THE ROLE OF MOBILE PHONE TRACKING TECHNOLOGY IN CRIME PREVENTION IN KENYA: A CASE OF NAIROBI CITY COUNTY

BY

MARGARET B. APIMA
ADM NO. C160/38913/2016

A RESEARCH PROJECT SUBMITTED TO THE SCHOOL OF SECURITY AND CORRECTION SCIENCES IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF MASTER OF ARTS DEGREE IN LEADERSHIP AND SECURITY MANAGEMENT

MAY, 2019
DECLARATION

This project is my original work and has not been submitted anywhere for examination of a degree or publication

Signature  -------------------------- Date  ----------------------

MARGARET BIKUNDU APIMA

C160/38913/2016

This project has been submitted for the review with our approval as University Supervisors

1. Signature  -------------------------- Date  ----------------------

Dr. John Kandiri

Senior lecturer, Department of Computing and Information Technology

Kenyatta University
DEDICATION

To my late father Hudson Mosomi who believed in me, my husband David Apima, my children Maureen, Derrick and Michael for giving me the support to achieve my goals.
ACKNOWLEDGEMENT

First, I wish to thank the Almighty God for giving me strength and skills to write this work. I also register my thanks and appreciation to the following, my supervisors Dr John Kandiri for support, guidance and sharing expertise in writing the project and for providing the initial background of the knowledge which led me to the idea of the research problem. My colleagues’ students who availed themselves occasionally to discuss and share ideas on the content of the project.

May God bless you all.
TABLE OF CONTENT

DECLARATION ........................................................................................................ ii
DEDICATION ........................................................................................................ iii
ACKNOWLEDGEMENT ......................................................................................... iv
TABLE OF CONTENT ........................................................................................... v
LIST OF TABLES .................................................................................................... ix
LIST OF FIGURES .................................................................................................. x
OPERATIONAL DEFINITION OF TERMS ............................................................ xi
LIST OF ABBREVIATIONS AND ACRONYMS ..................................................... xii
ABSTRACT .............................................................................................................. xiii

CHAPTER ONE: INTRODUCTION ........................................................................... 1
  1.1 Background of the Study ................................................................................. 1
  1.2 Statement of the Problem .............................................................................. 4
  1.3 Purpose of the Study ..................................................................................... 5
  1.4 Research Objectives ..................................................................................... 5
  1.5 Research Questions ...................................................................................... 5
  1.6 Significance of the Study .............................................................................. 6
  1.7 Scope of the Study and Limitations ............................................................... 6
  1.8 Assumptions of the Study ............................................................................ 7

CHAPTER TWO: RELATED LITERATURE REVIEW ............................................. 8
  2.0 Introduction .................................................................................................. 8
  2.1 Theoretical Perspective ............................................................................... 8
    2.1.1 Crime Pattern Theory ........................................................................... 8
    2.1.2 Information systems success model ..................................................... 10
  2.2 Empirical Framework .................................................................................. 11
2.2.1 Perceived Usefulness of Mobile Phones by Police Officers .................................. 13
2.2.2 Mobile Phone Tracking Techniques and Mapping Crime .................................. 16
2.2.3 Ease of use of Phone in Crime Prevention ....................................................... 20
2.2.4 Mobile Phone tracking to gather evidence for prosecution ................................ 22
2.3 Conceptual Framework ......................................................................................... 26
2.4 Gaps in the Literature Review ............................................................................. 27

CHAPTER THREE: RESEARCH METHODOLOGY ....................................................... 28
3.1 Introduction ........................................................................................................... 28
3.2 Research Design .................................................................................................. 28
3.3 Site of the Study .................................................................................................. 29
3.4 Population ........................................................................................................... 29
3.5 Sample Size and Sampling Techniques ............................................................... 30
3.6 Data Collection .................................................................................................... 31
3.6.1 Validity ............................................................................................................ 31
3.6.2 Reliability ........................................................................................................ 33
3.7 Piloting ................................................................................................................ 33
3.8 Data Processing and Analysis ............................................................................. 34
3.10 Ethical Considerations ....................................................................................... 35

CHAPTER FOUR ........................................................................................................ 38
ANALYSIS AND PRESENTATION OF RESEARCH FINDINGS ................................. 38
4.1 Introduction ......................................................................................................... 38
4.1.1 Response Rate ............................................................................................... 38
4.2 Respondents Background Information ................................................................. 39
  4.2.1 Respondents Rank .......................................................................................... 39
  4.2.2 Gender of Respondents ................................................................................ 40
  4.2.3 Age of Respondents .................................................................................... 40
  4.2.4 Respondents Level of Education ................................................................ 41
  4.2.5 Respondents Marital Status ........................................................................ 42
  4.2.6 Respondents Academic qualification ........................................................... 42
4.3 Perceived Usefulness of Mobile Phones by Police Officers .............................. 43
4.4 Mobile Phone Tracking Techniques and Mapping Crime to Prevent Crimes ...... 46
4.5 Ease of use of Mobile Phone in Crime Prevention ............................................. 50
4.6 Mobile Phone Tracking To Gather Evidence for Prosecution............................ 52
4.7 Inferential Statistics .......................................................................................... 54
  4.7.1 Correlation Analysis .................................................................................... 54
  4.7.2 Regression Analysis ................................................................................... 56
4.8 Summary of the Findings ................................................................................... 59
4.9 Interpretation of Findings .................................................................................. 61

CHAPTER FIVE ......................................................................................................... 63
DISCUSSION, CONCLUSION AND RECOMMENDATIONS .......................... 63
  5.1 Introduction .................................................................................................... 63
  5.2 Summary of the Findings ............................................................................... 63
  5.3 Conclusions ................................................................................................... 65
  5.4 Recommendations ......................................................................................... 67
5.5 Areas of Further Study ........................................................................................................ 67

REFERENCES ................................................................................................................................. 69

APPENDIXES ................................................................................................................................. 75
  Appendix I: Letter to the Respondent ......................................................................................... 75
  Appendix II: Questionnaire ........................................................................................................... 76
  Appendix III: Work Plan ................................................................................................................ 81
  Appendix IV: Budget ....................................................................................................................... 82
  Appendix V: Approval letter of research proposal ........................................................................ 83
  Appendix VI: Research Authorization Letter ............................................................................... 84
  Appendix VII: NACOSTI Letter .................................................................................................... 85
  Appendix VIII: Research Permit .................................................................................................... 86
LIST OF TABLES

Table 3. 1 Sample size ........................................................................................................31
Table 4.1 Response Rate ....................................................................................................38
Table 4.2 Distribution of Respondents by their Rank .......................................................39
Table 4.3 Distribution of Respondents by their Age .........................................................40
Table 4.4 Use of Mobile Phone Technology ......................................................................45
Table 4.5 Perceived Usefulness of mobile Phone ..............................................................45
Table 4.6 Crime Mapping Analysis ..................................................................................49
Table 4.7 Negative Impact on Use Mobile Phone Technology in Crime Mapping ...........50
Table 4.8 Calls from Emergency Phone Numbers .............................................................51
Table 4.9 Ease of Use of Phone Numbers Use in Crime Prevention .................................52
Table 4.10 Mobile Phone Tracking On Evidence for Prosecution ....................................54
Table 4.11 Correlation Matrix ..........................................................................................55
Table 4.12 Model Summary .............................................................................................57
Table 4.13 ANOVA ............................................................................................................58
Table 4.13: Regression Coefficients ................................................................................58
LIST OF FIGURES

Figure 4.1 Composition of Respondents by their Gender .................................. 40
Figure 4.2 Distribution of Respondents by their Level of Education ...................... 41
Figure 4.3 Distribution of Respondents by their Marital Status ............................ 42
Figure 4.4 Distribution of Respondents by their Academic qualification .................. 42
Figure 4.5 Mobile Phone Crime Mapping .......................................................... 47
Figure 4.6 Geographic Reference on Crime Data Used ......................................... 47
Figure 4.7 Training in Mobile Phone Technology Crime Mapping Techniques ........ 48
Figure 4.8 Emergency Phone Numbers ............................................................. 51
Figure 4.9 Mobile Phone Tracking ................................................................. 53
OPERATIONAL DEFINITION OF TERMS

**Cell Phone Tracking Systems:** These are systems that check the location of a mobile system. The identification of the location does not require the consent, request or involvement of the same user.

**Mobile Phone Tracking:** This refers to the determination of the specific location of a mobile phone device whether or not it is stationary.
### LIST OF ABBREVIATIONS AND ACRONYMS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOI</td>
<td>Digital Object Identifier</td>
</tr>
<tr>
<td>GPS</td>
<td>Global Positioning System</td>
</tr>
<tr>
<td>ICT</td>
<td>Information and Communications Technology</td>
</tr>
<tr>
<td>IS</td>
<td>Information Systems</td>
</tr>
<tr>
<td>LBS</td>
<td>Location Based Services</td>
</tr>
<tr>
<td>PC</td>
<td>Personal Computer</td>
</tr>
<tr>
<td>TAM</td>
<td>Technology Acceptance Model</td>
</tr>
<tr>
<td>TPB</td>
<td>Theory of Planned Behaviour</td>
</tr>
<tr>
<td>TRA</td>
<td>Theory of Reasoned Action</td>
</tr>
<tr>
<td>UTAUT</td>
<td>Unified Theory of Acceptance and Use of Technology</td>
</tr>
</tbody>
</table>
ABSTRACT

Traditionally, the prevention of crime has been the main aim of the police organizations since the start of the first modernized police agency. Technology today has greatly advanced and police officers can now, through mobile tracking technology, locate all calls received at the ICT command center and in turn know the exact location where there is distress and respond as required. The study sought to the role of Mobile Phone Tracking Technology in crime prevention and how if embraced it can help the national police service in the prevention of all crimes. Specifically, the study sought to examine the perceived usefulness of mobile phones by the police officers in crime prevention in Nairobi City County; to analyze how mobile phone tracking techniques help in mapping crime to prevent crimes in Nairobi City County; to investigate how the ease of use of mobile phone by police officers helping crime prevention in Nairobi City County; to establish how mobile phone tracking can be used to gather evidence for prosecution in Nairobi City County and to come up with best ways in which mobile phone tracking technology can be used in crime prevention in Nairobi city county. The study design was descriptive incorporating both qualitative and quantitative techniques. From the target population of 694 police officers serving in Langata and Embakasi divisions; the researcher targeted 208 respondents from all the cadres of regular police. Questionnaires were utilized in collecting the Primary data. Quantitative and qualitative methods were used to analyze the data and presented in form of tables and charts. The study found that respondents used mobile phone tracking technology to a great extent in crime prevention. The study also found out that the drops in crime rates was due to the willingness of people to contact law enforcement agencies using their cell phones, hence, improving response time of police units. The study also found that many police departments did not have mobile phone crime mapping and that the crime data used in their departments contained geographic reference. Majority of the police had received training on mobile phone technology crime mapping techniques. However, crime mapping analysis was conducted as needed though some factors impacted on respondent’s ability to use mobile phone technology in crime mapping effectively. The study further found out that police officers had functional free emergency phone numbers known to the public and which the police often received calls from the public. The study also found out that mobile phone tracking was used to gather evidence for prosecution. The study concludes that cell phones applications contributed extensively in compacting crime activities as it contributed to drop in major crimes. The study further concludes that majority of classification techniques established to predict crime prone areas are indeed more accurate. The study further concludes that mobile phones allowed the sharing of information with the police on crime issues instantly (real time) and they were also used to prove a case in the court of law. The study recommends that in order to help law enforcement officers to have a deep understanding and proper attitude in regards to usage of IT as policing tools, there needs to be an awareness program put in place. This will give details on the optimistic features of utilizing computers for policing purposes.
CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

A mobile phone is a portable device used for communication which does not require the use of a landline. According to Custers (2012), a mobile phone is fitted with software that enables people to track other cell phone user’s location without them knowing. The mobile phone tracking technology includes applications such as WhatsApp, snap chart, Instagram, SMS text messages, Facebook, call logs, multimedia file access among others (Walnycky, Baggili, Marrington, Moore & Breitinger, 2015). Many organizations around the world including the police use mobile phone tracking to prevent crime because it is cheap and available in the market. Many countries in the world including Kenya, the law requires that individuals register their mobile phone SIM cards immediately on purchase. The registration will enable the law enforcement and service providers to track the owner more easily in case of need (GoK, 2014).

According to Rossmo (2017), crime mapping involves a process where geographic information is used in conducting special analysis of crimes and other issues related to the police. Crime prevention is one of the main functions performed by the police officers worldwide. It is a pro-active approach which entails activities such as patrols, beats, collection of intelligence, surveillance and investigation of crimes (Durrant 2013).

Traditionally, the prevention of crime has been one of the main aims of police organizations dating back to the introduction of the first modernized police agency (Boba, 2014). Since the beginning of the 20th century, police in the United States have focused on three key operational strategies. These involve the prevention and control of
crime, random preventive patrol geared towards rapid response to citizens using call-for-service and the prompt investigations of criminal offenses (Brown, 2014).

Technology today has greatly advanced police officers can now through mobile tracking technology locate all calls received at the ICT command center and in turn know the exact location where there is distress and respond as required. At the same time the tracking aspect today is used to collect evidence that is intended for prosecution by linking the suspect to the crime through mobile tracking technology (Quarshie 2014).

Today, police officers receive information through the emergency call numbers and in Kenya we have 112/999 through which members of the public report cases such as murder, kidnapping assaults, robbery with violence, sexual assaults, accidents, stealing gender based violence, disasters among other crimes (Santos, 2014). Other than receive calls of distress from victims of crime, the Kenya police service utilizes free emergency phone numbers such as 112/999 and various hot lines to communicate with the public and from this calls they are also able to locate and map out the areas hence crime mapping, however little is known on how the use of 112/999 emergency lines through mobile tracking is assisting the police in preventing crime (Kenya National Police Service, 2016).

In Kenya Mobile phone technology has been underutilized in crime prevention. According to Koper, Lum, Willis, Woods & Hibdon, (2015), Mobile phone technology can be used to track criminals withdrawing money from bank accounts as a way of crime prevention. To overcome insecurity cases in Kenya, Quarshie (2014) indicated the
agencies of law enforcement can maximize on the use of mobile phone tracking technology in various areas. Custers (2012) for instance observed that police agencies may use the technology to track criminals who abduct or kidnap victims. This also to a greater extent may minimize the use of police resources which would have been otherwise incurred in travelling to bond the attendance of witnesses. Mobile phone tracking may also be used to link suspects to a crime and secure conviction meaning it can be used to collect evidential materials from the applications on the mobile phone for example Facebook, WhatsApp, call logs, videos, pictures just to name a few (criminal case 15 of 2010) however little is known and hence the need for the study to understand how mobile phone tracking can be helpful to police in gathering evidence for prosecution in Nairobi City County. There have been many cases of insecurity in Kenya hence this study sought to investigate whether mobile technology has been effectively applied to detect and deter crime in Nairobi City County.

In addition, little research has examined the influence of mobile phones in crime prevention. Studies that have been done are more generalized and do not specifically focus on mobile phones tracking. For example, Ferguson (2015) looked at technological innovations that can be used in preventing crime which was a study that was reviewed on the process of implementation and its influence. This study was a review of broad area in technological innovation with no clear focus. Therefore the study failed to capture the role of mobile phones tracking in crime prevention. Yet the mobile phone is a basic tool that is widely used all over the world. However little research has been carried out to find out the role of mobile phones tracking in crime prevention (Brown, 2015). In addition it
was a review of research and not an empirical study. In this study empirical field study was conducted to establish the role of mobile phone tracking technology in crime prevention in Kenya and more so in Nairobi City County. Klick, MacDonald and Stratmann (2012) also did a study on mobile phones in the prevention of crime as a relationship that has not been appreciated. Evidently research remains limited on the role of mobile phone tracking technology in crime prevention in Kenya and more so in Nairobi City County.

1.2 Statement of the Problem
Mobile phone tracking technology has been used by police officers in Kenya for more than a decade. The common emergency numbers used by the members of public in distress are 112 and 999. Police officers too also issue out their mobile phone contacts to the members of public to contact them in case of distress. Few studies have been done on the influence of mobile phone tracking technology in prevention of crime such as; Brown (2015) who looked at innovations in technology in preventing crime and policing. Klick, MacDonald & Stratmann (2012) also did a study on the prevention of crime as a relationship that has not been acknowledged. Evidently research remains limited on the role of mobile phone tracking technology in crime prevention in Nairobi City County. There have been many cases of insecurity in Kenya hence this study sought to investigate whether mobile technology has been effectively applied to detect and deter crime in Nairobi. This study specifically sought to establish the role of mobile tracking in crime prevention and aims to bridge this gap in Nairobi City County.
1.3 Purpose of the Study

The aim of this study was to explore the role of Mobile Phone Tracking Technology in crime prevention and how if embraced it can help the national police service in the prevention of all crimes.

1.4 Research Objectives

i. To examine the perceived mobile phones usefulness by the police officers in crime prevention in Nairobi City County.

ii. To analyze how mobile phone tracking techniques help in mapping crime to prevent crimes in Nairobi City County.

iii. To investigate how mobile phone ease of use by police officers helping crime prevention in Nairobi City County.

iv. To establish how mobile phone tracking can be used to gather evidence for prosecution in Nairobi City County.

v. To come up with best ways in which mobile phone tracking technology can be used in crime prevention in Nairobi City county.

1.5 Research Questions

i. What the mobile phones perceived usefulness by the police officers in crime prevention in Nairobi City County?

ii. How can mobile phone tracking techniques help in mapping crime to prevent crimes in Nairobi City County?

iii. How does the ease of use of mobile phone by police officers help in crime prevention in Nairobi City County?
iv. How is mobile phone tracking used to gather evidence for prosecution in Nairobi City County?

v. What are the best ways that mobile tracking technology can be used to prevent crime?

1.6 Significance of the Study

This study specifically sought to establish the role of mobile tracking in crime prevention and aims to bridge this gap in Nairobi City County. The study therefore would be of great importance to the Government of Kenya in coming up with appropriate strategies and policies for combating crime in the country. The national police service and the network service providers would also benefit from the outcomes of the research in coming up with strategies of cooperation in the passage of crucial information necessary for locating criminals. Other researchers and other academicians would use the results of this study as a reference document especially those advancing in the area of use of mobile tracking technology in crime prevention and it would add theory and practice to the existing knowledge.

1.7 Scope of the Study and Limitations

The study targeted National Police Service where the employees were the main focus points. Hence, the collection of data came from the employees who were considered very knowledgeable on the subject. The study sought to establish the role of mobile phone tracking technology in fighting and prevention of crime in Kenya.

The researcher expected hindrances while conducting the study. The researcher experienced uncooperative respondents. To counter this challenge, the researcher
obtained an introduction letter from the university indicating the purpose of the study. Also, the researcher ensured cooperation from the respondents by assuring them that the information they were providing was confidential.

The researcher expected that the respondents were likely to be biased in providing information. This in effect compromised the reliability and objectivity of the research. This limitation would be overlooked by analyzing the population that was sampled and the reason for conducting the study so as to provide a sense of assurance that they would not be subjected to victimization on the basis of information they provide.

1.8 Assumptions of the Study

The study assumed that the respondents cooperated enough to give the required information. This assumption disregards the fact that most of them usually have busy schedules at work and time to fill the questionnaire could be regarded as wasted. The researcher also assumed that selected respondents were willing to give information as sought by the study. The researcher further assumed that there was adequacy of resources, time and the target population intended to facilitate data collection, and that the information collected was a representation of the whole for inference. Finally, the researcher assumed that the data collected from the respondents was credible and reliable to be analyzed.
CHAPTER TWO: RELATED LITERATURE REVIEW

2.0 Introduction

According to Koper, Lum & Hibdon (2015), Information and communications technology (IT) has transformed the way people live, work, learn, and interact with each other. At a time when criminal dealings have become more sophisticated and modern aspects in crime activities have developed, equipment’s and technological aspects being utilized by law enforcement agencies in compacting such activities have also been enhanced. Therefore, the study objective was to determine the level at which mobile phone tracking technology is being applied as a strategy by Kenya police in compacting crimes activities in Nairobi City County.

2.1 Theoretical Perspective

2.1.1 Crime Pattern Theory

Crime pattern theory was founded and published in Environmental Criminology book by two Environmental criminologists Patricia and Paul Brantingham in 1981. This theory aims to establish how criminals target and execute criminal acts during their day to day dealings. The fact that insurgent violence is operationally and mechanically similar as normal crime, crime pattern theory can be utilized in unveiling how criminals target and execute criminal opportunities in the course of their day to day dealings. Crime pattern theory suggest that chances for criminal violence doesn’t always happen arbitrarily rather insurgents frequently look for these opportunities (Koper & Hibdon, 2015). Additionally, the Crime pattern theory gives an understanding about how a criminal evaluates these crime chances and wisely decide to execute them. This theory mainly links crime
mapping as from the insurgent pattern and law enforcement officers are in a position to map areas of crime out and strategize how to go about containing the mapped hot spots.

Crime pattern theory contains three main elements: paths, nodes, and edges. Nodes refers to areas that an individual frequently visits such as places of work, home, and recreational places. As Eck & Weisburd, (2015) affirms, the space surrounding these nodes is seen to be an activity space and such is a sub-element of an individual’s general space of awareness. In activity space, individuals undertake those things they usually do such as work, engage in insurgent activities, socialize live, or even commit crime. Normally, Paths are the major routes that individuals use in moving across these nodes. Therefore, insurgents and criminals seek for crime targets and opportunities around their activity nodes as well as along the paths between them. On the other hand, Edges are considered to be the borders of the areas within which criminal’s lives and operates. As Grossberg (2014) puts it, certain sorts of attacks are in most cases expected to take place at the edges, such as sectional insurgency between different ethnic groupings.

At the edges, majority of violent crimes occur there because individuals from various activity spaces meet there. Deutsch (2015) stated that the edges are more significant since a clear distinction between outsiders and insiders exists. Outsiders considers it safer to attack at the edges and there after return into their own areas whereas insiders in most cases carry their attacks within their activity spaces. De la Calle & Sánchez-Cuenca (2015) argue that, selecting a target mostly depended on predictable passage ways used by criminals to operate between their normal, day to day activity nodes. Therefore,
attacks are in most cases likely to happen where the awareness space of the criminal cut across a suitable target.

In this survey, crime pattern theory is applicable as it suggests that criminal might come across these crime opportunities far from their major paths, though they consider conducting their daily operations in areas they are more conversant with due to the fact that the risk and effort necessary to conduct an attack increases the more a criminal moves further from his/her activity space. Deutsch (2015) further asserts that, individual criminal or a gang of criminals usually conduct attacks when a sparking an event avails and when they are able to locate a victim or a target that properly fits within an attack pattern. Future actions relating to insurgent’s attack usually change over time since criminals continually revise their attack patterns based upon their continuing experience other than being assumed to be constant every time. This is also referred to as scripting, and thus one of the key objectives of countering criminals should involve rewriting criminal’s script through introduction of failure into their operations.

2.1.2 Information systems success model

After reviewing previous studies conducted, DeLone & McLean (1992) presented a comprehensive grouping of factors leading to proper performance of information systems. On examining the Information Systems (IS) literature, the authors categorized success measures into six key categories: data quality, singular effect, framework quality, hierarchical effect, use, and client fulfillment.
Various surveys conducted including (DeLone & McLean, 2016; Gorla & Somers, 2014) majoring on the model validity. The studies established that a significant link exists between the organizational influence, the quality of information, the influence of the individual, the satisfaction levels of the consumer and the quality of the system and the use. Provided that the use of the system is on a voluntary basis, it is measured based on the level of frequency of time, use, usage pattern, frequency of access, and the dependency. Individual influences are measured based on the decision-making performance and job performance. The quality of the system is measured according to the ease of use, reliability, functionality, flexibility, portability, data quality, integration and importance. The individual influences are measured the same way the job performance and the work environment are measured. The quality of information is measured according to the level of accuracy, completeness, timeliness, consistency and relevance (Xinli, 2015).

The theory is applicable to the study as it reveals the importance and link between the quality of information, system quality, user satisfaction, and user, organizational and individual influence. This implies that the variables have been linked in order to adopt and utilize the mobile technology to prevent crime. These influences must cater for the individual influences such as the traffic police officer and therefore achieve an organizational influence of preventing crime.

2.2 Empirical Framework

Crime prevention is a concept that has been applied in various ways in combatting crime problem. Crime prevention has been utilized to denote both activities (e.g. strategies
and/or crime prevention programs) as well as results (e.g. lower crime levels in the society and/ or lower degrees of offending or re-offending by persons). Boyle (2015) suggests that, various scholars have scrutinized the role/influence of formal social control mechanisms in the name of crime prevention (e.g. the restrictive police effects, courts of law, and corrections centers) as well as the informal social control techniques, which also have some influence (through techniques like commitment, attachment as well as involvement) of peers, family members, society, work, school, and the religion).

Additionally, various crime prevention strategies have been subjected to various target levels (primary, secondary, tertiary) and on the individual need (i.e. private actions), parochial (actions by neighborhood group residents), and public actions (i.e. calling police officers) to avert crime (Lim, Song, Chung, Rim & Lee, 2013). In order to understand crime prevention, one require to have both the intention as well as the consequences. Various measures need to be considered beyond the traditional number of criminal events or offenders. The level of harm that has been prevented and the number of victims harmed are other additional factors to put into consideration (Buitrago, 2015). A comprehensive crime prevention definition can be examined in regards to few factors especially crime reduction factors (e.g., gang membership or dropping out of high school).

As Maguire (2014) stated crime prevention is nowadays being used to both criminal justice-based initiative as well as non-criminal justice-based initiatives. The key emphasis revolves around utilization of technological mobile phone tracking to either avert crime (in specific places) or avert re-offending by particular groups of criminals (e.g. mentally
ill offenders and sex offenders). That doesn’t depend entirely on traditional actions such as police (arrest), courts (prosecution), and/or corrections.

2.2.1 Perceived Usefulness of Mobile Phones by Police Officers

Cazzulino, Burke, Muller, Arbogast & Upperman, 2014) conducted a study on mobile phone in policing and established that the application of mobile phone agencies mandated with enforcing law was on the rise. The study concluded that mobile phones offered police units with proper ways of getting to know what their citizens say about the crime and other events.

Another study carried out by Transportation Research Board, (TCRP) (2014) on the uses of mobile phones in public transportation in Washington, D. C., established that text messages were mostly utilized in providing riders with information such as fares and services but the same was scarcely being used in conveying information concerning the implementation of reporting suspicious or criminal activities. Despite the fact that a survey conducted by the LexisNexis Risk Solutions which majored mostly on social media as an investigative tool established that 22 percent of those agencies mandated with enforcing law and order use social media platforms for imploring crime tips. However, gaps have been identified after a review of the current literature as there doesn’t exist and particular method for measuring the effectiveness of utilizing mobile phone applications and platforms of social media.

Pell & Soghoian, (2014) on his article detailing the impact of cell phones on crime in USA indicated that various agencies mandated with enforcing law and order were in
agreement that cell phones applications contributed extensively in compacting crime activities. San Diego Police Department which is amongst these agencies fully supported cell phone application as it contributed to drop in major crimes by at least 4.7%. In Oregon also, there was a substantial rise in arrests made regarding hit-and-run accidents as other motorists are able to capture the license number plates of the offenders using their cell phones or even, read them off to 911 dispatchers. The article also suggests that police attributed the drops in crime rates to the willingness of people to contact law enforcement agencies using their cell phones, hence, improving response time of police units.

Weinstein, Drake & Silverman (2015) postulates that using mobile phone devices for vehicle tracking systems helps police departments to gain information on real-time and thus helping them operate more efficiently. However, despite the effectiveness in police work, there are various privacy issues brought about by the use of GPS by police as it can result in legal battles especially where some police officers don't follow appropriate procedures.

According to Hendricks (2013) supporters of cell tower location, is that when a call is made through a mobile phone, it tends to transmit a radiofrequency signal to the nearest tower. In order to establish which, tower the phone connected to at a particular time, investigators will look at phone records. On locating the particular tower that received the signals, investigators will easily establish the geographical range of that tower. The investigators will thus conclude that the phone as well as the making of the call were within that range of the tower when the call was made. According to Rutgers and Van der
Meer (2010) the use of the three different calls in order to come up with an overlapping area that resembles the Venn diagram that produces a small location which proves to be more reliable compared to the single tower method. Despite its accuracy, the GPS data is not readily available. For this reason, law enforcers traces the phone call, locate the tower, determine the tower range and wait to establish whether the suspect’s cellular phone data places him at or near the crime scene at the appropriate time.

Despite the fact that there is no significant relationship between general mobile phone technology use and crime fighting compacting, the overall productivity of law enforcers increases when their adaptation to using mobile phone technology rises (Losavio & Keeling 2014). To achieve more productivity in utilizing mobile phone technology, law enforcement agencies just like other organizations do they merge these technologies and their organizational practices to yield appropriate results. Therefore, the utilization of cell phone technology is a significant factor influencing the overall police work (Colvin and Goh 2015).

George (2015) suggested that police officers should make use of all information technologies resources available when setting up portals to merge their decentralized databases given the fact that the police department might strongly demand a database that makes it possible for them to share crime records organizations in the judicial area. However, it is interesting to note that criminals are also IT professionals where they utilize their knowledge to commit more crimes while at the same time establishing more targets. For instance, drug dealers were the early criminals to make utilize pagers and cell phone technologies.
Kata (2018) demonstrated how a consumer version of the Apple IPad and an Android tablet were modified for use by police officers in the field. In fact, IPads, tablets, and a variety of smartphones were used to push data to police officers in the field. This practical application demonstrates that departments are using tablets and smartphones in daily police workflows. This trend is not likely to end as departments seek to maximize efficiency through the use of mobile technology.

Madakam & Date (2016) conducted a research on security mechanisms for connectivity of smart devices in the internet of things. The study established that there was doubt with regards to the effectiveness of strategies applied. For instance, in a Kansas City Preventive Patrol Experiment, a survey was conducted on the effectiveness of strategies. The findings indicated that the patrol coverage did not have an influence on the crime, citizen’s fear of crime and other outcomes. Other findings include the quick response of traditional calls for service did not have an influence in preventing the probability of the occurrence of the crime. It also did not increase the likelihood of catching the offender (Paterson & Glass, 2015). Other studies provide evidence that there are an increasing number of officers which does not improve on the reduction of crime by the police (Hatry, 2014).

2.2.2 Mobile Phone Tracking Techniques and Mapping Crime

Bazzell (2016) conducted a study on mapping and detecting crime prone areas based on improved attribute oriented induce clustering and established that majority of classification techniques established to predict crime prone areas are indeed more
accurate. The final outcome of the study model provides for the improvement of spatial and temporal crime data aimed at creating dependable crime forecasting.

Sanders and Henderson (2013) conducted a study on the accuracy of hotspot maps for forecasting spatial patterns of crime differs between various types of crime and found out that crime hotspot mapping forecast abilities vary between the various techniques and also vary by crime type. According to study, kernel density estimation method was consistent and thus outperformed other techniques whereas street crime hotspot maps consistently predicted accurately where future street crime would take place in comparison to results obtained from other hotspot maps of different crime types.

According to Sanders, Weston and Schott (2015) mobile positioning may also include location-based services that provides the actual cell phone coordinates. Such technology is usually utilized by telecommunication firms to approximate the mobile phone location. Therefore, their locating technology is based on measuring power levels as well as antenna patterns and utilizes the mechanism that a powered mobile phone always communicates wirelessly with one of the closest base stations, so knowledge of the location of the base station implies the cell phone is nearby this can also be used to analyze and plan for the future crime prevention.

Using MapInfoSimpson (2014) pooled a grid reference with text-based search to ascertain the risk of victimization. Burglary techniques, points of entry, availability of vehicles, and victims’ data especially their age, ethnicity and gender constituted the crime data. Their Geographic Information System (GIS) permit data searches to be performed
utilizing a standard query language input as well as patented programming languages (e.g. Map Basic) permitting most of the functions and queries. The initial search established that every location where more than one burglary had been reported had also been recorded through the selection of entire record with at least one similar geographical location. Crimes such as personal robberies and assaults which normally take place in the street are assigned grid reference through address point of the building nearby known to the system (Sterling, 2016). The ability to graphically plot all the locations for visualization problem selected on a map as well as the combined ability to select repeats around a given geographical characteristic especially city center or road junction are the key advantages of using a GIS over a standard database package.

Within Nottingham, United Kingdom Woodlock (2015) utilized GIS to embark on repeat victimization identification. This is an attempt intended to avoid the various problems which one comes across when digging up non geographic database to extract repeat victimization records. To greatly improve the chances of an accurate ‘hits’ a geographical reference is utilized when probing for repeat victimizations incidents, despite the fact that the accuracy of the geo-reference is the most depended on as well as the frequency at which the system is put up to date in order to be at par with. Neff and Dawn (2016) analyzed crime incident data using the Merseyside Address Referencing System (MARS) which is the basic unit for the command, control and system of reporting crime occurrences utilized by police in Merseyside.

The perception of Crimes prone areas in England, South Nottingham were analyzed by Muncie (2014) using MapInfo. The police investigation officer’s perceptions of crime
hotspots were combined with hotspot identification survey data. Crime hotspots were plotted, covering motor vehicle theft and domestic and non-domestic burglary. Based on their South Nottingham crime hotspot knowledge, officers were requested to point out the location of any crime hotspots. The estimates were then mapped. The outcome indicates that police officers’ accuracy was fairly high in mapping out areas prone to domestic and non-domestic burglary, but were less accurate in identifying motor vehicle crime hotspots. Utilizing the results of the analysis, the local area crime information dissemination as well as crime recording practices was all reviewed.

Saunders, Hunt and Hollywood (2016) in their survey analyzed the domestic burglaries in (District 4 of the Police Department) Shreveport, La, and United States. Based on the data obtained from January 1998, a total of 58 burglaries were reported. Their study revealed that, the analysis of the crime was essential in order to ensure proper deployment of law enforcement officers which is a significant plan aimed at reducing burglary activity. Also, the analysis was significant so as to establish whether there is any geographic location concentrated with burglaries and also to establish if their occurrence timing of day or night. Using MapInfo, the map analysis, included residential total day and night burglaries, day time, the frequency of reporting, date, address, as well as other bulletin information comprising of things stolen, key suspect, and the mode of entry.

Making use of Shreveport police directed patrol unit, the districts community liaison officers, and the district 4 patrol personnel an operational plan was designed based on the map information. Ferguson (2016) additionally suggest that, more information was given to the patrol captain by detective and intelligence units who also worked closely with
police officers to locate suspects. The results which indicated that the highest burglaries concentration were based near a high school was reliable to what the information maps acknowledged a possible juvenile truancy problem in the area. To avert this problem, more resources were set aside and mobilized for the identified target. The absenteeism problem in this high school area was corrected, suspects involved in burglary arrested and more intelligence was collected for further use.

2.2.3 Ease of use of Phone in Crime Prevention

Frank & Brantingham (2012b) conducted a research in Washington, D.C majoring on those individuals who reported crimes which were serious. This survey was similar to another one referred to as 'Response Time Analysis conducted by Kansas City Police Department’s. The study capitalized on delays by citizens in reporting various crimes to police in New York, Peoria, Jacksonville, Florida, Calif, Rochester and San Diego. The survey which was conducted in interview form involved at least four thousand victims’ bystanders and eye witnesses involving at least three thousand three hundred serious crimes especially rape cases, robbery with violence, assault, motor theft, larceny and burglary. The study outcomes were similar to that of the Kansas City survey which indicated that delays by citizens to report crimes on time made it impossible for police to make arrest at the scene of crime. Also, the study conclusion elaborated that delay by citizens further reduced police efforts since their response time did not substantially influence the arrest rates.

Delays by citizens to report crime is appropriate to worry about only in the event where the individual himself is being involved as the crime is taking place. In such events, the
swift reporting to the police plus the swiftness of police response time rises the likelihood of arresting the criminals at the scene of crime or near its proximity. However, some of the noted reasons as to the delay by citizens in reporting crimes to police include uncertainty as to whether the crime is being committed or not and not being aware of police emergency number. Other reasons included giving fast priority in helping the crime victims, conflict between individuals as to call police or not, miss-communicating between the caller and the person at the other end of the phone.

Solymosi, Bowers and Fujiyama (2015) performed a survey aimed at analyzing relationship that existed between response times in relation to arrest of criminal at the scene of crime. The study sought to establish whether availability of witness, satisfaction of citizens as well as the frequency that citizens will be injured as a result of crime and non-crime cases. The survey outcome specified that crime reporting time was longer compared to either dispatching call time as well as time taken to travel and make a call and that was almost longer as both time to travel to a call and dispatch to a call combined. For most of the crimes which were revealed after it had already taken place, time to respond to the same was revealed to not relating to any possibility of arresting the perpetrators or even locating a witness. For rimes which had a witness or involving the actual victim, time taken to report was found to be strongest determinant that arrest could be made.

According to Oduor, Acosta & Makhanu (2014) when companies considers the user features of their staffs, the corresponding use of IT can also increase. Additionally, the survey indicated that the law enforcement officers’ attitude towards utilization of
computers is very significant as it influences the utilization of IT as a policing tool. The study recommended that in order to help law enforcement officers have a deep understanding and proper attitude in regards to usage of IT as a policing tool, an awareness program detailing the optimistic features of utilizing computers in policing should be conducted.

Custers (2012) revealed that agencies involved in enforcing law and order did their best to incorporate technological aspects in investigating crimes prosecution processes despite the fact that majority of them are not satisfied. Given the fact that majority of police officers lack proper understanding of the new technology, they therefore prefer to continue utilizing the prevailing technology as opposed to the new one. However, it is yet to be established as to which technology is utilized most and more effective in regards to police departments (Custers 2012). In this case, one cannot precisely establish which is the major issue affecting the use of new technology might it be insufficient budget or lack of knowledge and experience. A critical review as well as proper understanding is significant for learning and understanding these barriers.

2.2.4 Mobile Phone tracking to gather evidence for prosecution

William and Aasheim (2013) conducted a research on mobile solution for metropolitan crime detection and reporting in Ghana and found out that the key issue hampering crime detection as well as reporting is in appropriate communication platform between the police and the members of the public. This is because police and members of general public lack appropriate platform that is sufficient for real time communication on matters regarding crime activities, criminal suspects as well as those being investigated for
committing various insurgencies in the community. Lack of readily accessible information of crime trends in major towns and cities was also a key setback to public security needs. In the paper, a mobile infrastructure for detecting, reporting and tracking down criminal perpetrators utilizing cell phones was proposed. The infrastructure was centered on the client-server architecture; allowing real time communication between members of general public and police officers on matters related to crimes.

Lim, Song, Chung, Rim & Lee (2013) conducted a study on forensic evidence collection procedures of smartphone in crime scene and established that smartphone evidence could play a significant role in proving criminal charges in investigation matters involving criminal accident. The study provides that the items and forensic procedures which a forensic investigator using smartphone should capture when it takes place, searches and verifies the Smart phone in the accident scene taking into account features of the Smart phone and launches a criminal related search database and indicate what form of evidential aspects for criminal charge are possible to be collected through the implemented applications taking into account the categorized database.

Wolfe, Marcum, Higgins & Ricketts (2016) argued that the information stored on cell phone data bases could easily be helpful in addressing critical investigation questions such as establishing the person one has been in contact with, what they communicated about as well as their location for instances, those accused of sexual harassment might have used a cell phone to communicate with their victims, share videos and photos and entice their victims thus providing a sufficient digital cyber trail which investigators can very easily follow.
Taylor (2016) argues that since mobile devices especially smart phones are currently an important part of majority of individuals’ day to day lives, such devices are therefore likely to be used in facilitating crimes activities as well being used when crimes are being perpetrated. Given the fact that mobile phone is the most personal computing device one has, it therefore provides a computer in one’s pocket that can be effectively be used (Hendricks, 2013). A mobile phone belongs to a single individual as opposed to other devices like laptops, game machine and servers which might have more than one user. Despite their size, mobile phone devices might contain vital personal data including text messages, videos, call history, photos, e-mails, address books, credit card details, and calendar items (Welsh, 2018).

Usually, mobile phone devices can be used in various ways such as communication, photo sharing, social media networking, blogging, notes taking, accessing internet, recording and playing videos among others (Manning 2013). Data transfer between individuals has also been facilitated as a result of advancement in technology especially digital videos and thus the computing power of mobile devices allows users to utilize them the same way they used computers in the last decade. The user of mobile phone can easily be located at any time owing to the fact that these devices are portable as they fit in pocket or bag hence users carry them whenever they are (Ferguson, 2016). Therefore, the advancement of mobile computing and communication technology provides criminal and investigators with alike opportunities.

Lotterhos & Whitlock (2015) in their study established a detailed technique of addressing the problem associated with collecting full forensic images for large drives through
selective imaging in terms of resources and related costs by selecting data to image at the collection phase. For not undertaking analysis of a full forensic image, normally the legal standards of relevance and reasonableness are raised to address this concerns. However, it could be contended that since the arising variance relates to days or hours both in civil or criminal perspective, it could be considered reasonable to fully take bit-for-bit image and then undertake the analysis utilizing every available and possibly significant data. Therefore, the planned framework maintains full imaging and analysis steps, with the collection been reduced while review steps are incorporated to allow assisting and supporting the analysis fully instead of replacing it.

According to observations made by Grossberg (2014), they established that digital forensics subject matter continuously evolves as well as the techniques as unlike other forensic sciences. Relying on prevailing evidence collected in relation to processes and procedures would render it potentially reckless given the modern advancement in technology (Boyle 2015). They further assert that, in the absence of computer instructions, both modern and traditional media storage devices can operate under their own volition. However, traditionally recoverable data might be easily destroyed by such operations.
2.3 Conceptual Framework

Source: Adopted from Technology Adoption Mode

Use of Mobile Phone Tracking Technology in Crime Prevention
- Crime detection
- Crime investigation
- Crime Prosecution
- Efficiency of police officers

Dependent variable

Internet connectivity

Government policies

Training on mobile tracking

Government policies

Training on mobile tracking

Use of Mobile Phone Tracking Technology in Crime Prevention
- Crime detection
- Crime investigation
- Crime Prosecution
- Efficiency of police officers

Dependent variable
2.4 Gaps in the Literature Review

According to Manning, (2013), federal, local and state policing units seems to have been transformed by various changes involving soft and hard technology of policing in various significant ways. However, some researchers are not fully convinced as they raise questions on the need to understand what and by how much has changed. Paterson & Glass (2015) performed two key study reviews of technology and the police and in their recommendation they described this change process, reviewed the evidence of its influence on police practices and results, and discussed the consequences of technological alterations in policing for the general public. Both Manning (2013) and Kata (2018) conclude in similar way that there hasn’t been any significant improvement in police work performance as a result of them using technology. Related conclusions touching on insignificant of police technological advancement in their work performance have been concluded by other scholars who have also undertaken a deep review of the available studies touching on modern technological advancement on police performance (Whittaker, 2012). However, none of these mentioned studies has been conducted in Kenya hence this survey aims to address the following study questions: How can mobile phone tracking technology be used to detect crimes in Kenya? How can mobile phone tracking technology are used to deter commission of crime in Kenya? How can mobile tracking technology be used to gather evidence in Kenya? And how can the use of mobile tracking technology are used to improve crime prevention in Kenya?
CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

The section details the several stages and phases which were undertaken to complete this survey. In this chapter, study identified the techniques and procedures utilized in data collection, data processing as well as data analysis. In this regard, the following areas were addressed; methods of collecting data, design of the study, and analysis of the data.

3.2 Research Design

The study employed a descriptive research design. Descriptive research described data and characteristics about the population or phenomena being studied. Descriptive research answers the questions who, what, where, when and how (Creswell & Creswell, 2017). The descriptive design is ideal as the study sought to describe the role of mobile phone tracking technology in crime prevention. There are two forms of descriptive research designs, the longitudinal survey and the cross-sectional survey design.

The study adopted the cross-sectional survey design which involves the collection of data at one point in time unlike the longitudinal survey aims to collect data for a long duration of time from the same respondents. The cross-sectional survey design was appropriate as the researcher collected information from respondents within a specified period of time. The study also incorporated the exploratory research design.

For the attainment of the objectives, it was essential that the respondents owned subjective perspectives are captured. Chandran (2014) describes research design as an
understanding of conditions for collection and analysis of data in a way that combines their relationships with the research to the economy of procedures. Krishnaswamy (2018) suggests that research design deals with the detailing of procedures adopted to carry out the research study. Borg & Gall (2015) on the other hand give the purpose of descriptive research as determining and reporting the way things are.

3.3 Site of the Study

Selection of the sampling location is an important aspect of any particular study activity. Site of the study is concerned with where geographically the survey is located and the reasons why the site is preferred; while at the same time considering legal, ethical and cultural aspects (Lotterhos & Whitlock, 2015). Nairobi area was specifically considered for this study because of the role the mobile phones are playing in crime prevention, the vulnerability of the area to crime and high concentration of police stations within the Nairobi City County. The area has 18 police stations distributed among various administrative units. Nairobi being the capital and the largest city in Kenya presents a wide variety of technological needs in crime prevention necessitated by high population. In East Africa, Nairobi is the most populous city with approximately three million inhabitants as per the 2009 census (GoK, 2016). The study was carried out in two divisions in Nairobi City County. These are Langata and Embakasi as they are densely populated and the rate of crime is also high.

3.4 Population

The population of interest comprised of 38,921 police officers serving within Nairobi City County (Vigilance House, July, 2016).
3.5 Sample Size and Sampling Techniques

The survey used purposive sampling technique to select two divisions from the eight divisions in Nairobi City County. These are Langata and Embakasi as they are densely populated and the rate of crime is also high. The study then used stratified random sampling technique to select the nine cadres of the police: police constables; corporal; sergeants; senior sergeants; inspectors; chief inspectors; assistant superintendents; superintendents and senior superintendents from the two divisions. Stratified random sampling is a sampling technique that divides the target population into smaller units called strata.

The cadre of the officer was used to form the strata while performing the stratified random sampling. A sample picked randomly form each stratum was considered in a number proportional to the stratum's size when compared to the population. Random sample was then formed by pooling together the subsets of these strata. Saunders et al., (2016) suggested that a good sample is about 10%-30% of the accessible population. From the target population of 694 police officers serving in Langata and Embakasi divisions; the researcher targeted 30% respondents from all the cadres of regular police, contributing to a total of 208 respondents as presented in the below table.
<table>
<thead>
<tr>
<th>Rank</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC</td>
<td>176</td>
</tr>
<tr>
<td>CPL</td>
<td>8</td>
</tr>
<tr>
<td>SGT</td>
<td>6</td>
</tr>
<tr>
<td>S/SGT</td>
<td>2</td>
</tr>
<tr>
<td>IP</td>
<td>4</td>
</tr>
<tr>
<td>C.I</td>
<td>2</td>
</tr>
<tr>
<td>ASP</td>
<td>4</td>
</tr>
<tr>
<td>SP</td>
<td>4</td>
</tr>
<tr>
<td>SSP</td>
<td>2</td>
</tr>
<tr>
<td>TOTAL</td>
<td>208</td>
</tr>
</tbody>
</table>

3.6 Data Collection

Questionnaires were utilized in collecting the Primary data. Part I of the questionnaire contained demographic data of the respondents while part II contained data on the study objectives. Both open and closed questions were used to design the questionnaires where they were ranked through a 5-point type Likert scale as specified in appendix. In order to encourage participation and ensure there was uniformity in responses collected, close-ended questions were utilized. Moreover, to encourage study participants to give deep details concerning the study question, then open-ended questions were used. All the respondents were assured of strict confidentiality to the information they diverge so as to enhance their response rate. The questionnaire was administered on a drop and pick basis.

3.6.1 Validity

According to Adamides, Papachristos & Pomonis, (2012), validity refers to the meaning and accuracy of the survey implications that are centered on the survey results. The instrument’s validity can be considered as the extent the instrument actually reveals the theoretical construct being surveyed (Csikszentmihalyi & Larson, 2014). The overall
validity of a survey depends on various types of the validity. Content validity is concerned with addressing the extent to which the items established to provide a satisfactory and illustrative sample of the entire items might be considered to be of interest. The judgment of the study professionals in the field usually determines content validity due to the fact that there exists no statistical test that can be used to determine whether a measure sufficiently covers a content area or sufficiently represents a construct. Questions developed based on the literature review were used to achieve the content validity of this study.

Internal validity majors on the degree of certainty that observed effects in an experiment are really the experimental treatment result or condition (the cause), other than extraneous, intervening, or confusing variables. By controlling all other variables, the Internal validity was been enhanced. Researcher assessed study contents validity so as to ensure questionnaire accuracy was increased by randomly selecting facilitators who in turn discussed the whole questionnaire randomly. In order to enhance the validity, the comments obtained from these facilitators were reviewed first before being incorporated in the questionnaire.

On the other hand, external validity was concerned with the degree to which the survey findings were utilized in the real world beyond the survey controlled settings. This is the aspect of generalizability. However, attempting to increase internal validity are likely to definitely reduce external validity due to the fact that the study is conducted in a manner that is increasingly different from the real world. Selecting an extensive survey sample ensured that External validity was achieved.
3.6.2 Reliability

Noble and Smith (2015) defines reliability as the degree of consistency to which study instruments measures an attribute. Higher level of reliability is observed where there is less variation being produced by study instrument after repeated measurements. A relationship usually exists between validity and reliability. In this regard, a study instrument lacking validity cannot possibly be relied upon.

The variables of the study internal consistency were assessed using the Reliability analysis. Cronbach’s Alpha Coefficient was computed in order to asses and measure the study reliability after which the general assessment was given (Polit & Hungler, 2013). The higher the alpha coefficient value of Cronbach’s alpha coefficient which ranges between 0 and 1 the more reliable the instrument is. A high alpha coefficients suggest that a questionnaire has a good internal consistency i.e. All items indicating a Cronbach’s alpha coefficient of 0.7 or more are regarded to be reliable. The homogeneity of items should be reflected by a single construct measuring an Individual item which should produce highly correlated results. Chronbach’s alpha which usually tests all possible split halves was used to test this. A correlation coefficient greater or equal to 0.7 was accepted.

3.7 Piloting

A pretest of study instruments were arranged at Machakos County by the researcher where surveyed instruments already prepared for the research were issued to 21 (10%) of the respondents. To remove any ambiguity and ensure clarity of the question, respondent’s answers to the survey question were recorded and analyzed and any
problems were corrected or the question were all together removed from the study list. This was essential in ensuring that the study question and instruments were polished which in turn enhanced survey validity and reliability.

3.8 Data Processing and Analysis

According to Yan, Wang, Zuo, & Zang (2016), quantitative analysis is the numerical manipulation and representation of the research observations to describe and explain the phenomena that those observations reflect. Data processing entails interpreting the answers on provided on the questionnaire to a new form that can be worked on to produce statistics (Hyndman 2013). Data processing entails data editing, data coding, data entry as well as monitoring the entire data processing procedure. Data analysis was directed by objectives and goals of the research as well as data collected measurement in order to determine the patterns revealed in the data collected regarding the selected variables.

Data was analyzed through quantitative and qualitative techniques. The quantitative analysis involved the use of numeric measures to evaluate the objectives of the study. The numerical values were assigned to questionnaire responses and subjecting the same responses to the SPSS software. The analysis was then done based on descriptive statistics. The researcher then used the mean, mode, frequency and percentages to describe the data sets. Data was presented inform of tables and charts.

To establish the relationship, a regression was established. For each role of mobile phone tracking technology, an overall mean was determined and matched with the overall mean
of crime prevention. From this relationship, the model was generated to determine the relationship. The regression equation assumed the following form

\[ Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon \]

Where;

\( Y = \) Crime Prevention
\( X_1 = \) Perceived usefulness
\( X_2 = \) Ease of Use
\( X_3 = \) Tracking Techniques
\( X_4 = \) Prosecution
\( \varepsilon = \) error term.
\( \beta_0 = \) the constant which is the value of dependent variable when all the independent variables are 0.
\( \beta_1 - \beta_4 = \) the regression coefficient or change induced by \( X_1, X_2, X_3 \) and \( X_4 \) on \( Y \). It determines how much each \( X_1, X_2 \) and \( X_3 \) contributes to \( Y \) (Crime Prevention)

3.10 Ethical Considerations

Ethical considerations are a moral stance that entails conducting survey aimed at achieving both the high professional standards of technical procedures as well as maintaining respect and protection for the respondents who willingly contested to participate in the survey (Churchill & Iacobucci, 2010). At all stages of the research, professional ethical standards were noted and observed.
The research proposal was submitted to Kenyatta University to seek permission to undertake the survey. The researcher also sought consent from the National Council of Science and Technology to carry out the study. Voluntary participation and informed consent was obtained from the respondents, and a guarantee was given to them that their responses were only used for the stated purposes. In addition, the privacy and confidentiality of the respondents and their information were upheld and secured. Data and information obtained from other people’s work in the literature review were acknowledged professionally. Lastly, the researcher was bound by law to consider the risks involved in the research and disclose them to the potential respondents so that they could make informed decisions concerning whether to be involved in the study or not (Coolican, 2013).

From the beginning to the conclusion of the survey all relevant procedures were adhered to. These included; permission to undertake the survey to was obtained from relevant authorities. The sensitivity of the research topic was considered by the researcher while designing instruments to be used in data collection by determining what was permissible and not permissible. Thereafter, the consent of the participants was obtained which suggest that the principle of informed consent guided the survey. Voluntary participation was granted to the respondents. Also, in order to get the respondents consent, the researcher explained the objectives and goals of the survey prior to collecting data. The findings of the survey were made known as the anticipated outcomes were shared with various relevant institutions especially policy makers, participating institutions and the information centers. The information collected was treated with confidentiality and was
used only for study work. In the final report, the participant’s identity was withheld in order to protect them and the respondent’s answers was structured well to avoid those that could breach the respondents’ confidentiality. Acts of misconduct especially plagiarism and data fabrication were avoided by the researcher.
CHAPTER FOUR

ANALYSIS AND PRESENTATION OF RESEARCH FINDINGS

4.1 Introduction

This chapter presents the findings of the study, as set out in the research methodology. It outlines the study findings in line with the research objectives using descriptive statistics and the association between the study variables using inferential statistics. The results are presented on the role of mobile phone tracking technology in crime prevention in Kenya: a case of Nairobi City County.

4.1.1 Response Rate

The response rate of the police officers serving within Nairobi City County is presented in Table 4.1.

<table>
<thead>
<tr>
<th>Response</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responded</td>
<td>156</td>
<td>75</td>
</tr>
<tr>
<td>Not Responded</td>
<td>52</td>
<td>25</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>208</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Source: Researcher, 2018

Findings show that 156 out of the targeted 208 police officers responded to the questionnaires representing an overall response rate of 75%. This response rate was sufficient and representative and conforms to Bloomberg, Cooper, & Schindler, (2011) who indicated that a response rate of 50% is adequate while a response rate of 70% and over is excellent for analysis and reporting.
4.2 Respondents Background Information

This section presents the demographics of the respondents’ and their background information.

4.2.1 Respondents Rank

Table 4.2 Distribution of Respondents by their Rank

<table>
<thead>
<tr>
<th>Rank</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC</td>
<td>73</td>
<td>46.8</td>
</tr>
<tr>
<td>CPL</td>
<td>38</td>
<td>24.4</td>
</tr>
<tr>
<td>SGT</td>
<td>14</td>
<td>9.0</td>
</tr>
<tr>
<td>S/SGT</td>
<td>7</td>
<td>4.5</td>
</tr>
<tr>
<td>IP</td>
<td>14</td>
<td>9.0</td>
</tr>
<tr>
<td>C.I</td>
<td>8</td>
<td>5.1</td>
</tr>
<tr>
<td>ASP</td>
<td>2</td>
<td>1.3</td>
</tr>
<tr>
<td>Total</td>
<td>156</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: Researcher, 2018

Findings in Table 4.2 show that majority of the respondents who were the majority (47%), were in the PC rank, 24% were in the CPL rank, 9% were in the SGT and IP ranks, 5% were in the C.I and S/SGT whereas 1% were in the ASP rank. This shows that majority of the police officers who responded to the questionnaire were PCs.
4.2.2 Gender of Respondents

Figure 4.1 Composition of Respondents by their Gender

According to Figure 4.1, 76% of the police officers who were the majority were male while 24% were female. This thus depicts that most of the police officers serving within Nairobi City County are of male gender.

4.2.3 Age of Respondents

Age of the respondent’s was evaluated and presented as below;

Table 4.3 Distribution of Respondents by their Age

<table>
<thead>
<tr>
<th>Age</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-30 years</td>
<td>51</td>
<td>32.7</td>
</tr>
<tr>
<td>31-40 years</td>
<td>64</td>
<td>41.0</td>
</tr>
<tr>
<td>41-50 years</td>
<td>40</td>
<td>25.6</td>
</tr>
<tr>
<td>above 51 years</td>
<td>1</td>
<td>.6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>156</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Source: Researcher, 2018
Table 4.3 illustrates that 41% of the respondents who were the majority were between 31 and 40 years, 33% were between 20 and 30 years, 26% were between 41 and 50 years while 1% were above 51 years. This depicts that the police officers had experience for a number of years and so were equipped to respond to the study questions.

4.2.4 Respondents Level of Education

Figure 4.2 Distribution of Respondents by their Level of Education

<table>
<thead>
<tr>
<th>Level</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-Level</td>
<td>13%</td>
</tr>
<tr>
<td>O-Level</td>
<td>85%</td>
</tr>
<tr>
<td>CPE</td>
<td>2%</td>
</tr>
</tbody>
</table>

Source: Researcher, 2018

The tabulations show that; majority of the respondents as presented by 85% possessed an O-level certificate at the time of enlistment, 13% possessed an A-level certificate at the time of enlistment while 2% possessed a CPE certificate at the time of enlistment. This findings shows that the respondents were literate and thus could effectively respond to the questionnaire.
4.2.5 Respondents Marital Status

Figure 4.3 Distribution of Respondents by their Marital Status

Source: Researcher, 2018

As per the response, 80% of the respondents who were the most were married, 16% were single, and 3% were widowed while 1% were either divorced or separated. The study shows that majority of the police officers serving within Nairobi City County are married.

4.2.6 Respondents Academic qualification

Figure 4.4 Distribution of Respondents by their Academic qualification

Source: Researcher, 2018
Figure 4.4 illustrates that majority of the respondents who were the majority 34%, had college education as their highest academic qualification while 33% had university and secondary education as their highest academic qualification. This shows that the police officers were qualified in their field of work and thus effectively understood the role of mobile phone tracking technology in crime prevention in Kenya.

4.3 Perceived Usefulness of Mobile Phones by Police Officers

The first objective of the study was to examine the perceived mobile phones usefulness by the police officers in crime prevention in Nairobi City County. The respondents were provided with Likert scale rate questionnaires; 1= Never; 2= rarely; 3=sometimes; 4= often and 5= very often. The data was analyzed using descriptive statistics; mean and standard deviation and presented in frequency table based on the objectives.

Findings showed that respondents used mobile phone technology often to a great extent as shown by an average score of 3.75 in that; they located suspects, wanted persons, and other persons of interest to a great extent as shown by a mean score of 3.96, the productivity of the police increased when the adaptation to using mobile phone technology rose to a great extent as shown by a mean score of 3.87, information quality and timeliness were the components of mobile phone technology that were effective in terms of achieving the acceptance by patrol officers to a great extent as shown by a mean score of 3.85, checking the history of specific locations or person(s) before responding to calls for service to a great extent as shown by a mean score of 3.82.
Sharing information with community leaders or business owners to a great extent as shown by a mean score of 3.78, identifying crime trends and problems in their area of responsibility to a great extent as shown by a mean score of 3.77, locating vehicles of interest to a great extent as shown by a mean score of 3.77, focusing the activities of their personnel on specific locations that had the most problems to a great extent as shown by a mean score of 3.76.

Determining where to patrol when not answering calls for service to a great extent as shown by a mean score of 3.73, determining what to do about crime trends and problems in their areas of responsibility to a great extent as shown by a mean score of 3.69, determining how to respond to crime problems to a great extent as shown by a mean score of 3.68 and collecting, searching for information during field interviews to a great extent as shown by a mean score of 3.61 and mobile phones offered police ways to listen to the citizens and hear what was being said about the police, crimes, the quality of life, and events to a great extent as shown by a mean score of 3.55. The responses are presented in table 4.4 below.
### Table 4.4 Use of Mobile Phone Technology

<table>
<thead>
<tr>
<th>Statement</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile phones offered police a way to listen to the citizens and hear</td>
<td>3.55</td>
<td>1.263</td>
</tr>
<tr>
<td>what is being said about the police, crime, the quality of life, and</td>
<td></td>
<td></td>
</tr>
<tr>
<td>events</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The productivity of the police increases when the adaptation to using</td>
<td>3.87</td>
<td>1.067</td>
</tr>
<tr>
<td>mobile phone technology rises</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information quality and timeliness are the components of mobile phone</td>
<td>3.85</td>
<td>.935</td>
</tr>
<tr>
<td>technology that are effective in terms of achieving the acceptance by</td>
<td></td>
<td></td>
</tr>
<tr>
<td>patrol officers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identify crime trends and problems in your area of responsibility.</td>
<td>3.77</td>
<td>1.075</td>
</tr>
<tr>
<td>Determine what to do about crime trends and problems in your area of</td>
<td>3.69</td>
<td>1.081</td>
</tr>
<tr>
<td>responsibility.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Focus the activities of my personnel on specific locations that have the</td>
<td>3.76</td>
<td>.971</td>
</tr>
<tr>
<td>most problems.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Share information with community leaders or business owners.</td>
<td>3.78</td>
<td>.952</td>
</tr>
<tr>
<td>Determine where to patrol when not answering a call for service.</td>
<td>3.73</td>
<td>1.084</td>
</tr>
<tr>
<td>Locate suspects, wanted persons, and other persons of interest.</td>
<td>3.96</td>
<td>.976</td>
</tr>
<tr>
<td>Locate vehicles of interest.</td>
<td>3.77</td>
<td>1.013</td>
</tr>
<tr>
<td>Collect and search for information during a field interview.</td>
<td>3.61</td>
<td>1.086</td>
</tr>
<tr>
<td>Determine how to respond to a crime problem.</td>
<td>3.68</td>
<td>1.001</td>
</tr>
<tr>
<td>Check the history of a specific location or person(s) before responding</td>
<td>3.82</td>
<td>.937</td>
</tr>
<tr>
<td>to a call for service.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>48.84</strong></td>
<td><strong>13.441</strong></td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>3.75</strong></td>
<td><strong>1.033</strong></td>
</tr>
</tbody>
</table>

**Source: Researcher, 2018**

The respondents were further asked to indicate the extent to which they agreed with the following statements relating to perceived usefulness of mobile phone in crime prevention.

The tabulations showed that respondents agreed on statements related to perceived usefulness of mobile phone in crime prevention to a great extent as shown by an average score of 3.83 in that; mobile phones had made the Crime Prevention by the police easier to a great extent as shown by a mean score of 4.03, mobile phones had made the storage
of sensitive information as evidence for prosecution easier to a great extent as shown by a mean score of 3.87, mobile phones had made crime mapping possible to a great extent as shown by a mean score of 3.84, mobile phones had safeguarded the information of criminals being investigated to a great extent as shown by a mean score of 3.74 and mobile phones had made gathering evidence for prosecution more legible to a great extent as shown by a mean score of 3.69. The responses are presented in table 4.5 below.

Table 4.5 Perceived Usefulness of mobile Phone

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A mobile phone has made the Crime Prevention by the police easier</td>
<td>4.03</td>
<td>3.394</td>
</tr>
<tr>
<td>A mobile phone has made gathering evidence for prosecution more legible</td>
<td>3.69</td>
<td>1.013</td>
</tr>
<tr>
<td>A mobile phone has made the storage of sensitive information as evidence for prosecution easier</td>
<td>3.87</td>
<td>.939</td>
</tr>
<tr>
<td>A mobile phone has made crime mapping possible</td>
<td>3.84</td>
<td>1.084</td>
</tr>
<tr>
<td>A mobile phone has safeguarded the information of criminals being investigated</td>
<td>3.74</td>
<td>1.052</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>19.17</td>
<td>7.482</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>3.83</td>
<td>1.496</td>
</tr>
</tbody>
</table>

Source: Researcher, 2018

4.4 Mobile Phone Tracking Techniques and Mapping Crime to Prevent Crimes

The second objective was to analyze how mobile phone tracking techniques help in mapping crime to prevent crimes in Nairobi City County. The study established that 71% of the police departments currently did mobile phone crime mapping as indicated in figure 4.5 below.
The study also established that crime data used in the departments contained geographic reference as shown by 55% of the respondents whereas 45% indicated that the crime data used in their departments did not contain geographic reference as indicated in figure 4.6 below.

**Figure 4.6 Geographic Reference on Crime Data Used**

Source: Researcher, 2018
On training in mobile phone technology crime mapping techniques, 51% of the respondents indicated that they had received training on mobile phone technology crime mapping techniques while 49% indicated that they had not received training on mobile phone technology crime mapping techniques as indicated in figure 4.7 below.

**Figure 4.7 Training in Mobile Phone Technology Crime Mapping Techniques**

Source: Researcher, 2018

On how often respondents conducted crime mapping analysis the study found out that crime mapping analysis was conducted as needed as shown by majority (46%) of the respondents, 24% indicated that they conducted crime mapping analysis on a monthly basis, 14% indicated that they conducted crime mapping analysis on a weekly basis, 11% indicated that they conducted crime mapping analysis on a daily basis whereas 5% indicated that they did not conduct crime mapping analysis as shown by table 4.6 below.
Table 4.6 Crime Mapping Analysis

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily</td>
<td>17</td>
</tr>
<tr>
<td>Weekly</td>
<td>22</td>
</tr>
<tr>
<td>Monthly</td>
<td>38</td>
</tr>
<tr>
<td>As needed</td>
<td>71</td>
</tr>
<tr>
<td>Not Applicable</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>156</td>
</tr>
</tbody>
</table>

Source: Researcher, 2018

The study also aimed at analyzing the extent to which respondents had a negative impact on the ability to use mobile phone technology in crime mapping effectively. The results showed that some factors impacted on their ability to use mobile phone technology in crime mapping effectively as shown by an average score of 3.49. Limited support from superiors negatively impacted on respondents’ ability to use mobile phone technology in crime mapping effectively to a great extent as shown by a mean score of 3.65.

Limited working knowledge on how mapping was used in the field negatively impacted on respondents ability to use mobile phone technology in crime mapping effectively to a great extent as shown by a mean score of 3.64, limited financial resources negatively impacted on respondents ability to use mobile phone technology in crime mapping effectively to a moderate extent as shown by an average score of 3.49.

Limited training opportunities negatively impacted on respondents’ ability to use mobile phone technology in crime mapping effectively to a great extent as shown by a mean score of 3.36 and limited mobile phone technologies negatively impacted on respondents’ ability to use mobile phone technology in crime mapping effectively to a great extent as shown by a mean score of 3.33. The results are shown in table 4.7 below.
Table 4.7 Negative Impact on Use Mobile Phone Technology in Crime Mapping

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limited mobile phone technologies</td>
<td>3.33</td>
<td>1.080</td>
</tr>
<tr>
<td>Limited financial resources</td>
<td>3.49</td>
<td>1.155</td>
</tr>
<tr>
<td>Limited training opportunities</td>
<td>3.36</td>
<td>.977</td>
</tr>
<tr>
<td>Limited working knowledge on how mapping is used in the field</td>
<td>3.64</td>
<td>1.174</td>
</tr>
<tr>
<td>Limited support from superiors</td>
<td>3.65</td>
<td>1.038</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>17.47</strong></td>
<td><strong>5.424</strong></td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>3.49</strong></td>
<td><strong>1.084</strong></td>
</tr>
</tbody>
</table>

Source: Researcher, 2018

4.5 Ease of use of Mobile Phone in Crime Prevention

The third objective was to investigate how mobile phone ease of use by police officers helping crime prevention in Nairobi City County. The study established that the police has functional free emergency phone numbers known to the public as shown by 67% of the respondents who were the majority whereas 33% indicated that they did not have functional free emergency phone numbers known to the public. The results are shown in figure 4.8 below.
Figure 4.8 Emergency Phone Numbers

Source: Researcher, 2018

On how often respondents received calls from the public using free emergency phone numbers, 30% of the respondents who were the majority indicated that they sometimes and often received calls from the public using free emergency phone numbers, 22% indicated that they very often received calls from the public using free emergency phone numbers, 10% indicated that they never received calls from the public using free emergency phone numbers while 8% indicated that they rarely received calls from the public using free emergency phone numbers. The results are shown in table 4.8 below.

Table 4.8 Calls from Emergency Phone Numbers

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never</td>
<td>16</td>
<td>10.3</td>
</tr>
<tr>
<td>Rarely</td>
<td>12</td>
<td>7.7</td>
</tr>
<tr>
<td>Sometimes</td>
<td>47</td>
<td>30.1</td>
</tr>
<tr>
<td>Often</td>
<td>47</td>
<td>30.1</td>
</tr>
<tr>
<td>Very often</td>
<td>34</td>
<td>21.8</td>
</tr>
<tr>
<td>Total</td>
<td>156</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: Researcher, 2018
On the ease of use of phone numbers use in crime prevention, respondents agreed with statements related to ease of use of Phone Numbers use in Crime Prevention to a great extent as shown by an average score of 3.69 in that; mobile phones allowed the public to share information on crime with the police instantly (real time) to a great extent as shown by a mean score of 3.92, mobile phones were used to prove a case in the court of law to a great extent as shown by a mean score of 3.74, mobile phones are easier to use by the police in the prevention of crimes to a great extent as shown by a mean score of 3.59 and the police officers were well trained in using mobile phones to map crimes to a great extent as shown by a mean score of 3.53. The results are shown in table 4.9 below.

**Table 4.9 Ease of Use of Phone Numbers Use in Crime Prevention**

<table>
<thead>
<tr>
<th>Statement</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A mobile phone is easier to use by the police in the prevention of crimes.</td>
<td>3.59</td>
<td>1.157</td>
</tr>
<tr>
<td>The police officers are well trained in using mobile phones to map crimes</td>
<td>3.53</td>
<td>1.143</td>
</tr>
<tr>
<td>A Mobile Phone Allows The Public To Share Information On Crime With The Police At The Instantly (Real Time)</td>
<td>3.92</td>
<td>.937</td>
</tr>
<tr>
<td>A mobile phone is used to prove a case in the court of law</td>
<td>3.74</td>
<td>1.046</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>14.78</strong></td>
<td><strong>4.283</strong></td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>3.69</strong></td>
<td><strong>1.070</strong></td>
</tr>
</tbody>
</table>

Source: Researcher, 2018

**4.6 Mobile Phone Tracking To Gather Evidence for Prosecution**

The fourth objective was to establish how mobile phone tracking can be used to gather evidence for prosecution in Nairobi City County. Majority (71%) of the respondents indicated that they used mobile phone tracking to gather evidence for prosecution in their line of duty while 29% did not use mobile phone tracking to gather evidence for prosecution in your line of duty. The results are shown in figure 4.9 below.
On the extent to which respondents agreed on statements related to mobile phone tracking to gather evidence for prosecution, respondents agreed to a great extent as shown by an average score of 3.95 in that; the information stored on cell phone data bases was helpful in addressing critical investigation questions to a great extent as shown by a mean score of 4.27, mobile phone devices contained vital personal data including text messages, videos, call history, photos, e-mails provided evidence during prosecution to a great extent as shown by a mean score of 3.96, the advancement of mobile computing and communication technology provided investigators with good opportunities to prove a case during prosecution to a great extent as shown by a mean score of 3.86 and smartphone evidence played a significant role in proving criminal charges in investigation matters involving criminal accident to a great extent as shown by a mean score of 3.74. The results are shown in table 4.10 below.
Table 4.10 Mobile Phone Tracking On Evidence for Prosecution

<table>
<thead>
<tr>
<th>Description</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smartphone evidence could play a significant role in proving criminal charges in investigation matters involving criminal accident</td>
<td>3.74</td>
<td>1.046</td>
</tr>
<tr>
<td>The information stored on cell phone data bases could easily be helpful in addressing critical investigation questions</td>
<td>4.27</td>
<td>4.185</td>
</tr>
<tr>
<td>Mobile phone devices contain vital personal data including text messages, videos, call history, photos, e-mails which could provide evidence during prosecution</td>
<td>3.96</td>
<td>0.904</td>
</tr>
<tr>
<td>The advancement of mobile computing and communication technology provides investigators with good opportunities to prove a case during prosecution</td>
<td>3.86</td>
<td>0.895</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15.83</strong></td>
<td><strong>7.030</strong></td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>3.95</strong></td>
<td><strong>1.757</strong></td>
</tr>
</tbody>
</table>

Source: Researcher, 2018

4.7 Inferential Statistics

Inferential statistic is a technique that allows use of samples to make generalizations about the populations from which the samples have been drawn. Pearson’s product moment correlation analysis was used to assess the relationship between the independent variables while multiple regression $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta 3X_4 + \epsilon$ was used to determine the predictive power of the role of mobile phone tracking technology in crime prevention.

4.7.1 Correlation Analysis

Correlation is a statistical measure that determines the relationships between two or more variables or sets of variables. It also shows the level of significance of the relationship. The correlation analysis also shows the direction of the relationship between the variables and the magnitude. In this study, Pearson Product moment correlation was used to
determine the relationship between independent variables and the dependent variable.

Table 4.11 indicates the correlation matrix between independent variables and dependent variable.

**Table 4.11 Correlation Matrix**

<table>
<thead>
<tr>
<th></th>
<th>Crime Prevention</th>
<th>Perceived usefulness</th>
<th>Ease of Use</th>
<th>Tracking Techniques</th>
<th>Prosecution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crime Prevention</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived usefulness</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td></td>
<td>.611**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td>.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td></td>
<td>156</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ease of Use</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>-.144</td>
<td>.251</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.317</td>
<td>.079</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>156</td>
<td>156</td>
<td>156</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tracking Techniques</td>
<td></td>
<td>.581**</td>
<td>-.234</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>.000</td>
<td>.031</td>
<td>.102</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.318</td>
<td>.934</td>
<td>.427</td>
<td>-.061</td>
<td>.676</td>
</tr>
<tr>
<td>N</td>
<td>156</td>
<td>156</td>
<td>156</td>
<td>156</td>
<td>156</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.05 level (2-tailed).**

**. Correlation is significant at the 0.01 level (2-tailed).**

**Source: Researcher, 2018**

The table above indicates the correlation matrix between the independent variables and dependent variables. According to table 4.11, there is a very high positive relationship
between crime prevention and perceived usefulness, ease of use and tracking techniques of magnitude 0.611, 0.144 and 0.518 respectively. The positive relationship indicates that there is a correlation between the independent variables and dependent variables with perceived usefulness having the highest value and tracking techniques having the lowest correlation value. The results also reveal that there is a weak negative correlation between prosecution and the crime prevention as shown by a correlation of magnitude -0.144. This notwithstanding, two of the factors had a significant p-value (p<0.005) at 95% confidence level. The significance values for relationship between crime prevention and perceived usefulness and tracking techniques p <0.005. This implies that all the independent variables were significantly correlated with crime prevention.

4.7.2 Regression Analysis

Regression analysis is a statistical process for estimating the relationships among variables. With this analysis, one is able to understand how the typical values of the dependent variable change when one of the independent variable is varied, while the other variables are held constant/fixed. For this study, a multiple regression model was applied to identify the impact of perceived usefulness; ease of use; tracking techniques and prosecution on crime prevention and how if embraced it can help the national police service in the prevention of all crimes. The model summary provides information about the regression line’s ability to account for the total variation in the dependent variable
Table 4.12 Model Summary

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.781&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.610</td>
<td>.575</td>
<td>5.88308</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), perceived usefulness; ease of use; tracking techniques and prosecution

Source: Researcher, 2018

The findings show that the independent variables had a qualified influence on the dependent variable as shown by an Adjusted R Square =0.575. The output indicates that the strength of association between the variables is relatively high (Adjusted R Square = 0.575). The four independent variables (perceived usefulness; ease of use; tracking techniques and prosecution that were collectively studied, explain only 57.5% of the variation on crime prevention as represented by the Adjusted R Square. This therefore means that other factors not studied in this research contribute 42.5% of the variation in the crime prevention and how if embraced it can help the national police service in the prevention of all crimes.

ANOVA

Analysis of Variance (ANOVA) consists of calculations that provide information about levels of variability within a regression model and form a basis for tests of significance of the model.
Table 4.13 ANOVA

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Regression</td>
<td>2436.325</td>
<td>4</td>
<td>609.081</td>
<td>17.598</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>1557.476</td>
<td>152</td>
<td>34.611</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>3993.801</td>
<td>156</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent Variable: Crime Prevention
b. Predictors: (Constant), perceived usefulness; ease of use; tracking techniques and prosecution

Source: Researcher, 2018

In view of the results in table 4.13 above the significance value is 0.000 (which is less than <0.05) indicates that the overall model is statistically significant in predicting the role of mobile phone tracking technology in crime prevention. A P-value < 0.05, shows that the overall model was a good fit. A regression coefficient is a key output of regression analysis. It is interpreted as the proportion of the variance in the dependent variable that is predictable from the independent variable. The results are as shown in the table 4.14 below;

Table 4.14: Regression Coefficients

<table>
<thead>
<tr>
<th>Model</th>
<th>Coefficientsa</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unstandardized Coefficients</td>
</tr>
<tr>
<td></td>
<td>B</td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
</tr>
<tr>
<td></td>
<td>Perceived usefulness</td>
</tr>
<tr>
<td></td>
<td>Ease of Use</td>
</tr>
<tr>
<td></td>
<td>Tracking Techniques</td>
</tr>
<tr>
<td></td>
<td>Prosecution</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Crime Prevention

Source: Researcher, 2018
The regression function extracted using the unstandardized betas is as follows

\[
Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon
\]

\[
Y = -14.572 + 0.119 X_1 - 0.260 X_2 + 0.413 X_3 + 0.732 X_4
\]

According to the regression function, holding all factors constant at zero, the coefficient for Crime Prevention was -14.572. Perceived usefulness, Ease of Use and Tracking Techniques Tracking Techniques were found to have a significant influence on Crime Prevention (\(\beta = -0.119\), P-value (0.000<0.05), (\(\beta = -0.260\), P-value (0.001<0.041), (\(\beta = -0.236\), P-value (0.07>0.00) respectively. Prosecution values, (\(\beta = 0.732\), P-value (0.07>0.055) was determined not to significantly influence the role of mobile phones in crime prevention and how if embraced it can help the national police service in the prevention of all crimes.

4.8 Summary of the Findings

The first objective of the study was to examine the perceived mobile phones usefulness by the police officers in crime prevention in Nairobi City County. The study established that police officers used mobile phone technology to locate suspects, wanted persons, and other persons of interest. Further, productivity of the police increased when the adaptation to using mobile phone technology rose and information quality and timeliness were the components of mobile phone technology that were effective in terms of achieving the acceptance by patrol officers.
The second objective was to analyze how mobile phone tracking techniques help in mapping crime to prevent crimes in Nairobi City County. The study established that crime data used in the departments contained geographic reference and police officers had received training on mobile phone technology crime mapping techniques. However, limited support from superiors negatively impacted on respondents’ ability to use mobile phone technology in crime mapping effectively.

The third objective was to investigate how mobile phone ease of use by police officers helping crime prevention in Nairobi City County. The study established that police officers often received calls from the public using free emergency phone numbers. The study also found out that mobile phones allowed the public to share information on crime with the police instantly (real time) and the police officers were well trained in using mobile phones to map crimes.

Lastly, the fourth objective was to establish how mobile phone tracking can be used to gather evidence for prosecution in Nairobi City County. The study established that police officers used mobile phone tracking to gather evidence for prosecution in their line of duty. The information stored on cell phone data bases was helpful in addressing critical investigation questions in that mobile phone devices contained vital personal data including text messages, videos, call history, photos, e-mails provided evidence during prosecution.
4.9 Interpretation of Findings

The study provided two types of data analysis; namely descriptive analysis and inferential analysis. The descriptive analysis helps the study to describe the relevant aspects of the phenomena under consideration and provide detailed information about each relevant variable. For the inferential analysis, the study used the Pearson correlation, the multivariate regression analysis.

Correlation and regression analysis results were important in understanding the nature of the relationship of the variables and the predictive power of the proposed model. There is a very high positive relationship between Crime Prevention and perceived usefulness and ease of use of magnitude 0.611, and 0.518 respectively. The positive relationship indicates that there is a correlation between the independent variables and dependent variables with perceived usefulness having the highest value. Ease of use had an insignificant negative association with Crime Prevention. The output indicates that the strength of association between the variables is relatively high (Adjusted R Square = 0.576). The four independent variables (perceived usefulness; ease of use; tracking techniques and prosecution) that were collectively studied, explain only 57.5% of the variation in Crime Prevention as represented by the Adjusted R Square. This therefore means that other factors not studied in this research contribute 42.5% of the variation in the Crime Prevention.

Therefore, basing on these findings, the study rejected the null hypothesis that there is no relationship between mobile phone tracking technology in crime prevention and accepted
the alternative hypothesis that there exists a relationship between mobile phone tracking technology in crime prevention and how if embraced it can help the national police service in the prevention of all crimes.

These findings are in line with Rosenbaum et al, (2011) who found that the impact of cell phones on crime in USA indicated that various agencies mandated with enforcing law and order were in agreement that cell phones applications contributed extensively in compacting crime activities. San Diego Police Department which is amongst these agencies fully supported cell phone application as it contributed to drop in major crimes by at least 4.7%. In Oregon also, there was a substantial rise in arrests made regarding hit-and-run accidents as other motorists are able to capture the license number plates of the offenders using their cell phones or even, read them off to 911 dispatchers. Police also attributed that the drops in crime rates to the willingness of people to contact law enforcement agencies using their cell phones, hence, improving response time of police units.
5.1 Introduction

The objectives of the study were to examine the perceived usefulness of mobile phones by the police officers in crime prevention in Nairobi City County, analyze how mobile phone tracking techniques help in mapping crime to prevent crimes in Nairobi City County, investigate how the ease of use of mobile phone by police officers helping crime prevention in Nairobi City County, establish how mobile phone tracking can be used together evidence for prosecution in Nairobi City County and to come up with best ways in which mobile phone tracking technology can be used in crime prevention in Nairobi City County. Here, discussions of the findings are shown as well as the comparison of the findings presented in chapter four with the literature studied in chapter two.

5.2 Summary of the Findings

The study found that respondents used mobile phone technology in crime prevention. These findings are in line with Rossmo (2017) who found that the impact of cell phones on crime in USA indicated that various agencies mandated with enforcing law and order were in agreement that cell phones applications contributed extensively in compacting crime activities.

The study also found that many police departments did not have mobile phone crime mapping and that the crime data used in their departments contained geographic
reference. Majority of the police had received training on mobile phone technology crime mapping techniques. However, crime mapping analysis was conducted as needed thought some factors impacted on respondent’s ability to use mobile phone technology in crime mapping effectively. This is supported by Xiang et al.,(2010) in that mapping and detecting crime prone areas based on improved attribute oriented induce clustering and established that majority of classification techniques established to predict crime prone areas are indeed more accurate. The initial search established that every location where more than one burglary had been reported, it had been recorded through the selection of entire record with at least one similar geographical location. Crimes such as personal robberies and assaults which normally take place in the street are assigned grid reference through address point of the building nearby known to the system.

The study further found out that police officers had functional free emergency phone numbers known to the public and which the police often received calls from the public. These findings correspond with Frank & Brantingham (2012b) who contends that delays by citizens to report crimes on time made it impossible for police to make arrest at the scene of crime. Also, the study conclusion elaborated that delay by citizens further reduced police efforts since their response time did not substantially influence the arrest rates. Delays by citizens to report crime is appropriate to worry about only in the event where the individual himself is being involved as the crime is taking place. In such events, the swift reporting to the police plus the swiftness of police response time rises the likelihood of arresting the criminals at the scene of crime or near its proximity. However, some of the noted reasons as to the delay by citizens in reporting crimes to
police include uncertainty as to whether the crime is being committed or not, not being aware of police emergency number, giving fast priority in helping the crime victims, conflict between individuals as to call police or not, miss-communicating between the caller and the person at the other end of the phone.

The study also found out that mobile phone tracking was used to gather evidence for prosecution. These findings are in line with William and Aasheim (2013) who argued that the key issue hampering crime detection as well as reporting is in appropriate communication platform between the police and the members of the public. This is because police and members of general public lack appropriate platform that is sufficient for real time communication on matters regarding crime activities, criminal suspects as well as those being investigated for committing various insurgencies in the community. Lack of readily accessible information of crime trends in major towns and cities was also a key setback to public security needs.

5.3 Conclusions

From the findings of this study, we conclude that the mobile phone applications have revolutionized the crime prevention unit of the police to an extent though it still requires to be implemented fully. The use of the mobile phone in crime has been propelled by invention of various applications such as the Facebook, twitter, emails, short text messages and the WhatsApp social media platforms. This approach has eased the police officers tasks of crime prevention to a slightly great extent but still there is more that needs to be done pertaining the police officers usage of phones, personal norms (cognitive acceptance), effortlessness and the police organization management style so as
to effectively enhance the crime prevention via this platform. Police effort to use mobile technology was found to have significant effects on crime prevention.

The study concludes that cell phones applications contributed extensively in compacting crime activities as it contributed to drop in major crimes. The study concluded that the police adopted electronic Identification; police-public interface; centralized information storehouse; radio frequency identification (RFID) and electronic transport (E-Transport) systems. The police further adopted online verification and fingerprints reader; real-time Information access; closed circuit television (CCTV) and intelligent sensors systems in crime control in Nairobi County.

The study further concludes that majority of classification techniques established to predict crime prone areas are indeed more accurate. Radio Frequency Identification (RFID); Electronic Identification; Online Verification and Fingerprints Reader; Police-Public Interface; Real-time Information Access; Electronic Transport (E-Transport) and Closed Circuit Television (CCTV) were Electronic policing systems has contributed to efficiency of Crime Control in Nairobi County to a great extent.

Lastly, the study concluded that high demand and better remuneration for IT skilled in other labor markets; Lack of control when using electronic policing systems; Obsolete equipment in the workstations; Difficulties in access to the Electronic Policing systems; Inadequate training in the use of IT in the police force; Time constraint at the police’s field or workplace; Difficulties to integrate existing systems with electronic policing systems; The fear consequences of using the Electronic Policing systems and Cost of
utilization of IT resources is too high for the police force were challenges faced in implementation of Electronic Policing in Crime Control in Nairobi County.

5.4 Recommendations

From the findings of the study, we recommend the following:

i. Police officers need to be equipped with smart phones, in-serviced and training on the mobile applications usage so as to enhance efficiency in crime prevention deliberations.

ii. The police organization management ought to create a database integrating all police stations or develop a mobile application for the police personnel and a specific crime unit domain in that the retrieval of reports and access of the reported cases can be easily and securely shared in a secure platform.

iii. The police organization management needs to provide technical and financial support to the police officers to motivate them in an effort of improving their productivity and accountability.

5.5 Areas of Further Study

The outcome of this research shows a comprehensively integrated framework to understand the vibrant relationships among several dimensions of the perceived usefulness of mobile phones, mobile phone tracking techniques, ease of use of mobile phone, how mobile phone tracking can be used and best ways in which mobile phone tracking technology can be used in crime prevention. However, further research efforts
are needed to examine these factors in all the other counties since much emphasis was placed in Nairobi in order to compare findings.

A replica of this study should be carried out but this time using a larger sample, more time should be allocated to the same and a combination of focus group discussions, these will help to counter check the information provided and provide in-depth contextual data that could further deepen understanding of the role of mobile phone tracking technology in crime prevention and how if embraced it can help the national police service in the prevention of all crimes.

Further research on general public on their perceived usefulness of the mobile phone applications use in efforts to prevent crime ought to be done as crime prevention is a concerted effort by all the parties involved.
REFERENCES


APPENDIXES

Appendix 1: Letter to the Respondent

Letter to the respondent

Kenyatta University
Department of Leadership and Security Management
P.O Box 43844-00100
Nairobi

Dear Sir/Madam,

RE: YOUR INTENDED PARTICIPATION IN THE RESEARCH PROJECT

Your kind attention is drawn to aforementioned issue.

You have been carefully selected to participate in this research study entitled “The Role of Mobile Phone Tracking Technology in Crime Prevention in Kenya: A Case of Nairobi City County.” Kindly fill this questionnaire and return it to the undersigned. Any information given by you will be treated with utmost confidentiality and shall not be divulged to anybody without your express approval.

Thanks in advance for your anticipated cooperation

Yours Faithfully,

Margaret B. Apima

0720 266 419
Appendix II: Questionnaire

Section A: Demographic Data

Please select a letter for each question below:

1. What is your rank?
   - PC [ ]
   - CPL [ ]
   - SGT [ ]
   - S/SGT [ ]
   - SGT [ ]
   - CPL [ ]
   - S/SGT [ ]
   - SGT [ ]

2. What is your gender?
   - Male [ ]
   - Female [ ]

3. What is your age?
   - 20-30 years [ ]
   - 31-40 years [ ]
   - 41-50 years [ ]
   - above 51 years [ ]

4. At the time of enlistment, what was your education level?
   - CPE [ ]
   - O-level [ ]
   - A-Level [ ]

5. What is your marital status?
   - Single [ ]
   - Married [ ]
   - Widowed [ ]
   - Separated [ ]
   - Divorced [ ]

6. What is your highest present academic qualification?
   - Secondary Education [ ]
   - College Education [ ]
   - University Education [ ]
   - Others (Specify) ………………………
**Section B: Perceived Usefulness of Mobile Phones by Police Officers**

To what extent do you use mobile phone technology to do the following? Tick appropriately where 1= Never; 2= rarely; 3=sometimes; 4= often and 5= very often

<table>
<thead>
<tr>
<th>Statement</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile phones offered police a way to listen to the citizens and hear what is being said about the police, crime, the quality of life, and events</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The productivity of the police increases when the adaptation to using mobile phone technology rises</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information quality and timeliness are the components of mobile phone technology that are effective in terms of achieving the acceptance by patrol officers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identify crime trends and problems in your area of responsibility.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Determine what to do about crime trends and problems in your area of responsibility.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Focus the activities of my personnel on specific locations that have the most problems.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Share information with community leaders or business owners.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Determine where to patrol when not answering a call for service.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Locate suspects, wanted persons, and other persons of interest.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Locate vehicles of interest.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collect and search for information during a field interview.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Determine how to respond to a crime problem.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check the history of a specific location or person(s) before responding to a call for service.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

To what extend do you agree with the following statements relating to perceived usefulness of mobile phone in crime prevention?

1.-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, 5-Strongly Agree

<table>
<thead>
<tr>
<th>Perceived Usefulness of mobile Phone</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>A mobile phone has made the Crime Prevention by the police easier</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A mobile phone has made gathering evidence for prosecution more legible</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
A mobile phone has made the storage of sensitive information as evidence for prosecution easier

A mobile phone has made crime mapping possible

A mobile phone has safeguarded the information of criminals being investigated

Section C: Mobile phone tracking techniques and mapping crime to prevent crimes

Does your department currently do mobile phone crime mapping?
Yes [ ] No [ ]

Does the crime data used in the department contain a geographic reference?
Yes [ ] No [ ]

Have you received any training in mobile phone technology crime mapping techniques?
Yes [ ] No [ ]

How often do you conduct crime mapping analysis?
Daily [ ] Weekly [ ]
Monthly [ ] As needed [ ]

Rate each of the following factors according to the extent to which they have a negative impact on your ability to use mobile phone technology in crime mapping effectively where 1 = Never; 2 = rarely; 3 = sometimes; 4 = often and 5 = very often

<table>
<thead>
<tr>
<th>Statement</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limited mobile phone technologies</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Limited financial resources</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Limited training opportunities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Limited working knowledge on how mapping is used in the field</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Limited support from superiors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Section D: Ease of use of mobile Phone in Crime Prevention

Do you have functional free emergency phone numbers known to the public?

Yes [   ] No [   ]

How often do you receive calls from the public using free emergency phone numbers?

Never [   ] Rarely [   ] Sometimes [   ]
Often [   ] Very often [   ]

To what extent do you agree with the following statements relating to ease of use of Phone Numbers use in Crime Prevention? 1.-Strongly Disagree, 2.-Disagree, 3.-Neutral, 4.-Agree, 5.-Strongly Agree

<table>
<thead>
<tr>
<th>Ease of use of Phone</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>A mobile phone is easier to use by the police in the prevention of crimes.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The police officers are well trained in using mobile phones to map crimes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A Mobile Phone Allows The Public To Share Information On Crime With The Police At The Instantly (Real Time)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A mobile phone is used to prove a case in the court of law</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

How has the free emergency phone numbers contributed to crime prevention in the area?

.................................................................................................................................
.................................................................................................................................
.................................................................................................................................

Section E: Mobile phone tracking to gather evidence for prosecution

Have you ever used mobile phone tracking to gather evidence for prosecution in your line of duty?

79
Yes [ ] No [ ]

Kindly explain

..........................................................................................................................
..........................................................................................................................
..........................................................................................................................

How helpful was the information obtained from mobile phone in proving your case in the court of law?

..........................................................................................................................
..........................................................................................................................
..........................................................................................................................

To what extend do you agree with the following statements relating to Mobile phone tracking to gather evidence for prosecution? 1.-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, 5-Strongly Agree

<table>
<thead>
<tr>
<th>Evidence for Prosecution</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smartphone evidence could play a significant role in proving criminal charges in investigation matters involving criminal accident</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The information stored on cell phone data bases could easily be helpful in addressing critical investigation questions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mobile phone devices contain vital personal data including text messages, videos, call history, photos, e-mails which could provide evidence during prosecution</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The advancement of mobile computing and communication technology provides investigators with good opportunities to prove a case during prosecution</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Appendix III: Work Plan

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Proposals Writing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data collection</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Report Writing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Submission</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Review</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Publication</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix IV: Budget

<table>
<thead>
<tr>
<th>Activity</th>
<th>Amount (Kshs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) Field Work for both Pilot and Main Studies</td>
<td>40,000</td>
</tr>
<tr>
<td>(ii) Typing, Photocopying and Duplication</td>
<td>22,000</td>
</tr>
<tr>
<td>(iii) Stationeries</td>
<td>20,000</td>
</tr>
<tr>
<td>(iv) Travel Expenses</td>
<td>20,000</td>
</tr>
<tr>
<td>(v) Contingencies</td>
<td>10,200</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>112,200</strong></td>
</tr>
</tbody>
</table>
Appendix V: Approval letter of research proposal

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel 810901 Ext. 4150

Internal Memo

FROM: Dean, Graduate School
TO: Margaret Bikundu Apima
C/o Security & Correction Science Dept.

DATE: 28th June, 2018

REF: C160/38913/2016

SUBJECT: APPROVAL OF RESEARCH PROPOSAL

We acknowledge receipt of your revised Research Proposal as per our recommendations raised by the Graduate School Board of 9th May, 2017 entitled “The Role of Mobile Phone Tracking Technology in Crime Prevention in Kenya: A Case of Nairobi City County”.

You may now proceed with your Data Collection, Subject to Clearance with Director General, National Commission for Science, Technology and Innovation.

As you embark on your data collection, please note that you will be required to submit to Graduate School completed Supervision Tracking Forms per semester. The form has been developed to replace the Progress Report Forms. The Supervision Tracking Forms are available at the University’s Website under Graduate School webpage downloads.

Thank you.

ANNBELL MWANIKI
FOR: DEAN, GRADUATE SCHOOL

C.c. Chairman, Department of Security and Correction Science

Supervisors:

1. Dr. John Kandiri
C/o Department of Security and Correction Science
Kenyatta University

AM/014

83
Appendix VI: Research Authorization Letter

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 8710901 Ext. 57530

Our Ref: C160/38913/2016

DATE: 28th June, 2018

Director General,
National Commission for Science, Technology
and Innovation
P.O. Box 30623-00100
NAIROBI

Dear Sir/Madam,


I write to introduce Margaret Bikundu Apima who is a Postgraduate Student of this University. The student is registered for M.A degree programme in the Department of Security and Correction Science.

Margaret intends to conduct research for a M.A Project Proposal entitled, “The Role of Mobile Phone Tracking Technology in Crime Prevention in Kenya: A Case of Nairobi City County.”

Any assistance given will be highly appreciated.

Yours faithfully,

MRS. LUCY N. MBAABU
FOR: DEAN, GRADUATE SCHOOL
Appendix VII: NACOSTI Letter

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: +254-20-2213471, 2241143, 310571, 2219420
Fax: +254-20-318345, 318249
Email: dp@nacosti.go.ke
Website: www.nacosti.go.ke
When replying please quote

Ref: No. NACOSTI/P/18/68881/25407 Date: 11th October, 2018

Margaret Bikundu Apima
Kenyatta University
P.O. Box 43844-00100
NAIROBI

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on “The role of mobile phone tracking technology in crime prevention in Kenya: A case of Nairobi City County” I am pleased to inform you that you have been authorized to undertake research in Nairobi County for the period ending 11th October, 2019.

You are advised to report to the County Commissioner and the County Director of Education, Nairobi County before embarking on the research project.

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit a copy of the final research report to the Commission within one year of completion. The soft copy of the same should be submitted through the Online Research Information System.

BONIFACE WANYAMA
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Nairobi County.

The County Director of Education
Nairobi County.
Appendix VIII: Research Permit

THE SCIENCE, TECHNOLOGY AND INNOVATION ACT, 2013

The Grant of Research Licenses is governed by the Science, Technology and Innovation (Research Licensing) Regulations, 2014.

CONDITIONS

1. The License is valid for the proposed research, location and specified period.
2. The License and any rights thereunder are non-transferable.
3. The Licensee shall inform the County Governor before commencement of the research project.
4. Excavation, filming and collection of specimens are subject to further necessary clearance from relevant Government Agencies.
5. The License does not give authority to transfer research materials.
6. NACOSTI may monitor and evaluate the licensed research project.
7. The Licensee shall submit one hard copy and upload a soft copy of their final report within one year of completion of the research.
8. NACOSTI reserves the right to modify the conditions of the License including cancellation without prior notice.

National Commission for Science, Technology and Innovation
P.O. Box 30623 - 00100, Nairobi, Kenya
TEL: 020 400 7000, 0713 788577, 0735 484245
Email: dir@nacost.go.ke, registry@nacost.go.ke
Website: www.nacost.go.ke

Republic of Kenya

National Commission for Science, Technology and Innovation

RESEARCH LICENSE

Serial No. A 21085

CONDITIONS: see back page