreased. The reason for the increase of crime is reactive policing approach through prevention crime by using only visible policing. It is important to use crime mapping to record criminal activities and for planning crime prevention initiatives.

The crime statistics represented at the Mankweng and Polokwane police stations for the period 2014 to 2015 as illustrated in the above tables show that crime is has not been resolved yet. Crime is old as man himself and the police have to put in actions and plans directed at preventing crime. The challenges the police face at both police stations is the increase in the rate of criminal activities such as robbery with aggravating circumstance, assault with intent to do grievous bodily harm and sexual offences. The tables above on 1.1. and 1.2. show that robbery with aggravating circumstance and assault with intent to do bodily grievous bodily harm was the major crimes reported at Polokwane and Mankweng police stations.

Preventing crime requires a well- prepared SAPS with resources in place to help them to manage, control and prevent crime. The high rate of crime shown in the tables are clear indications that the current approach used by the police to combat crime fails to combat crime effectively and a new approach is required. It will be helpful if crime intelligence, investigating officers and crime office can work together as one unit, because of the shortage of staff, and it will be easier to collect sufficient crime data to prevent crime successfully.

According to Balogun, Okeke and Chukwukere (2014:n.p), the benefits derived from using GIS technology necessitate its implementation as it provides accurate, reliable and comprehensive data round the clock, and it helps in trend prediction and decision making which results in high productivity and effective utilization of manpower. An advance technology such as GIS is used by police to help them in crime analysis to impact on the efficiency in crime reduction and professionalism (Ibrahim & Kuta, 2015:43). GIS can be used for improving the conventional method used by the police in fighting crime and it can also be used for 24 hours' surveillance of high crime areas

for control and prevention criminal activities, rather than using road blocks to locate and apprehend wanted people (Ejemeyovwl, 2015:64).

1.4. The research question, aim and objectives of the study

The researcher has to ask questions in any research study that is conducted to enable him/her to achieve and address the objectives of the study. The research question is about the research topic that the researcher seeks to know about (Cresswell, 2014: 143). The purpose of research question is to narrow down the specific question that the researcher needs to answer in the research study (Creswell, 2011:110).

It is clear that the research question is derived from the research aim to investigate the research problem and to have a better understanding of the problem identified (Walliman, 2016:76). In order to understand the research problem of the study, the following research question was formulated:

What is the value of crime mapping in crime prevention planning?

The purpose of the study has to contain information that guides researcher about the direction of the study, the participants in the study and where the study will take place. The purpose of the study is the central idea that control the entire study and needs to be clearly and succinctly formulated and useful. Therefore, the purpose of it is to reflect what the study intends to achieve, not the problem or issue leading to a need for the study (Creswell, 2014:123-124). The purpose of study should help the readers to understand the research study, to identify the objectives of the research, what motivated the researcher to investigate the specific topic and what exactly the researcher was trying to find out. The research study has to be evaluated, meaning that the researcher has to indicate clearly what the research set out to achieve and the readers need to judge whether the research has been successful. Therefore, it is important for the researcher to pay sufficient attention to specific aspects of the study, including topic of study, research question and objectives of the study to achieve the purpose of the study (Denscombe, 2010:7-9). The purpose, aim and objective are interchangeably and are synonyms for one another. The aim and objective is something which the researcher plans to do or to achieve, while the purpose and aim

indicate why the researcher chose to investigate the specific topic or why something exists (De Vos, Fouche & Delpont, 2011:94).

The aim of this study is to assess the value of crime mapping in crime Prevention planning. The objectives of this study are to:

- Assess the current status of GIS at Polokwane and Mankweng Police Stations.
- Determine whether GIS and impact on crime reduction at Polokwane and Mankweng Police stations.
- Determine the effectiveness of GIS in crime fighting.
- Identify any shortcoming that hampers the use of GIS at Polokwane and Mankweng police station.
- To make recommendations that can be used to improving the use of GIS in crime prevention.

It is important that both police stations utilise GIS and manual pin mapping resources to understand the nature of crime levels in their areas. The use of GIS and manual pin mapping in policing will empower the police to utilise this system as a crime management tool to enhance crime prevention and reduction in both police stations. Therefore, GIS and manual pin mapping can help police to analyse crime to facilitate the effective planning and executing of anti- crime operations in their policing areas.

1.5. The envisaged value of this study

This study will provide information to the members of the SAPS about the successfulness of using GIS and Manual pin mapping in crime prevention at the Polokwane and Mankweng police stations. This type of research is required to provide police management with information to make them aware of the value of technology as a crime prevention approach to control and manage crime. This study may be helpful to formulate policies that can be contributed towards crime prevention planning. The study is intended to assist the police management to use the GIS and manual pin mapping as the key tool for the operational and tactical purpose of mapping crime and crime pattern analysis. It can also help police with strategy decision making by supporting such decisions by locating the police to the place of crime and for targeting

criminals and developing problem-oriented policing project. The public who resides within the two policing areas, will also derive value from this study, as crime will be prevented more effectively. The study will benefit community members if there is a partnership between them and police in preventing crime. The community members can access crime statistics on the SAPS website to view crime levels in their policing areas and to report crime anonymously online at the Crime Stats. The community members can take part in crime prevention initiatives through reporting crime online to create communication channel between them and the police. This study will also benefit the students and academics who may do research on the similar topics. The findings and recommendations of the study may contribute to the knowledge base of research institutions to stimulate further research on the topic to close gaps that have not been identified.

1.6. Key concepts

Concepts constitute the building blocks of research studies and it include abstractions representing an object, a property or a certain phenomenon. Concepts serve as a researcher's tool bag and their purpose is to understand the foundation of communication and serve as components of theories (Welman, Kruger & Mitchell, 2005:20). The purpose of key concepts is to show the background of the study and anyone who reads such concepts will be understanding the concepts relevant to the study better (Walliman, 2016:55). Concepts form the foundation of research studies and represents the way in which researcher conducted his research (Bryman & Bell 2011:33).

1.6.1. Geographical information systems (GIS)

GIS is a computer- based tools used by crime analysts to collect, store and retrieve data so that it can be manipulated, analysed and displayed as special data (Santos, 2013:5). GIS refers to a collection of computer programs that assist the police to develop the strategy that reduce crime, prevent victimization and the investigation of crime (Paynich & Hill, 2010:1). GIS is the computer software that allows the user to modify, visualise and query as well to analyse geographic and tabular data (Santos, 2013:5). GIS is a powerful crime analysis tool that is used to analyse information and

compare crimes that are committed at the different times with one another, for association analysis and link cases by using data drilling (Horne, 2007:18). The use of GIS in policing can benefit police with a decision support system for policy makers by providing them with a framework that can be used to improve quality of service delivery and to make police react quickly and proactive when preventing and reducing crime. These benefits of GIS will enhance safety of people's lives, their properties and will provide a favourable business environment to prospective investors (Balogun, Okeke & Chukwukere, 2014:455-465).

1.6.2. Crime analysis

Crime analysis is the study of the criminal incidents, crime patterns identification, trends and problems, with the purpose of the dissemination of information to the police to assist them with providing solutions to crime patterns, trends and problems (Paynich & Hill, 2010:9). Crime analysis is the systematic examination of crime and disorder problems and other police activities (Boba, 2009:4). Crime analysis is a study of criminal behaviour by employing data mining, crime mapping, statistics, research methods, desktop publishing, charting, presentation and thinking skills to combat crime effectively (Eloff, 2006:4). Crime analysis is a technique used by police to focus on analysing trends, spaces and times to develop offender profiling that facilitates the identification of offenders and criminal associations so that they can be apprehended and arrested. Analysis begins from explaining the descriptive presentation of data so that patterns and distribution of crime can be understood by police and how crime occurs, so that they can develop effective solutions to tackle crime (Newburn, 2003: 343 - 345).

1.6.3. Crime prevention

Crime prevention refers to the police intervention to reduce the continuity of crime and the perceived fear of crime (Lab, 2004:23). Crime prevention is defined as a crime prevention approach to reduce fear of crime and increasing safeguarding of citizens' safety (O'Block, Donnermeyer & Doeren, 1991:8). Crime prevention involves the broader social control of unethical criminal activity to prevent crime, as well as to analyse every situation where crime has taken place to change that situation by

preventing future crime (Hollin, 2013:376). Crime prevention is action taken by police and other role players to eliminate crime opportunities that exist in the physical and social environments in which communities find themselves. The best way in which crime prevention can be achieved is through police patrol, surveillance, public awareness about crime, police to involve private security companies in crime prevention endeavours and strict sentencing approaches by courts (Steenkamp & Potgieter, 2004:73). Crime prevention is a technique used by police to control crime through roadblocks, patrols, stop- and- search cars, emergency responses and investigation of reported crimes (Mofokeng, 2015:110).

1.7. Delimitation of the study

This study focuses on Polokwane and Mankweng stations. The reason to choose the mentioned police stations is that areas that are within both police stations have been faced with serious and very high rates of crimes that affect and threaten the socio-economic development and the quality of life of ordinary citizens in the surrounding areas. These crimes include: kidnapping, rape, armed robbery, house robbery, theft and murder. The police are faced with serious challenge to address these crime problems because they undermine the value of crime mapping as arsenal towards crime prevention. The researcher intended to assess the value of crime mapping in crime prevention at Polokwane and Mankweng police stations to see which can be used as crime prevention planning and as result can provide solutions to crime problems in the areas concerned. For the purpose of this study, the researcher focused on the crime information and crime prevention units at both police stations to achieve the objectives of this study. Within the scope of this study, the researcher discussed the inclusion and exclusion factors in Chapter five (the methodology).

1.8. Summary

This chapter outlined the general orientation of the study which includes an introduction, background of the study, research problem, research aim and objectives of the study, research questions, the value of the study, key theoretical concepts, and the delimitation of the study. The purpose of this chapter is to ensured that the reader

understand the topic of the study, as well as key concepts of this study to know what to expect in the following chapters.

CHAPTER 2

An overview of Geographical Information Systems (GIS)

2.1. Introduction

The police must use technology to determine whether it has a significant impact on crime prevention. It is their responsibility to ensure that they implement the proper application of state- of- the- art and highly advanced technology such as GIS and manual pin mapping to combat crime successfully. The application of GIS and manual pin mapping in policing has been quite innovative and is a useful way to examine crime in a geographical context.

This chapter focuses mainly on GIS and manual pin mapping as a crime prevention tool. The use of GIS and manual pin mapping helps the police to manage information more effectively and to combat crime at local and international levels. GIS and manual pin mapping have increasingly been recognized locally and internationally by police agencies as highly effective tools for crime pattern analysis, crime trend evaluation and to assist in strategic planning and problem solving.

2.2. A selection of best practices of implementing GIS

The high levels of crime around the world have raised concern among academics, police and security experts to find new ways to handle information about criminal activities to understand its causes, locally, nationally and internationally better. The new tool is GIS which plays a crucial role in representation and visualization of crime information to understand crime better and to respond adequately to crime problems (Ibrahim & Kuta, 2015:43). The researcher chose the following countries, namely Australia, England and the United States because GIS has been used extensively in these countries and much research has been conducted on GIS.

- **Australia**

The use of GIS in Australia was developed by Shiffer and Jankowski in the 1990s for formulating a land use model. The use of GIS helped the Australian government to build a land use model that can grow social, economic and environment factors in formulating sustainable development scenarios (Pettit, 2005:n.p). The Australian police use GIS to plan innovations in urban planning, community- based activities and the local government's role in crime prevention. GIS is often used by local governments to publicise their services on the Internet, such as planning and environmental management so that the public can access such information. It also assists in democratising the planning process by providing environment information freely to the public; and the objective of crime prevention is also fostered by increasing the availability of spatial information on the internet. GIS helps police to integrate spatial information by using different sources and it can be done by performing spatial analysis and representing data in different ways. Therefore, by sharing data with other law enforcement agencies, the police can help in crime reduction and prevention. Using GIS enables the police to identify crime hotspots and apprehend criminals (Herborn, 1999:n.p).

GIS Technology is increasingly used by different organisations such as local governments, private companies, correctional services, police services and other government departments to promote data sharing among agencies so that communities are able to access data about public spaces and local communities. The use of GIS in policing empowers communities to have a better understanding of crime problems so that they can become part of effective crime prevention strategies which enhance the role of the public space in the community. GIS is an effective crime prevention tool that is used by the Australian police to become increasingly inter-agency, politically and socially broadened rather than narrowed to the policing side only (Hebron & Lee, 1991:12).

- **England**

GIS was first introduced in England in the 1990s by the Police Department and Crime and Disorder Reduction Partnership (CDRPS) as a tool for crime analysis (Weir & Bangs, 2007:2). The police of England use GIS to examine social cohesion, spatial segregation and the bordering of affluent and disadvantaged areas in explaining levels of crime (Bowers, 1999:159). Police use GIS to analyse demography, housing, social conditions and crime to target crime prevention strategies that are provided by an information system capable of handling large quantities of data such as spatially-referenced crime, incident data and cross-referencing them with crime information that is identified on land use, infrastructure and demographic and social conditions (Ekblom, 1988:n.p). GIS uses three main types of maps that can be used by the police to delineate areas of high crime. These maps include a point distribution map which is used to identify crime incident locations, a conventional shaded map which is used to show variations in crime rates across territorial units; and a probability surface map which is used to show different boundaries or contours delineating areas of unusually high criminal activity. Therefore, GIS can help police to do spatial query, context setting and mapping exercises (Ebdon, 1985:n.p). Police use GIS in sampling packages in the development of enhanced maps for plotting individual crime locations and crime hot spots (Bowers, 1999:180).

Police agencies around the world need to embrace the use of GIS because it is a powerful tool that has capacity to deal proactively with criminal behaviour. The attitude of police agencies globally in embracing GIS for controlling and preventing crime facilitates in developing police with the skills and the necessary transition from the traditional method of crime control to the modern (Ibrahim & Kuta, 2015:48).

- **United States**

The use of GIS in the United States was introduced in 1990s by the Vice President Al Gore to support the police with crime mapping technology. A project was funded by the National Institute of Justice together with researchers and practitioners as well as United States cities, namely Jersey City, Hartford and San Diego to fight drug markets

and to trace syndicates. The United States police use GIS to study drug markets and track their movement over time as crime prevention initiatives to control crime within communities. The use of GIS in policing help them to interpret maps to analyse crime, to develop policies and strategies that can be used to share crime data with security agencies to assist them to prevent crime (Santos, 2013:11).

The police in the United States use the Internet to convey information through crime maps to communicate with the public by placing maps on their website so that the public can access crime information by logging in on the police website. They also use the Internet to disseminate crime information because using maps on the internet helps the public to understand the risk of crime within their communities. The problem of publishing maps with crime information on the Internet is that only those who have access to the Internet will benefit to be able to determine the level of crime within their areas. The publishing of crime maps on the Internet for public cognisance is an effective method for sharing crime information with the public and in that way police engage the public to become part of fighting crime within their areas (Ratcliffe, 2004:n.p).

The police can learn from these three countries to use GIS in such a way that it can help police in crime prevention by using a predictive policing method. It means that the police must use GIS to help them with crime information and analysis to inform them about forward – thinking crime prevention by identifying past events of crime. Therefore, crime analysts can predict future crime events to allow the police to target such places so that a proactive approach can be used to prevent and disrupt crime.

2.3. Crime mapping

Previously, when police agencies were established law enforcement officers and civilian crime analysts virtually mapped crimes with push pins and paper maps (Horne, 2007:115). These maps can be traced back to the early 1900s when the New York Police Department and other large departments started to use manual maps to illustrate crime locations. Social scientists such as Adolphe Quetelet and Guerry were the first two people who created manual pin maps. These maps were drawn by hand and were very labour intensive (Hill & Paynich, 2014:11). According Harries (1999:1),

crime mapping has long been an integral part of the process known today as crime analysis. Mashiloane (2014:145) outlines that crime mapping is the analytical technique to divide crime by pinning each incident of crime, identifying crime hot spots and showing the specific places and the clustering of specific crimes. For the purpose of this study, the researcher focused on four types of crime mapping, namely, GIS, manual mapping, computer mapping and high definition mapping.

2.3.1. Geographical information systems (GIS)

GIS is the computer application that is used for capturing, managing, integrating, manipulating, analysing and displaying data which is spatially referenced to the earth. It also provides the forum within which base maps can be layered with crime data and other geographical data that represent the landscape of the specific area where the crime data is associated (Chainey & Ratcliffe, 2005:38). GIS is the collection of computer applications that are used to store, retrieve and display spatial data on maps. In addition, GIS is the computer application to assign spatial coordinates to crime incidents and other locations such as criminals' residences and to produce compositions with crime locations and spatial context features such as street address and police sectors (Gorr & Kurland, 2012:3-4). GIS is the computer technology that is used for collecting, managing, visualisation, analysing and sharing geographical data about a specific area of the earth (Eloff & Prinsloo, 2009:28).

GIS is computerized information technology used to pull together large quantities of information that are contained in crime dockets, reports and captured crime locations, as well as to extract data through time, date, modus operandi and crime type queries that are geographically based. Furthermore, GIS is the key tool for the spatial analysis and visualisation of crime (Breetzke, 2015:n.p). Crime mapping is the process of using a GIS for recording and mapping crimes that have occurred recently, identifying crime hot spots, implementing crime prevention responses and effectively helping to understand the crime distribution for the purpose of monitoring the impact of crime prevention initiatives and communicating crime statistics to the public (Santos, 2013:95).

2.3.2. Manual pin mapping

Manual pin mapping is a wall map that is used by the police to show the location of crime and crime types. Therefore, the police use different coloured pins in manual pin mapping to represent several types of crimes. These maps are problematic because they are difficult to read when several types of crimes represented by different colour pins, are mixed together and therefore these maps are limited (Horne, 2007:115). Manual pin maps are large police crime maps in which pins are literally stuck into them to mark crime points and color-coded pins are used to represent the several types of crime. Therefore, it is difficult to access these maps and to keep them up to date (Gorr & Kurland, 2012:30).

Manual pin maps have serious limitations, but are useful to show where crime occurs. Manual pin maps are useful in showing the location of crimes and different coloured pins are used on maps to represent different types of crime (Harries, 1999:1). Manual pin mapping is an elementary crime mapping technique in which dots represent the locations or concentration of crimes (Leitner, 2013:323).

2.3.3. Computer mapping

Computer maps use electronic format maps. It presents the geographical data such as locations, streets, buildings and parks. Computer mapping has similar limitations as manual wall maps; for example, one of the limitations of computer mapping is that when clicking at a specific point, only the specific crime incident address will appear and the user cannot further access the particular crime beyond that point (Mashiloane, 2014:145). Computer crime mapping is a tool used by the police to analyse and correlate data sources to create a detailed crime incidents snapshot of the geographical areas. It also allows police to plot crime related data against a digitized map of the community (Mamalian & Lavigne, 1999:n.p). Computer crime mapping is a flexible and efficient tool, and therefore used for organising and recording large volumes of crime data. Computer crime mapping depends on the existence of a record of crime report that is captured on the computer; information about the location of that

crime and availability of digital base maps on which the computer can map these data (Markovic & Stone, 2002:2).

2.3.4. High definition mapping

High definition mapping is used to analyse the crime patterns in small areas through a two-step process. The first step is the detailed base map of the area, showing the features of the environment of the area, such as all streets, buildings, sidewalks, fields, bushes, trees and shrubs on the map. The second step is the exact crime locations to map the crime on the right side of the sidewalk and footpath between the sidewalk and bushes. This accurate base map and exact crime location provides the crime analyst or police with detailed information about what may be the cause of the crime (Paulsen & Robinson, 2004:200).

Crime mapping plays an important role in policing to depict the geographical features within communities such as street addresses, public roads, shopping centres, schools, police departments and emergency roads. Crime mapping helps the police to identify hotspots, crime locations, victims' and offenders' residential addresses as well as to understand crime distribution and to respond to crime that is reported.

2.4. The GIS components

GIS consists of three components, namely, a point feature, a line feature and a polygon feature (Chainey & Ratcliffe, 2005:42). Each feature has its own attributes that describe data. The purpose of these features is to view, query, relate and manipulate the data behind these features as one of the important components of a GIS. By simply clicking on a point, a line or a polygon feature it is easy to identify the data associated with the specific feature. These data include information such as victim and offender characteristics, reason for commission of crime, date and time of incident as well as address and location where incident took place (Hill & Paynich, 2014:14).

A point feature represents the location of the crime depicted on a GIS-generated map by a symbol or label. In GIS a point feature represents the same as a pin placed on a

paper wall map. For example, GIS uses different symbols to represent the location of crime, buildings, type of crime and location address (Santos, 2013:88). Crime location is represented by a dot or suitable symbol as a point feature on a GIS (Chainey & Ratcliffe, 2005:42). A line feature is a line that separates geographical features that can be represented on a map by a line or set of lines. The line feature represents buildings, streets, rivers, streams and power lines in the community on the map (Santos, 2013:88). A line feature is a line that connect the different points shown on a GIS generated map (Chainey & Ratcliffe, 2005:42).

A polygon feature is a geographical area that represents a multi-sided figure with a closed set of lines on the map. A GIS-generated map may use a polygon feature to depict different boundaries, parks, schools and police sectors (Santos, 2013:88). A polygon feature represents a closed area around its perimeter with a polyline. A polygon is a solid object for the area that is covered and shaded using different colours to represent city boundaries (Chainey & Ratcliffe, 2005:42).

For GIS to work, the computer files containing the data must be brought together to use, edit, query and link them and also to add new data and generate a display for output. These attribute files and the objects can be linked together by querying point, line and polygon on the map by viewing attribute data in a GIS and by selecting those objects (Chainey & Ratcliffe, 2005:42).

2.5. Crime mapping by type of crime analysis

Crime mapping plays an important role during the crime analysis process and it does not stand alone as its own sub-category of analysis. Crime mapping helps the police to analyse crime by specifically focusing on the geography (Santos, 2013:63).

The following are examples of the crime mapping used within these types of crime analysis: Intelligence analysis: crime mapping is used to display crime and criminal relationships within their networks about where they live, work and places they frequent. These maps can be used to view the local communities and regions of the country. These maps can be also used for mapping crime such as organised crimes along with the other gang related crimes (Santos, 2013:63). Intelligence analysis uses

crime mapping to analyse crime information so that crime can be presented in the form of time lines and association link charts so that crime analysts can understand and have a clear picture about the criminal group and activities (Mashiloane, 2014:117).

Criminal investigative analysis is crime mapping and use geographic profiling with the purpose of conducting a statistical analysis about the locations connected with the crime series patterns to identify where the offender lives (Santos, 2013:63). The primary purpose of criminal investigation analysis is to understand crime patterns of serial crime crossing city, state and national boundaries by linking their behaviour and evidence associated with incidents so that offenders can easily be caught (Katantamalundu, 2004:28). "Criminal investigative analysis entails the use of physical and psychological attributes of a criminal to identify them" (Govender, 2011:123).

Tactical crime analysis is crime mapping and is used to identify the crime patterns that link the proximity of crime incidents. Crime mapping is useful particularly to identify property crime patterns. For example, crime mapping can be used for the spatial analysis of the crime of theft that may reveal clusters of activity at specific locations that might indicate crime patterns (Santos, 2013:63). The purpose of tactical crime analysis is to examine recent crime information that was reported to the police by the public. Tactical crime analysis focuses on the information of different types of crime such as method of entry, point of entry, suspects' characteristics, type of victim, type of weapon used and also the date, time and location of crime (Katantamalundu, 2004:28).

Strategic crime analysis is crime mapping and is used as a long-term application, to analyse the relationship between the criminal activity and disorder indicators, such as a higher volume of vacant property or a disorder call for service. It helps to examine the crime patterns at specific locations and to calculate the crime rate information as well as to incorporate crime data information with the qualitative geographical information (Santos, 2013:63). Strategic crime analysis consists of long-term plans such as monthly, quarterly and yearly plans to compile the criminal and non- criminal information that includes crime, calls for service and traffic information that can be analysed to aggregate data. This type of analysis helps police to use statistical techniques and research methods to investigate long-term problems and evaluate

organisational procedures (Katantamalundu, 2004:28-29). Operation crime analysis is crime mapping and is used to examine dispatch calls for service to provide the police with resources to the specific locations and to design the best patrol beats to the locations of the beat police officials. For example, spatial statistics are used to estimate the area boundaries where the calls service distributes calls among police beats and can determine the locations for the beat police officials to minimize the travel distance for police officials (Santos, 2013:63). Operational crime analysis uses crime mapping to present crime information to assist the police to identify specific and immediate crime patterns, series, sprees and also to help the police in providing investigative leads to catch criminals (Krause, 2007:26).

Administrative crime analysis is crime mapping and is a valuable tool used by police, researchers and media organisations to convey information to the public about criminal activity. Police agencies and media organisations put maps on their websites that depict areas of crime, along with the corresponding tables and definitions. For example, police agencies place crime maps about neighbourhood crime information on their websites on a monthly or quarterly basis so that the public can access that crime information by means of computers in their homes or at a local internet cafe (Santos, 2013:63). The primary purpose of administration crime analysis is to inform audiences about crime and audiences include police executives, city councils, media, citizens, and neighbourhood groups so that they are aware of the high rate of crime within their areas. This crime information can be published on police websites and the general public can access this kind of information on the internet (Katantamalundu, 2004:29).

Crime mapping contains all forms of crime analysis. It also plays an important role in terms of every type of analysis, even if it is not present in every crime analysis product. Crime mapping does not stand alone as its own subcategory, but it requires a type of crime analysis process that specifically focuses on geography.

2.6. The value of implementing GIS in the SAPS

The value of implementing GIS and manual pin mapping in policing is recognized as an effective tool because it has the capability for the visualization of crime, the analysis

of crime patterns, crime mapping, allocation of resources to the police and supporting police in strategic planning and decision making. Moreover, the usefulness of implementing crime mapping is that it has the power to link spatial and non-spatial crime data, share information with the public, analyse crime data in order to identify the crime patterns series in both interior and exterior places, as well to understand the events and dynamics better that involve people, places and crime locations (Pendleton, 2012:4).

Eloff and Prinsloo (2009:25), assert that GIS and manual pin mapping assist the police management with developing crime analysis strategies with a spatial context and they provide a spatial technology basis for use as a crime management strategy. Breetzke (2015:n.p), indicates that the value of GIS and manual pin mapping in police lies in the spatial analysis, visualization of crime and ability to interact with crime data. Moreover, GIS and manual pin mapping can be used as the key tool for operational and tactical purposes by mapping series of crimes; and in strategic decision-making by targeting crime risky hotspots in communities and supporting that decision by locating police on crime locations. The value of implementing GIS and manual pin mapping can help the police to monitor their performance, in crime management and improving service delivery and can be used as twenty-four-hour surveillance of high crime areas for control and crime prevention.

2.7. The challenges that hinder the use of GIS and manual pin mapping in the SAPS

The biggest problems that hinder the use of GIS and manual pin mapping in policing are the ignorance and negative attitudes amongst police officials regarding the value of technology as tool in decision making and combating crime (Ibrahim & Kuta, 2015:46). The SAPS is struggling to use GIS and manual pin mapping as an intelligent information-driven approach to crime prevention, because their members lack skills to develop questionnaires and record detailed information on certain types of crime (Breetzke, 2015:n.p). Lack of planning is another reason why there is limited use of crime mapping at some police stations countrywide. The lack of planning includes unavailability of public documents that has been issued describing the rollout of GIS and manual pin mapping within policing in detail, the lack of documentation regarding

the implementation and operation of the GIS and manual pin mapping at police stations countrywide from the SAPS management (Breetzke, 2015:n.p). The police see GIS and manual pin mapping as an intelligence-driven crime fighting and prevention arsenal tool but there are various challenges the police face to tap into the full potential of the technology (Ibrahim & Kuta, 2015:45). The challenges facing the police are to integrate their record management system (RMS) data into GIS. Therefore, the reason why many police stations in South Africa do not use the GIS is that police officials cannot export or enter RMS data into the GIS which results in them not to using it at all. The problem of data integration is a serious barrier that prevents most police stations from using the computer mapping system (Paulsen & Robinson, 2014:210).

2.8. GIS and manual pin mapping as crime prevention and reduction tool

GIS and manual pin mapping can help the police in preventing and better understanding the causes of crime that can lead to problems concerning police strategies, by simply focusing on the pinpointing crimes on the map. In this regard, the police use crime mapping to place pins on a map to identify areas of high crimes, rather than using community policing principles to try to understand the underlying causes of crime and responding to the areas through traditional methods of policing, such as directed patrols. In this sense the police agencies use crime maps to pinpoint the areas with a high number of crimes as well as the areas of target policing (Paulsen & Robinson, 2004:225). The use of GIS and manual pin mapping helps the police to understand crime distribution clearly, to explore the different mechanisms, as well as the dynamics and generators of criminal activity through observing the pattern analysis with other local data (Chainey & Ratcliff, 2005:4).

The implementation of the crime mapping application in policing can finally ensure the access to census and socio-economic data. These data can be used as crime prevention strategies to build cooperation between the police and other departments that are involved in the welfare of urban residents. In this way it is easy to identify target areas such as welfare work, urban rehabilitation and police patrols that can be integrated to combat crime (Lochner & Zietsman, 1998:71).

Crime analysts use crime mapping to analyse spatial and temporal factors in order to understand series of crimes or to detect patterns and trends. Crime mapping helps crime analysts to examine crime patterns to link particular areas, for example, a liquor store or a motel that may experience a high number of incidents in their vicinity. Incidents such as assaults, prostitution and drug dealing may be concentrated in close proximity of a liquor store or motel and are locations of offending establishment (Leipnik & Albert, 2003:5). Spatial analysis is a technique used by crime analysts to understand the relationship between land use behaviour and crime types (Eloff, 2006:7). Temporal analysis is a crime analysis technique to understand the time and date of the occurrence of crime (Katantamalundu, 2004:27).

Crime analysts use crime mapping to facilitate visual and statistical analysis regarding the spatial nature of crime and other different events, and to link unlike data sources bases together on common geographical features of an area and also to provide maps that help them to communicate analytical results (Santos, 2013:23). GIS helps crime analysts to communicate with police officials, other law enforcement agencies and policing policy makers to devise strategies for combating and preventing crime (Pendleton, 2012:7).

2.9. The importance of crime information systems integrated with GIS

The future success of GIS within policing in South Africa is dependent on the present status of the technology that is currently used by the SAPS. The possibilities of integrating GIS and linking it to all crime prevention is unlimited in policing. SAPS management committed itself to use information management systems which include the Case Administration System (CAS), Records Management System (RMS) and Computer-Aided Dispatch System (CADS) (Santos, 2013:68). CAS is the crime information system that is currently used by the SAPS for capturing information of offenders and victims. It is essentially a tool for a docket management system that is used to gather information on crime cases, such as the location and time of the crime at police station level. This system runs on the central computers of the SAPS and all users across South Africa can access it over the SAPS network. The problem is the unavailability of CAS in some police stations in South Africa and that CAS is not linked to the GIS crime mapping technology; and it is difficult for police officials to make a

spatial distribution and interpretation of criminal activity (Breetzke, 2015:n.p). RMS is the central information computer system of the SAPS operations and it is designed as a data entry and storage system. The RMS includes databases such as crime reports, arrest reports, people's information, property and evidence information, as well as vehicle information, accident reports, field information, calls for service and investigations. The main purpose of RMS is to store crime incident data and to link it to other related data across the police station countrywide (Santos, 2013:68).

Santos (2013:68), indicates that CADS is the computer technology that uses telecommunication and geographical displays in policing to support the police dispatch and response functions. The main purpose of CADS is to dispatch officers, to keep track of police officers' locations and activities as well to record communication between police officials and dispatch in the CADS. However, CADS is different from the 10111 system which receives and records actual calls from citizens about crime committed, as police use CADS to transfer key pieces of information about citizen calls for service to the CADS system, which later records all information pertaining to dispatch calls.

It is important for the police to collect, capture and retrieve data so that crime analysts can examine it at a later stage. The use of GIS, together with other technological applications that are currently used by the SAPS can help crime analysts to compare and examine collected data more effectively.

2.10. Geographical profiling

Geographical profiling is the police investigation strategy to search the locations that are connected with a series of crimes with the purpose of narrowing down the search of a suspect. The purpose of geographical profiling is to manage large volumes of information that help police to focus on the limited resources that directly link to the area of offender residence. Geographical profiling is used on crime series where there is a set of crimes and there is a belief that it has been committed by the same offender. These types of crime can be linked by crime locations, crime pattern and physical evidence (Paynich & Hill, 2010:155). Geographical profiling is a set of serial crime investigations to identify and analyse the crime locations and to determine the most

probable residence area of an offender (Osborne & Wernicke, 2003:25). Geographical profiling is a police investigation strategy that is used to identify the locations that are connected with the series of crime to determine the most probable area of offender residence. This technique is used in any circumstances where an unknown offender carries out a series of criminal activities at known locations (Horne, 2007:124).

Holmes and Holmes (2002:215), state that geographical profiling is the investigation strategy to obtain information about crime series, for example, crime location type, arterial roads and highways, physical and psychological boundaries, land use, neighbourhood demographics and routine activities of victims and displacement. Harries (1999:152-154) points out that geographical profiling can be used in a multiple crime scene that involves a single crime. It is important to understand that geographical profiling does not solve crime, but provides information to the police to help them in major crime investigations.

2.11. Geocoding

Geocoding is the process of coding the earth and providing information for geographic referencing that can be used in crime mapping on the computer (Harries, 1999:97). Geocoding provides the street address where a crime incident has taken place and the geographical area provides information relating to the crime scene, victim and suspect area (Santos, 2013:92). Geocoding is the process of using street addresses and positioning them into a computer map using latitude and longitude coordinates. In this way coordinates provide crime locations in a two-dimensional space (Hill & Paynich, 2014:13). Geocoding is the idea of entering the place name or street address on the GIS data base to show crime location (Tomaszewski, 2015:88). According to Hill and Paynich (2014:133-137), Topologically Integrated Geographic Encoding and Referencing system (TIGER) is required to identify the geographical crime locations that concentrate on high priority crimes in the area of a police station. The problems of incorrect recording of street addresses at crime locations and human errors such as incomplete data within the police docket make difficult to geocode crime data. In this regard data cleaning, GIS database maintenance and management are required for pre-geocoding of crime data to improve the geocoding of high rates of crime in South Africa.

2.12. The regulatory framework for crime mapping in SAPS

In terms of section 205 (3) of the South African Constitution of 1996, the responsibility of the SAPS is to ensure that the police provide safety and security to South African citizens to maintain public order, to protect and secure all citizens, and their properties as well as upholding and enforcing the law. Section 205 (3) of the South African Constitution of 1996 further indicates that the duties of the police is to prevent, combat and investigate crime (Constitution of the Republic of South Africa 1996). The core functional service of the SAPS is to prevent, combat and investigate national priority crimes (SAPS Act 57 of 2008). The SAPS is the main stakeholder in terms of crime prevention and it must ensure that as far as humanly possible within the parameters of the law to manage, investigate, prevent and solve criminality. The SAPS responsibility is to create a safe and secure environment to benefit basic service delivery such as education, health care and social development to encourage international investment and tourism which benefit the country (SAPS Act 68 of 1995).

The regulatory framework for crime mapping in SAPS within South Africa was introduced by the government in 1994. These two legal frameworks are the National Crime Prevention Strategy (NCPS) of 1996 and the National Crime Combating Strategy (NCCS) of 2000 to support the use of crime mapping in crime prevention in policing. The NCPS has a four -pillar approach to crime prevention. The first pillar focuses on the Criminal Justice System (CJS) to ensure that the CJS is more efficient and effective for crime prevention. It provides a sure and clear deterrent to criminal behaviour and it helps in reducing the risk of re-offending. The second pillar outlines that the NCPS helps in reducing crime through environmental design and the main focus is reducing crime opportunities and to increase the detection and identification of criminals. The third pillar approach is based on providing public awareness through educating communities about the value of NCPS in crime prevention and to changing the way communities react to crime and violence. The fourth pillar provides a trans-national crime prevention programme to ensure that crime at the cross-border is controlled more effectively to prevent illegal immigrants from entering the country and it also helps in human and drug trafficking related crime. It helps the police to link and identify criminals that are in the country and with international crime syndicates (SAPS

Strategic Plan, 2014-2019:6). The role of the NCCS in the crime prevention approach helps to guide the police in daily operational matters at police station level. The NCCS focuses on the geographic approach and the main aim is to identify the areas that are affected by high crime rates, to cluster them into crime combating zones and to target these for aggressive high -density street level policing. The use of NCCS helps police in crime mapping, crime pattern analysis and map searches for plotted crimes as well as time and grid analyse of plotted crimes (Breetzke, 2008:n.p). The NCCS has two approaches for crime prevention planning. The first approach deals with the selection of geographical areas identified as having the highest recorded crime levels. Police direct their resources to the geographical areas that are affected by high crime volumes to improve service delivery in these areas and to stabilise high crime rates to initiate medium-term strategies for social crime prevention planning. The second approach of NCCS deals with preventing and investigating crime such as organised crime by task teams of experienced detectives and they focus on the parts of the country where most crime occurs (SAPS Strategic Plan, 2014:n.p).

2.13. Summary

GIS is computer technology that is used worldwide to capture large amounts of location-based crime information and allows police to plan effectively in advance for emergency responses, apprehension of criminals, to predict future criminal events and to identify crime hot spots. Police rely on GIS for crime mapping and analysis, as it helps them in analysing crime, criminal tracking and crime prevention, and also helps in examining crime sites to identify suspects and leads to arresting offenders. This chapter has established that GIS is recognized locally and internationally as a powerful tool to assist in crime prevention planning, managing crime and analysing crime.

CHAPTER 3

The use of crime analysis in crime mapping

3.1. Introduction

Crime is a cancer that society fears and it causes society to mistrust the criminal justice system to be able to protect their lives in general. The proper analysis of crime helps the police to understand criminal activities and to devise crime prevention strategies that can help to manage crime. Crime analysis is a way in which information about crime and disorder can be investigated.

Crime analysis helps police to identify, analyse crime and disorder problems as well as to guide them in implementing effective crime prevention strategies to solve crime. This chapter will focus on the concept of crime analysis, the purpose of crime analysis, types of crime analysis, the theoretical foundation of crime analysis, as well as the concept of crime information analysis, techniques of crime information analysis and the crime analysis process.

3.2. Crime analysis

Crime analysis is the process of combining police relevant data to identify and interpret crime patterns as well as other crime trends to inform the police about the threat to specific locations. These crime patterns can be identified amongst offenders, victims, offences, spaces and places (Newburn, 2003:340). Crime analysis is the systematic study of criminal behaviour, disorder problems and police related issues such as socio-demographic, spatial and temporal factors to assist police in the apprehension of criminals and assist them in disorder reduction, crime prevention and evaluation. Qualitative and quantitative data methods are used by crime analysts to tackle crime. They use qualitative data methods to examine non-numerical data methods for discovering underlying causes of crime. This includes field research such as observing characteristics of locations and identifying individuals with specific knowledge about a particular crime, as well as content analysis such as examining police dockets. Quantitative methods are also employed by analysts to conduct numerical or

categorical data for statistical analysis. This analysis uses socio demographic information to search the location of crime and for purposes of identifying victims and suspects. The use of spatial analysis helps to understand the nature of crime problems, disorder locations, their relationship to other events and geographical features of the specific locations. Crime analysts use temporal analysis to understand the nature of crime by examining long- term trends of crime, for example, over several years, by seasons, and on a monthly basis (Santos, 2013:3).

3.3. The purpose of crime analysis

The purpose of crime analysis is to support police with crime prevention and crime detection efforts so that offenders can be apprehended through investigative crime analysis. Operational crime analysis supports the deterring function of the police through crime prevention efforts (Petersen, Morehouse & Wright, 2000:109). The purpose of crime analysis is to supply the police with detailed information about crime that has occurred recently so that criminals can be targeted through problem-oriented and intelligence-led approaches. Police use a problem- oriented approach to respond to crime that has been reported to them by patrolling in the communities so that it can be easy to target and arresting criminals. An intelligence-led approach helps police to understand organised crime and deal with large volume of crime information to identify offenders (Newburn, 2003:341).

The purpose of crime analysis is to look at crime and other law enforcement crime data using formal analytical, statistical techniques and research methods that have been developed in social science. These crime data include studying arrests and crime reports, as well as offender and victim characteristics, and crime scene evidence. By analysing numerous sources of information, crime analysts can assist decision makers in policing by providing useful information to them about crime so that they devise strategies that can be used to fight and prevent crime (Hill & Paynich, 2014:9).

3.4. Types of crime analysis

This section outlines the different types of crime analysis such as operational crime

analysis, tactical crime analysis, intelligence crime analysis, crime investigative crime analysis and strategic crime analysis. Operational crime analysis examines how police deploy their resources such as grant funds, redistricting assignment and budget issues (Osborne & Wernicke, 2003:10). Operational crime analysis focuses on staffing and resources deployment. It seeks to identify how to organise the internal operation of a police department better in order to minimise inefficiency and maximise effectiveness (Hill & Paynich, 2014:10). According to Krause (2007:10), operational crime analysis supports the police by providing them with crime information which can be used to identify crime trends, patterns, series and sprees as well as to focus on providing investigation leads. Santos (2013:62), explains that operational analysis is the study of crime so that the police can deploy resources such as personnel, money and equipment in preventing crime and disorder in their jurisdiction.

Tactical crime analysis examines current criminal activity by analysing how, when and where the criminal activity occurs to assist police in pattern development, investigation leads, suspect identification and case clearance (Santos, 2013:61). Police use tactical crime analysis to develop a prediction of an offender's future behaviour so that surveillance units can deploy crime prevention strategies to identify where offenders are predicted to strike again in order to apprehend them (Hill & Paynich, 2014:9). The goals of tactical crime analysis are to promote a rapid response so that crime problem can be tackled properly and to predict current patterns of criminal activity for possible future crime events (Osborne & Wernicke, 2003:5).

Intelligence crime analysis focuses on organised criminal activity information to link people, events, and property to crime that occurs. The information that is analysed includes surveillance, informants and undercover operations and it is not necessary that criminal information is the only information that has to be analysed but also information such as telephone records, travel information, bank statements, tax records and business relationships of the suspect being investigated (Hill & Paynich, 2014:10). According to Santos (2013:600), intelligence crime analysis is used to identify networks of organised crime to help police in apprehending those violators of the law. These networks include human trafficking, drug trafficking, prostitution rings and financial fraud rings.

Administrative crime analysis involves informing the public about crime levels in their communities through publishing crime information on the police website countrywide (Hill & Paynich, 2014:10). Administrative crime analysis is intended to be used by police administrators, government officials, media and citizens to disseminate crime information to be easily accessible by every person. The crime information on the police website can be accessed by communities, business owners, victims, criminals and media outlets (Santos, 2013:62). According to Osborne and Wernicke (2003:8), "Administrative crime analysis focuses on providing summary of data, statistics and general trends information to police managers".

Crime analysis refers to public safety and discipline practice in policing to combat criminal activity. However, crime analysis has different types and the main purpose is to address crime and disorder.

3.5. Theoretical foundation of crime analysis

Crime analysis is the study of crime that involves the limited use of criminology and criminal justice theory. The objectives of the crime analyst are collecting and cleaning data, counting crime that has occurred recently and finding solutions that can be used to identify crime patterns and to solve crime problems. It is important for crime analysts to use criminological and criminal justice theories in their work because those help them to understand the root reasons of individuals to offend, to address everyday crime and to seek solutions to different situations. In this section the researcher will outline the concepts of environmental criminology, the problem analysis triangle, rational choice theory, crime patterns theory and routine activity theory to help police to deal with everyday crime and disorder (Santos, 2013:21-36).

3.5.1. Environmental criminology

This theory was developed by Paul and Patricia Brantingham in 1980. Environmental criminology is a crime theory that explains criminal events and immediate circumstances in which crime occurs. Therefore, criminal events can be understood as offenders, victims and laws in specific settings at particular times and places. In other words, environmental criminology looks for crime patterns and seek to explain

environmental influences and arrives at rules that enable predictions to be made about emerging crime problems and designs strategies that inform development that might be used to prevent crime (Wortley & Mazerolle, 2008:1). Environment criminology is different from traditional criminological theories because it does not attempt to explain the root causes of crime or why people become criminals as it focuses on the various aspects of setting in which crime occurs. A setting is the location where crime occurs such as a city, town and even rural areas, and can be divided into settings in which particular behaviour occurs and within these specific settings routine behaviours creates opportunities for crime to occur in a systematic way. Crime occurs only if an opportunity exists for that crime and the theories of environment criminology help police to understand how these opportunities are created and subsequently cluster them together. The goal of environmental criminology is not to explain why offenders commit specific crimes, but to understand different aspects of a criminal event so that patterns of behaviour can be identified as well as environmental factors that create opportunities for crime (Santos, 2013:26-27). According to Wortley and Mazerolle (2008:235), environmental criminology focuses on the notion that leaving a house unattended creates an opportunity for offenders to commit crime and people often leave their houses unattended, which facilitates the crime.

3.5.2. Problem analysis triangle

Lawrence Cohen and Marcus Felson developed the problem analysis triangle from Criminological Theory. The purpose of it is to study crime that demonstrates the different elements of crime and unlawful acts, as well as to show the relationship and interaction between these elements of crime, and the elements which lead offenders to create opportunities to commit crime. In order for crime to occur, different elements of crime must be present, namely, an offender, a victim and crime location (Stenton, 2006:28). The problem analysis triangle is the theory that assists police to understand crime settings. This problem analysis explains that for a crime event to occur, it is necessary for the elements of crime to be present such as an offender, a victim or target, property such as, a vehicle or building and, these must come together at a particular place and time. However, it means that if these elements of crime are not present together, crime cannot occur (Santos, 2013:27).

3.5.3. Rational choice theory

This theory was developed into Criminology by Clarke and Cornish in 1987 (Burke, 2014:66). The main purpose of rational choice theory focuses on the offender's decision to decide whether there are potential costs and benefits for committing a crime and it is the offender's choice to choose whether to commit crime or not; depending on this rational calculus. This rational choice theory forces offenders to think carefully to maximise their pleasure and minimise their pain and if they choose to commit crimes, the risk of apprehension is outweighed by the potential reward (Paulsen, Bair & Helms, 2010:10-11). The rational choice theory is based on behaviour that influences offenders to take rational decisions to commit crime for gaining cost and benefits from the criminal event, and therefore, these rational decisions for committing a crime is influenced by cost and benefits. If police use this approach, they will prevent more crime and may succeed in apprehending and arresting more criminals (William & McShane, 1994:221-222).

Rational choice theory explains that offenders make choices whether to commit a crime or not, based on the anticipated risk of apprehension or rewards. This theory further explains that if offenders are given a chance to commit crimes, they will do so if the chance of apprehension is limited. The importance of rational choice theory in policing is that police and crime analysts will understand the behaviour of offenders and why they choose to commit crimes or not, and subsequently effective crime prevention strategies that can be used to prevent future crimes (Santos, 2013:29).

3.5.4. Crime pattern theory

This theory was introduced into criminology by Brantingham and Brantingham in 1993 (Paulsen et al, 2010:16). The purpose of crime pattern theory is to focus on criminal events, patterns of crime and criminal behaviour. The pattern theory provides police detailed information about criminal events to understand opportune cross-products of law, offender motivation and target characteristics which are presented against crime locations at a particular space and time (Eloff & Prinsloo, 2009:25). Crime pattern theory helps police to use their skills to understand the nature, extent and development of crime as well as certain different types of crime that are based on a specific

geographical area for a certain period of time. Crime analysts analyse crime patterns by using graphs, marking and updating of geographical maps, keeping statistics and creating structured reports so that crime patterns can easily be identified. However, crime pattern theory focuses on similarities and differences within crimes in determining whether crimes are committed by the same individual or a group of offenders, based on the crime pattern information (SAPS, 1999:3). According to criminological study, crime pattern theory is looking for the behaviour of offenders and seeks to understand how offenders come together with victim, in space and time within crime settings. This theory focuses mainly where criminal events often occur in areas where the activity in the space of potential offender and victim comes together (Santos, 2013:30).

3.5.5. Routine activity theory

This theory was introduced into criminology by Cohen and Felson in 1979 (Paulsen et al, 2010:13). The purpose of it is that for crime, to occur a minimum of three factors are needed to come together in time and space, namely suitable target, a likely offender and the absence of a capable guardian (Newburn, 2003:352). According to Paulsen et al. (2010:13), routine activity theory explains that the offender has the opportunity to commit a crime if the elements of crime are present, such as offender, suitable target and absence of guardian for a specific period of time and space. This theory outlines that if there are no formal or informal guardians present for a period of time in space to deter the offender from committing a crime, the offender will be motivated to commit crime, and victimization will increase. According to Pourheidari and Croisdale (2010:8-9), routine activity theory states that in order for criminal events to occur, the following three elements must be present within a specific period of time and space. The first element is that the offender must be motivated to commit crime, the second element demands that there must be availability of a target and the third element is that the absence of a guardian makes it possible for criminal events to take place. A crime will likely not occur, if these three elements do not come together during a criminal event.

These theories fit into crime mapping to help crime analysts to understand how and why specific crime and disorder problems occur. Crime analysts have to understand

crime mapping in accordance with these theories to help them to explain, interpret and predict crime that occurs, so that they can analyse crime to devise improved crime prevention planning to prevent future crimes.

3.6. Crime information analysis techniques

Police agencies around the world use crime information analysis as tool that support crime prevention to the extent that every police operation and investigation needs to be analysed and verified carefully before it can become valid information or data. It is important that crime analysts examine information collected by police during the course of their operation and investigation of crime. These include CADS, RMS, CAS, Criminal Record System and Firearm Circulation System before arriving at a conclusion that the information collected is regarded as valid and reliable evidence. After conducting crime information analysis, the crime analyst is able to draw and present an accurate picture regarding the commission of crime from the beginning and at the end to identify who committed a crime (Petersen, Falhman, Ridgeway, Erwin & Kuzniar, 1996:1). Crime information analysis assists the police to analyse information from crime reports and criminal offenders to help them to reduce crime, victimisation, loss and suffering. This crime information analysis helps police to investigate crime and provides a system of monitoring to manage the effectiveness of security and crime prevention measures (Horne, 2009:70). The following analysis techniques that will be discussed are association analysis, financial analysis, time series analysis and link analysis:

- Association analysis

Association analysis is the technique used by police to link people, groups and businesses to understand their relationships, so that the investigator can collect information on the nature of the group and the manner in which the group or people interact with one another (Govender, 2011:123). Crime analysts use association analysis to show connections of organised crime and their criminal activity, and these techniques help them to identify hierarchical structures and role players such as people, locations and activities. It is important that when a crime has been committed and there is a suspicion that it happened in an organised fashion, these problems are

addressed by using association analysis (Horne, 2009:72-73). Association analysis is known as network or link analysis and is used to show relationships or connections among criminal networks that participated in different criminal events. It is also used to show the hierarchy of entire organisations and the role each member plays (Petersen et al, 1996:3).

- Financial analysis

Financial analysis includes analyses of bank statements, deposits and withdrawals, as well as any transfer of money to individuals suspected to be involved in any criminal activity with the motive of committing crime to benefit financially. Therefore, financial analysis helps investigators to identify criminal organisations or groups and has become an integral part of many investigations as such information is used in court as evidence to prosecute criminals (Horne, 2009:72). Investigators use financial analysis where the motive for the commission of the crime is to gain a monetary profit. This involves crime such a human trafficking, drug trafficking, dealing with human organs and bank robbery. Before financial records of individuals and organisations can be used as part of criminal investigation, it is important that the police apply to the relevant court. By doing so they will get authority in terms of Section 205 of the Criminal Procedure Act 51 of 1977 to get permission for access to such financial record of the suspected person and from the applicable bank (Petersen et al., 1996:9).

- Time series analysis

Newburn (2003:346), indicates that time series analysis is used to analyse the pattern and frequency of criminal activity for a specific period of time for the purpose of identifying offending patterns and the escalation of such offending. Petersen et al. (1996:13) outline that this type of analysis focuses on the occurrence of crime for a specific period of time as it shows a series of criminal actions and their specific criminal activities. The police can pinpoint the number of phone calls on the occurrence of crime at a specific place over a period of time. According to Paulsen et al. (2010:88), time series analysis involves a set of methods and is used by police for analysing and

forecasting measures, particularly on points of data measurement in time. The purpose of it is to analyse and forecast numeric values rather than predicting them.

- Linkage analysis

Linkage analysis is used to identify relationships between offender, specific crime incidents and geographical area to look at similarities to compare the pattern of specific crimes. In order to see that crimes are related, it is important that enough similarities exist that support the theory that links person or persons who have perpetrated the crime (Mashiloane, 2014:72). The purpose of linkage analysis is to correlate a suspect of one crime to another and to narrow down the search to identify the location where known criminals or other suspects may possibly reside within a limited distance from incident locations (Horne, 2011:123).

After conducting crime analysis, crime analysts will use these techniques to present a clear picture about crime and possible suspects for committing a crime. Crime information analysis techniques can be applied to investigate any type of crime, for example, drug trafficking, human trafficking, terrorist attacks, weapon smuggling and robbery.

3.7. Crime analysis process

The crime analysis process involves steps which crime analysts must follow to produce and improve analytical data products. These steps include collection, collation, analysis, dissemination and feedback from user information (Santos, 2013:53-59). The first step of the crime analysis process is gathering information, the second step is sorting out that information, the third step is analysing collected information, the fourth step is to report findings and to present information to other crime analysts while the last step involves evaluation of the validity and reliability of data (Stering, 2008:51). The steps of crime analysis process will be discussed in detail in the next paragraphs.

- Data collection

The first step of crime analysis process is data collection. This means that crime analysts must pull together crime information collected by the police during their daily operations. Crime analysts must take note that crime information that is not properly organised, vague or inaccurate because the police do not know how and what information to store makes it difficult to assess the relevance of those data (Newburn, 2003:342). Data collection is connected closely with data storage where crime analysts enter crime reports such as incident reports and arrest reports into a computer system. It is important that data collected be in electronic format so that crime analysts are able to decode information to see whether information that has been collected is reliable and valid so that analysis of crime information can take place (Santos, 2013:55-56).

- Data collation

The second step of the crime analysis process is data collation. This means that crime analysts must sort crime information into categories and subcategories. For instance, if crime analysts deal with different reports such as crime reports, media reports and other law enforcement reports, they must ensure that such reports are categorised and sorted. In this step, crime analysts separate different types of crime reported in different periods of time and categorise them by making a folder of residential burglary reports, a folder of robbery reports and a folder of auto thefts. The purpose of data collation is to clean data by looking for mistakes and correcting them with the tools used for analysis (Osborne & Wernicke, 2003:31-32). Data collation is important to ensure validity and reliability of crime information reports submitted by police. Therefore, crime analysts must read carefully, and sort police crime reports correctly into categories. Once the sorting of crime reports has been completed, the next step will be analysing reports (Stering, 2008:510).

- Analysis

The third step in the crime analysis process is to analyse sorted data. Analysis forms the heart of the crime analysis process in which crime analysts ensure that they analyse collected data and turn it into useful and accurate information for the purpose of dissemination. It is the responsibility of the crime analyst to interpret crime patterns, series and trends to be used by patrol officers, detectives and command staff so that they can turn that information into crime prevention strategies to reduce crime (Osborne & Wernicke, 2003:33). The objective of analysis is to provide police with information that is useful and appropriate, and which also aids in successful crime investigation, as well as the increased apprehensions of criminals (Horne, 2009:71).

- Dissemination

Once the data analysis is completed, crime analysts must share their findings with other crime analysts and police officials for the purpose of deriving at solutions to prevent crime. Crime analysts use the following methods to analyse data: paper documents, electronic reports, maps, presentations, e-mails, internet, documents and phone calls. Crime analysts must take note that it is not necessary to include all information they have collected, but report relevant information related to specific topics or issues. Crime analysts are support staff that help police departments to contribute towards crime prevention, as well as the creation of sharing knowledge about crime, disorder issues and general police operation activities by disseminating their results to role players such as other analysts, researchers, other law enforcement officers and police officials (Santos, 2013:58-59).

Dissemination constitutes the way in which crime analysts release their crime information to police by following conditions and protocols, basically focusing on the security classification of the information and security clearance to avoid breaching of security. Crime analyst dissemination of information takes place by attending workshops, the presentation of reports, providing written reports, conducting face to face sessions with police officials and also using media to share information (Govender, 2011:124). One way in which dissemination of information is done is by

means of crime bulletins, such as tactical, strategic and administrations bulletins reports (Osborne & Wernicke, 2003:36).

- Feedback

The final step of the crime analysis process is when crime analysts need to receive feedback from other crime analysts, police officers and other law enforcement officers from whom they get crime information. Feedback from other role players helps crime analysts to improve data analysis and quality of a particular analysis so that decision makers will be able to design strategies to evaluate the usefulness of the analysis to manage or control crime (Santos, 2013:59). It is important that crime analysts know which crime information products are working and which are not, so that analysts can know how users plan to use their final products and how important it is for them to implement these end products to combat crime (Govender, 2011:125). In the policing environment it is important that the operational activities of the police are continuously evaluated to capture the context of intervention and mechanisms that make them successful or not. This shows that the purpose of analysis is to evaluate the operational activity of police so that crime in specific locations can be monitored to render police practice more effective (Newburn, 2003:345).

The crime analysis process is not linear and crime analysts must ensure that the steps of the crime analysis process follow one another from the beginning to the end to achieve crime analysis process objectives. The crime analysis process provides evidence and information so that police can investigate criminal cases, identify and trace suspects successfully to bring them to justice.

3.8. Summary

Crime analysis is the engine of policing agencies, and is used to guide them in resource allocation, predicting crime series, as well as the monitoring and evaluation of crime information products. It is the responsibility of the SAPS to be ready to respond to the results of analysis, and if used effectively by the police, it can help them in reducing crime, victimisation, loss and suffering and can lead to the successful investigation of crime. Crime analysis is a component within the SAPS created at each

police station level in South Africa to ensure that the crime threat is successfully addressed and investigated thoroughly.

CHAPTER 4

Crime prevention approaches and crime analysis

4.1. Introduction

Crime is a serious problem that affects innocent people negatively regarding their quality of life and it also impacts negatively on economic growth and development of the country. The former President Thabo Mbeki stated in his inaugural speech in 1999 that one way in which the police can win the war of crime is through effective crime prevention to ensure safety and security in South Africa.

One of the most serious challenges of the SAPS is to control, manage and prevent crime. However, it is the responsibility of the police to ensure that they protect the citizens of South Africa through crime prevention, detection and punishment of criminals. Crime prevention is the approach used by the police to respond to reported crime so that intervention can take place to stop the continuation of the occurrence of crime and to reduce the opportunity of criminals to offend. In this chapter the researcher focuses on different crime prevention approaches such as crime prevention through environmental design, situational crime prevention and intelligence led policing.

4.2. The concept of crime prevention

Fear of crime will always affect people as long as crime is not resolved, and human reactions are based upon the direct experience of crime. The high levels of crime in communities create fear of crime (Schneider & Kitchen, 2007:4). The problem of high crime levels and the economic and physical impact of crime in society needs to be examined to understand the fear of crime in the communities. Crime is a disease that promotes fear of crime and presents a perception of criminal victimization that is not necessarily real and forms the basis for daily inactivity and anxiety in society (Lab, 2014:15). The reduction of fear of crime is the most important component of crime prevention strategies that can be used by police and security personnel to understand the extent of that fear and issues related to measuring fear. Crime prevention is a daily operation of police and is designed to reduce and address consequences of crime as

well as the perceived fear of crime (Lab, 2014:10-27). Crime prevention is the practice of crime risk management and the purpose of it is to reduce crime in a cost-effective way to promote the security and socioeconomic wellbeing of potential victims. This can be done by means of arresting, court prosecuting and imprisonment of offenders, and the aim is controlling offenders' behaviour. The most effective way to manage and control crime risk is to remove crime entirely by blocking opportunities for the occurrence of crime, police patrols in urban neighbourhoods and installing CCTV systems to monitor movement. All these can assist law enforcement to prevent, deter, delay or detect possible criminal attacks on potential victims (National Crime Prevention Institute, 1986:2).

Crime analysis plays an important role by providing information to police about criminal activities so that police develop strategies to be visible by patrolling possible crime locations. In that way crime information provided by crime analysis assists the police to intervene and respond to crime problems as a way of reducing and preventing crime (Newburn, 2003:341). Crime analysis is at the core of effective policing to help them to study crime and disorder problems, direct them where the criminals plan to commit crime and for the apprehension of criminals (Hill & Paynich, 2014:8-9).

4.3. Crime Prevention Through Environmental Design

Crime Prevention Through Environmental Design (CPTED) is criminological theory and the focus is based on designing security measures surrounding built environments with the aim of reducing crime opportunities and the fear of crime at particular spaces. Another benefit of CPTED is to ensure that crime is lowered significantly and communities, and their properties and the value thereof are protected against crime (Fennelly, 2012:02). According to Atlas (2008:53), CPTED is an environmental criminology theory based on drawing appropriate designs and application of buildings and surrounding areas for the purpose of improving the quality of life of every citizen by ensuring that crime, as well as the fear of crime is reduced. It is important that crime prevention practitioners, police, architects, town planners and security personnel have knowledge about CPTED theory, concepts and application to devise strategies that can be used for designing new buildings or renovating existing buildings to ensure that crime opportunity is limited in the environment. The purpose of CPTED is to reduce

the causes of crime through police intervention to minimise the opportunity for criminal events and address the fear of crime by ensuring that proper planning, design and management principles are implemented to the built environment so that criminal activities can be controlled and managed effectively (Kruger, 2005:n.p). According to Van Biljon (2014:79), CPTED is concerned with sound planning and designing built environment to reduce the opportunity for crime. Therefore, if the appropriate application of sound planning and design is applied correctly, it will help architectural and planning initiatives to reduce the opportunity of crime. The CPTED approach also helps to unite architects, security experts, law enforcement agencies and others to plan physical features of building and surrounding areas effectively to increase the safety of citizens and deter crime.

Tilley (2005:795), indicates that CPTED is a crime prevention approach designed to reduce crime opportunities in the physical environment. The police use CPTED as a risk management approach and it helps them to reduce crime, fear of crime as well as criminal opportunities so that occupants can foster positive social interaction among themselves. Crowe (2000:34-35), submits that CPTED is a programme that is used in the physical environment to manipulate behavioural effects of criminals to reduce the incidences, fear of crime and also improve the quality of life of citizens. These behavioural effects can be accomplished by preventing criminals from the opportunity to commit a crime in a physical environment. Schneider (2010:57), indicates that CPTED is a crime prevention approach that is used to reduce crime opportunities in the physical environment.

The role of crime analysts in the CPTED is to map crime to understand the offenders' criminal behaviour and the distribution of crime in the physical environment. The focus is on the relation of the physical environment and crime to understand what influences offenders to commit crime. Crime analysts look at crime patterns, crime attractors and crime generators that motivate offenders to commit a crime and develop strategies that will make it difficult for offenders to commit crime (Pretorius, 2015:n.p).

4.3.1. The principles of the CPTED model

CPTED relies on four principles, namely territorial reinforcement, surveillance, access control and activity support and image management. These approaches work together to influence human interactions subtly in ways that will discourage and reduce anti-social behaviour (Sutton, Cherney & White, 2008:62). The following section will discuss four principles:

4.3.1.1. Territorial reinforcement

Territorial reinforcement creates a defensible space where users of particular spaces can confirm a sense of proprietorship or ownership at approved particular spaces to discourage illegitimate users. This means that territorial reinforcement requires the creation and maintenance of a particular space to show clear hierarchies with well-recognised boundaries that will differentiate between public and private areas. Through these physical and symbolic barriers, boundaries of occupants are divided into categories such as public, semi-public, semi-private and private. Therefore, these barriers include fences and walls that show public and private areas as well as signboards, vegetation or changes in surfaces that create zones of transition that direct people to move from public to private spaces. Zones of transition help residents and other authorised people to keep an eye on areas to ensure that those areas become legitimate for them to challenge those individuals who seem to be intruding (Sutton et al., 2008:63).

Territorial reinforcement gives property owners and building occupants a sense of ownership to increase vigilance in their spaces to identify trespassers and send them clear messages that offenders will be identified and challenged. Lastly, territorial reinforcement gives users of space a sense of proprietorship to alert potential offenders that they are not welcome, and they are at risk if found in these buildings or properties and their offending behaviour will not be tolerated or go unreported (Atlas, 2008:63).

4.3.1.2. Surveillance

Surveillance is electronic technology that increases visibility and monitoring within, as well as around the facility and it helps to legitimise occupants and casual observers to increase observation, detection and report trespassers or possible misconduct. The purpose of surveillance is to keep intruders under observation so that undesirable behaviour can be under control (Atlas, 2008:63). The key principle of surveillance is to ensure that risks associated with offending behaviour are increased. The aims of surveillance are to help security personnel and police to increase intervention, apprehension and prosecution of offenders. Informal systems mean natural surveillance, as well as external areas such as streets, parks, car parks, bus shelters and train stations. Natural surveillance involves individuals who observe shops, houses, companies and government department facilities to increase the outdoor use of space to attract people who can act as watchers or gatekeepers. Formal or organised systems of surveillance increase guardianship of people such as bar staff, security personnel, attendance or store persons and the assigned responsibility for surveillance to a third party (Sutton et al., 2008:63).

4.3.1.3. Access control

The aim of access control is to deny and restrict potential criminals to gain access to the facility (Sutton et al., 2008:63). Access control involves barriers that decrease crime opportunities and create a perception of risk for offenders to offend. Therefore, the purpose of access control is to keep intruders away from facilities because of an increased perception of risk (Crowe, 2000:36). Access control is a design concept directed at reducing crime opportunities because criminals target easy routes to escape from facilities and limiting access to an area is an effective way to manage crime and to deter criminal activities (Atlas, 2008:60-61). To deny people to gain access control to a facility reduces the opportunity for crime, but to decrease the effort needed to enter and exit a building gives an opportunity for criminals to commit a crime. The best way to make it difficult to commit a crime is through installation of locks, bars on windows, unbreakable glass, intruder alarms and fence (Lab, 2014:38).

Access control involves barriers used to defend spaces as well as to be on the alert by checking the movement of offenders in public space such as offices, factories and apartments or in any buildings for the purpose of risk reduction (Bajpai, 2003:n.p). Clarke (1997:n.p) argues that access control is a security measure intended for defensible space and it is used to exclude potential offenders to gain access to any facilities or buildings. These measures include fencing around facilities or buildings, electronic personal identification numbers (PIN) to gain access to facilities or electronic access to the parking garage and reception desk on the ground floor of the facilities or buildings. These are regarded as crime reduction measures for robbery, theft, burglary and vandalism or other atrocities.

4.3.1.4. Activity support and image management

Activity support and image management improve natural surveillance through placing facilities and amenities in safe locations. The aim of development of mixed land into facilities such as residential, recreational, entertainment and restaurant precincts, is to ensure that activities happen throughout the day and night so that areas are not abandoned at some stage. Activity support and image management can improve the image of an area by attracting legitimate users through preventing negative elements and removing signs of crime which will send positive messages that a specific area is under control. The development of such areas can be carried out by a designated third party who has experience as a property developer or manager (Sutton et al., 2008:64).

The purpose of activity support and image management is to ensure that such spaces are well looked after and crime free. The maintenance and management of facilities is to ensure that the owners care for and will defend the property against criminal activity. Therefore, if facilities are not maintained, it may show that the owner is not concerned about the property and neglect will encourage criminal activities to take place. A dilapidated and abandoned area where there is littering and graffiti is rampant often attracts the occurrence of crime (Atlas, 2008:66). The most important role played by crime analysis on CPTED is to examine the physical environment and offender behaviour to understand the relationship between crime committed and physical space so that crime analysts develop solutions how the physical environment should be designed to maximize crime prevention (Hill & Paynich, 2014:37). The purpose of

crime analysis on CPTED is to analyse the physical space to understand its impact on the occurrence of crime (Pretorius, 2015:39).

4.4. Crime displacement

Crime displacement is a crime prevention strategy that is used to prevent change in crime through preventing actions of the individual or society. Displacement means that if you shift crime from one place to another, it may be prevented in one situation to another by simply altering the results of crime. The aim of crime displacement is to prevent crime by moving the crime around instead of eliminating the amount of crime (Lab, 2014:87). The displacement of crime serves as a crime prevention tool because it disrupts offenders from committing crime as well as disrupting the location of the criminal business enterprise. Crime displacement weakens crime by disrupting the availability of crime activity by moving crime from one place to another; for instance from one neighbourhood to another or from one city to another. The following are different forms of displacement:

- Place displacement means that the problem moved from one place to next.
- Time displacement means that the problem moved from one time to the next.
- Target displacement means that the offender changes the target by keeping the same time and place, for example, offenders robbing drug dealers versus robbing seniors out for a walk.
- Method displacement means that the offender changes the manner of committing crime by displacing common robberies to armed robberies.
- Offence displacement means that the offence changes from one type to the next (Atlas, 2008: 69- 70).

The police can achieve crime displacement through responses to crime reported, patrolling and investigating reported crimes. Crime displacement is a crime strategy used by police to intervene in crime problems so that criminals would not have the opportunity to do criminal activities. It is important that the police identify crime hotspots so that police officials can be deployed in such places to ensure that further

criminality is prevented through intervention and in that way crime displacement is achieved.

Crime analysis plays an important role by examining crime data reported to the police by identifying locations that have high volumes of crime by informing police about crime risk locations so that they can be visible and patrol to make it difficult for offenders to offend (Hill & Paynich, 2014:51).

4.5. Situational crime prevention techniques

Situational crime prevention involves measures used by law enforcement agencies to reduce crime systematically, directly and permanently as far as possible, so that it becomes more difficult and riskier to commit a crime (Clarke, 1997:n.p). Situational crime prevention revolves around the idea that it is possible to make changes in the environment to make offending behaviour less attractive for potential offenders and these show that offenders do not just act on impulse, but they take a conscious decision whether to commit a crime or not. There is a clear belief that offenders make choices to commit crimes in place where risk is lower to be apprehended (Lab, 2014:216). Situational crime prevention is the study of criminal behaviour in an environment and it tries to understand how people perceive opportunities of crime so that it can remove those opportunities of crime that existing in the environment (Sutton et al., 2008:51). Situational crime prevention techniques measures are used to manage crime through control, planning and manipulation of the immediate message to warn offenders that the attempt required to execute crime is risky (Bajpai, 2003:n.p). The following are examples of situational crime prevention techniques:

4.5.1. Situational crime prevention measures used to increase perceived effort

This type of crime prevention measures prevents the offender from the opportunity to commit criminal activities. Therefore, if police management can direct their operations to places identified as crime hotspots and by placing their members at such places and being visible all the time it will make it difficult for an offender to commit crime (Clarke, 2007:n.p).

- Target hardening

Target hardening is used to secure targets by making them more resistant to attacks and more difficult to remove or damage with the help of technology, design and tactics. The target can be protected through the use of locks, screens and shields (Bajpai, 2003:n.p). This view is supported by Clarke (1997:n.p), who indicates that target hardening is an obvious way in which physical barriers such as locks, safes, screens or reinforced materials can be used to reduce criminal opportunities through obstruction. According to Schneider and Kitchen (2007:34), the aim of target hardening is to ensure that offenders are deflected from the target so that crime opportunities can be reduce as far as possible.

- Deflecting offenders

Bajpai (2003:n.p), explains that deflecting offenders constitutes situational crime prevention measures and used as logical segregation or exclusion of likely offenders. According to Van Biljon (2014:69), deflecting offenders is used to influence offending activities of offenders to the extent that it keeps them away from intended target to prevent more victimisation. Clarke (1997:n.p), indicates that routine activity theory suggests that to deflect offenders away from the target is an effective way in which the situational crime prevention model can successfully tackle crime.

- Controlling facilitators

Another way in which crime can be controlled and managed is by controlling facilitators of crime so that they will be restricted to gain access with the tools and devices at their disposal to commit a crime (Atlas, 2008:74). The best way to control facilitators of crime is if any individual wishes to gain access in any premises to hand in his/her weapons on entry before access can be granted to prevent risks of using weapons inside premises (Clarke, 1997:n.p). Crime analysts must use maps when they analyse crime to check whether there is a threat of crime to ensure that crime prevention measures are in place to reduce any opportunities for crime (Hill & Paynich, 2014:50).

4.5.2. Situational crime prevention measures used to increase perceived risks

This type of crime prevention measures prohibits offenders from committing crime because of putting themselves at risk of being caught. Before offenders can commit a crime, they try to determine whether there is a possibility of being caught and if there is a risk of being caught, offenders choose not to commit crime (Van Biljon, 2014:69).

- Entry and exit screening

The use of electronic methods of screening at the entry and exit of buildings is another form of crime prevention (Bajpai, 2003:n.p). The purpose of entry and exit screening is to ensure that the entries and exits are monitored through electronic methods such as card access control and an attendance system, a sensor alarm system and a fingerprint attendance access control system (Atlas, 2008:74). Clarke (1997:n.p), points out that entry screening differs from access control because the purpose of it is less to exclude potential offenders than to increase the likelihood of detecting those people who are not in conformity with entry requirements. The primary function of exit screens is to detect theft by ensuring that objects removed from the protected area are detected.

- Formal surveillance

According to Clarke (1997:n.p), formal surveillance is used to deter potential offenders and formal surveillance is provided by police, security personnel and store detectives by installing closed circuit television (CCTV) and cameras for monitoring the movement of people inside and outside the buildings for the purpose of crime reduction.

- Employee surveillance

The purpose of employee surveillance is to ensure that buildings or premises are guarded to respond speedily in any incidence arising to prevent vandalism. An example of employee surveillance is the appointment of security guards to monitor

parking areas during high risk time (Bajpai, 2003:n.p). Some employees who deal with the public on a daily basis perform a surveillance role by virtue of their position. These include shop assistants, hotel security guards, park keepers, attendants of parking lots and train conductors. The responsibility of those employees is to conduct monitoring of their work environment (Clarke, 1997:n.p).

- Natural surveillance

Natural surveillance includes neighbours, staff, students or parents, sports clubs or any other person who has a legitimate reason to be on the particular place and be in position to observe and see around. Other natural surveillance elements include trees and shrubs that are trimmed down to provide a corridor for visibility to ensure that shrubs and trees do not shield the building from nearby premises and roads; ensuring that lighting enhances surveillance by illuminating all buildings clearly (Bajpai, 2003:n.p). Natural surveillance is improved through street lighting in defensible space as well as people going out to do daily business activities to oversee public spaces (Clarke, 1997:n.p).

The role of crime analysts is to identify an array of related ideas about crime information that involves the extension of territorial control and the influence of boundaries by marking with real and symbolic barriers as well as with installation of surveillance equipment that will connect building and site design for the purpose of crime opportunity reduction (Schneider & Kitchen, 2007:17). The important role played by crime analysts is to obtain crime information for analytical purposes to support police in decision-making through the presentation crime information to them to improve investigations, crime prevention and intelligence gathering (Paulsen et al., 2010:3-4).

4.5.3. Situational crime prevention measure used to reduce anticipated rewards

If these crime prevention measures are put in place and offenders cannot commit a crime, offenders will cease engaging in criminal activities. The moment offenders are denied the opportunity to do crime, they will move where there are rewards that benefit them to commit crime (Clarke, 1997:n.p).

- Target removal

Target removal involves measures used to reduce victimisation by shifting or removing targets from risk situations so that offenders are unable to commit crime. Examples of these measures include the use of phone cards and steel covers in public phones to reduce theft, as well as theft incidences by removing gas and electronic coin meters that attract offenders to commit crime (Bajpai, 2003:n.p). Target removal is directed at eliminating the incentive for crime. The removal of target strategies includes a non-cash policy that removes the threat of robbery by using direct deposits cheques and cashless transactions (Atlas, 2008:74).

- Identify properties

The marking of possessions is a very effective crime prevention strategy used to help during detection and helps to identify goods during thefts and burglary. The idea of marking goods give direction to their location when the same are recovered as stolen goods (Bajpai, 2003:n.p). Clarke (1997:n.p), indicates that writing names in a book is the same as a simple form of property marking. The practice of marking property relating to vehicles requires the registration of motor vehicles before vehicles can be sold in South Africa and also it requires to carry a unique vehicle identification number (VIN). Therefore, the marking of major parts of high-risk automobiles have to be marked with the VIN to reduce vehicle theft as these markings make it more difficult for criminals to steal vehicles.

- Reducing temptation

Reducing temptation involves removing the activities exposed to the public domain that invite criminals to commit a crime. The fewer opportunities exist for temptation for offenders, the less likely they will commit a crime (Van Biljon, 2014:73). For example, temptation can be reduced by ensuring that no car is parked in the inner city area without any form of protection (Clarke, 1997:n.p).

- Denying benefits

These measures are directed at ensuring that offenders are denied the benefits resulting from crimes (Clarke, 1997:n.p). Denying benefits helps to prevent crime through crackdown on the markets and transactions of stolen goods. The technique used is the market reduction approach and it discourages criminals to sell stolen goods at potential markets (Bajpai, 2003:n.p).

The role of crime analysts is to identify offenders of crime through analysing hotspots to ensure that their interest of committing crime can be obstructed through intervention and preventing crime to occur (Atlas, 2008:57).

4.5.4. Situational crime prevention used to induce guilt or shame

This type of crime prevention measures puts offenders in the position that will induce the peril of feeling guilty or shame if caught committing crime. If criminal activities are revealed by the police, offenders will fear embarrassment and humiliation of moral wrong when discovered, as well as when disapproval is expressed by others (Van Biljon, 2014:74).

- Rule setting

Clarke (1997:n.p), indicates that rule setting involves the rules and procedures used by every employee as acceptable behaviour in the working environment. For example, most businesses require their employees to use the telephone for work purposes only and all retail stores establish strict cash handling and stock control procedures to be followed by employees all the time. The purpose of rule setting is to ensure that any ambiguity is removed concerning the acceptability of conduct. Similarly, Van Biljon (2014:74-75), explains that rule setting involves new rules, procedures and clarification that are already in place to ensure that acceptable behaviour is followed to remove any ambiguity concerning prescribed conduct or actions.

- Stimulating conscience

Stimulating conscience is concentrating on attitudes of law breakers to ensure that measures are in place at times when offenders are contemplating whether or not it is necessary to commit a specific kind of offence (Clarke, 1997:n.p). Stimulating conscience does not concentrate on lasting changes in general attitudes of a law breaker, but its main purpose is to stimulate feelings of shame at the time when offenders contemplate the commission of a specific type of offence (Van Biljon, 2014:75). Controlling disinhibitory crime is not only facilitated by tools such as weapons used, but also by psychological disinhibitors such as alcohol and drugs, which undermine the usual social or moral inhibitions, or impair perception and cognition so that offenders are not easily aware that they are breaking the law (Clarke, 1997:n.p). The strategy is required to be in place so that activities are directed at minimising circumstances that weaken individuals' ability to think critically to self-assess their behaviour (Van Biljon, 2014:76).

- Facilitating compliance

This measure deals with members of the public to comply with the law of the country and encourages them to do the right thing and refrain from doing illegal activities (Van Biljon, 2014:76). Facilitating compliance is a measure used to make it difficult for offenders to commit the crime and encourages people to be law abiding citizens (Clarke, 1997:n.p).

Situational crime prevention techniques have been applied globally as crime prevention and reduction initiative model that were undertaken by law enforcement agencies. They help police or other law enforcement agencies in a target- oriented approach for crime prevention that utilises managerial techniques, design and manipulation of environmental factors to reduce the threat of criminal risks.

The role of crime analysis is to identify conditions that influence offenders to choose to commit crime and to understand how offenders and victims are in the same place during the commission of crime. Therefore, crime analysts design intervention

approaches that will manipulate crime settings to reduce the opportunity for offenders to commit crime (Santos, 2013:29).

4.6. Intelligence-led policing (ILP)

Intelligence-led policing is the approach used by police to guide them in managerial philosophy so that police activities such as data analysis and crime intelligence become pivotal to an objective and decision-making framework that facilitates crime prevention planning (Wortley & Mazerolle, 2008:268). Intelligence-led policing includes the use of all policing activities from neighbourhood policing and partnership work to achieve the investigation of serious crime such as organised crime and terrorism. It also helps police to enhance proactive policing efforts to produce positive outcomes of police actions towards reducing crime and protecting the community against any threats (Buckley, 2014:32-33). Intelligence-led policing is used to identify criminal capability, assessing criminal intention and managing intervention for the purpose of apprehending criminals. The outcome of intelligence-led policing is presented as serving and supporting evidence gathering so that police can achieve successful prosecution of offenders (Harfield & Harfield, 2008: 6). Intelligence-led policing is a police model for problem-solving, information sharing and police accountability to enhance intelligence operations (Ronczkowski, 2012:115).

The role of crime analysts to use ILP is to improve crime reduction, disruption and prevention through using strategic management and effective enforcement strategies that target prolific and serious offenders (Wortley & Mazerolle, 2008:268).

4.6.1. The origin of ILP in policing

During 1990s, Her Majesty's Inspectorate of Constabulary developed crime prevention strategies called the British National Intelligence Model (NIM) which was later released in 2000 and formally adopted by the British Association of Chief Police Officers (ACPO) in 2002 as accepted policy; and which is used as national police policymaking body (Mashiloane, 2014:177). The Kent Policing Model developed from NIM and later Kent Policing Model developed into Intelligence-led Policing. The ILP was developed by David Phillips and Brian Flood in 1993 from the Kent Policing Model in the United Kingdom (UK). The purpose of the Kent Policing Model is to help policing agencies in

the collection and analysis information on criminal and their associates' information to inform target enforcement, which will prevent criminal behaviour through disruption (Osborn, 2012:n.p).

David Phillip states that the Kent Policing Model promotes proactive policing and it can be used in high-volume property crime and organised crime (Wortley & Mazerolle, 2008:266). Due to the high volume of crime in the UK, David Phillips further states that the Kent Policing Model is the most extensive and influential proactive intelligence led policing initiative demonstrated across the UK. This view is supported by her Majesty's Inspectorate of Constabularies by describing the Kent Policing Model as an intelligence -led proactive problem approach that is used in policing to help in crime reduction, as well as a crime combating technique as its primary objective (Osborn, 2012:n.p). The purpose of developing the ILP Model is to help police to understand the role played by criminals during the commission of crime through the collection and analysis of information related to the crime. The employment of the ILP model can assist the police in developing tactical responses to threats and strategic planning related to emerging or changing threats (Mashiloane, 2014:172, referred in Carter, 2008:2). ILP is a crime prevention approach which is used for developing and maintaining a detailed and up- to- date picture about crime patterns as well as criminality, so that the police can respond to crime through intervention in the most effective way by disrupting networks and removing prolific offenders (Newburn, 2003:321- 322). Police use ILP as crime prevention tool for the effective and efficient collection, recording, dissemination and retention of crime information (Buckley, 2014:32).

Crime analysts use ILP for the purpose of identification of material which can be used to assess intelligence value and enables police decision-making to prioritise tactical and strategic levels for the purpose of preventing and detecting crime at early stage (Buckley, 2014:32).

4.6.2. The implementation ILP in policing

ILP is a police business model for systematically collecting, organising, analysing and utilising intelligence products to guide police agencies how to take operational and

tactical decision regarding crime prevention planning. It is important that police agencies use ILP aids to identify, examine and formulate preventative, protective and responsive operation measures for specific targets, threats and problems. ILP is a proactive application of crime analysis, coming from established processes of intelligence analytic functions within policing and is used as the best practice from existing policing models. This approach guides policing agencies how to collect, examine, vet and compare large quantities of information that enable them to understand crime patterns, identify individuals, their enterprises and crime locations that present the highest threat to the community and the focus is on criminals and terrorist-related activity. Therefore, using this method properly, policing agencies can prioritise the deployment of resources effectively and efficiently to achieve crime prevention outcomes (Ronczkowski, 2012:115). The advantage of ILP is that it seeks to establish links and crime patterns between suspect and crime scene locations for the crime committed in different locations with the purpose of identifying crime series. It also helps policing agencies to do long-term planning to devise strategies that can be used to combat crime by applying a range of preventative measures such as direct police patrols, neighbourhood watch schemes, using cameras and closed-circuit television systems (Zinn, 2010:121). The main advantage of incorporating technology in policing is not taking a critical line on what business is doing, but it focuses on the effectiveness and efficiency to tackle and reduce crime the communities. It involves identifying and limiting the activities that promote the increase of high numbers of criminals and dangerous offenders as well as controlling disorder and tackling problems that adversely affect community safety and quality of life. In order to achieve the aim of ILP, the police have to improve community safety, reduce crime rates and to control criminality and disorder (Newburn, 2003:321).

The role of crime analysts in using ILP is to ensure that policing is managed successfully, and intervention takes place to reduce crime problems. Therefore, crime analysts will ensure that incidences of organised crime are linked together for the purpose of gathering, collecting, analysing and interpretation of criminal activities for target responses (Newburn, 2003:321).

4.6.3. The implementation of National Intelligence Model (NIM) in policing

The NIM was first introduced in England and Wales by the British Home Office. The purpose of introducing the NIM was to ensure that police commanders understand an ideal intelligence model for the entire business of policing to enable them to anticipate risks and threats that affect communities across the public domain. Home Office Secretary David Blunkett ensured that the NIM was included in the first policing plan in 2003 to 2006 (Mashiloane, 2014:178). NIM, a product of National Criminal Intelligence Service (NCIS), was developed on behalf of the Crime Committee of the Association of Chief Police Officers and subsequently became the major vehicle for conducting ILP. It was rolled out to 43 police service stations in England and Wales; and was supported by the Home Office and Her Majesty's Inspectorate of Constabulary (Newburn, 2003:321).

NIM became the policing business model in England and Wales around April 2004 and was also adopted in the UK by the Serious Organised Crime Agency (SOCA), the Immigration Service, Crime and Disorder Reduction Partnership, Probation Service and Health Authorities. NIM is designed to work on three levels within policing, namely local levels, cross- border, national and international levels. At local level, neighbourhood policing focuses on addressing its own crime and disorder problems. They collect information and use local resources to address crime problems across geographical areas. At cross border level it deals with offenders who operate in different jurisdictional areas. At national and international levels, it deals with serious and organised crime activity to identify offenders operating at this level by using proactive methods. Targeting and response is directed to dedicated units (Wortley & Mazerolle, 2008:274-275).

The role of crime analysts is to ensure that the police have the ability to improve the collection, analysis, management of police and deployment of resources so that police can reduce, control and investigate crime more successfully (Osborn, 2012:n.p).

4.7. The three- I model of ILP

The three- I model of ILP focuses on the following components, namely interpret, influence and impact (Wortley & Mazerolle, 2008:272). These three-I model components will be discussed in the following paragraphs.

- Interpret

Crime intelligence analysts must interpret the criminal environment so that they can determine who the main players are, as well as their significant and merging threats. This approach requires crime intelligence analysts to seek information from intelligence contributors by interviewing police officials, investigating officers and informants (Wortley & Mazerolle, 2008:272-273). It is the responsibility of intelligence units within policing agencies to interpret the criminal environment. These units need to seek information from both internal and external sources regarding criminal activities. The interpretation of a criminal environment is done through analysing collected crime data and information about the criminal activities taking place to the identified place or area during police operational activities. The intelligence end product generated from crime information has to be disseminated to different operational units to impact positively on the criminal environment (Mashiloane, 2014:183).

- Influence

It is the responsibility of the intelligence crime analyst to influence the thinking ability of decision makers (Wortley & Mazerolle, 2008:272). The intelligence crime analyst have an impact on the criminal environment by reducing crime by using intelligence end product results implemented by decision makers (Mallory, 2007:7). The intelligence units should have strategies in place to identify the decision makers to influence their thinking ability regarding the crime prevention model that should be implemented (Mashiloane, 2014:184).

- Impact

The decision makers must have the necessary experience and knowledge to reduce crime by positively influencing the impact on the criminal environment. In this approach the decision makers must devise methods to be used to implement crime prevention strategies successfully (Wortley & Mazerolle, 2008:273-274). This view is supported by (Mashiloane, 2014:184, referred in Ratcliffe, 2003:3-12), by stating that decision makers need to be enthusiastic and have skills that enable them to explore different ways to reduce crime to have a strong positive impact on the criminal environment. A positive impact on the criminal environment is measured by reduce crime in the community and good police-community relations as well as invested trust and confidence of the community in the police so that they can provide them with information about criminal activities in their geographical area.

For the three- I model of ILP to prevent and reduce crime or offender disruption to occur, all components of the three-I model must follow one another systematically. Intelligence crime analysts must interpret the criminal environment and use intelligence product results to influence decision makers, while the decision makers must use direct resources effectively to have a positive impact on the criminal environment. The role of the crime analyst is to gather, collect, store and analyse information for the police to investigate crime, to control crime and for crime prevention measures (Paterson & Pollock, 2011:n.p). The role of crime analysis is to help police to identify and prioritise crime problems so that daily operations of police can be directed to places where crime is rampant to reduce and prevent crime (Newburn, 2003:344).

4.8. Summary

The problem of crime has become much more complex and challenging. Reported crime appeared to have stabilised but reports of certain crimes are still increasing and police are expected to design models that will address the needs of policing in the twenty first- century. In order to prevent crime effectively, police are required to utilise pro-active methods rather than re-active methods.

CHAPTER 5

Research methodology

5.1. Introduction

Research is a fundamental strategy that is used locally and internationally by police to understand crime problems facing any country. The SAPS has a research institute division dealing with research and its responsibility is to ensure that any individual or organisation who wishes to conduct research within SAPS has to apply, before permission can be granted, after which the research can commence. The researcher received permission from SAPS and the permission letter is in Appendix C. Research is the process in which scientific methods are used to expand particular knowledge in a field of study. Research methodology is a research process which the researcher follows to achieve the objectives of this study. The focus in this chapter is the research design, description of the population and the sampling technique, as well as the data collection, data analysis techniques, trustworthiness of study and ethical issues.

5.2. Research design and approach

The research design is the road map the researcher employs during the research journey to find answers for the research question. The research design is the researcher's investigation strategy, structure and plan to gather information to obtain answers to the research question and the research problem. The research design is a recipe to guide the researcher how to conduct the research study (Kumar, 2005:84). Within social science research there are two research approaches, namely the qualitative and the quantitative approach. Therefore, these approaches differ in terms of purpose, sampling and data collection. A quantitative approach depends on statistical analysis with the purpose of generalising the findings of the study (Bless, Smith & Sithole, 2013:16). The main aim of a quantitative approach is to open the possibility of statistical analysis, formulas and numerical data to measure the quality of data (Babbie, 2011:36). In contrast, a qualitative approach is the examination of

non-numerical data for the purpose of discovering underlying relationships of meanings and patterns (Dantzker & Hunter, 2000:75).

The researcher reviewed several research methodology sources to understand the meaning of the pragmatic philosophical worldview and concluded that this worldview is most suitable worldview for his study (Creswell, 2013:11). According to Creswell (2014:11), the pragmatic worldview enables the researcher to have freedom of choice and to choose the methods, procedures and techniques that suit his study. This approach allows the researcher to understand the research problems better. It further allows the researcher to use mixed methods, such as qualitative and quantitative approaches of study and different methods of data collection. The researcher adopted the pragmatic philosophical worldview to understand and explore the value of crime mapping in crime prevention from the most suitable perspective possible.

For the purpose of this study, the researcher adopted a qualitative research approach. According to Bless et al. (2013:16), a qualitative approach is used where the problem has not been fully investigated before. It further allows the researcher to investigate the problem from the participant's point of view and to determine how the participants feel about the particular phenomenon. Withrow (2014:298), argues that qualitative approach encapsulates a broad category of research methods that attempt to produce a deeper understanding of human behaviour in detail, including its meaning and its motivation. According to Creswell (2014:175), the qualitative researcher, has the primary purpose of collecting data from research participants to understand the research problem better. For the purpose of this study, the researcher utilized exploratory research, with the aim of assessing and understanding the value of crime mapping in crime prevention at the Polokwane and Mankweng police stations.

5.3. Population and sampling

The population in a research study is the specified aggregation of the elements from which all sample is actually drawn (Babbie, 2011:186). The population is the group of the elements the research will focus on (Bless et al., 2013:164). The population contains the total collection of all units about which the researcher wishes to draw specific conclusions (Welman, Kruger & Mitchell, 2005:52). Population is the set of

elements on which the investigation of the research study focuses (Bless & Smith, 1995:87). The population includes the study of object such as individuals, groups, organisations, human products and events or the conditions in which they are exposed (Bryman et al., 2014:170).

The population of this study comprises the SAPS members at Polokwane and Mankweng Police Stations. The researcher used manual pin mapping and GIS at Polokwane and Mankweng police stations in terms of crime prevention planning. The physical locations where the study took place were mentioned in Chapter 1, section 1.3. This study targeted two units at each police station, the Crime Information Office and the Crime Intelligence Units. There are four police officials working in these units at each police station, and in total eight officials participated. The researcher intended to select five participants from each police station but was unable to do so (see section 5.4.2). The inclusion criteria were five to ten years' service and experience; in- service training working with GIS and manual pin mapping, and at least a National Diploma in Policing Management or any other tertiary qualification related to Criminal Justice.

The participants were selected because they are employed as crime analysts and their responsibilities are analysing crime, crime mapping, geographical profiling and compiling crime statistics. According to Baker (1994:142), sampling refers to a unit analysis drawn from the wider population. Kumar (2005:148), explains sampling as a method of selecting a smaller sample from the larger group. According to Mason (2002:125), sampling involves the elements drawn from the wider population. Babbie and Mouton (2010:174), argue that sampling refers to a smaller list of elements from a study population. The researcher used purposive sampling to select research participants from the identified research population. According to Kumar (2005:244), purposive sampling depends on the researcher's application of the inclusion criteria as to who can be selected to provide data rich information to achieve the objectives of this study. Bless et al. (2013:172), argue that purposive sampling refers as the researcher's final decision to select sampling. Before the researcher visited both police stations, he obtained permission to conduct research from the Provincial Commissioner, the Provincial Head of Crime Registrar and the Provincial Head of Organizational Development, and final approval was granted by Divisional Commissioner of Research. The letter of permission to conduct research within both

police stations is attached as Appendix C. The researcher visited both police stations and requested the assistance from the commander of each component at both police stations to select the participants by using inclusion criteria based on working experience with crime mapping. The researcher selected six research participants and Station Commanders at both police stations who met the inclusion criteria. Therefore, a total of eight research participants was selected including crime analysts and Station Commanders at both police stations. The commander of each component was included as they know which police officials have most knowledge and experience of the use of manual pin mapping and GIS in Mankweng and Polokwane.

5.4. Methods of data collection

Data collection involves the methods used to collect data such as unstructured or semi-structured interviews, documents and visual material (Creswell, 2014:189). The researcher used semi-structured interviews to explore the value of crime mapping as methods of data collection. A pilot study is a process in which the researcher conducted interviews with non-research participants with the aim of ensuring that the interview schedule is clear and coherent. The aim of the pilot study is to help the researcher to prevent problems which may crop up during data collection (Grove, Burns & Gray, 2013:n.p). The researcher conducted a pilot study after consultation with the supervisor to test the interview schedule. The pilot study revealed minor shortcomings in the interview schedule and the supervisor assisted the researcher to amend it.

5.4.1. Semi-structured interviews

For the purpose of this study, the researcher conducted semi-structured one-on-one interviews with all the research participants. This type of interview is limited to two people, namely the researcher and research participant only (De Vos et al., 2011:296). Semi-structured interviews allow the researcher to use an interview schedule, which consists of a list of questions and topics to be covered during the interview (Bernard, 2013:182). For the purpose of this study, semi-structured interviews are useful as they enable the researcher to understand the context and content of the interview (May, 2011:135).

Semi-structured interviews enable the researcher to seek clarification and elaboration on answers given by participants so that responses can be recorded. It also allows the researcher to probe beyond the answers to obtain rich data from them (May, 2011:123). The researcher transcribed the collected data himself to be analysed by means of the Tesch data analysis method. The interview schedule for the research participants at Mankweng and Polokwane police stations is attached as Appendix A.

5.4.2. The challenges which complicated the data collection

In this study the researcher was confronted with challenges which complicated the data collection, because there are only eight police officials at both police stations who know about and understand crime mapping. Both police stations trained only two Crime Information Officers (CIO) and their responsibilities are to map crime on a daily basis. It was difficult to secure interviews with participants, and the researcher had to contact participants telephonically on a daily basis. The researcher would arrange for interviews with participants which were often cancelled or postponed at the last moment as a result of the pressure and workload they received on that specific day. Ultimately interviews were secured, but unfortunately only a few officials participated in the study.

The researcher decided to interview one participant in the crime intelligence office at both police stations and discovered that the crime intelligence officials know little about crime mapping and they found it difficult to express themselves. The crime office at both police stations are staffed by four police officials, two of which had received training in crime mapping and two are clerks who assist crime officers with administration duties, and therefore did not receive any training on crime mapping. The researcher decided to conduct additional interviews after consultation with the supervisor which were directed to the station commanders at both police stations. The purpose of the interviews was to determine the views of both station commanders regarding the value of crime mapping in terms of crime prevention planning. The researcher conducted interviews with research participants at both police stations, including crime analysts and station commanders; in total there were eight participants.

5.5. Method of data analysis

Data analysis is the process of preparing and organising data such as text data into transcripts and image data for analysis by reducing the data into themes. Subsequently coding and condensing the codes must be done and the data must be represented in figures, tables and discussion (Creswell, 2013:180). In this study, the researcher analysed data by organising, interpreting, presenting and giving order to a large amount of data collected (De Vos et al., 2011:333). According to Creswell (2014:186), the Tesch data analysis method engages the researcher in a systematic way to analyse textual data. In this study, the researcher adopted the eight steps of the Tesch method (Tesch, 1990:142-145). Tesch's eight steps to analyse data are as follows:

- Step 1: the researcher read through the transcriptions carefully to get an overall sense of ideas and to make notes as ideas cropped up.
- Step 2: the researcher picked one document on the top of the list and read it carefully to understand the underlying meaning of its ideas.
- Step 3: the researcher made a list of all similar topics and grouped them in the same category.
- Step 4: the researcher labelled similar topics next to appropriate segments of the text.
- Step 5: the researcher grouped similar topics belonging to the same category together.
- Step 6: the researcher named each category and arranged the codes in alphabetical order.
- Step 7: the researcher organised the data materials belonging to the same category by grouping them together and began a preliminary analysis.
- Step 8: the researcher recoded existing data if necessary.

The researcher transcribed the audio-recorded interviews into text to understand the information obtained during the interviews. The researcher used an open coding

method to create codes for similar topics and grouped them into categories as themes. Five categories of themes emerged.

Data analysis is the process of breaking down data into manageable sections such as themes, patterns and trends to determine the relationship between themes and variables. The purpose of data analysis is to understand the process the researcher used for collecting data into significant information.

5.6. Trustworthiness of the study

The researcher ensured the issues of trustworthiness by adopting the approaches developed by (Bless et al., 2013:236-237), namely credibility, dependability, transferability and conformability.

5.6.1. Credibility

Credibility means that the researcher obtained actual findings which make sense. The researcher demonstrated overall internal logic regarding the appropriateness of the research questions, the study design, the data collection methods, as well as the approach used to analyse data. The researcher must be able to defend the research design and methodology decided on in terms of current theory as well as the knowledge about the field. To ensure credibility, the researcher used triangulation (Creswell, 2013:191). Triangulation refers to using different sets of data as sources of information by examining evidence from those sources and using it to build a coherent justification for the themes. This means that the researcher conducted interviews with the research participants and used similar questions; comparing the responses against one another to see if they are the same or different on similar issues (Creswell, 2013:191).

5.6.2. Dependability

Dependability requires the researcher to describe and then to follow a clear and thorough research strategy precisely to show that each of the steps of the research has been completed thoroughly and carefully. If the researcher fails to describe the

sampling method in detail even if he shows that the sampling methods were applied correctly, the critical reviewer will have little trust in the results obtained from that sample (Denscombe, 2010:n.p). If the researcher can describe exactly how data was collected, recorded, coded and analysed and this process is illustrated by means of valid examples, the critical reviewer will trust that the results are in fact dependable (De Vos et al., 2011:346). To ensure dependability in this study, the researcher recorded the participants' responses and field notes by repeating the same research process with all participants to confirm whether the same findings will be obtained. The researcher will keep the audio recordings and transcription for a period of five years in a secure place.

5.6.3. Transferability

Transferability refers to comparing the external validity with the results that apply to other or similar contexts. It compels the researcher to provide detailed descriptions of the context of the data collected to discover the relationship between the researcher and participants. This information allows other researchers to compare and assess the similarities between the given situation and other contexts; therefore it is regarded as transferability of findings. According to De Vos et al. (2011:346), transferability refers to the theoretical parameters of the research to ensure that those who conduct the policy research studies within those parameters can determine whether or not the theoretical parameters of the research can be generalized for a new research policy and transferred to other settings.

5.6.4. Conformability

Conformability allows other researcher or observers to obtain the same findings in similar contexts. It further allows other researchers to understand precisely what the researcher investigated, why it was done in the particular manner and in what context the study was conducted. For the purpose of this study, to ensure conformability the researcher was neutral as far as possible and refrained from influencing the research results. To ensure trustworthiness of the study, the researcher ensured that the findings of his study can be proved. The researcher should convince the reader that the findings of the study can be verified as true from the original data (Rolfe, 2004:506).

To ensure trustworthiness of the study, the validity and reliability of the study should be tested. Validity means that the findings of the study should reflect the truth from the original data. On the other hand, reliability means that if the researcher uses the same research process to obtain data and similar findings would be produced (Babbie & Mouton, 2010:199-122).

To ensure the trustworthiness of the study the researcher must prove that the findings of the study were obtained without any reasonable doubt. The researcher must show the readers how the findings of the study were obtained by following the research process step by step until the findings of the study are reflected from the original sources.

5.7. Ethical issues in research

UNISA expects researchers to undertake ethical research and discourage any forms of unethical research practice (UNISA, 2013:2). The researcher has a moral responsibility to conduct research ethically (Harding, 2013:24). According to Oliver (2010:44), one of the critical ethical issues is to obtain permission to conduct research from the gatekeepers. The researcher obtained permission to conduct this research from the SAPS head office. The researcher obtained an ethical clearance certificate from the Ethical clearance committee of the College of Law at UNISA (attached in Appendix B and the outcome for the approval to conduct research at SAPS attached in Appendix C). The researcher adopted the following ethical principles: the signing of an informed consent form by every participant, namely that of confidentiality, anonymity and non- maleficence.

5.7.1. Informed consent

Informed consent means that the researcher requested permission from the participants to participate in the research and outlined how long the interviews would take and what the research topic will entail (Harding, 2013:25). Informed consent implies that the researcher must ensure that all information regarding the purpose of the research, the procedure which will be followed and the dangers to which research participants may be exposed as well as the researcher's credibility is provided (De Vos

et al., 2011:59). The researcher ensured that informed consent was given by participants before data collection commenced by means of a signed consent form as a mutual agreement. The informed consent between research participants and researcher is reflected in Appendix D.

5.7.2. Confidentiality

Confidentiality means that private details and information provided by participants are not circulated to others (Oliver, 2010:81). To ensure confidentiality, the researcher handled all information provided by the research participants in a confidential manner (De Vos et al., 2005:61). For the purpose of this study, the researcher assured participants that any information provided will be strictly confidential.

5.7.3. Anonymity

Anonymity means that the identity of the participants will be protected if they provided information to the researcher (Harding, 2013:26). To ensure anonymity, the researcher protected the identity of the participants against any risk that any other person who accesses the research report may be able to identify the person who provided the information (De Vos et al., 2011:61-62). For the purpose of this study, to ensure anonymity the researcher will as far as possible refrained from revealing the research participants identifies to any person.

5.7.4. Non- maleficence

Non- maleficence means that the researcher will ensure that the participants are protected from any unnecessary physical or psychological harm (Leedy & Ormrod, 2013:105). The researcher must ensure that participants are protected from any injuries during the research study (Bless et al., 2013:29). To ensure non-maleficence, the researcher adhered to research ethics and protected the research participants from any physical discomfort that may emerge from the research study. UNISA policy on research ethics requires the researcher to be honest when reporting the findings of the study and not to deceive the participants about the purpose of the study (UNISA, 2013:3-6).

Ethical behaviour is an important principle in research and compels the researcher to conduct research honestly and respect the rights of individuals. Ethics involve matters concerned with plagiarism and honesty in reporting the results, and also include issues such as human subjects in both biological and social sciences.

5.8. Summary

The researcher adopted qualitative research methods to address his research problem. The population of his study is two police stations, namely: Polokwane and Mankweng police stations, and the researcher decided to use purposive sampling, because only police officials with experience in crime mapping were selected. The researcher collected data by conducting semi structured one- on- one interviews with police officials. This was followed by data analysis by means of Tesch's data analysis method because it allows the researcher to analyse textual data in a systematic way. Lastly, the researcher focused on the trustworthiness of the study by ensuring that data collected is credible, dependent, transferable and conformable. To ensure the ethical issue in research, the researcher must report findings honestly and by following the UNISA policy on research ethics.

CHAPTER 6

Presentation of the research findings

6.1. Introduction

This chapter presents the findings of this study. The aim of presenting the findings of this study is to assess the current status of crime mapping at the Polokwane and Mankweng police stations in terms of crime prevention planning. The researcher conducted interviews with research participants to investigate the impact of crime mapping on crime prevention. The aim was to identify any challenges that may restrict their use. The results of these findings will assist the researcher to make recommendations that can be used to improve the use of crime mapping in crime prevention at both police stations to minimise the threat of crime within communities. In this chapter, the focus of the research findings will be on the meaning of GIS and manual pin mapping, their current status and, impact on crime prevention. The challenges of implementing GIS and manual pin mapping at both police stations, as well as the use of GIS to analyse crime and the limitations of manual pin mapping in crime prevention will be discussed. The responses of the research participants will be presented by quotes such as A1 to A3 and B1 to B3 from crime analysts, as well as responses from Stations Commanders which will be represented by SCA and SCB.

6.2. The understanding of the meaning of GIS

GIS is a computer application and is used to capture, analyse and retrieve large volumes of crime information and uses geography and computer-generated maps as interface for the police to integrate and store crime information of the specific locations of crime to respond effectively to the threat of crime by identifying hotspots and analysing historical events and predicting future events. GIS is computer software to manage, prevent and control crime through crime mapping.

Participants described GIS as a computer application used within policing to map criminal activities. They further said that it helps them to identify locations of crime by pin mapping crime that has been reported to them and registered on the Investigate

Case Docket Management System (ICDMS) and Global Access Control System (GACS), which contain crime information on station level that is linked with GIS. Participants also explained that GIS helps them to identify different types of crime locations together with crime date, time, types of crime, modus operandi and crime descriptions so that crime committed can be controlled, prevented and managed effectively.

A1 *“GIS is a computer tool which is utilised by police to mapping crime and it is essential tool because it connects data with geography. It can also show different kind of maps to query categories of crime incidents reported from different crime locations. Let me give you example, if I click cases that is reported and registered in Investigation Case Dockets Management system (ICDMS) and pin map them on GIS it can show me that crime such murder is committed in these location and also show me when crime was committed, date of incident and time will appear on the same GIS map”.*

B1 *“GIS is a police area on the map and on that map I can pin map case where crime is happening and is about police area and pin mapping of information on the system and it use electronic method system. I use GIS daily as crime happening in my police area, I can pin map each crime and it has different code, symbols and simply by clicking crime case and pin map it on the GIS it can show me street names and street corners where crime is happening and at the end of the day I can draw crime information, for example on the 2017- 07-01 to 2017-07-07 crime information such as rape, robbery, house breaking and business robbery it happened on these locations, and I can print or draw written report or map to see where crime is happing currently so that I can presents crime information to crime prevention officials during parade for directing their operation where there is high concentration of crime”.*

B2 *“GIS is a computer tool use to capturing of information to ensure that all reported crime are mapped in order to ensure effective prevention and reduction of crime”.*

The above quotes indicate that the participants have a correct understanding of what GIS is, namely that it uses electronic maps to represent criminal activities and represents crime data electronically. GIS is an effective and user- friendly tool to map criminal activities because it connects data with geographical features. It shows different types of crime, locations of crime, the date and time of the crime, identify hotspots, analyse data, crime descriptions and weapons used. It can also store and analyse large quantities of crime information to help police draw crime reports to present those during parades to inform crime prevention officials about areas of high concentrations of crime.

6.3. The current status of GIS in policing

The status of the use of GIS in policing depends on the current use of the technology in policing linked or connected with GIS. The technologies used by police to ensure the effective use of GIS are GACS, ICDMS, RMS and CADS. For GIS to be effective in policing these technological applications must help police in crime prevention planning.

The participants described the current status of the use of GIS as effective and efficient to manage, analyse crime and to update station commanders about crime threats within their stations. They further said that GIS helps them to manage large volumes of crime data and helps them to plan crime prevention operations by targeting hotspots. The participants also indicated that GIS helps them to capture large quantities of crime information which they can analyse at a later stage.

A2 “As I am speaking with you now, I am Crime Information Officer (CIO) and my responsibility at this station is to manage crime, analyse it and updating station commander about crime threat within our station. GIS is operated in these crime office and I am currently use GIS to manage crime and it is effective and efficiency, and GIS is link with computer application systems such as GACS and ICDMS whereby all the information which may have been captured by Community Service Centre(CSC) Personnel on the ICDMS which is link with GIS. When I am entering on GIS application all criminal activities register by

CSC personnel on the ICDMS will appear under GIS application, and therefore I can access the crime case that register on the ICDMS and pin map them ".

B3*“Current status of GIS in Polokwane is effective and it enable us to access large volume of crime data with different categories of crime and their locations so that we can do crime threats analysis to compare current and previous month crime to see whether there is increasing or decreasing of crime to guide the station commander how best crime can be prevented and to deploying more members on such locations where there is threat of crime. Current status on Polokwane police station is hundred percent (100%), we use it every day and if crime is registered on the ICDMS then we pin it on the same day and the only case that is outstanding or not been pin map is the cases that is going to be transferred to police station that is outside my police boundaries and the moment the case is outside my police boundaries and if I try to pin map that case the GACS system will tell me that it is outside my police boundaries and I cannot pin map that case”.*

A3*“Participant indicate that the current status of GIS in Mankweng police station is effective, it help us as crime analyst to draw crime report at the end of every month to compile monthly crime statistics to see the performance in our station and also to see in what percentage the crime rate is increasing and decreasing, so that the areas where crime increasing the crime prevention planning can be focus on such locations and that locations is mark as hotspot”.*

The above- mentioned quotes indicate that both police stations use GIS daily as GIS is connected with ICDMS and GAGS to record crime case information. It is clear that police rely on crime information reported by victims at station level as well as other crime information on RMS which is used to store crime incident data that link with other related data across police stations countrywide; as well as crime information on CADS which is used to keep track of police official locations and crime activities to record communication between police officials and dispatch calls. It is also used to transfer citizen calls to the CADS which later records information relating to dispatch calls for crime prevention purposes. These quotes show that both police stations use GIS and other technological applications to manage crime problems. The police must use GIS

and other technological applications for GIS to be effective, because it depends on other computer technologies for planning and managing crime.

6.4. GIS impacts on crime prevention in Policing

The use of GIS in policing can impact positively on crime prevention by using the predictive policing method. It means that police use crime information and analysis in crime prevention by identifying past events of crime. Crime analysts can predict next crime events to allow police to target such places proactively to prevent and disrupt crime.

Participants mentioned that GIS impacts on crime prevention by means of crime pattern analysis to group crime together so that crime prevention initiatives can be directed to locations with possible threats of crime. They also indicated that GIS helps them to identify crime locations and hotspots by pinpointing dots to ensure that crime prevention officials can be posted on such locations to prevent future crimes.

A1 “GIS impacts on crime prevention in our station because it has demotion which group offences together whereby crime prevention can be directed to crime locations through using crime pattern analysis (CPA) and our focus will be on the locations where there is high concentration of crime. Example how GIS impacts on crime prevention, it guide police by retrieve data on computer by using GIS application and these data can be used to brief crime prevention officials during parade. As crime information officer I will present crime information during parade to show where there is high concentration of crime and during the course of crime prevention officials daily duties they must put their focus on patrolling and be visible on such locations that identified during the process pin mapping and in that way is how GIS impacts on crime prevention”.

B2 “GIS is impacts on crime prevention, it is important that CSC personnel is monitored to ensure that they feeding GIS with correct information and if they feed it with wrong information we will be working with wrong information, and

daily we check whether open dockets information correspond with dockets is register on the system to ferrying data integrity”.

A3 *“GIS help to empower crime prevention officials to be knowledgeable about what, where, who, why and how aspects of each priority crime within their police station take directions”.*

B1 *“GIS help us to pin point crime that registered by CSC and immediately we click crime case on the ICDMS to pin map and it show us what type of crime is committed and the locations. Then after we search street address where crime is committed and it can show us crime locations on the map and it help us to draw crime report to brief crime prevention officials about hotspots areas for the purpose of planning their daily crime prevention programs”.*

The participants indicated that they use GIS to record and retrieve data about crime activities that had occurred and was reported to them for crime prevention planning to prevent future crime. They further indicated that monitoring is important to supervise CSC personnel to record data correctly so that crime information available on their computers can impact positively on crime prevention planning.

6.5. The use of GIS in policing to assist in crime analysis

Crime analysts use GIS to integrate and analyse data for the purpose of identifying, apprehending and prosecuting criminals; as well as helps the police effectively allocating resources to the places where crime often occurs. The police can use GIS maps to predict and identify points or hotspot areas as well as use data for communication and demographic patterns to predict and identify sensitive crime locations in relation to the given time. GIS helps police during crime analysis to detect crime patterns in disaggregated spatially referenced crime data and it helps them to produce detailed demographic, social and land use profiles for areas to map crime, data overlay, link and coverage creation.

Participants mentioned that GIS can assist police in crime analysis by retrieving recorded crime data and analysing it so that hotspots and where each type of crime occurs can be easily identified to establish crime series, patterns and linkages for the

certain period. They further said that during crime analysis GIS helps them to identify, the day and time of the crime, crime scene, method used to commit crime, weapon used and any valuables taken on the recorded crime data.

A2 *“GIS help us to retrieve crime data and analyse it to identify hotspot of each category of crime and we can establish the relationship between hotspot and certain geographical features, for examples high way, open areas and taverns. It also helps us to establish crime patterns, series and linkage of crime over period time.*

B1 *“GIS assist us as police to analyse crime through logging on GIS systems and we will analyse crime by clicking analyse to identifying the day, time, modus operandi used to commit crime and locations of crime as well as property stolen. For example, each police station have different sectors and on each sector we analyse crime through grouping it by locations, date, time and street names together and it will give us indication where it is hotspot and we placing our crime prevention officials where there is high concentration of crime to prevent future crimes”.*

A1 *“GIS assist to analyse crime through connecting the two crime locations by linking one offender who committed several crimes such as first cash transit and second car hijacking by examining crime patterns and first crime it leads to identify the road use by offender and second crime may help to identify the direction where residential address of offender will be”.*

The participants clearly stated that GIS is helpful to the police during the crime analysis process and to identify patterns of crime, series and links between crimes. The participants indicated that GIS can help them to analyse crime through identifying hotspots, patterns, series and links between crimes. The analysis of crime can help police to prevent crime.

6.6. The challenges that hamper the use of GIS in policing

The limited training and little time given to crime analysts to develop skills to collect and enter data into the GIS negatively impacts on its use in policing. Another challenge that hampers the use of GIS in policing are the limited data obtained from crime prevention officials. Without reliable data there is nothing to be pin-pointed and therefore it leads to the ineffective application of the GIS. The cost of maintaining GIS, accessing and cleaning data, as well as importing data into GIS also contributes to its underutilisation in policing.

The participants indicated that challenges that hamper the use of GIS in policing are unreliable information about criminal activities and human errors during capturing of the data. These mistakes make it difficult to pin- point criminal activities because crime locations and geographical blocks are different and if there is no match between the crime locations and the geographical block it is impossible to pin- point criminal activities. Some participants mentioned that the limited training offered to crime analysts to empower themselves to use GIS impacts negatively on both police stations. GIS is not used regularly because of lack of skills, as well as lack of communication between the municipality and both police stations during the development of certain areas result in some criminal activities not being pin- pointed because both police stations do not have maps of new areas.

***B2** “Challenges that hampers the use of GIS in policing is the limited data about criminal activity during the opening of case dockets and taking of statements from victims. Therefore, those officials who taking statements does not write it correctly as result also those who captured statements on the ICDMS will also capture it incorrectly, and during the drawing of various report on the GIS we will found out that what we called geographical block number is different with the scene of crime or location of crime and it hamper the use of GIS and if geographical block and locations of crime are different, it make difficult to pin map criminal activities because of the wrong capturing of crime data and as result we will be dishing out of unreliable of crime information. Other challenge that hampers the use of GIS is the theft of data cable that transport the network and without network GIS will be ineffective”.*

A1 *“Challenges that hampers the use GIS in policing is the lack of skills among us as crime analysts because we receive little training which takes only one to two weeks, understaff and no policy document guiding us how to use GIS”.*

B3 *“Challenges that hampers the use of GIS in policing is that municipality and police station are not working together during the development of certain areas, for example if there is development inside police area such as new suburbs and new streets is not loaded on the GAGS, it difficult to do pin map crime on such locations and it force us to visit on such locations to take coordinates of that areas by using GPS and when we connect GPS with our system it easy to identify new development areas and on that it will help us to pin map crime on such locations”.*

The participants indicated that lack of crime information from the police also affects the use of GIS in policing. This results in the police not using GIS at all. Errors made during capturing of crime data contribute negatively on crime prevention planning because police will be deployed to wrong crime locations. The lack of planning in policing to implement policy that guides the police how GIS is operated, illiteracy amongst police and lack of basic computer literacy are factors that negatively impact on the use of GIS in policing. The lack of communication between police and municipalities is another contributing factor because some locations where crime occurs are loaded on GIS. Therefore, it is difficult to pin point crime on such locations, and it forces police to take coordinates of such locations on GPS and later connect these locations with GIS to map crime. It wastes time to take coordinates of crime locations and to load on the GIS later before crime can be pin- pointed.

6.7. The understanding of the meaning of manual pin mapping

Manual pin mapping is a paper map of the policing area placed against a wall to pin point the locations of crime. Police agencies around the world use manual pin maps for mapping crime and it is a method used to fight and prevent crime. Manual pin mapping consists of a traditional map which using pins of different colours presenting specific crimes, e.g. red for murder and blue for robbery. Manual pin mapping uses a large map against a wall during parades to point the locations of several types of crime.

Participants could correctly define manual pin mapping and its uses. The participants indicated that manual pin mapping helps police to deploy members to problematic places. They further indicated that the purpose of manual pin mapping is to ensure that criminal activities are recorded so that management can devise strategies to help in planning daily operations.

B2 *“Manual pin mapping is a wall map that is used by us as police locally and internationally to direct us to the crime locations and different color-coded pin is used to represent each type of crime and it give us direction where there is a high volume of crime. Let me give you example how manual pin map work, if certain types of crime such murder, assault, car hijacking and robbery it occurs in different location and each crime types will be presented by colour pin, (e.g.) murder will represent by red pin, assault by white pin, car hijacking by blue pin and robbery by black pin”.*

A3 *“Manual pin mapping is paper map against the wall and on that map we will take crime as reported according to crime reports and drawn on previous day, and we will take crime report and to look where crime occurs and then after for example we put blue pin on house breaking and black pin on the theft out of motor vehicle locations on the map, and we going to have different maps that show us different types of crimes and location of it”.*

SCB *“Manual pin mapping is way of directing the police in terms of geographical area where crime is reported, so when different types or categories of crime are reported, we used different types of pin in terms of their colours for pin pointing exactly where and when the crimes occurred. As results we will be able to channel our resources in terms of preventing crime according to the crime categories”.*

SCA *“Manual pin mapping is way in which police record the criminal activities. It helps police at later stage to see where the crime occurs so that they can have plans to prevent crime. The police use different pin to identify crime within*

police station boundaries. The manual pin mapping help police to be visible to places where crime are reported to prevent further crimes”.

The above quotes indicate that manual pin mapping use paper maps to represent criminal activities and show the location of crimes for the police to use their resources to plan crime prevention. Each type of crime reported is represented by different colour pins in different locations and when the crime occurred.

6.8. The importance of using manual pin mapping in policing

The importance of using manual pin mapping in policing is that it helps management at stations to formulate or implement policies and directives that can help stations to improve performance in areas where the safety of communities is threatened in terms of high occurrence of crime. Those policies and directives can be directed to the crime prevention unit, investigation unit and crime intelligence unit to improve performance in terms of crime prevention and arrests of criminals. Using manual pin mapping in policing can help police understand criminal activities and the areas where crimes threaten the life of the communities better.

The participants indicated that manual pin mapping empowers members when they are briefed during parades how they are going to work in different sectors and where their focus must be to prevent crime. They further indicated that through directive of manual pin mapping the crime prevention official will know in each sector which types of crimes threaten the station and in that way the visibility of police may be enhanced. The participants mentioned that using manual pin mapping benefits all members of the station because every individual has access to the information on the board to see where crime occurs in each sector.

SCB *“It is very important to utilize that because in our lecture meetings we educate members about the strategies we used for manual pin mapping and if they familiarise that strategies of manual pin mapping and they will be able to have knowledge and understand manual pin mapping as results without directive and immediately after parade when they passing notice board where*

manual pin mapping is placed, they will read and see where their focus will be directed to the areas where the crime is threats within the station”.

SCA *“The manual pin mapping play important role because if police know that in sector one they have problems of house breaking during the nights and we will ensure that members are placed on such places to ensure police visibility and patrolled as well as stop and searching any suspected individuals and vehicle looming around can help police to identify crime and give us as police prevent more crimes. Therefore, less reported crimes to police it act as advantage to the station because it shows that station it improves performance in terms of crime preventions”.*

SCB *“The manual pin mapping play positive role because it helps police to improve the performance in the station, if the members know exactly where the crime happened or occurs and what types or categories of crime occurs and they will be able to channel their resources to the place where crime occurs often and their focus will be on such places”.*

SCA *“The manual pin mapping play important role because if police know that in sector one they have problems of house breaking during the nights and we will ensure that members are placed on such places to ensure police visibility and patrolled as well as stop and searching any suspected individuals and vehicle looming around can help police to identify crime and give us as police prevent more crimes. Therefore, less reported crimes to police it act as advantage to the station because it shows that station it improves performance in terms of crime preventions”.*

The above quotes indicate that manual pin mapping helps police stations to determine their performance in specific areas. Therefore, by using manual pin mapping management of the station can formulate solutions to improve their performance. The responses above further explain that this system helps management to plan daily operations by deploying members where there are high rates of criminal activities. Manual pin mapping helps police to identify crimes and locations and to apprehend offenders.

6.9. Manual pin mapping impacts on crime prevention in policing

Manual pin mapping impacts on crime prevention because the focus will be directed to where crime often occurs, as it is easy to identify such places and direct members to patrol such places by means of intelligence reports. Manual pin mapping helps management to plan strategies to implement crime prevention awareness campaigns and by encouraging communities to report criminal activities. Therefore, police and communities will fight crime together and communities will get opportunities to participate in crime prevention planning. Another impact of manual pin mapping on crime prevention is that each crime that was reported to police is reflected by a different colour and specific members can be deployed to specific areas to prevent future crimes.

The participants indicated that manual pin mapping is a tool used to direct them where to focus in terms of crime prevention planning. They also regarded it as helpful to plan daily operations such as roadblocks, public violence and land invasion. The participants agreed that manual pin mapping can help them to identify crime locations, when crimes occur and types of crimes so that they know what types of crime need to be prevented. The participants mentioned that the purpose of manual pin mapping in policing is to act as guiding tool to record criminal activities and to brief members during parades about the places that have large volume of crimes that need serious attention for crime prevention.

SCB *“Yes indeed it help a lot to prevent crime because manual pin mapping is direct members where to focus on, what to do, who to look for about the incident that is reported to the particular area and it help a lot to prevent crime”.*

SCA *“Yes it helps to prevent crime, in every shift leader of the shift brief crime prevention unit members how they going to work and their operations direct by manual pin mapping and they locate their members in different sectors using manual pin mapping according crime are reported and in that way they will patrol and be visible on such places as a results it will be difficult to criminals to commit crime and therefore crime can be prevented in this way”.*

SCA *“Manual pin mapping help police to plan daily operations such roadblocks, public violence, raiding places human trafficking, drug trafficking and occupied land illegally through directing them according crime are reported in different sector”.*

SCB *“Yes, when we talk about intelligence-led operation is the instrument like manual pin mapping. Intelligence led operation is an operation that is pre-determine by the occurrence of crime where it happened, who commit the crime and who is the victims of crime based on the information they have about particular crime and the police will focus on the particular area”.*

SCB *“Yes, it has positive impact on the crime prevention. For example, if in sector two police have problems of theft out of motor vehicles and it is challenges in terms of reported crimes and crime prevention officials will go on such sector and be visible and do roadblocks to stop all vehicle and to prevent crime as result will help police to apprehend stolen vehicle and arrest criminals”.*

The above quotes signpost manual pin mapping as a tool used by police to control, manage and prevent crime within police stations boundaries. The police use manual pin mapping to focus on places that have large volume of crimes to design strategies that can be used to deploy members to such places for visibility and patrolling to make difficult for criminals to commit crime.

6.10. The current status of manual pin mapping

The current practice of using manual pin mapping at both Mankweng and Polokwane police stations is effective. It is user-friendly and easy to understand during briefing sessions. Both police stations use manual pin mapping to direct them to different sectors where crime is a threat to communities within station boundaries. These police stations use manual pin mapping for administration purposes to deploy members according to crime reported in each sector to increase the visibility of members in such places to respond when crime occurs.

The participants shared the same views that they use manual pin mapping during parades to brief members about daily operations and deployment of members to each sector. They further mentioned that the purpose of using manual pin mapping is to direct them where crime occurs, when crime occurs, types of crimes, and locations of victims and suspects. The participant indicated that they use manual pin mapping to pinpoint crime reported to the Office of Station Commanders and corridors where parades take place so that members are familiar with the places where crimes threaten these police stations.

SCB *“The current status of manual pin mapping in my station is done by office of crime registry at provincial office and there is lot of development we move from manual pin mapping to electronic method, which is GIS. We use manual pin mapping during parades to brief members how they going to work in every shift to direct them to areas that must focus on and it help to identify places that have more crimes. We also resort to manual pin mapping when the system is down or there is no electricity at all”.*

SCA *“The current status of manual pin mapping in my station is active and in every shift crime prevention commander of every shift use manual pin mapping during parades to brief members how they going to work and directing by manual pin mapping according crime reported and the members are going to be deployed focusing on manual pin mapping”.*

SCB *“The first thing you must know when we do manual pin mapping is that we do manual pin mapping in my office and to corridors where every members can have access to manual pin mapping”.*

The above quotes indicate that both police stations use manual pin mapping on a daily basis to direct the police to develop and maintain a clear, detailed and up- to- date picture about crimes within both police station boundaries. They use manual pin mapping to identify places with high volumes of crime so that their members can respond to crime through intervening in the most effective way to prevent the commission of crimes and to apprehend offenders.

6.11. The limitations that hamper the use of manual pin mapping in crime prevention

One limitation that hampers the use of manual pin mapping in crime prevention is that it presents a limited picture of crime and it indicates only the locations of crime. It is also difficult to keep it updated and accurate and displays limited data. When police use manual pin mapping, they remove pins representing crimes when they update the system and it is difficult to track series of crimes that may overlap over the duration of weeks or months.

Participants indicated that other limitations that hinder the use of manual pin mapping to prevent crime are that it requires many documents, waste time, provide limited crime data and uses manpower during the process of crime mapping and it is impossible to manipulate when different types of crime occur on the same locations. The participants further indicated that tampering with manual pin mapping is another problem that impacts negatively on crime prevention planning.

SCB *“The challenge of using manual pin mapping in my police station is that some members who don’t understand the purpose of manual pin mapping they removing pin on the maps while they passing on the corridors where maps is placed. Therefore, when we compare maps on the corridors and maps in my office you can see that maps of the corridors tampered. Other challenge is that some members remove pins to put it to other places and in return it end up confusing patrolling officials and the end focus on wrong places in terms of crime prevention”.*

SCA *“The challenge of using manual pin mapping in my station is that police officials tampering with manual pin mapping through removing pin from one place to another. The other challenge of manual pin mapping is theft of manual pin mapping which put station confuse situation where the management cannot know high rate of crimes within police station”.*

SCB *“The limitations that hampers the use of manual pin mapping in policing is that it is time consuming because it has lot of documents need to work*

through and it can happen that we will miss something like street or CAS number because we have to work through large pile of documents and information and it waste time to write notes about crime activities occurs on different locations”.

SCA *“It is difficult to manipulate and update pin mapping because we have to remove pin every month if different crimes occurs on the same location and it make our work difficult to follow crime trends of three to six months because we have to remove pin every month end and it also show us limited picture of crime as well as impact on crime analysis and lastly it cost SAPS lot of money to buy three to five maps per year”.*

SCA *“The tampering with manual pin mapping impact negatively on crime prevention because crime prevention commanders cannot know what type crime is represented where pin is remove and it will be difficult to police to know what type of crime need to be prevention. The theft of map it will make station lose focus on the preventing crime because they will not know what types crimes reported in different sectors and this challenge affects negative to prevent crime”.*

The above quotes show that manual pin mapping does not live up to standards to help police to combat crime because it presents a limited picture of crime; it is impossible to manipulate and to follow crime trends. The use of manual pin mapping increases the work load of the police because they must draft many documents and to do much reading to present recent crimes. Manual pin mapping wastes time by having to prepare large piles of documents and some documents may be lost which can negatively impact on crime prevention.

6.12. Summary

The findings represented in this study assess the effectiveness of the manual pin mapping and GIS at Mankweng and Polokwane police stations in terms of crime prevention planning. The findings clearly show that manual pin mapping has many

limitations and challenges compared to using GIS in crime prevention planning. The findings revealed that manual pin mapping shows crime locations but presents a limited crime picture of crime which negatively impacts on crime prevention. The use of manual pin mapping proves to be ineffective to prevent crime. GIS is an effective tool to manage large quantities of crime information. Therefore, it helps police to understand the causes of crime and it can be used in operational, tactical and strategic decision making to analyse crime, identify hotspots, manage crime, and to deploy crime prevention officials to the location of crime.

CHAPTER 7

The interpretation of the research findings

7.1. Introduction

This chapter presents an interpretation of the research findings obtained by conducting one-on-one interviews with research participants with the focus on the Polokwane and Mankweng police stations. The aim of interpreting the research findings is not to repeat the research findings, but to interpret the research findings in such way that the reader understands what the researcher wanted to achieve. The researcher will interpret the research findings so that the research question and objectives of the study are answered. The researcher will interpret the research findings with the participants who are involved with crime mapping at both police stations.

The focus will be on the participant responses with regard to the use of GIS and manual pin mapping at Polokwane and Mankweng police stations to assess the effectiveness of crime prevention planning. In this chapter, the focus of the interpretation of the research findings will be on the current status of crime mapping at the research sites; the use of the respective techniques in crime analysis and the impact of the use of GIS and manual pin mapping on crime prevention. Lastly the challenges in the use of GIS and manual pin mapping on crime prevention and the role of GIS and manual pin mapping in crime prevention are discussed.

7.2. The current status of crime mapping at the research sites

GIS is a computer tool that is used by police to map criminal activities. It is an important tool used by police for recording criminal activities, identifying locations of crime, analysing crime and it guides police by directing them to locations where crime has occurred so that they can respond and prevent it (Santos,2013:n.p). Police use GIS to assign spatial coordinates to crime incidents and other locations such as criminals' residences and to produce compositions with crime locations and spatial context features such as street address and police sectors (Gorr & Kurland, 2012:3-4). The use of GIS helps police to pull together large quantities of information that are

contained in crime dockets, reports and capture crime locations as well to extract data through time, date, modus operandi and crime type queries that are geographically based (Breetzke, 2015:n.p). Manual pin mapping is a large paper map that is placed against a wall and is used by police to represent criminal activities. Manual pin mapping shows the police the locations of criminal activities and uses coloured pins to represent different types of crime. It helps police in their administration to deploy members to the places where crime presents a threat (Horne, 2007:115). Police use manual pin mapping during parades to visualize locations of crime, pointing out where and when crime occurs, directing them to places where crime is a problem and to manage crime (Chainey & Ratcliff, 2005:4).

The difference between GIS and manual pin is that GIS uses electronic maps to visualize criminal activities, record crime data on a computer, analyse crime, showing the time, date, place, modus operandi and weapon used during the commission of the crime (Mashiloane, 2014:145). Manual pin mapping uses a paper map that shows locations of crime, when crime occurs, and different types of crime represented by coloured pins. The similarities between GIS and manual pin mapping are that both use maps to represent crime, to identify crime locations; they show different categories of crime and direct the police to locations where there are high volumes of crime (Horne, 2007:115).

The current practice of using GIS and manual pin mapping at both police stations is effective. The crime analysts at both police stations use GIS and manual pin mapping daily to record criminality, to identify crime locations, to present a crime picture to police, to analyse crime and also to be used as 24 - hour surveillance for monitoring areas of high crime for crime control and prevention (Pendleton, 2012:4). The participants mentioned that the current status of using crime mapping is 100% percent. They use it daily for mapping crime and guiding management of both police stations to areas with high volumes of crime. The participants indicated that they use crime mapping to brief police at the daily parades about police operations to direct them where they must focus the deployment of police to problem areas to plan crime prevention approaches (Breetzke, 2015:n.p). The crime statistics provided in section 1.3. show that the steady decline of crime in both police stations may be attributed to the use of crime mapping in crime prevention.

Lochner and Zietsman (1998:71), state that the use of crime mapping help to update management at police stations to manage crime, to record different categories of crimes, to record crime information, to analyse crime and to plan crime prevention measures. Hill and Paynich (2014:9), indicate that the purpose of crime mapping is to look at crime and other law enforcement crime data used to study arrests and crime dockets as well as offender and victim characteristics, and crime scene evidence. By analysing numerous sources of crime information, crime analysts can assist decision makers in policing by providing useful information about crime so that they can design strategies to fight and prevent crime.

Both police stations use crime mapping as approaches for crime prevention planning. The use of crime mapping in policing is important and police must have a basic understanding of the use of crime mapping in policing before it can be introduced. The researcher noticed that although participants understand the use of crime mapping, they struggle to express themselves about the importance of using crime mapping in policing and they lack the theoretical background about crime mapping. It is clear that they were not empowered before the use of crime mapping was introduced in policing. It is important that both police stations introduce in-service training, awareness campaign and policy guidelines that will inform members about the value crime mapping in crime prevention planning. If both police stations use crime mapping properly, it can impact positively on crime prevention and it can help them to manage crime more effectively. Crime mapping is used locally and internationally to assist police in crime prevention planning.

7.3. The use of the respective techniques in crime analysis

It is important to understand how areas of crime, victims, offenders and crime come together in the same event to analyse crime effectively. Crime analysis uses the respective techniques to have a better understanding of crime events (Newburn, 2003:340). This includes operational, tactical, intelligence, investigative and strategic crime analysis. Crime analysis uses operational crime analysis for administrative purposes to help police ensure that human and physical resources are deployed to areas where there is a threat of crime and their daily operations must be focused on such areas for crime prevention. Crime analysis uses tactical crime analysis to study

police activities to understand crime events better with regards to when, where and how crime occurs to help police and investigators to identify the areas with crime problems. Crime analysis use intelligence crime analysis to help police to identify organised crime through wiretapping, surveillance and informants to gather, collect and link crime information together (Santos, 2013:63).

This information helps crime analysts to understand crime patterns, trends, series and sprees to prioritise information to target and apprehend criminals. It uses investigative crime analysis to study behaviour of serial criminals to determine what type of person commits crime serial (Santos, 2013:3). Crime analysis uses strategic crime analysis to study long-term crime problems and requires long- term planning. Long- term problems include monthly, quarterly, yearly and long-term planning which includes groups working together to develop intervention plans that will address crime problems in specific areas such as rural, urban and town (Katantamalundu, 2004:28-29).

The participants mentioned that the use of crime mapping in policing to analyse crime helps police to understand that the area of crime, victims, offenders and crime are inter-related as the same events. The analysis of crime helps police to have a broader picture about the distribution of crime, victims, offenders, location and clustering of crime in space (Leipnik & Albert, 2003:5). The participants indicated that crime mapping assists crime analysts to identify hotspot, patterns, series and linkages to trace criminals to target such criminals by focusing on areas with high volumes of crime for crime prevention. Crime analysis can help police to integrate and analyse crime data to identify crime patterns and crime areas, apprehend criminals and arrest them as an approach to prevent crime. Participants further mentioned that the use of crime mapping for crime analysis could help police to produce good intelligence that will impact positively on crime prevention planning (Santos, 2013:3).

It is the responsibility of every member of the SAPS to assist one another for the collecting, storing, analysing and dissemination of crime information for the purpose of crime prevention, investigation, to maintain public order as well as protecting South African citizens and properties. Crime analysis is an analytical tool that supports the prevention, reduction and investigation of crime by providing detailed information about crime to police which enables them to prioritise interventions. At station level,

separate offices, the crime information office and the intelligence office are responsible for the analysis of crime. The researcher noticed that at station level, the responsibility of collecting, gathering, storing, analysing and dissemination of crime is done by the crime information office only; although both the mentioned offices are supposed to work together to gather, collect, store, analyse and disseminate of information. The crime information office does not use the above- mentioned techniques of crime analysis but relies on crime information and crime data reported to the police station, which impacts negatively on data integrity. It is important that crime analysis techniques be used at station level, so that crime information produced by crime analysts can be used to identify crime, apprehend and arrest criminals.

7.4. The impact of the use of GIS and manual pin mapping on crime prevention

GIS and manual pin mapping are powerful tools used by police to impact on the crime prevention process from the first stage of data collection to the last stage of monitoring and evaluation of any target responses. It can be used as important mechanism in the preliminary planning stage for preventing crime and successfully designing initiatives that will tackle crime. The use of GIS and manual pin mapping can impact on crime prevention by identifying crime, the areas of crime, victims and offenders, the residential addresses of offenders and the arresting of offenders. Therefore, in this way the use of GIS and manual pin mapping impacts on crime prevention from the first stage of identification of crime to the last stage where offenders are arrested (Pendleton, 2012:4).

The participants indicated that the use of GIS in policing impacts on crime prevention because it shows police where crime occurs, the types of crime, the victims of crime and the alleged suspects. In this way it guides them where to focus, what to look for, what type of crime needs to be prevented and which specific areas need to be targeted for intervention. Participants mentioned that manual pin mapping and GIS impact on crime prevention by guiding police during their daily parades to brief their members about the daily operation plans such as roadblocks, to identify hotspots, public violence, and stop- and- search so that police can be in such areas for crime prevention (Breetzeke, 2015:n.p). The participants said that the use of GIS and manual pin mapping helps the police to record criminal activities, update police

management about the sectors with high volumes of crime and to observe criminal activities during the planning of crime prevention initiatives. As result, the use of GIS and manual pin mapping leads to identification of criminals, crime locations, the arrest of criminals and intervention before crime occurs (Paulsen & Robinson, 2004:225). Police use GIS and manual pin mapping to reduce and prevent crime by recording and mapping police activity such as calls for service, crime incidents, to support the police during parades by briefing them about crimes that has recently occurred. It also helps in predicting where the next crime may occur in future. It assists them to identify crime hotspots for targeting, deploying and allocating resources to the location of crime for suitable crime prevention responses (Chainey & Ratcliff, 2005:4).

The findings of the study show that utilisation of the manual pin and GIS in crime mapping impact positively on crime prevention. GIS and manual pin mapping help police at both the police stations to identify crime areas, victims, and to apprehend and arrest offenders to prevent future crime. The findings show that although the use of manual pin mapping and GIS adds value to crime prevention at both police stations, the information provided during parades is not adequate. The police rely only on crime information provided by crime information officers, without considering crime information from crime intelligence and detective units that can provide information that may have an impact on crime prevention. The insufficient crime information that captured by the Community Service Centre is not up to standard because the information captured only reflects the victims' version, and lacks information from witnesses, suspects, and investigation and crime prevention officials. The information provided by the Crime Information Officers on a daily basis impacts negatively on crime prevention because it lacks data integrity.

7.5. The challenges in the use of GIS and manual pin mapping on crime prevention.

The lack of training and skills of using GIS and manual pin mapping are challenges that affect the use of crime mapping at both police stations. The shortage of crime information officers also challenges the use of crime mapping because only one or two people occupy the Crime Information Office and if they are on study or vacation leave these offices are closed. The substandard taking of statements and capturing of crime

information also present challenges, because of incorrect information regarding victim residential addresses, crime location and lack of details about suspect (Breetzke, 2015:731-732).

The participants indicated that the challenges of using crime mapping at both police stations are the lack of crime information from crime intelligence, detectives and crime prevention, and without specific crime information there cannot be crime mapping. The participants said other challenges of using crime mapping at both police stations are the lack of training and the shortage of Crime Information Officers. There are no policy documents or guidelines that help them to understand the importance of using GIS and manual pin mapping for crime prevention (Breetzke, 2015:734-735). The participants regarded another challenge to use crime mapping as the negative attitudes of police officials about the importance of crime mapping; they ignore directives and guidelines provided by Crime Information officers during parades on how to handle crime problems (Ibrahim & Kuta, 2015:46).

The research findings show that the crime data presented on a daily basis by Crime information officers at both police stations rely on crime data reported to police. Crime intelligence, detectives, crime prevention and crime information officers should work together to gather, collect and analyse crime data to present corroborated crime data for the purpose of data integrity. It is important that awareness campaigns, proper training of personnel and the deployment of personnel to use GIS and manual pin mapping to improve crime mapping should be undertaken at both police stations. It is important that SAPS management implement policy documents that will guide police stations how best to use crime mapping and provide guidelines that will help to overcome the challenges of crime mapping and guidelines that will improve the crime mapping prevent crime more effectively.

7.6. The role of GIS and manual pin mapping in crime prevention approaches

The role of GIS and manual pin mapping in crime prevention approaches is to help the police to understand the distribution of crime, to identify crime locations, patterns of crime and hotspots and allocate resources to areas of crime for the purpose of intervention. Using GIS and manual pin mapping in crime prevention approaches

helps to record criminal activities, to identify crime locations, to brief police during parades about crime and to identify hotspots for targeted responses for future crime prevention (Balogun, 2014:n.p). The police use GIS and manual pin mapping for the deployment of crime prevention officials to high volume of crime areas and to predict the areas where crime may occur in future for the planning of crime prevention initiatives. Police management uses GIS and manual pin mapping to solve crime problems, to measure police performance regarding the increase or decrease of crime, to share crime information with the public by releasing crime statistics every year, and to manage and control crime for prevention purposes (Ejemeyovwl, 2015:64).

The participants mentioned that the role of GIS and manual pin mapping in crime prevention approaches at police station level is to help police on an administration level through the deployment of police to be visible and patrol crime areas for operational purposes. This helps them to conduct police operations such as roadblocks, public violence, strikes, stop- and- search of any person or vehicles suspected of being involved in criminal activities to prevent crime. The participants said that the use of GIS and manual pin mapping in crime prevention approaches helps police to know what types of crime occur, where the areas of crime are, who the victims and suspects of crime are, why crime occurs and how suspects committed the crime (Balogun et al, 2014:455-465).

Chainey and Ratcliff, (2005:4), state that the police use GIS and manual pin mapping to identify crime hotspots for targeting, deploying and allocating resources to the location of crime for suitable crime prevention responses. GIS and manual pin mapping help police to understand the crime distribution clearly so that they can address criminal activities. Pendleton (2009:25), indicates that the value of implementing GIS and manual pin mapping in policing is recognized as effective tools with the capability to be used for the visualization of crime, the analysis of crime patterns, crime mapping, allocation of resources to the police and supporting police in strategic planning and decision making.

The implementation of GIS and manual pin mapping in crime prevention adds value to crime prevention at both police stations. The findings in this research have shown that GIS and manual pin mapping helps police from the detection of crime to the final

proactive act of intervention. The police use GIS and manual pin mapping from the first stage of data collection, to the second stage of crime identification, the third stage of identification crime areas, to the fourth stage of identification of suspects and victims, the fifth stage of target response, sixth stage of response of crime that reported to the final stage of arresting offenders.

The findings also indicate that both police stations often use manual pin mapping for planning crime prevention and do not use GIS because of lack of skills and lack of crime information officers. Both police stations fail to compare information between GIS and manual pin mapping which can help to deal successfully deal with strategies crime prevention planning. The research proved that since the implementation of GIS and manual pin mapping there has been no assessment to evaluate the effectiveness and performance of the use of GIS and manual pin mapping in crime prevention planning. The SAPS must design assessment programmes that will measure the role of GIS and manual pin mapping in crime prevention approaches that will enable management to improve the use of crime mapping.

7.7. Summary

Throughout this chapter, the researcher interpreted the interviews with the participants who are directly involved in the use of crime mapping at both police stations for crime prevention planning. The researcher interpreted the research findings to compare participants' responses with the relevant literature to determine similarities and differences in those findings. When the researcher found similarities and differences in the research findings, he explained them so that readers may understand the findings better. The next chapter will present the summary of this study, recommendations and conclusions that may improve the value of crime mapping in crime prevention in the SAPS.

CHAPTER 8

Summary, recommendations and conclusion

8.1. Introduction

The findings of this study gave rise to recommendations and the conclusion. The study established that the police currently employ GIS and manual pin mapping in crime prevention planning. This chapter will represent the summary, recommendations and conclusion of the study. The researcher will provide recommendations based on the research findings which may improve the use of crime mapping for crime prevention planning.

The purpose of this chapter is to prove whether the aim, research question and objectives have been achieved or not. In this chapter, the recommendations of the study are based on the current status of crime mapping at the research sites, the use of the respective techniques in crime analysis and the impact of the use of GIS and manual pin mapping on crime prevention. It also presents the challenges in the use of GIS and manual pin mapping on crime prevention as well as the role of GIS and manual pin mapping in crime prevention approaches.

8.2. Summary of the study

The researcher conducted this study in order to understand the value of crime mapping in crime prevention at Polokwane and Mankweng police stations. Chapter 1 introduced the orientation to the study; and the focus was on the value of crime mapping in crime prevention planning in policing and the background of the study was presented to understand the development of the use of crime mapping in South Africa and specifically in the SAPS. The study presented the research problem, explained the problem of the study and identified the challenges that affect the use of crime mapping at both police stations. This was followed by presenting the research question to address the identified research problem of the study. The study presented the aim and the objectives so that the reader can understand what the researcher wanted to achieve at the end of the study. The study discussed the value of crime mapping in policing, communities and academically. Key words were identified so that the purpose

of the study was clear. Furthermore, the researcher presented the demarcation of the field of study to identify the geographic area of the study. The study was based in Limpopo Province, specifically at the Polokwane and Mankweng police stations.

Chapter 2 presented an overview of the use of crime mapping in crime prevention in South Africa. The researcher presented literature relevant to the use of crime mapping as crime prevention planning in South Africa, as well as a selection of countries that employ crime mapping in crime prevention, such as Australia, England and United States. The use of crime mapping in crime prevention planning has been used extensively in South Africa as well as in those countries, and much research has been conducted on crime mapping. Chapter 3 outlined the use of crime analysis in crime mapping as analytical tool to study the behaviour of offenders in a geographical area. Crime mapping contains forms of crime analysis and should be present during every crime analysis process. This chapter discussed the purpose of crime analysis in crime prevention approaches in general and the focus was on offender behaviour to understand the modus operandi during the commission of crime.

Chapter 4 dealt with crime prevention approaches and their analyses. The researcher discussed types of crime prevention which may be used in policing to improve crime prevention planning programmes. The researcher adopted the use of intelligence-led policing as crime prevention model for targeting offenders, investigation of organised crime, crime management and prevention. The researcher adopted a situational crime prevention model which has been used successfully in multifamily residential low-income housing. Therefore, the police and security experts can apply these techniques to reduce crime opportunities in commercial, industrial and government facilities (Atlas, 2008:73). Lastly, the researcher adopted CPTED as a place-based crime prevention approach which relies on the physical environment manipulation which affects the behaviour of space users.

Chapter 5 dealt with research methodology. The researcher adopted a qualitative research design to understand the value of crime mapping in crime prevention. This approach was followed with the population of the study which is from the Mankweng and Polokwane police stations. The study used purposive sampling to select participants and depending on the researcher's application of the inclusion criteria to

provide data- rich information to achieve the objectives of this study. The study used semi-structured interviews to interview the research participants. The data was analysed by using Tesch's eights steps analysis. Lastly, the researcher focused on the trustworthiness of study by ensuring that data collected is credible, dependent, transferable and conformable. To ensure the ethical aspect of research, the researcher must report findings with honesty and conduct the study by following the UNISA policy on research ethics.

Chapter 6 dealt with the findings of the study and the researcher analysed the data the value of the research findings. In chapter 7 the researcher interpreted the findings of the study based on the responses of the research participants. The researcher interpreted the research findings in such a way that the research question and objectives of the study have been answered. Chapter 8 discusses the summary of the study, and the recommendations that may be used to improve the use of crime mapping in crime prevention are presented. The conclusion is based on the interpretation of the research findings.

8.3. Recommendations

The recommendations of the study are based on the value of crime mapping in crime prevention planning at Polokwane and Mankweng police stations. The researcher focuses on the challenges of the use of crime mapping at both police stations to propose recommendations that can help to improve the use of crime mapping in crime prevention planning. The recommendations of this study are derived from the research data obtained during the interviews with the research participants and literature review.

8.3.1. The current status of crime mapping at the research sites.

The research findings show that both police stations use crime mapping in crime prevention. The use of crime mapping in research sites is effective at both police stations. The research recommends that police at both police stations connect GIS with CAS, RMS and CADS to manage and prevent crime effectively. The purpose of connecting GIS and CAS is to help police to verify crime information recorded on CAS at station level to correspond with crime information on the GIS for data integrity. The

purpose of connecting GIS and RMS is to help police with storage of investigation reports, arrest reports, informer or witness reports, communication on 10111 system and incident reports. Connecting GIS and CADS can help police to identify locations during patrols to record communication between police and dispatch officers to respond to emergency crime reported.

The research further recommends that the use of manual pin mapping together with CAS, RMS and CADS can help police to check whether crime information that has been recorded on technological applications correspond with crimes that is pinpointed on the manual pin mapping. Therefore, the use of manual pin mapping and these technological applications can help police to verify recorded crime information before crime prevention officials are briefed about crime activities during daily parades.

8.3.2. The use of the respective techniques in crime analysis

The research recommends that police use the following crime analysis techniques: operational, tactical, intelligence, investigative and strategic crime analysis to produce good quality crime data that can be used to prevent crime through crime mapping. The use of operational crime analysis helps police for the visible deployment of crime prevention officials in the community to obtain crime information from community members and witnesses during patrolling. Tactical crime analysis helps the police obtain crime information to identify suspects, crime locations and suspect residential addresses for target responses, to analyse crime patterns, for investigation leads and apprehension of suspects. The use of intelligence crime analysis assist police to obtain crime information from informers, intelligence collectors and undercover operation to identify organised crime and arrest offenders.

Strategic crime analysis helps police to obtain crime information to design plans to investigate long-term crime. This type of analysis helps police to provide crime information to crime prevention officials, investigators and intelligence collectors to work together to investigate long-term crime problems. In other words, the police at both police stations must not only analyse crime data reported at the police stations and that is captured in their system because it affects negatively on crime prevention planning. It is important that crime information officers analyse crime data obtained

and reported at police station level, intelligence unit, detective unit and crime prevention unit. For the police to have adequate crime information, they must ensure that collected crime data can be corroborated by detective, intelligence, crime information offices and crime prevention for data integrity.

The research further recommends that police use crime mapping to assist them to analyse crime through statistical or mathematical methods. It can help police to identify and analyse crime data to predict sensitive areas of hotspots by using crime data on surface communication, telephone communication and demographic patterns which can help them to predict sensitivity of hotspots in relation to a given time. This can help them to understand the distribution of crime in the geographical area and to identify patterns of criminal behaviour. Crime mapping can be use as operational deployment according to crime patterns established throung crime mapping to produce crime data with a single visual output that combines multiple data layers to produce quality of output that can be use to prevent crime.

8.3.3. The impact of the use of GIS and manual pin mapping on crime prevention

The research recommends that for GIS and manual pin mapping to impact on crime prevention at both police stations, police must use GIS and manual pin mapping to detect, analyse and identify crime. Crime mapping can help them to analyse crime trends based on the locations of crime, types and time of occurrence. It can help police management improve the handling of crime data within the police information system and regular capacity building of police for crime prevention planning. The research recommends that the use of geospatial technologies such as navigation vehicles and GPS facilities impacts on crime prevention for effective tracking and acquisition of digital maps at every police sector. It can help police to understand crime in relation to roads, police station areas, residences of victims and offenders as well as improving police service delivery and effectiveness.

The research recommends that police must verify all data before data it captured and analysed for data integrity. The police at both police stations must compare the crime data reported by victims with crime information obtained by investigation officers to ensure that crime information provided by victims and investigation officers are similar

before the compilation of final product of crime data. The research further recommends that the SAPS have evaluation and monitoring teams to oversee the use of GIS and manual pin mapping methods at police station level to indicate the impact of the use of these crime mapping in crime prevention through statistical methods.

8.3.4 The challenges in the use of GIS and manual pin mapping on crime prevention.

The research recommends that the policing at both police stations address the challenges that hamper the use of GIS and manual pin mapping by monitoring and inspection of crime information obtained by CSC and Crime Office personnel during the taking of statements and opening of dockets for the capturing of correct crime information as well as during the pinpointing of crimes on the map.

The research findings show that the lack of skills and shortage of analysts at the police station level are challenges preventing the effective use of crime mapping. Officials only received in-service training for one to two weeks and there are only one to two analysts. The research recommends that graduates who studied to qualify as crime analysts, for instance computer science, statistics, forensic investigation, geography and criminology. Such analysts must also receive in-service training in crime mapping to improve the use of crime mapping at both police stations.

The research recommends that partnerships with local government, private companies and other departments are informed to secure funding at both police stations to obtain Google maps to find locations when it is difficult to do geocoding where there is no map for areas.

8.3.5 The role of GIS and manual pin mapping in crime prevention approaches

The research recommends that for GIS and manual pin mapping to play a proactive role in crime approaches, police should use an integrated approach during collection and analysis of crime data. This integrated approach can help analysts to pinpoint criminal activities to have adequate crime information that can be used to produce intelligence products that can help police in crime prevention approaches. GIS and

manual pin mapping add value to crime prevention approaches by recording criminality, identifying crime areas, deploying of police at crime problem areas and analysing crime for crime prevention planning.

GIS and manual pin mapping play an important role during crime prevention approaches through recording and mapping police activity such as calls for service, crime incidents, supporting the police officials during parade with the purpose of briefing them about crimes that have occurred recently. It is also helping in predicting where the next crime may be occur in the future. These tools also help them to identify crime hotspots for targeting, deploying and allocating resources to the location of crime the suitable crime prevention responses.

8.4. Conclusion

This study focused on the value of crime mapping in crime prevention at Polokwane and Mankweng police stations, to determine whether the use of crime mapping in policing can have a positive impact on crime prevention planning initiatives. This study assessed the current status of crime mapping at the research sites to determine whether the use of crime mapping at both police stations can help them to prevent crime effectively.

The study identified the challenges which impede the use of crime mapping at both police stations. It is important that the management of Polokwane and Mankweng police stations appoint members to monitor and inspect the use of crime mapping to address the identified challenge. This study outlined the findings and recommendations that can be used to improve the use of crime mapping by means of further research in policing so that value of crime mapping in crime prevention can be realised locally and internationally.

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Addendum A

INTERVIEW SCHEDULE

TOPIC: The value of crime mapping in crime prevention.

The purpose of this study the use of the manual crime mapping and GIS in Mankweng and Polokwane police stations in terms of crime planning.

1. What do you think what is the meaning of geographical information system (GIS) and manual pin mapping is?
2. What do you think what is the current status of GIS in Mankweng police station?
3. Do you think GIS impacts on crime prevention in Mankweng and Polokwane police stations?
4. How can GIS assist police in crime analysis?
5. What do you think are the challenges that hampers the use of GIS Mankweng and Polokwane police stations?
6. What do you think what is the meaning of manual pin mapping is?
7. Do you think manual pin mapping impacts on crime prevention in Mankweng

and Polokwane police stations?

8. What do you think what is the current status of manual pin mapping in

Mankweng and Polokwane police stations?

9. What do you think are the limitations of use manual pin mapping in crime prevention in Polokwane and Mankweng police stations?

Addendum B

Ethical clearance certificate



COLLEGE OF LAW RESEARCH ETHICS REVIEW COMMITTEE

Date: 26/07/2016

Reference: ST 119 (2015)

Applicant: P. M. Matsaung

Dear P. M. Matsaung
(Supervisor: Prof R. Snyman)

DECISION: ETHICS APPROVAL

Name	P. M. Matsaung
Proposal	The value of geographical information system in crime prevention: a comparative study
Qualification	MTech

Thank you for the application for research ethics clearance by the College of Law Research Ethics Review Committee for the above mentioned research. **Final approval is granted.**

The application was reviewed in compliance with the Unisa Policy on Research Ethics.

The proposed research may now commence with the proviso that:

1. *The researcher will ensure that the research project adheres to the values and principles expressed in the Unisa Policy on Research Ethics which can be found at the following website:*

http://www.unisa.ac.za/cmsys/staff/contents/departments/res_policies/docs/Policy_Research%20Ethics_rev%20app%20Council_22.06.2012.pdf

2. *Any adverse circumstances arising in the undertaking of the research project that is relevant to the ethicality of the study, as well as changes in the methodology, should be communicated in writing to the College of Law Ethical Review Committee.*



Open Rubric

University of South Africa
Preller Street, Muckleneuk Ridge, City of Tshwane
PO Box 392, Unisa, 0003, South Africa
UNISA/UNISA/2016/72/LAW

An amended application could be requested if there are substantial changes from the existing proposal, especially if those changes affect any of the study-related risks for the research participants

- 3. The researcher will ensure that the research project adheres to any applicable national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study.*

Note:

The reference number (top right corner of this communique) should be clearly indicated on all forms of communication (e.g. Webmail, E-mail messages, letters) with the intended research participants, as well as with the URERC.

Kind regards



PROF B W HAEFELE
CHAIR PERSON: RESEARCH ETHICS
REVIEW COMMITTEE
COLLEGE OF LAW



PROF R SONGCA
EXECUTIVE DEAN:
COLLEGE OF LAW

Addendum C

Permission to conduct research in the SAPS

G.P.-8 002-0222 SAP 21

SUID-AFRIKAANSE POLISIEDIENS  **SOUTH AFRICAN POLICE SERVICE**

Privaatsak/Private Bag X 301

Verwysing Reference	2/1/2/1(17/2016)	CRIME REGISTRAR HEAD OFFICE PRETORIA 0001 08 May 2017
Navrae Enquiries	Brigadier Manamela Colonel Kenqu	
Telefoon Telephone	(012) 360 1093	
Faksnommer Fax number	(012) 347 2309	

A. The Divisional Commissioner
Research
South African Police Service
Head Office

B. The Provincial Head
Crime Registrar
Limpopo

AUTHORITY TO CONDUCT RESEARCH IN SAPS: THE VALUE OF GEOGRAPHICAL INFORMATION SYSTEMS (GIS) IN CRIME PREVENTION: M TECH: UNISA: RESEARCHER: PM MATSAUNG

A1. This office grants permission for the researcher to conduct interviews with Crime Information managers at the mentioned police stations.

2. Strict compliance of the following must be noted and taken care of by the researcher:

2.1 The researcher should contact Brigadier Molema who is the Provincial Head Crime Registrar in Limpopo before embarking on the project. She can be reached on the following numbers 0794956971;

2.2 The research will be conducted at the researches' own cost;

2.3 The research will be conducted without the disruption of the members' duties;

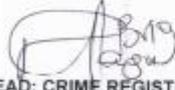
2.4 The information will strictly be treated as confidential at all times;

1

AUTHORITY TO CONDUCT RESEARCH IN SAPS: THE VALUE OF GEOGRAPHICAL INFORMATION SYSTEMS (GIS) IN CRIME PREVENTION: M TECH: UNISA: RESEARCHER: PM MATSAUNG

2.5 Participation in the interview must be voluntary.

B1. For your information.

  **MAJOR GENERAL**
HEAD: CRIME REGISTRAR
TN SEKHUKHUNE



Privaatsak Private Bag X94	Pretoria 0001	Faks No- Fax No.	(012) 393 2128
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Your reference/My verwysing:
My reference/My verwysing: 3/34/2
Enquiries/Navrae: **Lt Col Joubert
Intern Thenga
(012) 393 3118**
Tel: **JoubertG@saps.gov.za**
Email:

THE DIVISIONAL COMMISSIONER: RESEARCH
SOUTH AFRICAN POLICE SERVICE
PRETORIA
0001

Mr PM Matsaung
UNIVERSITY OF SOUTH AFRICA

RE: PERMISSION TO CONDUCT RESEARCH IN SAPS: THE VALUE OF GEOGRAPHICAL INFORMATION SYSTEMS (GIS) IN CRIME PREVENTION: MASTERS DEGREE: UNIVERSITY OF SOUTH AFRICA: RESEARCHER: PM MATSAUNG

The above subject matter refers.

You are hereby granted approval for your research study on the above mentioned topic in terms of National Instruction 1 of 2006.

Further arrangements regarding the research study may be made with the following offices:

The Provincial Commissioner: Limpopo:

- **Contact Person:** Lt Col Montjane
- **Contact Details:** (015) 290 6202

The Head: Crime Registrar:

- **Contact Person:** Brig Molema
- **Contact Details:** 079 495 6971

The Head: Organisational Development:

- **Contact Person:** Brig Mushi
- **Contact Details:** (012) 393 3292

Kindly adhere to paragraph 6 of our letter signed on the **2016-11-22** with the same above reference number.


**LIEUTENANT GENERAL
DIVISIONAL COMMISSIONER: RESEARCH
DR BM ZULU**
DATE: 2017/05/26

Addenda D

INFORMED CONSENT FORM

Affiliation: Department of Police Practice

Researcher: Pieter Mantjie Matsaung

Title of Study: The value of crime mapping in crime prevention.

Purpose of Study:

The purpose of this study is to assess and understand the process of the use manual crime mapping and GIS in Mankweng and Polokwane police stations. The researcher want to explore the development which have precipitated the use and integration of geographical information systems (GIS) and manual pin mapping as crime prevention tool within South African Police Service (SAPS).

Procedures:

The researcher will use semi-structured interviews and observation for collecting data and a tape recorder and observation notes will be used to record conversations and after interviews the tape recorder and observation notes taken will be stored in the lockable safe. The researcher will be conducting the semi-structured one-on-one interviews with the help of an interview schedule and the interviews will not be longer than three hours, but may end sooner by natural process or on request of the respondent or researcher, depending on the circumstances.

Risks and Discomforts:

The researcher will ensure that the participant are protected from any unnecessary physical or psychological harm during the research study. To ensure non risk and discomforts, the researcher will adhere the Unisa policy on research ethics and protect participant from any physical discomfort that may emerge from the research study. The participants have the rights when become tired or feel emotional discomfort at any time to request a break or the interview be postponed to a later date or terminated if so desired. The researcher will make every effort to ensure the risks and discomforts are avoided as far as possible for the participant.

Benefits:

This study will benefit the research participants to understand better the distribution of crime patterns and series in both interior and exterior spaces and also allowing for a better understanding of events and dynamics involving people, places, and crime hazards in the specific area. It also benefits research participants to understand the relationship between the land use behavior and crime types. The community will be benefited in terms of educating them with visual information to clarify crime concerns and crime level. In this regard the community will be able to access the crime map on the internet that was put by the SAPS on their websites to inform them about crime level. Community have access of the country crime information that is released by crime information on the SAPS website annually that provide detailed of crime rate that is reported at a national, provincial and police station level.

It is my hope that the respondents partaking in this study will feel the satisfaction of contributing to solving a social problem and facilitating in illuminating the problem of crime mapping in this study, which may help others in the future. The respondent shall also assist in providing insight into the problem, which can stimulate future research, and thus be of even greater help in the future. On a personal level, it is the hope of the researcher that the respondents will obtain personal satisfaction once they have discussed certain issues with the researcher and thus gaining personal insights that were not gained prior to the interview.

Respondent's Rights:

Participation in this study is voluntary and may be withdrawn at any time without negative consequences for the respondent. All information is treated as confidential and anonymity is assured by the researcher. The data shall be destroyed should the respondent wish to withdraw. The researcher (and her study leader) is the only individuals who will have access to raw data from interviews, and hereby ensure that data will be treated as stipulated above. Right of Access to Researcher: Respondents are free to contact the researcher at the telephone number as stipulated on this form, at a reasonable hour, in connection with interview particulars, if they so wish.

THANK YOU FOR YOUR PARTICIPATION IN THIS STUDY.

I, the undersigned, agree to participate in this study voluntarily without duress.

Signed aton this....day of20.....

Signature: (Print Name.....)