

**ANALYSING THE EFFICIENCY OF FORENSIC SCIENCE UNITS WITHIN KENYA
POLICE SERVICE IN SOLVING CRIMES**

JACOB M. NDERITU

C50/89642/2016

**A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILMENT OF THE
REQUIREMENTS FOR THE AWARD OF DEGREE OF MASTER OF PSYCHOLOGY
(FORENSIC) OF UNIVERSITY OF NAIROBI**

DECEMBER, 2018

DECLARATION

This research project is my original work and has not been presented for the award of a degree in this University or any other institution of higher learning for examination.

Signature.....Date.....

JACOB M. NDERITU

C50/89642/2016

This research project has been submitted for examination with my approval as the University Supervisor

Signature.....Date.....

SUPERVISOR

DR. LUCAS MWAURA

LECTURER, DEPARTMENT OF PSYCHOLOGY

DEDICATION

I dedicate this research study to my wife Christine Wawira, my children Margate, Duncan and Genaldine, my mother Margrate Muhihia and the entire Muhihia family.

ACKNOWLEDGEMENT

Special thanks go to my supervisor Dr Lucas Mwaura, for the guidance, insight and involvement in the writing and compilation of this study. Your invaluable support and patience throughout this journey has been incredible and is appreciated from the bottom of my heart.

I wish to also acknowledge Dr Luke Odiemo psychology department chairman, lecturers Dr Geoffrey Wango and Dr Karen Odhiambo and other academicians who have been with me through thick and thin by offering their teaching services, may the almighty God bless you abundantly

I am also greatly indebted to the Director Criminal Investigation department, George Maingi Kinoti for allowing me to conduct research in his institution, head of forensic, and head of training, and their officers in their area of jurisdiction, director of CID training school, and the trainees who were my participants for their support and willingness to provide the required information during the fieldwork phase of this study.

To my classmates and friends, without whose interest and co-operation I could not have completed this study. I thank you for supporting this initiative and affording me your time and sharing your experiences. Finally, I thank my family for instilling in me unquestionable values and morals, thank you for your love, guidance and for always believing in me throughout the year.

I dedicate this research study to my wife Christine Wawira, my children Margrate, Duncan and Genaldine for encouragement, perseverance and for always being with me throughout my academic journey, my mother Margrate Muhihia and the entire Muhihia family for their constant encouragement and for being patient enough to see me go through my academic struggle in an effort to realize my long cherished academic dream.

LIST OF ABBREVIATIONS

CID	Criminal investigation department
DIG	Deputy Inspector General
DNA	Deoxyribonucleic acid
EACC	Ethics and Anti-Corruption Commission
IG	Inspector General
NIS	National Intelligence Service
SCT	Social Cognitive Theory
SLT	Social Learning Theory
SPSS	Statistical Package for the Social Sciences

TABLE OF CONTENTS

DECLARATION	ii
DEDICATION	iii
ACKNOWLEDGEMENT	iv
LIST OF ABBREVIATIONS	v
LIST OF FIGURES	xii
LIST OF TABLES	xiii
ABSTRACT	xiv
CHAPTER ONE	1
INTRODUCTION	1
1.1. Background of the Study	1
1.2. Statement of the Problem.....	3
1.3. Purpose of the Study	4
1.4. Objectives of the Study	4
1.5. Research Questions	5
1.6. Research Hypothesis	5
1.7. Justification of the Study	5
1.8. Scope of the Study	6
1.9. Limitations of the Study.....	6
1.10. Assumptions of the Study	7
1.11. Definition of Terms	7
CHAPTER TWO	9
LITERATURE REVIEW	9
2.0. Introduction.....	9
2.1. Nature of Training in Forensic Science and how they create Harmony in Investigations ..	9

2.1.1.	Education Background of the Investigator.....	9
2.1.2.	Experience of Investigators.....	11
2.1.3.	Nature of Crime.....	12
2.2.	Availability of Forensic Investigation Equipment and their reliability to Produce Concrete Evidence.....	13
2.2.2.	Experience of Investigators.....	14
2.2.3.	Nature of Crime.....	15
2.3.	Forensic Process and how it is Helpful in Sustaining Trial in the Court of Law	16
2.3.1.	Education Background of the Investigator.....	16
2.3.2.	Experience of Investigators.....	18
2.3.3.	Nature of Crime.....	19
2.4.	Theoretical Framework.....	21
2.4.1.	Actor-Network Theory.....	21
2.4.2.	Cognitivism Theory.....	22
2.5.	Conceptual Framework.....	23
2.6.	Conclusion	25
CHAPTER THREE.....		26
RESEARCH METHODOLOGY AND DESIGN		26
3.0.	Introduction.....	26
3.1.	Research Design.....	26
3.2.	Location of the Study.....	26
3.3.	Target Population.....	27

3.4.	Sample Size and sampling Procedure	27
3.4.1.	Sample Size	27
3.4.2.	Sampling Procedure	28
3.5.	Data Collection	28
3.6.	Pilot of Research Instruments	28
3.6.1.	Validity of the Instruments.....	29
3.6.2.	Reliability of Research Instruments	29
3.7.	Data Collection Procedure	29
3.8.	Data Analysis	30
3.9.	Ethical Considerations	30
CHAPTER FOUR.....		31
DATA ANALYSIS AND PRESENTATION.....		31
4.1.	Introduction.....	31
4.3.	Demographic characteristics of Research Participants	31
4.3.1.	Participants Gender	32
4.3.2.	Age of the Participants	32
4.3.4.	Work Experience in Forensic Investigations	33
4.4.1.	Nature of Training in Forensic Science and Collection of Evidence.....	34
4.4.2.	Courses offered in CID training school related to Forensic Science	35
4.4.3.	Duration of Training as Forensic Investigator	35
4.4.4.	Criteria Used to Select Course Participants	35
4.4.5.	Experience of Forensic Investigators	35

4.4.6.	Training in Finger Prints and Relation to Practice of Forensic Investigation	36
4.4.9.	Employment of Forensic Scientist Graduates in the National Police Service	39
4.4.10.	Graduates Effectiveness in their Work in Relation to House Trained Officer.....	39
4.5.	Availability of Forensic Investigation Equipment and their reliability to produce concrete evidence	40
4.5.1.	Equipment Used In Forensic Investigations.....	40
4.5.2.	Function of the Forensic Investigation Equipment	40
4.5.3.	Education Background in Forensic Sciences and Application of Equipment on Evidence Collection	41
4.5.4.	Adequacy and Reliability of Forensic Equipment in Collecting Evidence.....	41
4.5.5.	Absence of Forensic Investigation Equipment.....	42
4.5.6.	Frequency of Availability of Forensic Investigation Equipment	43
4.6.	Forensic Investigation Process and Sustainability of Trial in Court of law	43
4.6.1.	Crime Scene Investigation Process	43
4.6.2.	Standard Procedures and Policies for Conducting Forensic Investigations	44
4.6.3.	Evidential Information from the Suspect	44
4.6.4.	Stages of Evidence Collection and application of Profiling, Interviewing and Interrogation.....	45
4.6.5.	Forensic Psychology and the Criminal Investigation Process	45
4.6.6.	How Investigators Squeezes out Correct Information from Suspects and still observe human right of suspect	46
4.6.7.	Professionalism, Impartiality, and Open Mindedness among Forensic Investigators ...	46

4.6.8.	Length of Time Taken to Secure Crime Scene	47
4.6.9.	Length of Time Taken to Apprehend Suspect and Produce Him/her in Court Of Law.	47
4.6.10.	Time the Prosecution from DPP Office to Join Police Investigators	48
4.6.11.	How to ensure Victims and the Investigators are not affected psychologically	48
4.6.12.	Points that Determine which Department a given Crime will be Investigated From	48
4.6.13.	Challenges Faced by Forensic Investigators	48
4.6.14.	Addressing Challenges to Deliver Justice to the Victims	49
4.7.	Inferential Statistics	50
4.7.1.	Model Summary.....	50
4.7.2.	ANOVA Results	51
4.7.3.	Coefficient of Determination	51
4.8.	Multiple Analysis of the Influence of Training, Availability of Equipment, And Forensic Investigation Process on Solving of Crimes	52
4.9.	Conclusion	54
CHAPTER FIVE		55
SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS		55
5.1.	Introduction.....	55
5.2.	Summary of findings.....	55
5.2.2.	Availability of Forensic Investigation Equipment and their reliability to produce concrete evidence.....	56
5.2.3.	Forensic Investigation Process and Sustainability of Trial in Court of law	56
5.3.	Conclusion of the Study.....	57

5.4. Recommendations of the Study	58
5.5. Suggestions for Further Studies	59
REFERENCES.....	60
APPENDICES	66
APPENDIX I: QUESTIONNAIRE	66
APPENDIX II:INTERVIEW GUIDE	71

LIST OF FIGURES

Figure 2.1. Conceptual Framework	25
Figure 4.2. Participants Gender	Error! Bookmark not defined.
Figure 4.3. In-Service Training in Forensic Investigations	37
Figure 4.4. Employment of Forensic Scientists Graduates in the National Police Service	39
Figure 4.5. Absence of Forensic Investigation Equipments	42
Figure 4.6. Standard Procedures and Policies for Conducting Forensic Investigations	44
Figure 4.7. Professionalism, Impartiality, and Open Mindedness among the Forensic Investigators	46

LIST OF TABLES

Table 4.1. Response Rate	31
Table 4.2. Age of the Participants.....	32
Table 4.3. Distribution of participants by Level of Education	33
Table 4.4. Duration of being involved in Forensic Investigation in Kenya.....	34
Table 4.5. Model Summary	50
Table 4.6. ANOVA of the Regression	51
Table 4.7. Coefficient of Determination	51
Table 4.8. Correlational Analysis of Training, Availability of Equipments, And Forensic Investigation Process on Solving of Crimes	53

ABSTRACT

The aim of the study was to analyse the efficiency of forensic science units within Kenya police service in solving crimes. The objective was to examine the nature of training in forensic science and how it create harmony in investigations, to assess the availability of forensic investigations equipment and their reliability to produce concrete evidence, and to analyse how forensic investigations processes are helpful in sustaining trial in the court of law. In addition the study explained how education, experience and nature of crime contribute to the efficiency in solving crimes. The study utilized descriptive research design and a target population of 500 participants which included CID officers drawn from the entire department in forensic investigation and CID trainees from CID training school. Data was analysed using descriptive statistics. The study adopted actor network and cognitivism theories. The study established that a well-trained officer will always work well with others in harmony to ensure that the investigation process is always a success, that training in forensic investigation equips officers the necessary skills, and that officers are able to work as a team and make decision on process and procedure to collect data on forensic investigations. The study concluded that there is lack of adequate modern crime investigation equipment and officers are challenge in terms of mobility to the crime scene. The study recommended that there is need for established standard investigation procedures.

CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

Using forensic investigation process in the past has largely been concentrated on crimes of a more serious nature like homicide and rape. Forensic techniques are however increasingly being used on a wider crime range and are routinely being used to help investigate larger crime volumes like vehicle crime, burglary and robbery. This advancement in technology has led to the formation of databases of DNA as well as automated fingerprint searching systems leading to huge changes in how forensic techniques are applied in crime investigations (HMIC, 2013). The developments are application can go on to be highlighted and current knowledge gaps can be identified at all processes of however insufficient when it comes to bringing about wholesome changes in the process of investigation (Van Niekrek, 2013). The current study aims to draw together the significant fundamentals that aid forensic investigation processes in order to improve investigators efficiency in solving crimes. This process has brought about a desire understand forensic investigation as a whole. With this, there is hope that the key issues that relate to forensic science the investigative stage right from the initial crime reporting, charging and finally the suspects' conviction.

Forensic investigation has been viewed as an important process in today's crime scene investigation. Crimes that occur in everyday life always leave traces which when investigated provide evidence on what happened, where, and how the crime was committed. The main aim of forensic investigation is to interpret the information which has been collected at the crime scene, reconstruct it to know what occurred (Swanson et al., 2013). The information collected at the crime scene is very fragile and needs to be handled carefully to avoid tampering with it. Forensic investigation has been deemed necessary in situations where the crime involves homicide in which traces have been left. Forensic investigation requires that the officers be highly qualified with well-versed knowledge on crime scene investigations. The officers should always act with professionalism as the physical integrity of the scene is required (Fisher, 2014).

According to Owen (2014), forensic investigation process has been a matter of concern in the current world today as many court cases have ended up relying on false evidence in relation to

what actually happened at the crime scene. Many of the victims and innocent people could have ended up in jail as the real perpetrators walk scot free. This has been attributed partially by the forensic investigators using old techniques in their operation which provides inaccurate information at certain instances. In other instances, corruption has led to the covering of the real perpetrators of the crime which reduces the appropriateness of the investigation processes. The forensic investigations process has led to the investigators devising new methods on carrying out their processes. The investigators have realized that the crime scene contain a lot of evidence which require appropriate investigation (Lee et al., 2014).

In today's world forensic science is very useful since it relies on experts to unearth and gather information from the crime scene to bring to book the suspects and the crime they committed. Irrespective of this, there still exist unsolved crimes in many parts of the world which have led to instances of denied justice. In Brazil for example, there exist approximately 60,000 cases of murder that happened for the last ten years (Associated Press, 2011). In addition to these cases around 24,000 of the victims have yet to be identified (Lee et al., 2014). In the United States and across Europe numerous murder cases have yet to be resolved range between 70-80 percent. The lack of integrity in solving these cases has deemed the forensic investigation process unreliable in the delivery of justice to the victims. This study examines the forensic processes in Kenya.

Ngboawaji (2012) stated that in Africa, especially in Nigeria cases of unresolved crime has been attributed to the reluctance of the Nigerian justice system in providing the right forensic evidence. This has created a forensic gap in the country which has made the citizens to have the view that the justice system is ineffective. In Nigeria life is seen to be meaningless as case of murder continue to happen without any action being taken against the criminals. Nigerians have lost confidence in the police institution as they see it as institution that allows murder to happen under their watch (Ngboawaji, 2012). An institution though to maintain law and order have been viewed as an institution that promotes and allow crimes of murder to occur.

In Kenya the forensic science has not been the best as the CID officers have not in many cases delivered appropriate evidence which has integrity. Most of the cases are believed to have been corrupted with the police officers covering what has been termed as the "big fish" (Olumbe,

2000). In most of the cases the police institution has lacked adequate forensic training to enable them handle the crime scenes and produce concrete evidence that has integrity. In Kenya murder cases have been occurring daily with most of them remaining unresolved. In other cases, it has been observed that the police officers lack modern equipment to collect evidence from the crime scene and produce it in the court of law. This has made solving of mysterious murder cases a tall order where family of the victims have been denied justice. According to Dr. Olumbe (2000) the main obstacle that has led to existence of many unresolved cases of murder in Kenya is the judicial system reluctance in carrying out the investigations, and leaving the police as the sole party in collecting the evidence (Olumbe, 2000).

Dishonesty among the police officers and lack of appropriate training has led to the piling of the murder cases with many of them remaining unresolved. This has led to many Kenyan citizens losing confidence with the police system as cases of murder that occurred twenty years ago remain unresolved. In addition, the police lack competence on appropriate procedures to conduct forensic investigations. This has made it impossible to have adequate investigation which can be relied upon when making meaningful recommendation (Olumbe, 2000). It against this background that the current study aims at investigating what constitute the appropriate forensic investigation process which will lead to appropriate delivery of justice to the victims of murder. This study will analyse the efficiency of forensic science units within the Kenya police service in solving crimes.

1.2. Statement of the Problem

Inadequate application of forensic science in investigations processes by the police system has been a problem which has remained for decades and which has been a great contributor of unresolved crimes cases in many parts of the world. The process has led to exoneration of the perpetrators of the crimes and prosecution of the innocent who end up suffering in jail for crimes not committed. Despite the advances of the forensic investigation process the evidence collected have been faulty and have led to wrongful convictions. The process has made the justice system to rely and put weight on false testing and imperfect evidence testing. This has made most of the victims to suffer from the injustices and unresolved murder crimes (Van Niekrek, 2013). It can also not be denied that in the pursuit of justice, the ones who are responsible for application of

the said justice have resorted sometimes to unmitigated fraud instead of seeking alternatives to place a conviction (Davis, 2013).

The retired chief justice of Kenya Dr Willy Mutunga once criticized the police officers for lack of seriousness in conducting appropriate forensic investigations that would ensure justice is delivered to the victims (Daily Nation April 2014). High profile murder has occurred in Kenya and the police are yet to conduct appropriate investigations. The murder of politician Tom Mboya, lawyer Willy Kimani, and many others remains unresolved and their families are still crying for justice. From the few examples it would be difficult to believe that the forensic investigations are efficient and reliable to solve crimes. The criticism is a clear indication that things are not right and that the police department does not have the required capability to carry out the investigations. This means that there are significant fundamental issues that need to be addressed in a bid to facilitate delivery of justice in Kenya and enhancing efficiency in investigation by the police. Research to analyse the efficiency of forensic science units within Kenya police service has been limited creating a knowledge gap that need to be filled by the current study.

1.3. Purpose of the Study

The purpose of the study was to analyse the efficiency of forensic science units within Kenya police service in solving crimes.

1.4. Objectives of the Study

1.4.1 Specific Objectives:

1. To examine the nature of training in forensic science and how it creates harmony in investigations.
2. To assess the availability of forensic investigations equipment and their reliability to produce concrete evidence that enables apprehension of real suspects.
3. To analyse how forensic investigations processes are helpful in sustaining trial in the court of law.

1.5. Research Questions

The study was guided by the following research questions:

1. How does the nature of training in forensic science create harmony in investigations?
2. Are the available forensic investigation equipment reliable to produce concrete evidence that enables apprehension of real suspects?
3. Do the forensic investigations process applied help in sustaining trial in the court of law?

1.6. Research Hypothesis

The study was guided by the following hypothesis:

H0₁ The nature of training in forensic science ought to create harmony in investigations

H0₂ The availability of forensic investigations equipment will be of value to produce concrete evidence

H0₃ Forensic investigations processes applied would sustain trial in the court of law

1.7. Justification of the Study

This study will be a source of knowledge in the academic study of psychology specifically in application of theories such as actor network theory and cognitivism theory. Actor's network theory argues that nothing exists outside those relationships. The theory further states that all factors in any social situation are on usually on the same level and therefore external social forces that are above what and how the participants in the network interact presently are non-existent. Ideas, processes objects and any relevant factors are therefore only important in the creation of social situations as humans. Actor Network Theory seeks to examine the inks nonhuman as well as human entities based on the approach of anti-foundationalism where everything exists after its performance. Human action and intention are decentred therefore in this approach.

The study further may contribute to cognitivism theory which has its basis on cognitive processes which are the centres of behaviours, emotions and thoughts. Stages of cognitive development have been proposed by cognitive theorists which help explain delinquency and crime. Lawrence Kohlberg refined Jean Piaget's work and proposed three moral development stages. The pre-conventional level occurs more in children and its focus is mostly on external

consequences that actions might have (Winna, 1988). The level of convention is commonly found in young adults and adolescents and focuses mainly on the expectations and views of society. The level of post-convention is more common in adults above 20 years of age and lays focus on critical examination of moral principles and human rights. The study may contribute to the theory by explaining the link between criminality and personality. There might currently be a lot of debate about whether personality characteristics are significant in determining the subsequent criminal behaviours.

The study offers empirical evidence on forensic investigation processes and the delivery of justice to the victims of crime. The study is important to policy makers such as Inspector General of police, Director of public prosecution, chairman Ethic and anti-corruption commission, Director General National Intelligence service and Director of criminal investigation in that it provides other perspectives on how to train and equip their respective institution. This may add new skill and knowledge, provision of quality work, effective communication of their finding that may enable apprehending and prosecution of suspect in both criminal and civil cases.

1.8. Scope of the Study

The sample of this study included the CID police officers in Nairobi County stationed in forensic department. It has the followings units: ballistics unit, cybercrime, criminal records unit (finger prints), scene of crime, photographic unit, documents and writing examination unit and bomb disposal unit. The findings may therefore not translate to officers in other countries apart from Kenya. The results of this study, however, might still be widely applicable as it will help with other CID officers in all parts of the world.

1.9. Limitations of the Study

Time was a limitation in that the researcher was not in a position to adequately address all issues in relation to the study and thus worked within the allocated time. The research period was considerably short but this was solved by allocation of more time for data collection. The participants could not fully answer the questions in the questionnaire satisfactorily due to the level of literacy and knowledge in forensic investigations and this may have affected the analysis of data. To avoid this, the researcher explained the importance of the research to the participants and why they should fill in the questionnaires.

Most of police information is classified and therefore the researcher was not able to get access to some of crucial information. Police officers are under oath to conceal the operation of the service thus challenge to get clear picture of the investigator's capacity. Another limitation encountered was the lack of adequate resources in terms of money to carry out the study satisfactorily. The researcher addressed this limitation by carrying out the research with the available finances.

1.10. Assumptions of the Study

This study was based on several assumptions. Firstly, it assumes that the forensic science units in the criminal investigation department were significant and could contribute immensely to the investigation processes. Secondly, it was assumed that training and equipping of investigators was significant to improve efficiency in forensic investigations. Thirdly, the study assumed that forensic science is significant and can provide the required information honestly and objectively. In the end, forensic science and investigations especially coupled with the necessary equipment should be promoted as a way of resolving various crimes.

1.11. Definition of Terms

Crime Scene Refers to a location associated with a crime that is committed. Crime scenes have physical evidence pertinent to an investigation.

Forensic Investigation Equipment Refers to the equipment that detects collects and then processes evidence and samples for determination and evaluation of the cases in a court of law.

Forensic Investigation Process Refers to a recognized scientific and forensic process used in criminal investigations. It can also be termed as a number of steps from the original incident alert through to reporting of findings. The process predominantly involves three steps which are acquisition, analysis, and reporting.

Forensic investigation This is using science and technology in investigating and establishing evidence or facts. The main aim is instituting proceedings of court and scientific knowledge is applied for a legal problem.

Forensic Science

Refers to applying science to civil and criminal laws especially on the criminal side of the investigation that in line with legal standards of criminal procedure and

Level of Training

This refers to the existing gap between future and current skills or knowledge that may be bridged by learning or training activities. In this study it refers to the gap that exists between the current knowledge on forensic investigation and the future skills on forensic investigation.

CHAPTER TWO

LITERATURE REVIEW

2.0. Introduction

This chapter provided the literature review of the study. It accounts for previous research and what had been found out in the area of study. This chapter focuses on analysing the efficiency of forensic science units within Kenya police service in solving crimes. In addition, the chapter presents the theoretical framework.

2.1. Nature of Training in Forensic Science and how they create Harmony in Investigations

This section captures literature review related to the first objective on the nature of training in forensic science and how they create harmony in investigations.

2.1.1. Education Background of the Investigator

A study by Van der Westhuizen (2016) on the level of skills and the quality of forensic investigation process utilized descriptive research design and targeted a population of 200 participants from the police training college. The study established that education background is important as it determines the quality of training of the investigator and how well he or she adapted to the investigation process. The study further established that forensic investigations required high end qualifications for the investigator to be conversant with the investigation process. Right from respondent number one to the final user of the information, all involved personnel should have enough understanding of scientific disciplines, forensic processes, and specialized services given by forensic labs.

To achieve this kind of integration and from a point of view that is methodological, the aim of training and education in this field is the provision of police personnel and modern forensic with skills to enable them manage methods facilitating the treatment of complex forensic trade data (by their quantity, split and diversity) for investigative purposes and/or intelligence. Criminal intelligence analysts for instance, support investigation through the processing of crime data in a way that is structured. Their methods can be used for the integration of information conveyed by

traces in the right data structures and models, to guide the treatment through the intelligent steps as well as facilitate interpretation through the use of various visualisation tools and methods. The key aspects for the implementation of such methodology is that forensic case data analysts should have a strong culture in forensics, or be paired with forensic scientists rather than having to report in a vacuum with no regard to the context of the event producing the evidence.

Gardner, (2015) did a study on forensic investigation and the skills of the investigation officers. The target population was 125 police officers who were requested to indicate on a five-point Likert scale how the skills influence the forensic investigation process. Using qualitative survey design the study established that criminal investigation officers with adequate skills on forensic investigation tended to carry out investigations with ease as compared to the one with little skills. The study further established that crime scene investigation involves recognizing and collecting all physical evidence potentially relevant to the solution of the case and thus it is necessary for the officers involved to always have the necessary skills to ensure the process is successful.

Capsambelis (2012) finds very little evidence of the research that addresses the criminal investigators' needs, but shows that an amount of effort has been spent to determine the educational needs when it comes to forensic science students. Capsambelis noted that a small number of academic programmes existed because previously, crime scene personnel have got their skills on the job and knowledge. The best situation is to have forensic evidence processed by senior scientists at crime scenes. This approach may be impractical and not feasible but Levinson and Almog's (2013) recommended certain indicators on how vital making sure those responsible for the crime scene processing as well as collection of evidence have specialists' training. The pool of unqualified forensic scientists is huge therefore leading to a shortage of qualified ones. This is attributed to colleges offering degrees but having no curriculum indicting basic science courses that are necessary for the occupation. Currently, the educational programs available are hampered by a lacking in protocols to handle evidence and lack of training in the right use of scientific equipment

2.1.2. Experience of Investigators

Davis et al. (2010) undertook a survey on expertise of a forensic investigator and the conduction of forensic. The study involved 779 participants from forensic professionals. The study used qualitative survey design. Descriptive statistics were used to analyse data. The study's findings established that experience and planning well are vital to the crime scene work. These include gathering the maximum information that is readily available through considering questions like: what might have gone on at the crime scene, how big is the problem's magnitude at the scene, is any special medical assistance needed, are there dangers that are particular, what additional help may be needed, is it an outdoor or indoor scene. Is the location remote, what are the locally available resources, what are the present's weather conditions.

When the evidence has been recognized, the right recovery methods (like tweezers, cotton tips, and adhesive tapes) as well as adequate packaging (like sharp object containers, collection boxes/bags) are made use of. All pieces of evidence are labelled then sealed following the requirements according to the local regulations. Priorities in the recovery of evidence need to be decided so as to prevent unnecessary degradation and loss of evidence. Documentation is a vital part in the process of recovery, including the evidence location before recovery. Selecting the relevant things is the recovery and recognition phase's challenge and is most effective and efficient when taking place at the scene, where there is existence of potential evidence and in the context, they produced it. When conditions are difficult however, it is preferred that one recovers more evidence and does the selection at a later stage. Recovery and recognition need extensive training and experience. It also needs a good understanding of whatever can be done on the types of physical evidence in forensic labs and the information that can be mined

The study has studied how forensic investigator experience influences his/her conduct of the forensic investigations. However, the study has some limitations. First the study has not explained how the researcher arrived to a population of 779 participants. The study has not explained how the data was presented and the conclusions made. In addition, the study has not elaborated on what experience the forensic investigator should have so that he/she can conduct appropriate investigation. Fisher, (2014) conducted a study on the police officer ability on forensic investigations and the gathering crime scene evidence. The study utilized qualitative

research design involving a target population of 200 police officer from the crime investigation department. The study established that police officer capability in gathering evidence was determined by how well they were experienced in the management of the crime scene. The study further established that experience enables the officers involved to bring perfection of the skill and make the gathering of evidence an easier task. From the study it is noted that new officers are not able to handle the scene due to fear of the unknown, but with time they develop courage and become exposed to different scenes and cases. The more one is exposed to the field situations, the more one is able to solve issues in a more practical way than the newly trained officers.

2.1.3. Nature of Crime

Skogan and Antunes (2014) conducted a descriptive research design study on the forensic investigation process and the various types of crimes involved. They established that the crimes resulting in the offenders being identified and later apprehended were mostly due to information given by witnesses, victims and the police. The study as well highlighted the fact that in most cases, especially big crimes like burglaries, the public were not in a position to provide the police with any information. These cases most likely remain unsolved and suspects are rarely identified. Whether witnesses (or victims) are in a position to provide any information is the crime circumstance's function, like whether a certain burglary was witnessed. Even the crimes that are mostly witnessed only yield vague descriptions of offenders. For instance, street robberies involve the interaction of victims and offenders. This however, tends to be short-lived, so the information victims provide concerning the offender characteristics is limited. The study by Skogan and Antunes (2014) focused on nature of crime and the quality of the forensic investigation process. The study has some weaknesses as it has not explained the sampling procedure used to obtain the sample population. The study also did not provide the conclusions made from the findings of the study nor did it elaborated clearly on the subject of the study. In addition, the study has talked of the various crimes but has no explained how the forensic investigation of the various crimes is affected by the skills obtained.

Burrows and Tarling (2012) conducted a study on the various types of crimes and quality of the investigation process. The study found that in adding to crime mix, more factors appear to be in

association with higher clear-up rates. In terms of social economic and demographic variables, the area's age distribution (proportion of males between the age of 15 and 24 in the area) and total population were inversely proportional to clear-up rates. In policing factors, the police officer's numbers per head of the population had only a weak association when it comes to clear-up rates, police workload however (number of crimes for every officer) and police expenditure were inversely proportional to clear-up rates (clear-up rates were lower where the expenditure for every officer was higher). The findings suggest that workload, when it comes to determining clear-up rates, is a factor that is more important than police presence.

2.2. Availability of Forensic Investigation Equipment and their reliability to Produce Concrete Evidence

This section captures literature review related to the second objective on availability of forensic investigation equipment and their reliability to produce concrete evidence. It reviews literature on how the availability of equipment relates to the production of concrete evidence.

2.2.1. Education Background of the Investigator

Lee et al. (2013) investigated the relationship between the reliability of forensic investigation resources and the capability of police officers handling them. The study established that investigators of crime scenes need individuals that are highly educated with a forensic science background, the criminal justice system and natural sciences. Expert technicians holding degrees in crime scene investigation look for clues and help in solving the puzzle of whatever took place at a crime scene. Technological advancements provide techniques and tools to figure out who committed a murder recently or a past cold case. Most current forensic investigators are hampered by a lacking in protocols in evidence handling and a lack of training in the right use of equipment. The study has focused on relationship between education background and the reliability of forensic investigation equipment. However there exist some gaps in the conduct of the study. No sampling has been provided by the study. Also, the study has not given how the data was presented, and how the conclusions were arrived upon. Further the purpose of the study has not been clearly brought out.

Lambert et al. (2013) did study on police expertise and contributions to forensic investigation equipment. The study utilized cross sectional survey research design. In addition, the study used a target population of 290 graduates of forensic science. Using qualitative analysis, the study established that education background on forensic investigation equipment is critical in the system of criminal justice because there is incorporation of the application of the analysing of evidence scientifically in the courtroom. In addition, the participants of the study supported the forensic education to be included so that law enforcement practitioners are well informed on how to use forensic investigation equipment. The predicted accurately the benefits the disciplines' integration so as to provide a justice system that is equitable. Forensic evidence is identified then collected and presented in a way ensuring its integrity and maintaining its availability through the whole process of criminal justice.

The conducted literature review revealed that only a little research was done on personnel needs in law enforcement, though crime laboratory needs have been deeply examined. Forensic evidence being mostly inadmissible due to wrong techniques of collection is a problem that was addressed in the Michigan study. The analysis brought to light the fact that potential material for evidence is left uncollected or trampled underfoot due to the fact that personnel in law enforcement are inadequately trained in the processing of crime scenes. Because forensic science involved scientific evidence analysis, it should be vital in the criminal justice system of the United States

2.2.2. Experience of Investigators

Hazelwood & Burgess, (2012) did a study on capability of locating and identifying of physical evidence at crime scenes. The study utilized descriptive research design and a target population of 121 forensic investigation officers. Using descriptive statistics, the study found that the most relevant and important evidence may not be obvious or directly visible to the naked eye but require high experience in the use of forensic investigation equipment. The study further stated that the physical evidence recognition starts by observation of the crime scene which is based on initial observations and considering the case's context, the incident's nature, possible scenarios and characteristics of surfaces that might bear potential evidence, a methodologic and flexible search strategy is implemented. This includes using the naked eye and magnifiers to search as well as other hand-held sources of light.

The above study has limitations that have created gaps which need to be filled. First the methodology has not been elaborated as no sampling procedure is provided to explain how the researcher arrived at the target population. In addition, the study has not clearly explained how experience of the police officers enables them to obtain accurate evidence from the crime scene. Further the study has not stated how the experience of the police officers would help them in the case where the evidence has been tampered with.

Dandurand, (2014) did a study on forensic investigation qualification and the ability to collect evidence. The study used survey research design to answer the research question of the study. The target population comprised of 50 junior police officers who were recently recruited in forensic investigation department. Using qualitative analysis, the study established that capturing the knowledge that underpins a police investigation is a key task for an investigator and it influences his or her performance. In fact, catching criminals cannot happen until an investigator first captures the knowledge provided by forensics, intelligence, and interviewing victims, witnesses, and interrogating suspects. The study further stated that the experience in gathering evidence using forensic investigation equipment is important in delivery of concrete evidence. Recovery and recognition of evidence needs extensive training and experience. It also needs understanding of what should be done on different types of physical evidence in forensic labs and the obtained information.

2.2.3. Nature of Crime

Redsicker (2013) did a study on influence of forensic investigation crimes and the gathering of forensic evidence. The study used descriptive research design. The target population was 111 CID officers who were between the ages of 30-40 years. The data analysis was conducted through the use of descriptive statistics. The study established that the nature of crime and the equipment used may assist to establish their real identities, through testimony, relay and prosecute who victimized the other by producing scientific evidence. Crime scene evidence gives good leads in investigations. The identity of the suspect, circumstances of the victim (like rape) may be related when examining the data carefully. The impressions of footwear, fingerprints and tool marks can technically be collected. Tools like the casting kit or others related to it are used.

The study further stated that the nature of crime will determine what equipment to be used and how they can be applied to gather concrete evidence. The study has concentrated on the relationship between nature of crime and the delivery of concrete evidence. No sampling procedure provided in the study. The study has not provided the conclusions and the recommendations of the study. The study has not clearly stated how the nature of crime and the delivery of concrete evidence are related thus creating a knowledge gap.

Lyman, (2012) did a study on investigation of crime scenes and the gathering of evidence. The study made use of survey research design. The target population for the study were 311 police trainees in police training college. Data analysis was done through descriptive statistics. The study established that there is proof of who committed the crime at the crime scene. The study further found that the physical evidence obtained through appropriate equipment confirms that the crime was committed, connects the suspect and the crime and proves who was victimized. The matching of the crime scene clues and victim and witness interviews narrows the criminal suspects down and assists in detecting the crime effectively. Techniques such as psychological profiling, handwriting expertise and polygraph testing assists investigators further to identify who the true suspects are. This ensures that justice prevails above injustice because the victim gets justice quickly and nobody gets punished wrongly for a crime they did not commit.

2.3. Forensic Process and how it is Helpful in Sustaining Trial in the Court of Law

This section provides literature on the third objective on the forensic process and how it is helpful in sustaining trial in the court of law.

2.3.1. Education Background of the Investigator

A study by Ogle (2014) on exploration of issues around detectives and investigations established that the process of investigating a crime scene is organized, methodological, systematic and requires appropriate education background in crime investigation process. The study used forensic investigation graduates as the target population. Through qualitative analysis the study established that producing evidence in the court of law require supportive facts which necessitates appropriate education in the articulation of issues to do with crime. The study also established that actions performed at the crime scene should be systematic, correct and objective

so as to achieve its full potential as an information source. The participants stated that when they applied a model of processing to the crime scene, the investigator needs to be ready to go back at any time to a previous repeat and step when necessary. The going back and forth is an important part of the processing of the crime scene. It always happens and at almost every step of the processing and this means if the investigator does not possess quality education the process may seem futile.

The study focused on crime scene investigation process and delivery of evidence. The study has some gaps in that no sampling procedure is given to explain how the researcher arrived to the sample population. In addition, the study has not elaborated on how crime scene investigation process is organised, method, systematic and logical process utilized. How well does the education level of the forensic investigators influence the sustainability of the forensic investigation process? How will it influence the forensic investigation process in a bid to be sustainable to stand trial in the court of law?

Swanson et al., (2013) did a study on crime scene investigation and appropriateness of the forensic investigation process. The study established that before action is taken at the crime scene, the investigator assesses the circumstances so as to decide on a plan of action and should note that assessment is a process that is ongoing and he/she should be able to adjust the plan whenever it is necessary. In addition, the study established that preliminary and quick walk through the crime scene is vital as it helps determine the extent and nature of the crime's extent, and note any possible evidence. When it comes to entering the crime scene however, the investigator proceeds cautiously, and is mindful of potential physical evidence. All evidence that is visible is traced and marked by placing labels or markers next to evidence.

National Institute of Justice (NIJ) publication asserts that fast evolving advances in science is in all forensic areas need to be incorporated in all practitioner education aspects. It details the areas where potential breakthroughs in science will affect the responsibilities and duties of investigators of crime scenes. Advances in trace evidence, tool mark exams and firearms, analytical toxicology, forensic pathology, digital evidence and fingerprint analysis enhance capabilities of investigators looking for physical evidence at the crime scene. Future innovations

are inclusive of possibilities of DNA chip technology which provides immediate DNA analysis by investigators who are trained forensic investigators.

2.3.2. Experience of Investigators

Becker and Dutelle (2013) did a study on the role of prosecutors on the investigation process. The study used qualitative research design. The study target population was 91 prosecutors in the court of law. Through qualitative analysis the study established that investigators and prosecutors are the most visible members of any criminal investigation team due to possession of adequate experience in criminal investigation process. The experience and the respect that exists between the team members is what propagates communication and helps in both the pre-trial and trial process. The study established further that a relationship between police investigators and prosecutors is either non-existent or frequently adversarial and this influences the forensic investigation process. The study has some gaps in that it has no sampling procedure, and no data collection procedure. The study also has not clearly explained how the experience and the respect between the members of the forensic investigation team propagates communication and helps in the pre-trial and trial processes. Further the author has not explained how prosecutors make the forensic investigation process sustainable to stand trial in the court of law.

The above arguments are supported by Kyprianou (2010), in his study on the efficiency of prosecutors in forensic investigation process. He used descriptive research design and a target population of 351 prosecutors who had handled forensic investigations for the last ten years. Using descriptive statistics for data analysis, the study who established that prosecutors prosecute cases where they have confidence and the confidence has its basis on the quality and quantity of evidence, the supporting document's quality, and ability of witnesses to communicate from the witness stands, all of which are provided by investigators. The study further stated that in the investigative process, prosecutors give the police extensive legal advice, mostly when they seek it, but sometimes because law officers themselves posit that the sensitivity of a case requires their intervention. Police are part of the prosecution team which means that they know that they are ultimately answerable to court for the way investigations and interviews are conducted and for their respect for the due process rights.

Shameem and Tuiketui (2012) in their study on the role of the investigator in the process of persecution stated that the investigator's role is to investigate the alleged criminal offence's commission, gather evidence then interrogate suspects and finally refer charges for the prosecutor. The role evidently means that officers need to possess some experience in criminal investigation process, and have to understand that they are ultimately answerable to court for how they conduct interviews and investigations and also for the respect they have for the due process rights. The investigator contacts the prosecuting officer immediately for a meet up within 14 more days for a combined review of the case docket and consolidating their findings.

2.3.3. Nature of Crime

Mihajlovic, Gilliland and Peterson (2014) made a study that was mostly based on randomly examining 2700 investigations that are drawn lab files and police in 4 jurisdictions of the US: cases of physical evidence got over-sampled (1600 cases got examined whereby there was collected then examined physical evidence besides 1100 ones where there was no physical evidence used). Cases of physical evidence covered covered aggravated assault, robbery, rape, burglary and homicide only. Clearance rates of cases where there was actual retrieving of physical evidence and examination in labs were compared by others which had no evidence. While controlling for other factors in association with investigative outcomes that are positive (identifying a suspect at an investigation's outset, easy access to witness information and the taken for police to arrive after a crime is discovered).

The researcher used log linear analysis in examining the joint effects of the selected offence variables on variable outcomes. According to the findings cases of physical evidence had generally higher clearance rates compared to the rest. The first crime scene investigation hours or the "golden hours", as they are called, are crucial because police get information about a potential suspect's identity and obtain relevant data and facts. The study has some limitations. First the study has not explained how the investigations of the various crime cases will enhance the sustainability of the forensic investigation process. The study has stated that in high profile cases, the criminal justice system has a strong need for immediate information to focus the investigation and formulate plausible scenarios. Despite this it has not explained how the high-

profile cases enhance the sustainability of the of the criminal investigation process in the production of concrete evidence.

A recent study in the Netherlands by Peterson et al. (2014) on forensic DNA investigation and delivery of justice in court of law. The study utilized descriptive research design. The target population was 121 CID officers draw from the criminal investigation department. Through descriptive analysis the study found that the average turnaround times (right from when the crime scene is sampled to the DNA report) are sixty-six days for high magnitude crimes to forty four days for high volume crimes. This is a clear indication that chains of forensic DNA investigation might meet all volume and quality requirements but does not meet the criminal justice's needs, and to be more specific, the law enforcement ones with respect to delivery times of results.

The study is supported by Downes, (2013) who argued that speed optimized methods in forensic labs give the advantage of operation in a high-end lab environment therefore minimizing contamination risks and many more experimental errors. Also, forensic DNA experts exist for the job of evaluating complex profiles and the interpretation of criminalists. Approved profiles are quickly added and searched against the databases. This approach has a disadvantage however in that the samples still need to be transported to the lab, which takes up more time, paperwork and logistics processes. Stringent and time consuming procedures in the custody chain are needed to minimize risks of incorrect labelling, sample mix-up and sample loss.

Forensic evidence is identified, then collected and preserved in a way ensuring its integrity is maintained and it is available through the whole process of criminal justice. The most recent advances include advanced methods used to examine more degraded and smaller DNA samples. Mitochondrial analysis development, which is useful when investigating crimes like kidnapping and discovery of skeletal remains at a place where DNA is not present, , is revolutionizing how capable forensic scientists and crime scene investigators are in crime labs.

2.4. Theoretical Framework

This section presents the theoretical framework applicable for the current study. The theories to be used include the Actor-Network Theory, and the education theory. The theories are discussed in the subsequent sections.

2.4.1. Actor-Network Theory

The proponents of the theory are scholars Bruno Latour, Michel Callon and John Law. The theory states that all things in the natural and social worlds exist in a constantly shifting network of relationships. The theory argues everything exists inside those relationships. It further states that all factors involved in social situations are on one level, and therefore no external forces exist beyond how and what network participants presently interact. Thus, processes, ideas, objects and all relevant factors are viewed as important only in creating human social situations. ANT is of the view that social forces do not exist in themselves and cannot therefore be used in explaining social phenomena. Strict empirical analysis should instead be undertaken in describing instead of explaining social activity. This is the only time one can introduce social forces, just as an abstract theoretical concept and not something genuinely existing in the world.

The theory provides an explanation on how material-semiotic networks combine and act as a whole; clusters that create meaning are semiotic and material. As part of this it might look at explicit strategies for the relation of different elements together to form a network and subsequently a coherent whole. The networks have the potential of being transient and to exist in a constant making and re-making. This means relations should repeatedly be performed so the network does not dissolve. Additionally, they assume that relations' networks are intrinsically incoherent, and might contain conflicts. The assumption is that nothing lurks out of the network of relations and as above noted, suggests that no difference exists in the ability of animals, humans, technology or non-humans to act (and that only enacted alliances exist). Immediately actors engage with actor networks they too are caught up in the relations web, and get to be part of the entelechy.

The theory is relevant to the study for forensic investigation for it involves different actors both humans and non-humans but with a common goal to find out what happened on the basis of the

evidence left by the criminal. Actor Network Theory examines the inks of nonhuman and human entities based upon an anti-foundationalism approach where by nothing exists prior to its performance. Human intention and action are therefore decentred in this approach. Interrelated social factors lie behind and shape the growth and stabilization of an artefact as socially constructed by Trevor Pinch, Weebe Bijker. In the second approach, it sees technology and society as a seamless web (Moser et al., 2001). The metaphors of seamless web integrate political, economic and social aspects and erase macro and micro-level distinction. Both are in assumption that technology or social artefacts can be understood if interrelated within a wide non-technological range, social factors to be specific.

2.4.2. Cognitivism Theory

Cognitivism is a theoretical framework in understanding the mind gaining credence around the 1950's. It was a response to behaviourism which cognitivsts say neglected the explanation of cognition. Cognitive psychology got its name from Latin *cognoscere*, referring to information and knowing, and therefore cognitive psychology is one of information processing and is derived in part from early traditions of investigations of thought and solving problems (Mandler, 2002). Behaviourists accepted the existence of thinking, but saw it as behaviour in and of it. Cognitivists later argued that as thinking is vital to psychology, its study should become a field on its own. Cognitivists presuppose a specific mental activity form, the kind elevated by computationalism.

Cognitive theory stresses knowledge acquisition mainly and mental structure growth. Cognitive theory focuses on conceptualizing the learning process of the student: how well information is received, processed and organized into schema: how it is retrieved after recall. Simply, cognitive theory explains the knowledge acquisition process and subsequent effects on mental structures in the mind (Shell, 1980). Learning is not really about what a learner is doing but it is a process that depends on existing information and the learner's method of getting new knowledge (the integration of new information and existing schemas). Acquisition of knowledge consists of the internal mental structures' codification within the mind of the student. In accordance with the study, the study must actively participate in their own process of learning. Cognitive approaches focus mainly on the learner's mental activities like goal setting, organizational strategies and mental planning (Winna, 1998).

Cognitivism theory has its basis on the fact that processes of cognition are at the heart of behaviours, emotions and thoughts. It has largely been based Aaron Beck and Albert Elli's work, whose emphasis is mainly what people think rather than their actions. Cognitive theorists propose stages of cognitive development that help explain delinquency and crime. Lawrence Kohlberg refined Jean Piaget's work by proposing three moral development levels. The pre-conventional level, common in children, has its focus on external consequences that may come from actions (Winna, 1988). The conventional level, common in young adults and adolescents, focuses on societal expectations and views. The post-conventional level, common in adults over 20 years of age, has its focus on critical examination of moral principles and human rights. Theorists are in argument that offenders fail to develop their capacity for moral judgement above a pre-conventional level. Other cognitive theories look at crime and delinquency from a perspective of life development.

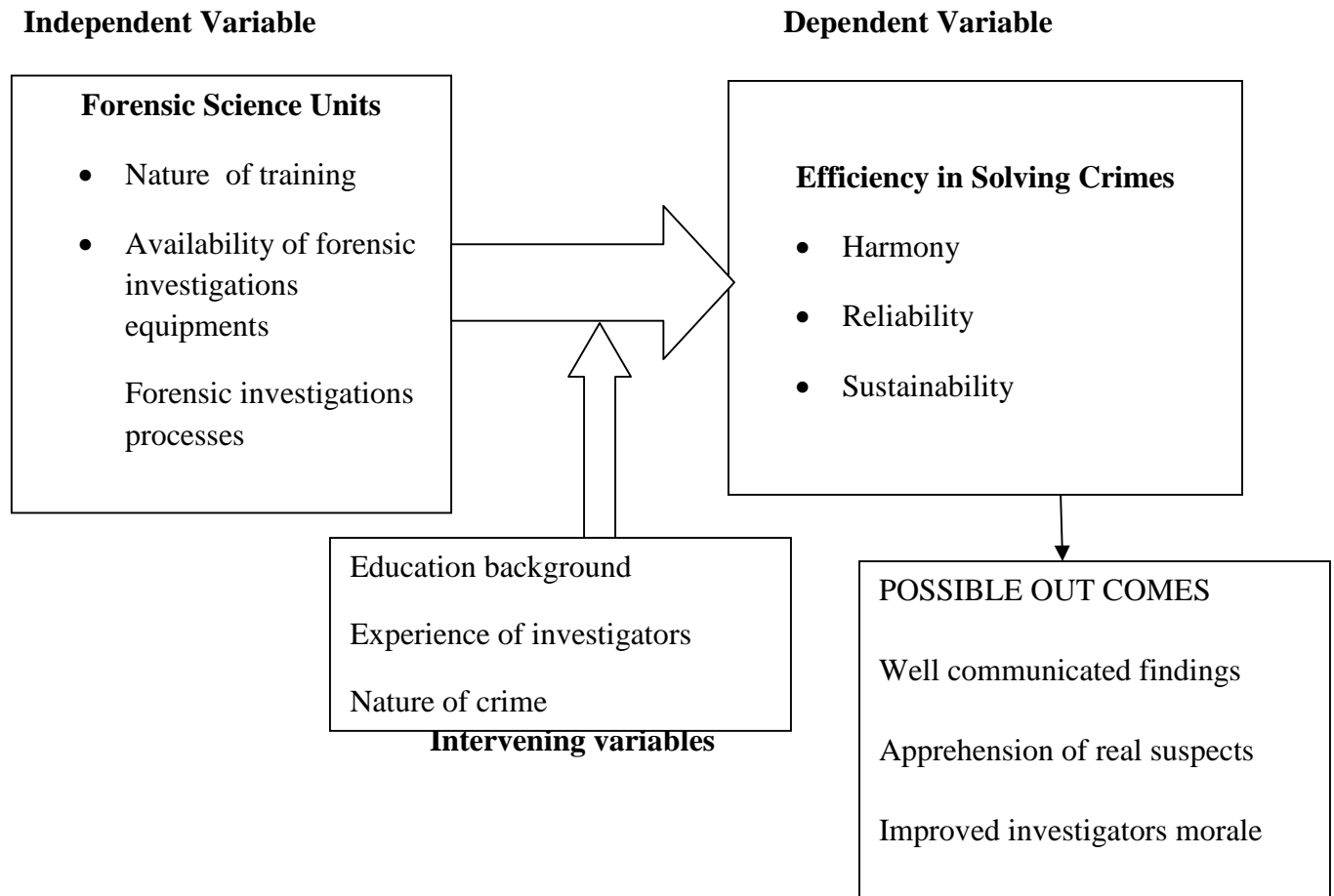
Cognitivism theory lays focus on a potential link between criminality and personality. Although currently, there is much debate on whether characteristics in personality play a big role when it comes to determining subsequent behaviour, prominent criminologists argue that the root cause of crime is not social issues (bad schools, high unemployment) but rather deeply developed features of the personality of the human and its earlier experiences. Impulse personality, lack of empathy and low intelligence are some of the leading characteristics of individuals at the risk of being offenders (Wilson, 2007).

2.5. Conceptual Framework

A conceptual framework is a diagrammatical research tool that intends to assist a researcher develops awareness and understanding about the situation under scrutiny and also communicates this (Roberts, 2011). The conceptual framework shows how the dependent and independent variable are related. It is presumed that an independent variable either determines or affects the dependant variable (Van der Waladt, 2008). It changed as required, and values in no way represent a problem in need of explanation in an analysis, but are simply taken as given. The conceptual framework in this study is based on the relationship between various variables. The

independent variables in this study are forensic science units, while the dependent variable is the efficiency in solving crimes.

Figure 2.1. Conceptual Framework



2.6. Conclusion

The chapter reviews existing literature on analysing the efficiency of forensic science units within Kenya police service in solve crimes. Two theories, namely; Actor network theory and cognitivism theory, under which the study is based, have been discussed. The chapter has also presented a conceptual framework reflecting the relationship between independent and dependent variables.

CHAPTER THREE

RESEARCH METHODOLOGY AND DESIGN

3.0. Introduction

This chapter presents the methods that the researcher utilized to achieve the research objectives of the study. The methods included the research design, the target population, the sampling design, the sample, data collection instruments, techniques and the data analysis techniques that will be used in the study. The purpose of the study was to analyse the efficiency of forensic units within Kenya police service in solving crimes.

3.1. Research Design

The study made use of descriptive survey research design. The method was preferred as the researcher can collect data for answering of questions about the subject study's status. Descriptive research survey reports and also determines how things are done and assists a researcher describe phenomenon in terms of characteristics, attitudes and values (Mugenda and Mugenda, 1999). Orodho, (2003) says that descriptive survey is collecting information through interviews or using questionnaires in the sampling of individuals. This method was appropriate for the study in that it helped in portraying the accuracy of people's profile situations and events. A research design that is descriptive allowed for deep analysis of elements and variables of the population under study and collection of large data amounts in a largely economical way. It made generation of factual data concerning the study possible. This is because descriptive survey relies largely on secondary data which assists in development of the case based on facts obtained through statistics and descriptive interpretations from archival data and material

3.2. Location of the Study

The study was conducted in Nairobi County at the CID headquarters and the CID training school in South C. Kenya Police Criminal Investigation Department is a semi-autonomous directorate of the National police service that investigates complex cases. It is commonly called "CID". It is headed by a director reporting to the inspector general of police. Due to the position's sensitivity, the director is appointed by Kenya's president. CID headquarters can be found on Kiambu road, Nairobi. The CID headquarters are located on Kiambu Road, Nairobi. The C.I.D. Training School was established in 1957 to enhance the Kenya Police capacity and efficiency in criminal

investigations. In 1969 the CID Training School was relocated from City Centre to South C where it is currently located.

3.3. Target Population

The study targeted 500 participants who included the CID officers at the CID headquarters and who were well versed with knowledge on forensic investigations and the CID trainees at the CID training school in South C.

3.4. Sample Size and sampling Procedure

This section describes the sampling technique, sample size and selection that was employed in the study.

3.4.1. Sample Size

A sample is a sub-group or smaller group got from the accessible population (Mugenda & Mugenda, 1999). Sampling is the process of selecting the people who participated in a study. This study adopted the stratified sampling technique. Stratified sampling is a probability sampling technique wherein the entire population is divided into strata or subgroups and then the final subjects proportionally selected from the various strata. The reason for the sampling method choice was because it enabled the researcher to sample representatively even the most inaccessible and smallest subgroups in a population. This let the researcher sample the population's rare extremes. Additionally, the study used Cochran's sample size formula which was appropriate for the population mentioned. The study used a 95% confidence level which its Z value is 1.96 per the normal table.

$$n_0 = Z^2 pq / e^2$$

$$n = n_0 \frac{1}{1 + (n_0 - 1) / N}$$

Cochran's sample size formula

$$(1.96)^2 (0.5) (0.5) / (0.05)^2 = 385$$

To obtain the sample for the population of 500

$$385 (1 + (385 / 500)) = 217$$

3.4.2. Sampling Procedure

Sampling is the process of selecting the people who will participate in a study. This process should be representative of the whole population. Sampling is hence the procedure, process or technique of choosing a sub-group from a population to participate in the study (Ogula, 2005). This study adopted the stratified sampling technique. From the possible 500 target population, stratified random sampling was employed to select a total of 217 sample of the population.

3.5. Data Collection

An interview guide and questionnaire were used in the collection of primary data. The questionnaire had questions meant to answer questions relative to the study's objectives. The questions entailed both closed-ended questions that enhance open ended and uniformity quantitative and to enable maximum collection of data and to generate quantitative and qualitative data. The questionnaire was divided into two sections, the research questions section and the background information section. Furthermore, the former was divided to sections according to the research objectives. In addition, the study collected secondary data which involved secondary documents analysis.

3.6. Pilot of Research Instruments

Piloting helps the researcher to generate an understanding of the concept of the people being interviewed. In conducting the pilot study, the researcher was interested in establishing whether the participants had the same understanding of the questions and thus would offer the information required. Mugenda and Mugenda (2003) posit that even the most carefully constructed instrument cannot guarantee to obtain one hundred percent reliability. Piloting is important as it helps in determining the reliability of the instrument. In this research, 20 participants were chosen to contribute and they were not included in the sample chosen for the study. Test-retest reliability is obtained by administering the same test repeatedly over a period of time and still produces the same results. During piloting the researcher administered the questionnaire to a different set of participants who are not part of the groups of sampled participants, but similar in characteristics to those sampled for the study. The piloting process

also played the important role of checking the participants for their suitability, clarity, relevance of information and appropriateness of the language used.

3.6.1. Validity of the Instruments

Validity is how much an instrument measures what it purports to measure (Mugenda & Mugenda, 2003). It is the meaningfulness and accuracy of inferences that are based on results of the research. In this regard, experts in the field of forensic science achieved the content validity through an evaluation of the content. The instruments were handed to two experts groups, one had to assess the concept the instrument was measuring and the other had to determine if the set of items represents accurately the concept being studied.

3.6.2. Reliability of Research Instruments

Reliability is the consistency of data that comes from using a particular research method. A test measures what is under measurement to the degree. Mugenda (2003), states that reliability is the measure of the degree to which a research instrument yields the same result after repeated trials over a period. In this regard, test-retest was employed to check on reliability. This involved administering an instrument twice to the same subjects, but after a time. To determine stability therefore, a test or measure was done on the same subject at a later date. Results were then correlated and compared with the previous test to give a stability measure. Responses got during the piloting were made use of in calculating the reliability coefficient from a matrix of correlation. Cronbach's Alpha Coefficient, that is internal coefficient's measure, was used to estimate the reliability of the instrument which measures internal coefficient

Table 3.3: Reliability Coefficients

Variable	Number of items	Cronbach's Alpha
Training	10	0.862
Forensic Equipment	7	0.814
Process	9	0.769

3.7. Data Collection Procedure

The procedure for data collection started once the researcher was given a letter of approval by the university to go to the field. Using the letter of approval, a permit to conduct the study was

acquired. Afterwards, the head of the criminal investigation department was informed of the study and hence all the relevant stakeholders were informed as well. The researcher used the services of three research assistants in the data collection process. The research assistants were trained on how to administer the questionnaire. The drop and pick method was used where the research assistants delivered the questionnaire to the participants and picked them when completed.

3.8. Data Analysis

The data for the study was analyzed both qualitatively and quantitatively. The collected data was keyed in then analysed with the help of SPSS. The quantitative data that was generated was then subjected to the available descriptive statistics features to generate standard deviation and mean which was presented by the use of frequencies, percentages and tables, while Qualitative data consisted of words and observations, not numbers. Pearson's correlation coefficient was used to show the strength of the relationship between nature of training in forensic science and how they create harmony in investigations, the availability of forensic investigations equipment and their reliability to produce concrete evidence, and to analyse how forensic process is helpful in sustaining trial in the court of law. Regression was used to show how education, experience and nature of crime contributed to the efficiency in solving crimes by the police service.

3.9. Ethical Considerations

This study adhered to correct procedures of research and all information sources were acknowledged far and wide. Before the extraction tool was administered, the supervisor's consent was sought. The researcher presented before a panel of scholars to indicate that the information (data) extracted was only used for the purpose of the study.

CHAPTER FOUR

DATA ANALYSIS AND PRESENTATION

4.1. Introduction

This chapter presents the data that was found on the efficiency of forensic science units within Kenya police service in solving crimes. The research was conducted on a sample of 217 participants to which questionnaires were administered. The chapter introduces with analysis of participants' personal information, and then looks into the analysis of themes: nature of training in forensic science and how they create harmony in investigations, availability of forensic investigation equipment and their reliability to produce concrete evidence, and forensic process and how it is helpful in sustaining trial in the court of law.

4.2. Questionnaire Return Rate

Out of the sampled population, 175 questionnaires were returned duly filled in making a response rate of 80.6%. The response rate was representative and was adequately used to answer the research questions.

Table 4.1. Response Rate

Response	Frequency	Percentage
Filled in questionnaires	175	80.6
Un returned questionnaires	42	19.4
Total Response Rate	217	100

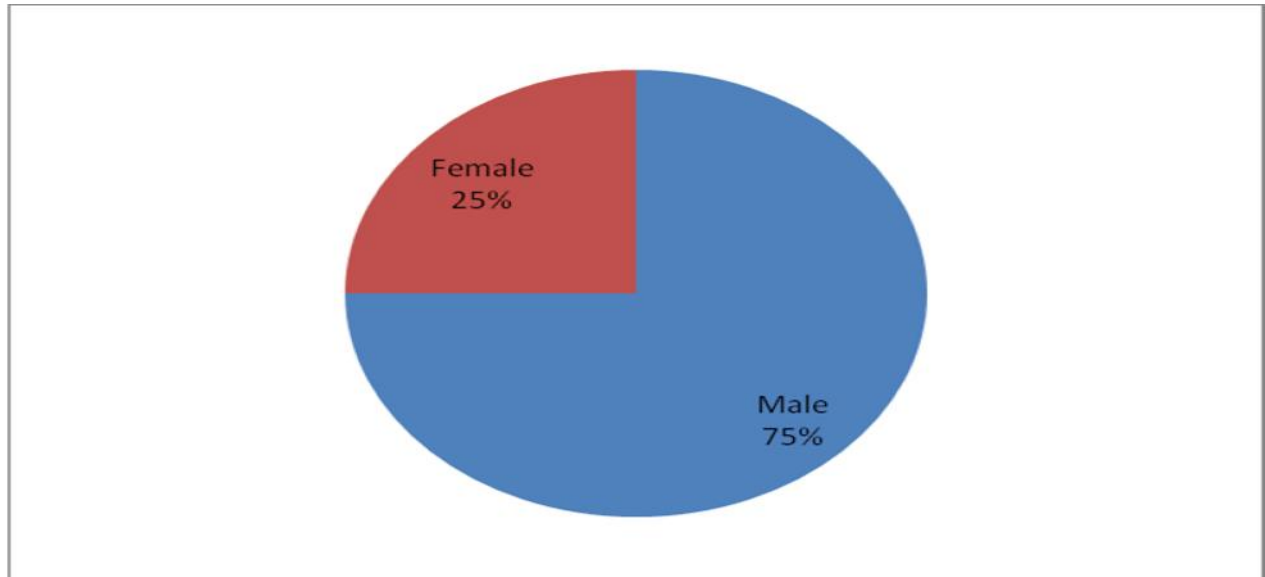
4.3. Demographic characteristics of Research Participants

The participants' personal information included: gender, age, highest level of educational qualification and the period of time the participants have been involved in forensic investigation in Kenya.

4.3.1. Participants Gender

The participants were requested to indicate their gender in order to inform the researcher as to whether gender is a factor in determining the conduction of forensic investigations.

Figure 4.2. Participants Gender



A majority the participants were male (75%) of while a minority were females (25%). This depicts that male were mostly involved in the conduction of forensic investigations.

4.3.2. Age of the Participants

The participants were asked to indicate their age. This was important as it enabled to identify whether age gap has an effect on the proficiency on forensic investigations.

Table 4.2. Age of the Participants

	Frequency	Percentage (%)
24 years and below	10	5.7
25-29 years	23	13.1
30-34 years	49	28.0
35-39 years	56	32.0
40-44 years	18	10.3

45-49 years	12	6.9%
Above 50 years	7	4.0%
Total	175	100%

According to the findings, a majority of the research participants (60%) were between 30 and 39 years. This depicts that most of the participants were aged enough and thus could offer high quality information on the conduct of forensic investigations among the police service because of their experience.

4.3.3. Distribution of participants by Level of Education

The participants were requested to indicate their level of education.

Table 4.3. Distribution of participants by Level of Education

	Frequency	Percentage (%)
Secondary	20	11.4%
Certificate / Diploma	97	55.4%
Graduate	53	30.3%
Post Graduate	5	2.9%
Total	175	100%

From the findings, most of the participants (55.4%) had a Certificate / Diploma level of education. This implies that participants had ample knowledge on forensic investigations and hence higher chances of getting reliable data. This was significant as the researcher could identify whether the information provided was true to the word and whether the participants actually understood what was involved in forensic investigations.

4.3.4. Work Experience in Forensic Investigations

The study also sought to establish the extent to which participants had being involved in Forensic Investigation.

Table 4.4. Duration of being involved in Forensic Investigation in Kenya

	Frequency	Percentage
Less than a year	11	6.3%
between 1-2 years	20	11.4%
Between 2-3 years	57	32.6%
between 3-4 years	73	41.7%
over 4 years	14	8.0%
Total	175	100%

Based on the findings most of the research participants (74.3%) been involved in forensic investigation in Kenya for a duration between 2 - 4 years. Subsequently, this illustrates that most of the officers had been involved in forensic investigations in Kenya for a longer duration and thus could offer concrete information.

4.4. Nature of Training in Forensic Science creating Harmony in Investigations

This section presents findings on nature of training in forensic science and how they create harmony in investigations which are presented in the subsequent section.

4.4.1. Nature of Training in Forensic Science and Collection of Evidence

The participants were requested to indicate how the nature of training in forensic science influences the collection of evidence at crime scene, and crime scene reconstruction. According to the participants a well-trained officer will always work well with others in harmony to ensure that the investigation process is always a success. In addition the participants indicated that through training in forensic investigations an officer can get experience and courage to perform his duties, and that the officers are able to work as a team and make decision on process and procedure to collect data on forensic investigations.

4.4.2. Courses offered in CID training school related to Forensic Science

The participants were requested to name different courses offered in CID training school related to forensic science. According to the participants the courses offered included fingerprints, blood pattern, DNA analysis, document and writing forensic, crime scene handling, suspect interviewing, profiling, interrogation, as well as evidence collection. The participants further stated that when an officer completes these courses he or she is in a position to work harmoniously with others during forensic investigations.

4.4.3. Duration of Training as Forensic Investigator

The participants were asked to describe how long it takes for one to be well trained as forensic investigator. According to the participants it takes 6 months to 12 months to be fully trained. In addition the participants indicated that several courses are beginner courses which take a duration between 2 weeks and one month mostly attended on need basis. Once the officer completes the course he or she is a qualified investigator who can undertake the investigations efficiently.

4.4.4. Criteria Used to Select Course Participants

The participants were requested to indicate the criteria used to select course participants and later deployment at the forensic investigation department. The participants indicated that first you must be a police officer then talent spotting is done, which is not always fair. They further stated that a senior officer may favour their families or friends when they feel the job is rewarding especially on monetary terms, thus ending up with passionless officers. The participants further stated that corruption may also be involved to necessitate course participation and thereafter deployment. Corruption has been a vice that has affected the selection of the right people to be trained as forensic investigator hence derailing the process and the delivery of justice to the victims.

4.4.5. Experience of Forensic Investigators

Participants were requested to describe how the experience of forensic investigators helps in creation of harmony in investigations. The participants indicated that experience comes with well communicated findings as it facilitates team work, and well-coordinated investigations. As a result appropriate evidence is collected as well as facilitation of speedy investigations. It was

evident from the participants that they are trained with better facilities but these facilities are not available at the stations of work hence they cannot utilize all the skills that were acquired while in training. The participants reported that there should be a relationship between the training and practice in the way you have been trained hence the better trained you are, the more you should be efficient in the field. The more you undergo the training the more you are able to handle the scene of crime.

However, participants noted that lack of equipment may make the practice inefficient. This is because while they acknowledged the importance of thorough training, they also alluded to the fact that the more training one gets the more one is equipped to handle the scene of crime satisfactorily. Experience as reported enables one to make appropriate decisions on what to do and be able to know how to do it, for example, in photography and finger marks. It is evident from the findings that experience makes one confident and how to use the apparatus well. The more one attends the scene of crime, the more one gets the experience to handle them courageously and in a specialized way. The more one has been in the field the more one learns and improves on one's skills.

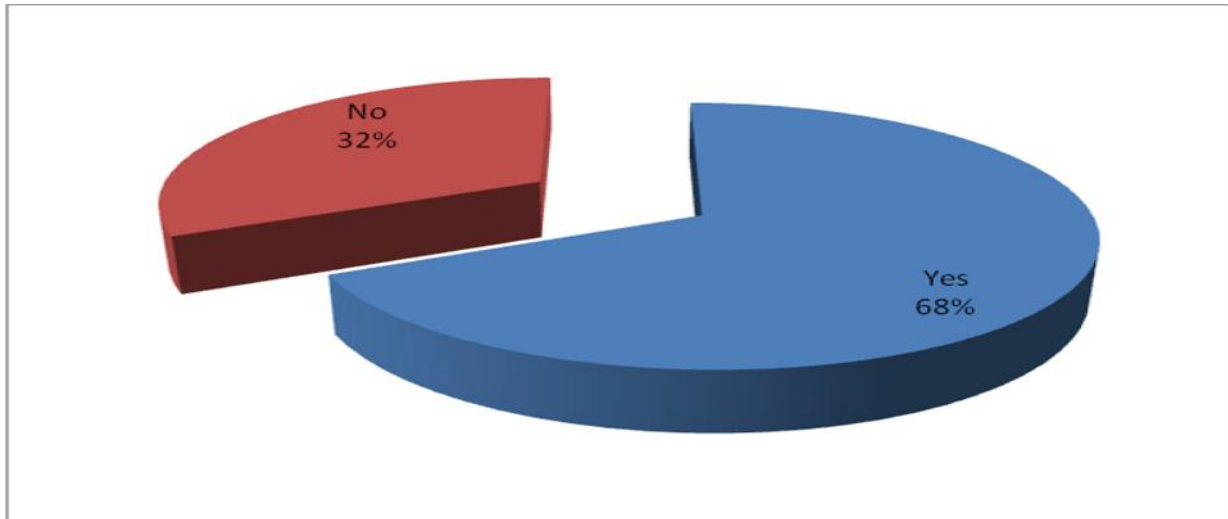
4.4.6. Training in Finger Prints and Relation to Practice of Forensic Investigation

The participants were requested to indicate how training in finger prints, writing and tools marks relate to the practice of forensic investigation and creation of harmony in investigations. The participants stated that at the age of 18 years Kenyan citizen are provided with a mandatory document called national identity card that allow one to access most services. At this point fingerprint are picked which are always used whenever one is suspected to have committed crime. In addition the participants stated that if one is a suspect in any serious crime fingerprints are taken again and are compared with the fingerprint in the scene of crime and in the data bank which then helps in the identification of the real suspect. In relation to practice the participants indicated that the forensic department will use the finger prints to identify a suspect who ought to have committed heinous acts.

4.4.7. In-Service Training in Forensic Investigations

The participants were requested to indicate whether they go for in-service training in forensic investigations. This was important to the researcher as it informed him whether refresher courses are carried out to familiarise the officers on the changes in forensic investigation.

Figure 4.3. In-Service Training in Forensic Investigations



From the findings majority (68%) of the participants indicated that they go for in-service training in forensic investigations while 32% indicated they do not. This depicts the participants go for in-service training in forensic investigations. They trained on courses such as basic forensic, basic crime scene, photographing, explosive incident counter measure, advanced explosive incident counter measure, post blast investigation, advance electricity for bomb technicians, evidence collection and packaging, CBRN threat awareness and mitigation course, improvised explosive device disposal, chemical safety and security of radioactive material, tactical commander course, and bomb data analysis course. Those who had not attended any in-service course gave various reasons. There is always in-service training which is done mostly by sponsors from foreign countries like USA, Britain, France and other countries that through their security and criminal justice institutions also facilitate the training. One is expected to attend at least one or two. One of the respondent stated that “I have not attended any in-service training for I have not done the initial course for basic forensic investigation. I am waiting to join the

training when donor funds come and it is also limited to the number of people needed to attend and the time in which they are required to attend”. The in-service trainings are not a must but the Officer in Charge at CID is the one who picks the individuals who need to undergo the short courses. Those who attend such courses are awarded certificates of participation and they are trained by foreign experts through their embassy. Some participants, however, reported non-attendance of any in-service training they learnt and gained skills as they work in the forensic department.

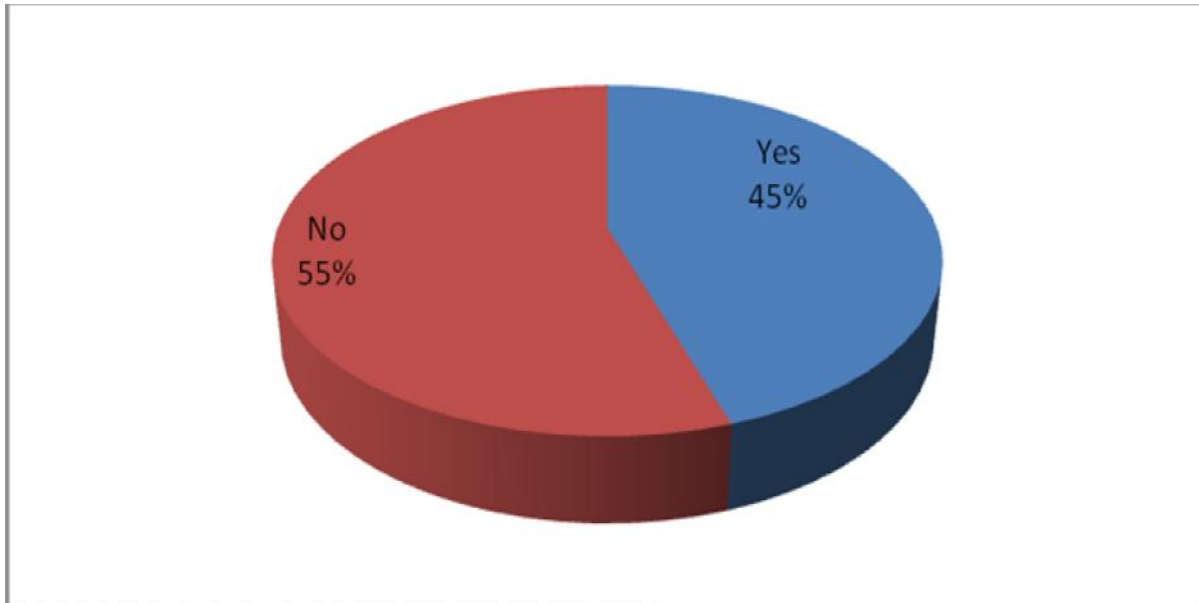
4.4.8. Experience in Nature of Crime and Efficiency in Forensic Investigations

The participants were supposed to show how experience in the nature of crime relates to efficiency in forensic investigations. This was important as it informed the researcher whether experience is a factor in determining how the investigations are carried out. According to the participants officers who have handled several crimes are aware of process and procedures that are more appropriate in collection of evidence, construction of the case and in helping to apprehend suspect. The participants further indicated that lack of enough experience may make handling of forensic investigation a tall order which may hamper delivery of justice. Experience is expected to bring perfection of the skill and make one an authority in one’s field, but sometimes the contrary takes place. From the excerpts, it is noted that new officers are not able to handle the scene due to fear of the unknown, but with time they develop courage and become exposed to different scenes and cases. The more one is exposed to the field situations, the more one is able to solve issues in a more practical way than the newly trained. Some participants reported fear of handling crime scenes due to the challenges faced in the field. They indicated that the crime scene makes one more careful and more observant at the scene for some of the cases might raise international concerns hence the challenges. Previous experiences enable one to perfect one’s skills. It was, however, noted that though experience comes with courage and expertise some new trainees are getting advanced training which was not available in the previous trainings to other officers. The new trainees therefore get more exposed to new facilities and new technologies.

4.4.9. Employment of Forensic Scientist Graduates in the National Police Service

The participants were requested to indicate whether the National police service employ graduates forensic scientists.

Figure 4.4. Employment of Forensic Scientists Graduates in the National Police Service



From the findings majority (55%) indicated that National Police Service does not employ Forensic Scientists Graduates while others (45%) indicated they do. This depicts that National Police Service may not have employed Forensic Scientists Graduates.

4.4.10. Graduates Effectiveness in their Work in Relation to House Trained Officer

The participants were requested to indicate if the graduates are more effective in their work than in house trained officer. According to the participants the police service do not advertise forensic scientist jobs but during recruitment there are few graduate who by chance get the opportunity to be employed as constable after which their career is recognized and thus taken to CID training school to be trained on investigations. The participants further stated that in most cases they perform better because it's their passion having chosen to pursue degree in that field. In addition the participants indicated that the passion also depends on how the officers are motivated to do their job.

4.5. Availability of Forensic Investigation Equipment and their reliability to produce concrete evidence

This section presents findings on availability of forensic investigation equipment and their reliability to produce concrete evidence. The findings are presented in subsequent sections

4.5.1. Equipment Used In Forensic Investigations

The participants were requested to list the available equipment that are used in forensic investigations in Kenya. The participants stated that most of the equipment included the camera for taking photos, fingerprint dusting kit, desk top computer for analyzing using software like adobe Photoshop, Corel, and VLC video viewer. In addition the respondents indicated that the section also run CCTV cameras for suspect identification, NORITSU photo printer, equipment bomb tract, hand held chemical analyzers, explosive detectors, x-ray machines, motor vehicle mounted x-ray system, EOD (explosive ordinance disposal) robots, radiation detection equipment, frequency jammers, server and software, and FTIR (Fourier, Transform Infrared Spectroscopy). The equipment are fundamental in the detection of the suspects especially on finger print identification. In addition according to the study, the tools and technology used by the forensic scientist depend on the type of evidence to be collected and the kind of laboratory where such evidence is analysed. Although many scientific and allied services apply to forensic sciences, there are common disciplines provided by State forensic laboratories. In addition the participants indicated that available technologies and equipment are only relevant for finger printing and photography.

4.5.2. Function of the Forensic Investigation Equipment

The participants were requested to indicate the function of the forensic investigation equipment. According to the participants the camera was used for taking photos, the desk top computer was used for analyzing using software like adobe Photoshop, while CCTV cameras were used for suspect identification. Additionally, incorporation of no-touch wand and magnetic fingerprinting lets investigators get the perfect crime scene fingerprints impression with no contamination.

In addition, the incorporation of magnetic fingerprinting dust and no-touch wand allows investigators to get a perfect impression of fingerprints at a crime scene without contamination. They pointed out that the technology and equipment are old. The participants also pointed out

that they use aprons instead of specialized attires for crime scene investigations. This can leads to the contamination of the scene and the tampering of the evidence.

4.5.3. Education Background in Forensic Sciences and Application of Equipment on Evidence Collection

Participants were requested to indicate how education background in forensic sciences improves the application of equipment on evidence collection. According to the participants an officer who is trained to use equipment will be able to maximize their application in data collection and analysis. The education background will act as the foundation through which appropriate forensic investigation can be undertaken. The participants stated that one has to be trained in the basic investigation course at CID training school in relation to the criminal investigations equipment. The basic training course comprises: Criminal procedure, the Penal Code, Evidence Act, CID structures, photography, basics in fingerprints, handling of exhibits and general scenes of crime, then later you need to do a placement test in which you have selected in the list of your choices.

4.5.4. Adequacy and Reliability of Forensic Equipment in Collecting Evidence

The participants were requested to indicate whether the forensic investigation equipment are adequate and reliable in collecting evidence from the crime scene. According to the participants the CID department have several equipment that are used in evidence collection and analysis. In addition the participants indicated that most of the equipment are however very old or outdated and they require modern sophisticated equipment that will be more reliable as compared to the current ones. The participants stated that the facilities and tools are not adequate to deal with the common cases and scenes of crime satisfactorily. The participants indicated that some of the equipment available for use are not supplied directly but collected from the government chemist. They, however, said that kit one (basic kit for any forensic expert) is only adequate to deal with minor crime scenes and not the major ones.

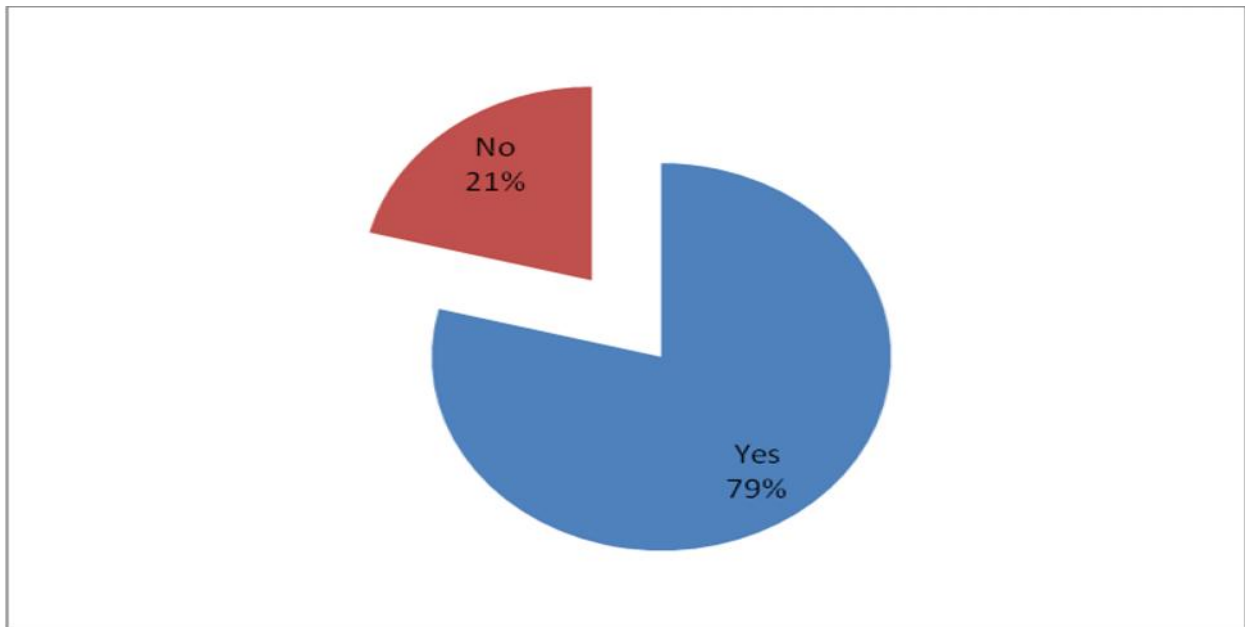
The respondent further stated that some evidence collection kit was reported to be currently unreliable and not being used for it can be corrupted and lose data. Some of the equipment not available are sometimes brought from abroad by well-wishers. One respondent stated that they do not collect all the information due to lack of equipment (cameras, films, aluminium powder)

because machines used for processing are ancient and if you use carbon black you need to photograph it first. Lifting tapes, lens, scale, glove, masks, swabs and ammonium solution are not provided by police but have to be sought from the government chemist. The participants also stated that the other things that they have to use but are never provided by the police include packing material, bottle (plastic, glass), labels and seals.

4.5.5. Absence of Forensic Investigation Equipment

The participants were asked to indicate whether the absence of forensic investigation equipment would have an influence on the reliability to produce concrete evidence.

Figure 4.5. Absence of Forensic Investigation Equipment



From the findings majority (79%) of the participants indicated that absence of forensic investigation equipment would have an influence on the reliability to produce concrete evidence while 21% indicated that absence would have no effect. This depicts that absence of forensic investigation equipment would have an influence on the reliability to produce concrete evidence. In addition the participants indicated that the equipment that are used are very essential in data collection and analysis. They further indicated that equipment give a confidence level of above 80% and thus their absence means no investigation can be efficient.

4.5.6. Frequency of Availability of Forensic Investigation Equipment

The participants were requested to state how often they get new forensic investigation equipment and new technology in the field of their operation. According to the participants one of the hindrances in equipping the department is lack of funds which would facilitate the purchase of the new technology and equipment. In addition participants indicated that bureaucracy also hinder effective supplies of the required equipment and this implied that took longer to purchase prerequisite equipment. The participants further stated that the forensic investigation equipment are not adequate and at times are not available for most are brought by donors and others are got from outside countries hence the process of getting them becomes a challenge. This hampers the investigation and the delivery of justice to the victims. The participants stated that they did not use any modern technology. They, however, said that there are fingerprint machines known as digital Ruvis work station or Ruvis fingerprint work station which is not used at the scenes of crime for it's a new technology with several procedures to follow. The participants further stated that facilities and technologies are very expensive and this is a big challenge in purchasing of new facilities required on the ground. From time to time government supplies the equipment but there is the challenge of finances and low budget. Also, there are departments that are given priority due to the emerging issues in general security.

4.6. Forensic Investigation Process and Sustainability of Trial in Court of law

This section presents the findings on forensic investigation process and sustainability of trial in court of law. The findings are presented in the subsequent sections.

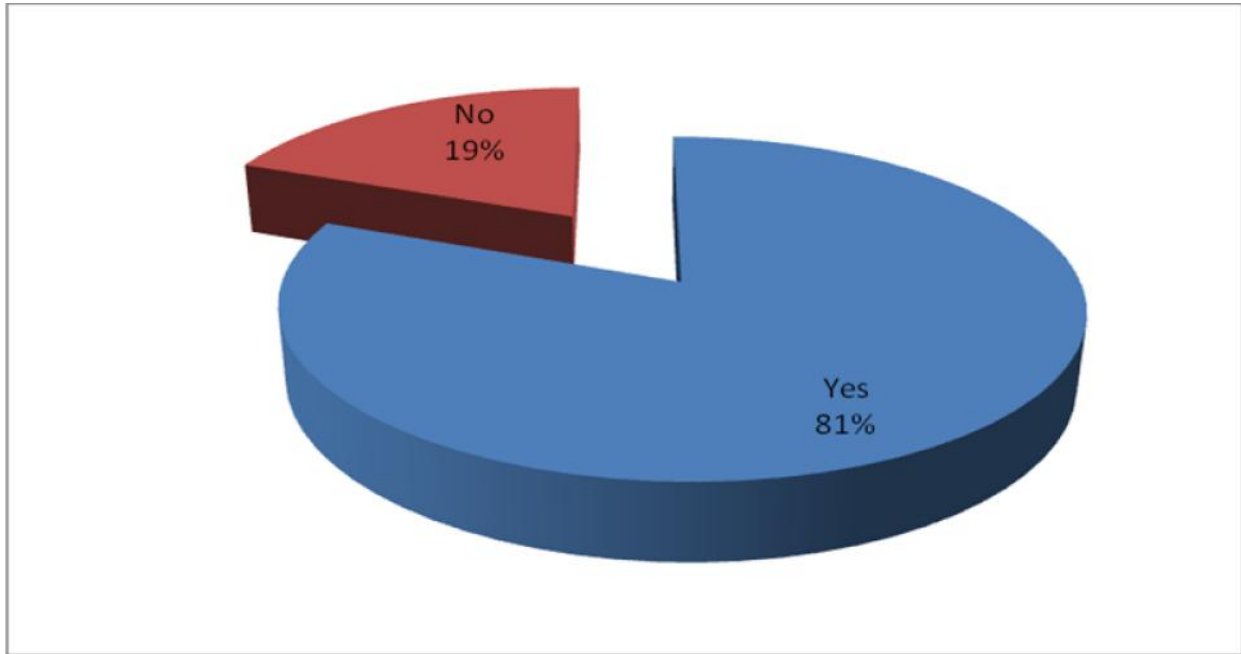
4.6.1. Crime Scene Investigation Process

The participants were requested to describe the crime scene investigation process and its applicability in collection, examination, analysis and reporting of crimes. According to the participants the first thing in crime scene investigation is to condone scene of crime and help any victims if there is. In addition the respondent indicated that the next step is ensure the scene is safe for investigators, doctors and other participants to operate from, collect evidence by taking photos, blood pattern, and fingerprints which will be used to apprehend the culprits.

4.6.2. Standard Procedures and Policies for Conducting Forensic Investigations

The participants were requested to indicate whether there are standard procedures and policies for conducting forensic investigations in Kenya.

Figure 4.6. Standard Procedures and Policies for Conducting Forensic Investigations



From the findings majority of the participants (81%) indicated that there were standard procedures and policies for conducting forensic investigations in Kenya while 19% indicated absence of standard procedures. This depicts that there were standard procedures and policies for conducting forensic investigations in Kenya. In addition the participants indicated that there are set rules that investigators follow to ensure that evidence is not interfered with, is packed and submitted to departmental committee. In addition the participants indicated that for analysis, the information is reconstructed and a case is formulated which help in aligning the suspect in Kenya.

4.6.3. Evidential Information from the Suspect

The participants were requested to explain how the investigators get evidential information from the suspect. According to the participants after the suspect is apprehended, an officer may profile

them which means getting a better picture of the suspect life and background information. This will help the officer to formulate the interview and interrogation questions. In addition the participants indicated that interviewing is where the suspects are asked question freely as they wish to answer or not and in good conducive environments. The participants further stated that interrogation is where the suspects are pressed to give information through tough questions that are asked and the suspect is expected to answer. The participants indicated that interviewing and interrogation were the main methods of getting evidential information from the suspect.

4.6.4. Stages of Evidence Collection and application of Profiling, Interviewing and Interrogation

The participants were requested to indicate stage of evidence collection where profiling, interviewing and interrogation of suspects are applied. According to the participants after the evidence has been collected and a suspect is apprehended the appointed forensic investigator is given mandate to carry on with case construction. The participants further indicated that the person must be profiled to know whether the right suspect is in police cells and not the innocent ones and that the information accessed gives a lead to the kind of person the suspects is. Interviewing follows and if investigator is not satisfied with information received from suspect interrogation is employed to press the suspect to give the right information.

4.6.5. Forensic Psychology and the Criminal Investigation Process

The participants were asked to explain how forensic psychology is applied in the criminal investigation process to improve in the collection of evidence. According to the participants forensic psychology is an intersection between psychology and criminal justice system. It concentrates on mens rea (guilty mind) and criminal act (actus reus). In addition the participants indicated that it also help the investigator to treat a suspect as human being and observing their human rights. In addition they stated that it prepares the investigator to handle emotion and prevent post traumatic stress disorders to himself and also help the victim of crime psychologically.

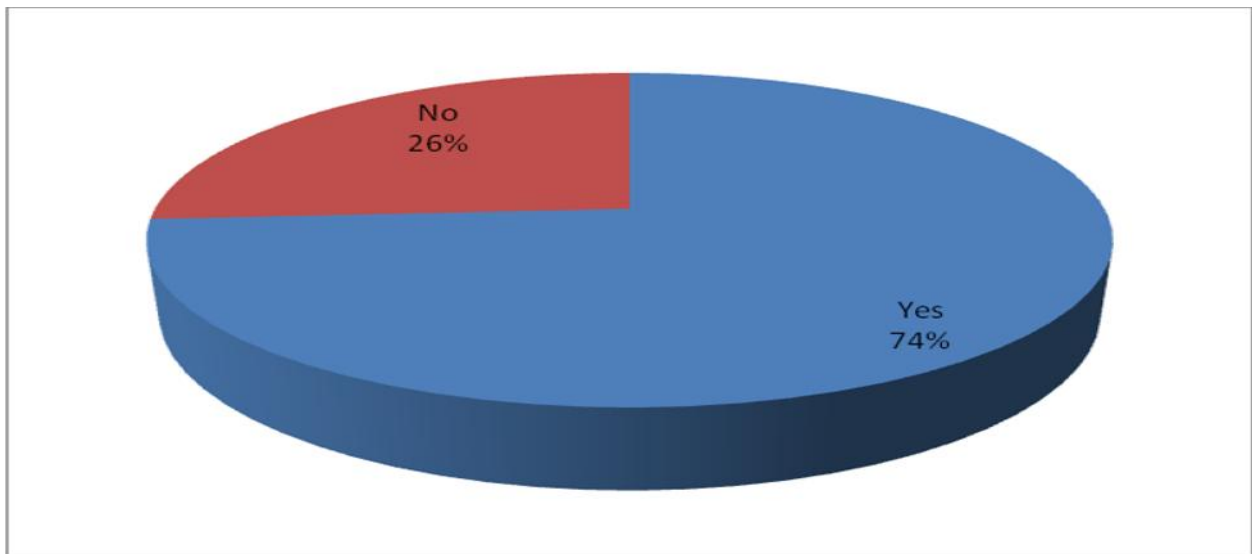
4.6.6. How Investigators Squeezes out Correct Information from Suspects and still observe human right of suspect

The participants were requested how the investigators ensure that they squeeze out correct information from suspects and at the same time ensure they observe the human rights of the suspects. According to the participants human rights courses are offered in the training school together with psychology courses which prepare the investigators on handling the suspect well while still managing to squeeze out the right information. This is done through the creation of a favourable environment where the suspect feels safe.

4.6.7. Professionalism, Impartiality, and Open Mindedness among Forensic Investigators

The participants were requested to state whether professionalism, impartiality, and open mindedness among the forensic investigators influence the sustenance of trial in the court of law.

Figure 4.7. Professionalism, Impartiality, and Open Mindedness among Forensic Investigators



From the findings majority (74%) of the participants indicated that professionalism, impartiality, and open mindedness among the forensic investigators influence the sustenance of trial in the court of law while 26% were of the contrary opinion. This depicts that professionalism, impartiality, and open mindedness among the forensic investigators influence the sustenance of

trial in the court of law. In addition the participants indicated that where people are trained to be professionals, impartiality and open minded is virtue that all officers should have. The participants further indicated that this will necessitate delivery of justice to the victim and their family. They further stated that this will also ensure no innocent person lands in jail. Impartiality eliminates compromised evidence and corruption is out of question. Open-mindedness approach to investigations helps the investigators to approach the crime scene hoping for many possibilities that lead to crime, which will aid in the elimination of bias.

4.6.8. Length of Time Taken to Secure Crime Scene

The participants were asked to state how long it takes to secure crime scene, collect evidence and reconstruct the evidence collected. According to the participants it is not possible to generalize time that will be taken to condone the crime scene. It depends with nature of crime, the presence of trained investigators, their experience in handling investigation, and the education background. In addition the participants indicated that the equipment available to collect evidence are also significant in determining the time taken to secure a crime scene. The participants further stated that from evidence collection a team of investigators form a committee that analyze and construct a case where evidence is considered enough the suspect are apprehended and taken to court to answer the charges.

4.6.9. Length of Time Taken to Apprehend Suspect and Produce Him/her in Court Of Law

The participants were requested to indicate the length of time taken once the evidence is collected to apprehend suspect and produce him/her in court of law. According to the participants once the evidence is collected it gives a lead to the suspect and he/she is apprehended immediately but it depend with many factors like whether the suspect is within the crime scene ,going to hiding, whether the suspect has a phone so he can be traced and many others issue. The participants further stated that once the suspect is in police cell he/she should be produced in court of law in less than 24 hours unless it's on a weekend. The prosecution may consider requesting the court for more time to collect evidence as the suspect remain in custody.

4.6.10. Time the Prosecution from DPP Office to Join Police Investigators

The participants were requested to indicate the time the prosecution from DPP office join the police investigators to enable filing of the case in the court of law. According to the participants the police forensic investigators start their job at crime scene where they collect evidence, reconstruct it and apprehend the suspect. The participants further stated that the prosecution team from office of director of public prosecution are only invited in major cases to make water tight case at this point the file from CID is handed over to them for further input and aligning of suspect in the court law, otherwise most cases are prosecuted directly by investigating officer.

4.6.11. How to ensure Victims and the Investigators are not affected psychologically

The participants were asked to state how police service ensures that the victims and the investigators are not affected psychologically by what they witness in crime scene. According to the participants the national police service have trained psychologist who give emotional support, therapies and psychological training, to the victim to help them adopt and accept the situation as it is. The participants further stated that the investigators have been trained on emotional and psychological stability during investigation. They also go through counselling therapies after any investigations that are considered traumatizing, to avoid post traumatic stress disorder.

4.6.12. Points that Determine which Department a given Crime will be Investigated From

The participants were requested to indicate what points determine which department a given crime will be investigated from. According to the participants the nature of crime is considered if the crime is on guns or weapons and thus referred to the ballistic unit. The participants further stated that if its murder it is referred to the homicide units. If it's on cyber related crime it is referred to cybercrime units. The participants further stated that if it's on collection of fingerprint evidence it is referred to the finger print. If another crime is committed like fraud, land cases, robbery and many other they are taken to the appropriate section within the CID.

4.6.13. Challenges Faced by Forensic Investigators

The participants were requested to indicate the challenges faced by forensic investigators during the conduction of forensic investigations. According to the participants the challenges included

interference with crime scene, licensing of forensic equipment sometime delays, there is certification to be an expert and be licensed to testify in court of law which take almost three years of training, inadequate working materials, hostile scene of crime, mobility problem, and short durations for investigations issued by court. They stated that Kenya has had less than 400 experts since the time the forensic department was started. It was also reported that Nairobi has less than 30 crime investigation experts. Another challenge is lack of modern crime investigation equipment. Even when the equipment is available, there is not enough of it. The participants also identified the challenge of mobility to the crime scene with only very few functional vehicle serving the whole Nairobi County. The experts emphasized that the biggest challenge is in training since this is limited; they are not exposed to new skills from other experts and only a few attend those trainings and they do not share their knowledge and skills with others. They also stated that they face challenges regarding how the first witnesses (officers on the scene) handle issues and at the same time the public is not informed on how not to compromise the scene of crime.

4.6.14. Addressing Challenges to Deliver Justice to the Victims

The participants were requested to indicate how the forensic investigators overcome these challenges to deliver justice to the victims. According to the participants in order to address the challenges faced in delivery of justice that there should be public sensitisation program, and budget increment for equipment purchase. In addition they stated that the government needs to recruit relevant experts who are well informed on forensics and ones who are frequently in the field should be taken for in-service training. Also the trainings should be made frequent and competitive on the issues of crime and how to solve the emerging trends of crimes. The government needs to invest heavily in issues of national security and forensics, in specific by completion of the forensic laboratory and should be well equipped with modern facilities and training school which will offers thorough training to the experts on issues of crime. There is great need for forensic labs in every county instead relying on the government chemist for analysis and also equip all sections as per their needs and be networked to make the process effective and fast. The government has the duty to enlighten the public on the issues or forensics and there is need for forums with the public on how to safeguard the crime scene and how to react to incidences of insecurity and crimes. The department needs vehicles which are customized as mini labs for simple analysis to suit the needs of the scenes of crime. Also

equipment should be light to carry and effective ones for field officers to access areas which are not accessible by vans.

4.7. Inferential Statistics

The researcher conducted a multiple regression analysis to test the relationship among independent variables on crime solving. The researcher applied the statistical package for social sciences (SPSS V 21.0) to code, enter and compute the measurements of the multiple regressions for the study. Coefficient of determination explains how much changes in the dependent variable can be explained by the change in the independent variables or the percentage of variation in the dependent variable (solving of crimes) that is explained by all the three confounding variables (education background, experience, and nature of crime).

4.7.1. Model Summary

The table below provides the model summary of the relationship between the predictor variables and police service in solving crimes. The findings are as shown below:

Table 4.5. Model Summary

Model	R	R Square	Adjusted Square	RStd. Error of the Estimate	F	P-value
1	.930 ^a	.864	.858	.239	47.341	.000

a. Predictors: (Constant), education background, experience, and nature of crime

b. Dependent Variable: efficiency in Solving of Crimes

From the analysis in the table above $R^2=0.864$, i.e. 86.4% variation in that solving of crimes is explained by predictors in the model. However 13.6% variation unexplained in solving of crimes is due to factors not in the regression model. From this test result the model is a good model and can be used for estimation purposes. From the findings shown in the table above there was a strong positive relationship between the study variables as shown by $R=0.930$, i.e. 93% this indicates that there is a significant relationship between the predictor variables and efficiency in solving of crimes.

4.7.2. ANOVA Results

The table below provides the ANOVA results of the relationship between the predictor variables and solving of crimes. The findings are as shown below:

Table 4.6. ANOVA of the Regression

		Sum	of			
Model		Squares	df	Mean Square	F	Sig.
1	Regression	10.596	3	2.649	46.474	.023 ^a
	Residual	9.747	171	.057		
Total		20.343	174			

a. Predictors: (Constant), education background, experience, and nature of crime

b. Dependent Variable: Efficiency in Solving of Crimes

The significance value is 0.023 which is less than 0.05 thus the model is statistically significance in predicting how the factors (education background, experience, and nature of crime) influence the efficiency in solving of crimes. The F critical at 5% level of significance was 2.649. Since F calculated is greater than the F critical (value = 46.474), this shows that the overall model was significant.

4.7.3. Coefficient of Determination

The table below provides the coefficient of determination on the relationship between the predictor variables and the efficiency in solving of crimes. The findings are as shown below:

Table 4.7. Coefficient of Determination

	Unstandardized		Standardized		
	Coefficients		Coefficients		
	B	Std. Error	Beta	T	Sig.
Model 1(Constant)	0.181	0.416		0.192	0.847
Education Background	0.469	0.100	0.383	4.69	0.033

Experience	0.140	0.014	0.157	0.002	0.015
Nature of crime	0.309	0.086	0.317	0.027	0.013

a. Dependent Variable: Efficiency in Solving of Crimes

Multiple regression analysis was conducted as to determine the efficiency in solving of crimes and the three variables. As per the SPSS generated table below, regression equation

($Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \epsilon$) becomes:
 ($Y = 0.181 + 0.469X_1 + 0.140X_2 + 0.309X_3 + \epsilon$)

According to the regression equation established, taking all factors into account (education background, experience, and nature of crime) constant at zero, solving of crimes was 0.181. The data findings analyzed also showed that taking all other independent variables at zero, a unit increase in education background will lead to a 0.469 increase in solving of crimes; a unit increase in experience will lead to 0.140 increase in solving of crimes, and a unit increase in nature of crime will lead to a 0.309 increase in solving of crimes. This infers that education background contributes the most to the solving of crimes, followed by nature of crime. At 5% level of significance and 95% level of confidence, education background, experience, and nature of crime were all significant on solving of crimes.

4.8. Multiple Analysis of the Influence of Training, Availability of Equipment, And Forensic Investigation Process on Solving of Crimes

Correlational analysis using Pearson’s Product Moment technique was done to determine the relationship between training, availability of equipment, and forensic investigation process on solving of crimes.

Table 4.8. Correlational Analysis of Training, Availability of Equipment, and Forensic Investigation Process on Solving of Crimes

		Nature of training	Availability of forensic equipment	Forensic process	Solving of Crimes
Nature of Training	Pearson Correlation	1			
	Sig. (2-tailed)				
	N	175			
Availability of forensic equipment	Pearson Correlation	.526	1		
	Sig. (2-tailed)	.000			
	N	175	175		
Forensic process	Pearson Correlation	.578	.586	1	
	Sig. (2-tailed)	.000	.005		
	N	175	175	175	
Solving of Crimes	Pearson Correlation	.564	.563	.591	1
	Sig. (2-tailed)	.000	.000	.000	
	N	175	175	175	175

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

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

The results in Table 4.8 shows that there is a significant positive relationship between nature of training and solving of crimes ($r = 0.564$, $p\text{-value} < 0.05$). This implies that there is a very strong association between nature of training and solving of crimes which is significant.

The findings also reveal that there is a significant positive relationship between availability of forensic equipment and solving of crimes ($r = .563^{**}$, $p\text{-value} < 0.05$), thus implying that

availability of forensic equipment has a positive and significant relationship with the solving of crimes. On forensic process, the findings indicated a significant positive relationship between forensic process and solving of crimes ($r = .591^{**}$, $p\text{-value} < 0.01$) thus, depicting that forensic process have a significant positive relationship to the solving of crimes.

4.9. Conclusion

In conclusion, it is clear that there are no systems in place to address issues of human rights and code of conduct. Also there is an absence of mechanisms to address ethical issues during investigations. This suggests that the experts are likely to break the code and also deny the accused their rights. This being a disciplined career it requires specific guidelines for it to render services to people and at the same time with integrity and observing human rights. In relation to challenges the government has not invested in the department for the officers do not have enough modern equipment that can be used efficiently to respond to the crimes committed. This implies that the experts are really straining to handle crime scenes with minimal resources and system to check on how they perform their duties

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1. Introduction

This chapter presents the summary of findings, discussions, conclusion and recommendations on the efficiency of forensic science units within Kenya police service in solving crimes.

5.2. Summary of findings

This section presented the summary of the findings and they are discussed in subsequent headings:

5.2.1. Nature of Training in Forensic Science and how they create Harmony in Investigations

The study established that a well-trained officer will always work well with others in harmony to ensure that the investigation process is always a success. The study also found that training in forensic investigation an officer can get experience and courage to perform his duties, and that the officers are able to work as a team and make decision on process and procedure to collect data on forensic investigation. The study further established that experience comes with well communicated findings as it facilitates team work, and well-coordinated investigations. As a result appropriate evidence is collected as well as facilitation of speedy investigations. It was evident from the participants that they are trained with better facilities but these facilities are not available at the stations of work hence they cannot utilize all the skills acquired while in training. The study found that there should be a relationship between the training and practice in the way you have been trained hence the better trained you are, the more you should be efficient in the field. The more you undergo the training the more you are able to handle the scene of crime. In addition the study found that lack of enough experience may make handling of forensic investigation a tall order which may hamper delivery of justice. Experience is expected to bring perfection of the skill and make one an authority in one's field, but sometimes the contrary takes place. From the excerpts, it is noted that new officers are not able to handle the scene due to fear of the unknown, but with time they develop courage and become exposed to different scenes and cases. The more one is exposed to the field situations, the more one is able to solve issues in a

more practical way than the newly trained. Some participants reported fear of handling crime scenes due to the challenges faced in the field.

5.2.2. Availability of Forensic Investigation Equipment and their reliability to produce concrete evidence

The study established that an officer who is trained to use equipment will be able to maximize their application in data collection and analysis. The education background will act as the foundation through which appropriate forensic investigation can be undertaken. In addition the study established that the CID department have several equipment that are used in evidence collection and analysis. However the study found that most of the equipment are very old or outdated and they require modern sophisticated equipment that will be more reliable as compared to the current ones. Further the study found that one of the hindrances in equipping the department is lack of funds which would facilitate the purchase of the new technology equipment. In addition the study established that bureaucracy also hinder effective supplies of the required equipment and this it means it take a very long time to purchase required equipment to fight crime.

5.2.3. Forensic Investigation Process and Sustainability of Trial in Court of law

The study established that the first thing in crime scene investigation is to condone the scene and help any victims if there is. The next step is ensure the scene is safe for investigators, doctors and other participants to operate from collect evidence by taking photos, blood pattern, and fingerprints which will be used to apprehend the culprits. The study further found that there are set rules that investigators follow to ensure that evidence is not interfered with, is packed and submitted to departmental committee. The study found that after the suspect is apprehended, an officer may profile them which mean getting a better picture of the suspect life and background information. This will help the officer to formulate the interview and interrogation questions. Further the study established that after the evidence has been collected and a suspect is apprehended the appointed forensic investigator is given mandate to carry on with case construction.

The person must be profiled to know whether the right suspect is in police cells and not the innocent ones and that the information accessed gives a lead to the kind of person the suspects is. In addition the study found that forensic psychology is an intersection between psychology and criminal justice system. It concentrates on mens rea (guilty mind and actus reus). The study found that professionalism, impartiality, and open mindedness among the forensic investigators influence the sustenance of trial in the court of law. In addition the study established that where people are trained to be professionals, impartiality and open minded is virtue that all officers should have. This will also ensure no innocent person lands in jail. Impartiality eliminates compromised evidence and corruption is out of question. Open-mindedness approach to investigations helps the investigators to approach the crime scene hoping for many possibilities that lead to crime happening, which will aid in the elimination of bias.

The study found that the challenges forensic investigators face included lack of modern sophisticated equipment, financial strain, poor training in forensic investigations, lack of forensic scientist, lack of tailor made degrees program in forensic that suit Kenya set up, over reliance with the western technology, and lack of adequate personnel to cover the whole country. The study also found that there has never been enough manpower in the department. Kenya has had less than 400 experts since the time the forensic department started. It was also established that Nairobi has less than 30 crime investigation experts. The study also found that there was the challenge of mobility to the crime scene with only few functional vehicles serving the whole of Nairobi County. The experts emphasized that the biggest challenge is in training since this is limited; they are not exposed to new skills from other experts and only a few attend those trainings and they do not share their knowledge and skills with others.

5.3. Conclusion of the Study

The study concluded that training in forensic investigation will equip the officer with experience and courage to perform his duties, and that the officers are able to work as a team and make decision on process and procedure to collect data on forensic investigation. The study also concluded that experience comes with well communicated findings as it facilitates team work, and well-coordinated investigations. As a result appropriate evidence is collected as well as facilitation of speedy investigations. It was evident that officers are trained with better facilities

but these facilities are not available at the stations of work hence they cannot utilize all the skills acquired while in training.

The study further concluded that the CID department had several equipment used in evidence collection and analysis. In addition the study concluded that most of the equipment are however very old or outdated and they require modern sophisticated equipment that will be more reliable as compared to the current ones. Further the study concluded that one of the hindrances in equipping the department is lack funds which would facilitate the purchase of the new technology and equipment.

The study concluded that the first thing in crime scene investigation is to condone the scene and help any victims if there is. The next step is ensure the scene is safe for investigators, doctors and other participants to operate from collect evidence by taking photos, blood pattern, and fingerprints which will be used to apprehend the culprits. The study further concluded that there are set rules that investigators follow to ensure that evidence is not interfered with, is packed and submitted to departmental committee.

On the challenges faced by the investigators the study concluded that Kenya has less than 400 experts since the time the forensic department started. Nairobi County has less than 30 crime investigation experts. The study concluded that there is lack of modern crime investigation equipment. Even when the equipment are available, there is no enough of it. The study also concluded that there is the challenge of mobility to the crime scene with only very few functional vehicle serving the whole of Nairobi County. The experts emphasized that the biggest challenge is in training since this is limited; they are not exposed to new skills from other experts and only a few attend those trainings and they do not share their knowledge and skills with others.

5.4. Recommendations of the Study

From the conclusions the following recommendations can be made:

- There is need for a clear investigation procedure and standards that are followed by all actors in order to reduce friction and slow the service delivery.

- Experts need to have proper training and be from the bright and responsible people in society for them to be smart in their investigations.
- Initial training should also be followed by regular refresher courses of the same.
- The working ethics and codes of conduct need to be clear and outlined to avoid confusion and breach of universal human rights.
- The CID department should work in collaboration with the universities to provide graduate programmes for forensic investigation.
- The CID department should employ graduates in forensic science who have passion in the job and who will conduct the investigation in relation to their qualifications and experience.
- The government of Kenya should increase budget allocation to CID department and ensure all officers are well trained and they have modern equipment and technology to pursue serious crimes that the country is experiencing at the moment.

5.5. Suggestions for Further Studies

Opportunity for further research in the subject matter exists thus: it would be interesting to compare the findings with other CID departments in other counties. The population of the study would be much bigger; a second study is suggested to come up with a standard acceptable utilization levels. This will provide a standard upon which such studies can be replicated. In addition there is need to conduct a study on the detailed capacity of the officers to handle specific crimes in other departments involved in issues of crimes. Further there is need to conduct a study to identify the available facilities, technologies and their viable use in current crime investigations.

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APPENDICES

APPENDIX I: QUESTIONNAIRE

Kindly provide correct and useful data and fill appropriately as logically guided. (This questionnaire has been provided as a word document that can be filled out in soft copy and returned via e-mail; or printed, filled out and mailed).

SECTION 1: GENERAL INFORMATION

1. Gender of the respondent (Tick () Male () Female ()
2. Age (tick)
 - a) 24 years and below []
 - b) 25-29 []
 - c) 30-34 []
 - d) 35-39 []
 - e) 40-44 []
 - f) 45-49 []
 - g) 50 and above []
3. Highest level of educational qualification (tick)
 - a) Secondary education []
 - b) Certificate or diploma []
 - c) Graduate []
 - d) Postgraduate []
4. How many years have you been involved in forensic investigation in Kenya?(tick)
 - a) Less than 1 Year []
 - b) 1-2 Years []
 - c) 2-3 Years []
 - d) 3-4 Years []
 - d) 4 Years and above []

SECTION B: Nature of Training in Forensic Science

5. Explain how the nature of training in forensic science influence the collection of evidence at crime scene, and crime scene reconstruction?
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6. Name different courses offered in CID training school related to forensic science?

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7. How long does it take for one to be well trained as forensic investigator?

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8. What criteria is used to select course participants and later deployment at the forensic investigation department?

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9. Describe how the experience of a forensic investigators helps in creation of Harmony in Investigations?

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10. How does the training in finger prints, writing and tools marks relate to the practice of forensic investigation and creation of harmony in investigations?

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11. Do you go for in-service training in forensic investigations? Yes [] No []

12. How does experience in the nature of crime relate to efficiency in forensic investigations?

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13. Do the National police service employ graduates forensic scientists?

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14. If yes above are the graduates more effective in their work than in house trained officers?

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SECTION C: Availability of Forensic Investigation Equipment and their reliability to produce concrete evidence.

15. List the available equipment that are used in forensic investigations in Kenya.

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16. Explain the use of each equipment you have listed above

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17. How does the education background in forensic sciences improve the application of equipment on evidence collection?

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18. Are the forensic investigation equipment adequate and reliable in collecting evidence from the crime scene? Yes [] No []

19. Would the absence of forensic investigation equipment have an influence on the reliability to produce concrete evidence Yes [] No []

If Yes explain

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20. How often do you get new forensic investigation equipments and new technology in the field of your operation?

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SECTION D: Forensic Investigation Process and Sustainability of Trial in Court of law

21. Describe the crime scene investigation process and its applicability in collection, examination, analysis and reporting of crimes

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22. Are there standard procedures and policies for conducting forensic investigations in Kenya? (If yes explain) Yes [] No []

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23. Explain how the investigators get evidential information from the suspect.

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24. At what stage of evidence collection does profiling, interviewing and interrogation of suspects are applied?

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25. Explain how forensic psychology is applied in the criminal investigation process to improve in the collection of evidence?

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26. How do the investigators ensure that they squeeze out correct information from suspects and at the same time ensure they observe the human rights of the suspects?

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27. Does the professionalism, impartiality, and open mindedness among the forensic investigators influence the sustenance of trial in the court of law? Yes [] No []

If yes explain

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28. What challenges do the forensic investigators face during the conduction of forensic investigations?

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29. Describe how the forensic investigators overcome these challenges to deliver justice to the victims?

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30. Any other comments

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THE END

THANK YOU FOR YOUR PARTICIPATION

APPENDIX II:INTERVIEW GUIDE

1. Explain how the nature of training in forensic science influences the collection of evidence at crime scene and reconstruction?
2. How does experience of forensic investigator help in efficiency in solving crime?
3. Are the forensic investigation equipment adequate and reliable in collection of evidence from the crime scene? Name the equipment available.
4. Would the absence of forensic investigation equipment have an influence on the reliability to produce concrete evidence?
5. Does the professionalism, impartiality, and open mindedness among the forensic investigators influence the sustenance of trial in the court of law?
6. Which courses are offered in CID training school related to forensic science and how long does a police officer take to be considered well trained forensic investigator?
7. Describe the crime scene investigation process and its applicability in collection, examination, analysis and reporting of crimes.
8. How long does it take to secure crime scene, collect evidence and reconstruct the evidence collected?
9. Once the evidence is collected how long does it take to apprehend suspect and produce him/her in court of law?
10. At what time does the prosecution from DPP office join the police investigators to enable filing of the case in the court of law?
11. How do you ensure that the victims and the investigators are not affected psychologically by what they witness in crime scene?
12. At what points do you determine which department a given crime will be investigated from?
13. How do you decide what crime to be investigated in forensic department or another department?
14. Any other comments.

THE END

THANK YOU FOR YOUR PARTICIPATION