

**AN ANALYSIS OF HOW THE CURRENT STATUS OF FORENSIC SCIENCE
AFFECTS THE ADMINISTRATION OF CRIMINAL JUSTICE IN ZAMBIA**

By

VANESSA K. CHILIKWELA

(26100894)

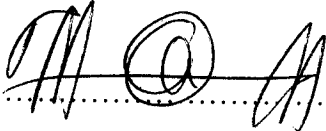
Being a Directed Research essay submitted to the University of Zambia Law Faculty in
Partial fulfilment of the requirements for the Award of the Bachelor of Laws (LLB) Degree.

UNZA

2011

DECLARATION

I, **VANESSA K. CHILIKWELA**, Computer Number **26100894** do hereby declare that this Directed Research Essay is my genuine work and to the best of my knowledge, information and belief, no similar piece of work has previously been produced at the University of Zambia or any other Institution for the award of Bachelor of Laws Degree or any other award. All other works cited or used in this essay are clearly acknowledged. No part of this work may be reproduced or copied in any manner without the prior authorization in writing of the author.

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VANESSA K. CHILIKWELA

ABSTRACT

Where there is law, there is crime; but there is no perfect crime. The existence of obligations of citizens in society and sanctions for the disobedience embodied in statutes are meaningless if the Courts cannot sufficiently uphold and ensure conformity to them. As an organ of the state, the Judiciary in particular the courts have the key function of administering justice. In administering justice, the Court relies upon the evidence presented before it; evidence which can be obtained through various means. One way in which evidence that is presented before the courts is obtained is through the use of forensic science.

It is the focus of the research to highlight the important dual relationship that exists between forensic science and the administration of criminal justice. The main question investigated by the research was whether the current status of forensic science has affected the administration of forensic science in Zambia, and if so, to what extent. Detailed consideration was made of the concept of forensic science as well as the key components of the Criminal Justice System. Further, the research highlighted the uses of forensic science in the criminal justice system before analysing the current status of forensic science in Zambia.

The research concluded that the important role that forensic science plays in administration of criminal justice cannot be ignored. Forensic science in Zambia has developed at a marginal rate in comparison to jurisdictions such as the US and UK and although this can be attributed to the later introduction of forensic science in Zambia, the current status of forensic science has had both positive and negative effects on the administration of criminal justice. It has affected the administration of criminal justice to a lesser extent though there is an urgent need to improve the current status of forensic science in order to improve the efficiency and quality of criminal justice administered by the courts.

DEDICATION

To my parents, Mr. And Mrs. Chilikwela for your unwavering love, support and resources rendered to me throughout the period of the research for the paper and studies at the School of Law. You are an inspiration to me and I am all that I am today because of you.

My brothers Choombwa, Webster and Kabesha Chilikwela for always being there for me, lifting me up and for the encouragement and faith given to me in times of doubt. You are amazing brothers.

To my partner and friend, Muleba, the road to here has not been easy. Thank you for standing by me; for being my perfect partner. This is only the beginning.

ACKNOWLEDGEMENTS

First and foremost, I want to thank the Lord God almighty for the successful completion of the research and the paper. Special thanks go to my parents Mr. And Mrs. Chilikwela, for your understanding, unwavering support and valid remarks rendered during the period of research for this paper. You are an inspiration and I am proud to be your Daughter.

The research was undertaken under the strict supervision of Judge K.C Chanda (RTD) without whom, this paper would not have been possible. The paper also benefited immensely from the critical input of Ms. C. Chitupila, Lecturer of Human Rights at the School of Law, University of Zambia. Your tireless efforts, honest valuable comments, insightful remarks and constructive criticisms on earlier drafts of this paper made this paper one of high quality and standard.

Special thanks to Mr. Nsofwa, Head of The Forensics Department, Mr. Illunga Ballistics Expert at the Ballistics Department and Mr. A. Mphande, Officer in Charge of the Fingerprints Bureau, all at the Zambia Police Service Headquarters, Lusaka for all the information and assistance rendered to me during my research, and for your patience and time taken to grant me interviews. I thank you all most sincerely; your contributions to this paper where invaluable.

LIST OF ABBREVIATIONS

ABIS-	Automated Ballistics Identification System
AFIS-	Automated Fingerprint Identification System
CODIS-	Combined DNA Index System
CSI-	Crime Scene Investigation
CSR-	Crime Scene Reconstruction
DNA-	Deoxyribonucleic acid
FBI-	Federal Bureau of Investigation
IBIS-	Integrated Ballistics Identification System
UK-	United Kingdom
US-	United States

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CHAPTER ONE

GENERAL INTRODUCTION

1.0 INTRODUCTION

1.1 WHAT IS FORENSIC SCIENCE?

The complex and intricate nature of a crime requires that the criminal justice system should have a system in place to analyze and solve it. Forensic science is an investigatory tool which aids in the analysis of evidence through the application of scientific knowledge and methodology to legal problems and criminal investigations and the scientific collection and analysis of physical evidence in criminal cases in a process called Criminalistics.¹ The application of various sciences to legal problems and criminal investigations is so as to answer the questions relating to the examination and comparison of evidence in criminal investigations in order to determine the innocence or guilt of an accused person. The word **forensic** comes from the Latin adjective *forensis*, meaning "*of or before the forum*";² this origin is the source of the two modern usages of the word forensic; as a form of legal evidence and as a category of public presentation.

Forensic science and forensic analysis are crucial in the determination of innocence or guilt of an accused person as it ensures an understanding of the circumstances surrounding a crime which is pivotal to ensuring that the correct charges are brought against the correct person. The mishandling or misinterpretation of evidence can be devastating to the goals of the Criminal Justice System and can result in the wrongful conviction of innocent persons and the failure to convict the true perpetrator of a crime. In complicated cases, and even in relatively simple ones, the most minute of details can become paramount to a successful prosecution or defence.³ Although forensic science can be used to investigate crimes in both civil and criminal jurisdictions, the focus of this research will be the use of forensic evidence in criminal jurisdictions in so far as they relate to the administration of criminal justice, and the application of these findings in relation to Zambia.

The research aimed to highlight the importance of a well developed system of forensic science to criminal justice. This is in light of the fact that it has been observed that although

¹ M. Sidebottom, The Importance of Forensic Science in Criminal Justice (30th March 2008)

² ² E.A. Martin, Oxford Dictionary of Law: Fifth Edition , Oxford University Press, New York, 2002.

³ J. Fisher, Forensic Science: A Small Part in a Big Play

the success in solving a crime requires that law enforcement agencies have good investigative skills, in Zambia currently, although forensic science exists, it is not a well developed and highly emphasized field in relation to criminal investigations and prosecutions.

1.2 OPERATIONAL DEFINITIONS

Forensic Science- It is a broad discipline which uses science to answer questions pertaining to legal situations pertaining criminal and civil cases. It is a field in which facts of a legal case are analysed in a scientific manner to gain information which can be used in the investigation and eventual prosecution.⁴

Criminal Justice System- This is the network of courts and tribunals which deal with criminal law and its enforcement. It is also the system of practices and institutions of government directed at upholding social control, deterring and mitigating crime and sanctioning those who violate laws with criminal sanctions and rehabilitation efforts.⁵

Combined DNA Index System (CODIS) - This is a DNA database based on a computer system that stores DNA profiles created by state, federal and local crime laboratories in the United States which is used to assist with the search and identification of suspects in crimes. It sets the standards for forensic DNA testing.

Forensic Investigation and Analysis- This is the practice of lawfully establishing evidence and facts that are to be presented in a court of law and analyzing them in order to establish relevance to the facts to be presented before a court of law through the use forensic science in order to uncover scientific evidence that may convict an accused person of a crime or exonerate a person who has been wrongfully convicted of a crime.⁶

Forensic Evidence- This is evidence obtained by the application of specific scientific methods to the evidence found where the crime occurred.

Automated Finger Print Identification- This is the process of automatically matching one or many unknown finger prints against a data base of known and unknown fingerprints for the purpose of criminal identification initiatives, the most important of which include

⁴ What is Forensic Science (wisegeek.com)

⁵E.A Martin, Oxford Dictionary of Law: Fifth Edition. (New York: at Oxford University Press, 2002)

⁶Forensic Identification. Article by wisegeek.com, accessed on 16th November 2010.

identifying a person suspected of having committed a crime or linking a suspect to other unsolved crimes.⁷

1.3 STATEMENT OF THE PROBLEM

Forensic science is an important investigatory tool which aids in the analysis of evidence in order to determine accurately the innocence or guilt of a person accused of a crime. Currently in Zambia, the field of forensic science as an investigatory tool is not properly established in comparison to other jurisdictions such as United Kingdom (UK) and United States (US). Instead criminal investigations and trials in the Zambian legal system emphasise mainly on witness testimonies and confessions from the accused without which there can be no conviction as cases are not able to be proved beyond reasonable doubt.⁸

Due to the lack of emphasis on the use of forensic science in criminal investigations and trials, it has been observed that the development of forensic science has been very slow which has led to it not being widely utilized and has in turn contributed to its underdevelopment in Zambia. The underdevelopment of forensic science in Zambia has affected and limited the efficacy of criminal investigations and the administration of criminal justice in that criminal convictions are mostly based on confessions from the accused and witness testimonies which does not allow for convictions in instances where there is neither a confession nor a witness because the case cannot be proved beyond a reasonable doubt to the satisfaction of the court. Alternatively, where there is a suspect in relation to a crime, it will not be possible to convict the accused if there is no witness testimony or confession from the accused himself because there will be no evidence properly established to connect him to the crime. This affects the role of criminal justice to protect society against those who commit criminal offences.

Further, the underdevelopment of forensic science in Zambia has also limited the innovativeness and creativity of the manner in which crimes and crime scenes are investigated and reconstructed as the Forensics Department of the Zambia Police Service do not have all the necessary facilities required for proper forensic investigation and crime scene reconstruction; where facilities are available, they are of a limited capacity. For example, Crime Scene Reconstruction involves intricate and very detailed processes such as collection

⁷ Forensic Identification. Article by wisegeek.com accessed on 16th November, 2010

⁸ S.M Magalashi Understanding DNA Evidence and Its Uses in the Criminal Justice System ,UNZA Press, Lusaka, (2008)

of DNA trace evidence which require particular facilities and equipment composite of a DNA laboratory that the Forensics Department currently does not possess. This has limited how well and thorough their investigation and processing of a crime scene and evidence is. The lack of facilities has also led to delays in trials because such evidence is processed abroad and the trial can only commence when such evidence has been processed abroad and the expert working on the evidence is available to testify as an expert witness in court.⁹

Such occurrences go against the vital role of an effective Criminal Justice System which is the timely dispensation of justice; after all, justice delayed is justice denied. The research will show the importance of a well developed system of forensic science as well as in what ways the problem of the underdevelopment of forensic science has affected the criminal justice system in Zambia.

1.4 SCOPE OF THE STUDY

The scope of the study and research conducted focused on the state of forensic science in Zambia and how it has affected the dispensation of criminal justice. However, comparisons were made with the state of forensic science in the US and the UK since these countries have extensively developed in the use and practice of forensic science. The comparisons aimed to show how the incorporation of forensic science in criminal investigations has effectively and significantly improved the administration of criminal justice in the jurisdictions of the US and UK.

1.5 RATIONALE AND JUSTIFICATION OF THE STUDY

With the onset of the 21st Century and the advent of modern technology, the nature of crime has become more intelligent and sophisticated, hence the need to use more modern methods of collecting and analyzing evidence. Although there is extensive literature that has been written on forensic science by writers and experts from the US and the UK which greatly emphasizes the connection between forensic science and criminal justice, it is clear that these writings have not had much impact on how criminal investigations and criminal justice are administered in Zambia. This can be evidenced by the limited literature written by Zambian

⁹ Interview with Mr. Nsofwa, Head of The Forensics Department at The Zambia Police Headquarters in Lusaka. Conducted on 13th December, 2010

authors on the subject despite its undeniable importance to criminal justice, as well as the limited practice and development of the science in Zambia. Those who have written on forensic science have admitted that certain fields of forensic science such as the field dealing with DNA evidence, are not well developed in Zambia and there is need to develop the field in order to make the Criminal Justice System in Zambia more efficient. The writers have acceded to the fact that there has been an underutilization and underdevelopment of forensic science in Zambia which has had adverse effects on the administration of criminal justice.¹⁰

The validation for this study was from the observation that partially due to the limited development and utilization of the field of forensic science, the efficacy of the Zambian Criminal Justice System is limited which has contributed to the Criminal Justice System in Zambia developing at a slow pace and dispensation of justice being inefficient. The study is an advocacy tool advocating for the proper development of forensic science in Zambia with the aim of expanding the investigatory tools used during the investigation of crimes as well as the evidence used in criminal cases to beyond just evidence solely from witness testimonies and confessions from an accused person. In the event where there are no witnesses or confessions to a crime, usually there will be no conviction since there is no other way of connecting the accused to the crime. Forensic science has the ability to provide such the link between the accused and the crime and allow for a conviction in the absence of witness testimonies or confessions from the accused.

1.6 OBJECTIVES OF THE STUDY

Given the integral role that forensic science plays in the Criminal Justice System, it was the ultimate objective of the research to highlight the importance of a well developed system of forensic science to the administration of criminal justice. The research also has the following specific objectives of:

- i. Discussing the concept and nature of forensic science and the requirements for the existence of a well developed and effective system of forensic science;

¹⁰ S.M Magalashi Understanding DNA Evidence and Its Uses in the Criminal Justice System ,UNZA Press, Lusaka, (2008)

- ii. Discussing the status and extent of practice (utilization) of forensic science in Zambia with a special focus on the state and role of the Forensics Department of the Zambia Police Service;
- iii. Giving a comparative study of Zambia and other jurisdictions that is the US and UK in order to show that the status of forensic science in Zambia which has affected the administration of criminal justice in Zambia; *vis a vis* the extent and status of forensic science in the US and UK and how efficient their criminal justice systems are in light of the advanced development and utilization of forensic science;
- iv. Answering the question what has been the effect of the status of forensic science on the administration of criminal justice in Zambia? This is in consideration of the fact that forensic science is not highly emphasized in criminal investigations as well as trials and convictions and the fact that there is currently no legislation in Zambia specifically addressing and supporting the existence of a well developed system of forensic science;
- v. Concluding by analysing of the viability of forensic science in Zambia by considering whether there is a need to develop an efficient and well functioning system of forensic science and if so, how can that be achieved and sustained?

1.7 SPECIFIC RESEARCH QUESTIONS

The objectives of this study were achieved by providing answers to the following research questions:

- i. What is forensic science; and what is the nature of forensic science?
- ii. What are the elements of an effective Criminal Justice System?
- iii. What is the importance of forensic science to the administration of criminal justice?
- iv. What is the status and extent of practice of forensic science in Zambia; what is the role of the Forensics Department of the Zambia Police Service?
- v. To what extent has the underdevelopment of forensic science affected the administration of criminal justice in Zambia?
- vi. Is there a need for the development of forensic science in Zambia and is the idea viable? If so, how can it be sustained?

1.8 SIGNIFICANCE OF THE STUDY

The research is an advocacy for the further development and maximum utilisation of forensic science in adjudicating of criminal matters in Zambia. This is in light of the fact that the development of forensic science will benefit firstly the parties to the cases by ensuring that charges are brought against the right person and that the correct person is convicted for the offence. It is a failure of criminal justice if wrongful conviction occurs. Forensic science will widen the scope of evidence that is usually admitted in court beyond witness testimonies and confessions to also include scientific evidence. Forensic science will help improve the efficacy of criminal investigations and assist those who carry out the investigations in the Zambia Police Service by ensuring accuracy in the analysis of evidence collected. It will also help lawyers and judges in the criminal cases brought before the court because the cases will be based on accurate evidence which will allow for cases to be adjudicated upon over shorter periods of time and guarantee that the correct person has been convicted of the crime. Forensic science will provide the fundamental link which allow for convictions were there are no witnesses or confessions from the accused.

1.9 RESEARCH METHODOLOGY

The literature used in the research paper was based on both primary and secondary information. The primary information was gathered through interviews with Zambia Police personnel, officers from the Forensics Department of the Zambia Police Service, Criminal Law practitioners and observation were necessary. Secondary information was be obtained through desk work which included reference to Statutes, Judicial decisions both local and foreign, textbooks, internet articles and reports.

1.10 OUTLINE OF CHAPTERS

The dissertation consists of five Chapters:

Chapter One provides a general introduction to the concept by making preliminary remarks on what forensic science is and defining the key concepts used throughout the paper.

Chapter Two outlines the nature of forensic science by highlighting the Locard's Principle which is the cornerstone of forensic science. It further outlines and discusses three specific

branches of forensic science most widely practiced in Zambia; ballistics firearm identification, DNA analysis and profiling and Forensic fingerprint analysis.

Chapter Three discusses the importance of forensic science to the Criminal Justice System with consideration of the different uses of forensic science in the Criminal Justice System, admissibility of forensic evidence as evidence and matters relating to the administration of forensic science.

Chapter Four analyses the status of forensic science in Zambia by presenting a discussion on the different departments composing the Forensic Department in Zambia and their functions. Further, the Chapter brings to light the challenges that are faced by the Forensic Department and analyses the effects of the status of forensic in Zambia on the administration of criminal justice in Zambia.

Chapter Five draws an overall conclusion on how the current status of forensic science in Zambia has affected the administration of criminal justice in Zambia while simultaneously making recommendations on how the issue of discussion can be rectified.

CHAPTER TWO

THE NATURE OF FORENSIC SCIENCE

2.0 INTRODUCTION

Having defined forensic science in the previous Chapter, the present Chapter will discuss the nature of forensic science as well as outline the three branches of forensic science which are under consideration in this research.

2.1. LOCARD'S EXCHANGE PRINCIPLE

Forensic science relates to the authentication of evidence and crime scenes in order to determine if a crime is what it purports to be or is alleged as being by using science. Forensic science is based on a principle known as **Locard's Exchange Principle** which states that:

“There is no such thing as a clean contact between two objects. When two bodies or objects come into contact, they mutually contaminate each other with minute fragments of material.”¹¹

Locard's principle is the cornerstone of forensic science and proposes that every contact between two bodies, objects or surfaces leaves a trace of physical evidence or material known as fragmentary or trace evidence, from which conclusive evidence can be retrieved.¹² Trace evidence is material found at a crime scene or accident scene in small (maybe almost invisible) but measurable amounts. It is critically important as it can definitively link an individual or object to the crime or accident scene. Locard's principle forms the basis for the fundamental rule of forensic science that a criminal always brings something to the scene of a crime, and he or she always leaves something behind and he or she will often take something away with them, which can be found on a search of their person, their garment, a vehicle, or their premises.

Forensic science is the tool used to analyse the fragmentary and trace evidence at a crime scene in order to identify and incriminate suspects and to also prove or disprove a claims made by suspects about a crime. For example, where a suspect claims that they were not present at a crime scene at the time that a crime was committed, fragmentary evidence found at the crime scene such as debris, fibres can be compared to those on the clothing, shoes or

¹¹ Forensic Science (Article by the University of Griffiths) 18th November 2010

¹² This principle was developed by Dr. Edmond Locard in Lyon, France in the 1900's

body of the suspect in order to prove that the suspect's claims are false and that he or she was present at the crime scene. It must be noted that although trace evidence on its own is often not enough to make a case, it can be used to corroborate other evidence or even prompt a confession which could help to solve the case.¹³

2.2 BRANCHES OF FORENSIC SCIENCE

Forensic science is a multi disciplinary field, each of which relates to the examining and gathering of evidence to be used in the prosecution of suspects in the courts of law. Forensic scientists examine a crime scene in order to obtain a permanent record of the crime scene by collecting substances, objects, trace or fragmentary evidence left at a crime scene for subsequent processing and comparison in order to reconstruct the crime scene and eventually use the evidence collected to apprehend a suspect if there is not one in custody and to prosecute the suspect as well.¹⁴ The research will focus on three specific fields of forensic science, as these are the most widely practiced and utilised forms in Zambia:

2.2.1 BALLISTICS FIREARMS IDENTIFICATION

Where the crime in question involves a shooting or use of firearms, the branch of forensic science that is used to investigate such a crime is ballistics firearms identification. Also known as forensic ballistics, it is the science of analysing firearm usage in crimes. Forensic ballistics involves the analysis of bullets and bullet impacts to determine the type of weapon it was fired from, identification of fired bullets, cartridge cases or other ammunition components as having been fired from a specific firearm and analysing firearm, ammunition and tool mark evidence in order to establish whether a certain firearm or tool was used in the commission of a crime.¹⁵ Ballistics is an important part of the Criminal Justice System because it involves analysis of bullets and bullet impacts to determine information of use to the courts as evidence in criminal proceedings or other part of a legal system. It can also reveal from what direction a bullet was fired to determine its flight path which is vital in corroborating the sequence of events of a crime.

¹³ K. Kruglick, A Beginners Primer on the Investigation of Forensic science

¹⁴ R. Saferstein, Criminalistics: An Introduction to Forensic Science, Prentice-Hall, New York 2000.

¹⁵ Ballistics: The Use and Study of Firearms. (Explore Forensics, 2010) Page 1

Forensic ballistics is based on the unique nature of each firearm and its components. Each firearm, no matter how similar the model or make, produces a unique tool mark on fired bullets and cartridges. The manufacturing and the use of the firearm leaves surface characteristics on the bullet or cartridge which cannot be reproduced in any other firearm which makes the tool mark of each firearm unique. Each weapon's barrel contains small ligatures and grooves, which, when a bullet is fired from them, makes marks on the shell casing, which can be used as a means of identifying the make and model of the gun if these shell casings are found at the scene.¹⁶ The unique surface characteristics left by a firearm on bullets and shell casings are due to the firearm being made of material which is harder than the ammunition components; this causes the firearm to leave impressions or striated marks on shell casings and other ammunition components which it comes into contact with as the bullet is fired. It must be noted that firearms do not change over time which allows for firearms recovered months or years after a shooting to be identified as having fired a specific bullet or cartridge case. Even in an instance where a gun has not been left at a crime scene, large degrees of information can be determined from the bullet, the nature of the wound on the victim and any gunshot residue left around the wound or on the victim.

Forensic science is used to consider certain unique characteristics of firearms that relate to the bullets fired from them in order to compare the tool marks on the ammunition and cartridges to the firearm in question. It forms a connection between the bullet and the firearm as it allows the tool marks found on the bullets or shell casings to be compared side by side, matched or eliminated. Further, forensic ballistics allows forensic experts to examine the wound on a victim in order to determine the nature of the bullet which created the wound and consequently the type of gun from which the bullet was fired. This information can be used to cross reference to the bullets of the firearm found in possession of the suspect in order to implicate or dismiss the use of the particular firearm in the commission of the crime in question. Forensic ballistics is important in cases of armed robbery and murder cases involving the use of firearms.¹⁷

¹⁶ K. Lotter, What is Forensic Ballistics? April 26, 2008. p 1

¹⁷ Ballistics World of Forensic Science. 20th November 2010

2.2.1.1 The Integrated Ballistics Identification System (IBIS)

This is a ballistics database used by forensic labs in the US. It is a national computerised forensic firearms identification system that integrates information on cartridge cases, shell casings, bullet analysis and electronic firearms reference libraries on a single computer platform. IBIS allows ballistic experts to use digital computer images of ballistic evidence to solve firearm related crimes. The system is used to identify and find a match between a specimen added into the database and a previously filed specimen. IBIS equipment photographs the surface of fired bullets and casings from crime scenes and laboratories. This System allows for bullets to be scanned into the system with a machine called the IBIS Trax, the machine takes 2-D images of a bullet casing and produces within the Identification System as a 3-D object, allowing two objects to be compared together on the screen. Upon entering a new image into the database, the system searches for a match by using advanced mathematical algorithms to correlate the new image against previously stored images. Using filters such as calibre, date of crime, date of entry, and rifling specifications, the correlations produce lists of possible matches. A forensic examiner then visually compares the matched images on a computer monitor. If a possible match is found, the images are compared with actual evidence by an examiner on a microscope for a final determination.¹⁸

The IBIS System provides a means for law enforcement agencies to communicate with each other regarding ballistics evidence found at crime scenes. Before the system was put in place, in order to determine if a bullet or casing found at a crime scene was linked to any other crime, it required sending the actual evidence to several crime labs in different states in order to determine any connections. A similar system has been established in the UK known as the National Ballistics Intelligence Service (NABIS). The IBIS is the database system currently used by Ballistics Department of the Zambia Police Service.

2.2.2 DNA FORENSICS AND DNA PROFILING

Deoxyribonucleic acid (DNA) is the biological chemical code which specifies the function, appearance and pedigree of an individual, which is found in every cell of individual's body and is unique to each individual except identical twins.¹⁹

¹⁸ World of Forensic Science: Integrated Ballistics Identification System (2005)

¹⁹ Advancing Justice Through DNA Technology, 2004 Report from the Department of Justice

The DNA pattern of each individual is a combination of the DNA patterns of both parents. It is because of the uniqueness of an individual's DNA that DNA examination and analysis is an important forensic tool and is based on the Locard's Principle which states that every contact leaves a trace. Forensic science uses the trace amounts of genetic material left behind at a crime scene during the commission of a crime; this information can then be profiled and used to include or exclude suspects as being sources of the genetic material. Forensic scientists compare these DNA profiles to determine whether the suspect's sample matches the evidence sample collected from the crime scene.

It is not possible to test the whole of an individual's DNA, as such, a standard forensic analysis involves the testing of 13 specific regions of an individual's DNA in order to create the DNA profile of that individual (also known as a DNA fingerprint) and to determine which combination of DNA is most abundant in the genetic material found at the crime scene. The DNA combination in the genetic material from the crime scene is compared to the DNA of the suspect in order to include or exclude the suspect as the source of the abundant combination of DNA found in the genetic material recovered from the crime scene.²⁰ A marker by itself usually is not unique to an individual; if, however, two DNA samples are alike at four or five regions, odds are great that the samples are from the same person. If the sample profiles do not match, then the person from whom the DNA sample was collected did not contribute the DNA at the crime scene but if the patterns match, the suspect may have contributed the evidence sample. DNA Profiling involves the identification and description of DNA from biological evidence collected at a crime scene and there are three main methods used to profile.²¹

a) Restriction Fragment Length Polymorphism (RFLP)

This method of DNA profiling considers that DNA is composed of a vast ladder of vertical pieces of alternating sugar molecules and phosphate groups. The DNA from the sample or suspect is cut into segments of varying lengths by a sequence specific enzyme. The segments are separated out on the basis of size using a technique called electrophoresis, where the fragments are charged using high voltage. Fragments of a particular length are transferred to

²⁰ DNA Profiling in Forensic Science. XII- Biotech DNA Profiling Article 1

²¹ DNA Profiling was first introduced by Dr. Alec Jeffreys, an English geneticist at the University of Leicester in England in the mid- 1980's.

a nylon membrane and are matched up with radioactively labelled fragments of DNA called **DNA probes** in such a way that only fragments that are identical stick together. The excess radioactive fragments are washed away and an x-ray of the remaining fragments taken to produce an **autoradiograph**. The autoradiograph gives a picture of which of the labelled fragments was in the original sample; successive regions of the DNA are examined to give an indication of the probability that the sample comes from a given suspect.²²

b) Short Tandem Repeat Profiling (STR)

STR uses an enzyme to make many copies of a small section of the DNA. The section is cut into pieces by another enzyme, and separated by electrophoresis. The continued replication of the segment of DNA increases the number of copies of the original strand. The fragments are then visualised with a silver stain, with the pattern of light and dark bands and a statistical analysis on the abundance of the observed patterns is seen as being characteristic for an individual and this can be cross referenced to the DNA of a suspect to determine if it is a match. This method is used particularly in the analysis of trace amounts of DNA as it allows for the increase of the amounts of the original material through replication.²³

c) Mitochondrial DNA Analysis (mtDNA)

With this method, nuclear DNA is extracted from cellular organelle called mitochondrions and compared to the profile of a potential maternal relative in order to establish the identity of the owner of the DNA tissue extracted from the genetic material recovered from a crime scene. All mothers have the same mitochondrial DNA as their offspring because the mitochondria of each new embryo come from the mother's egg cell. The father's sperm contributes only nuclear DNA. mtDNA is a more useful method in cases where the DNA material available cannot be analysed using the RLFP or STR methods, for example in the analysis of older biological samples which lack nucleated cellular material. The method is also important in identifying unidentified remains thus it serves as an important tool for the investigation of missing persons cases, victims of crashes or fires are often unrecognizable, but if adequate DNA can be isolated, a person can be positively identified if a sample of their DNA or their families is available for comparison.

²² DNA Profiling in Forensic Science. XII- Biotech DNA Profiling Article 2

²³ Using DNA to Solve Cold Cases - A Special Report from the National Institute of Justice (July 2002).

2.2.2.1`Combined DNA Index System (CODIS)

CODIS is a database and electronic search engine that allows crime laboratories throughout the United States to exchange DNA information about criminals, suspects, and victims of crime, operated by the US Department of Justice through the Federal Bureau of Investigation (FBI). CODIS uses two indexes to generate investigative leads in crimes where biological evidence is recovered from the crime scene. The Convicted Offender Index contains DNA profiles of convicted felons and the Forensic Index contains DNA profiles developed from crime scene evidence including DNA evidence found on the victim. All DNA profiles stored in CODIS are generated using STR (short tandem repeat) analysis. DNA from biological evidence such as blood and saliva are gathered from crimes and crime scenes that have no suspect and compared to the DNA in the profiles stored in the CODIS systems. CODIS utilizes computer software to automatically search its two indexes for matching DNA profiles, if a match is made between a sample and a stored profile, CODIS can identify the perpetrator.²⁴ If not, the sample is stored as a sample profile for future reference.

Additionally, CODIS consists of a third index which contains ancillary information that provides additional information for investigators to use in order to solve crimes. One index catalogues information collected from unidentified human remains and another collects DNA profiles voluntarily donated by the relatives of missing persons. This file is used to quantify the statistical significance of a DNA match. Information entered into the Forensic Index from different locations in the US helps link crimes together to a single suspect and when a DNA profile from the Forensic Index matches one from the Offender Index, a suspect can be identified. CODIS has helped investigators develop leads in cases and carry out more coordinated investigations. In the US, the DNA Identification Act of 1994 authorises the use of DNA data and formalises CODIS by requiring that the DNA profiles of offenders of sexual and other violent crimes in all 50 states in the US be sent to CODIS. There is currently no such database in Zambia.

2.2.3 FORENSIC FINGERPRINT ANALYSIS

All human beings are born with a characteristic set of unique ridges on our fingertips. The ridges, which are rich in sweat pores, form a pattern that remains fixed for life. Even if the

²⁴ Advancing Justice Through DNA Technology (2004 Report from the Department of Justice)

skin is removed, the same pattern will be evident when the skin regenerates. Because an individual's fingerprints remain distinctive throughout his life, fingerprint analysis is a long-established means of determining a person's true identity since it is fact that no two fingerprints have ever been found to be identical; it is important as individualising evidence to link a person to a particular crime. As such fingerprinting, as a form of personal identification, is a refined methodology that is proven in practice and accepted in courts of law. If a fingerprint from the scene of a crime can be linked to one in a database or from a suspect, an identification can be made. The courts will readily accept fingerprint evidence, so long as it is properly collected and analyzed.²⁵

When analysing fingerprints, forensic experts analyse the raised edges on the skin of the fingers known as friction ridges. The patterns of these ridges are categorized as whorls, arches or loops. Perspiration is always present in friction ridges which causes fingerprints to be left behind on whatever surface a person touches. Unlike DNA evidence, fingerprints can easily be wiped down at a crime scene by a criminal and this can present a challenge for investigators in identifying the perpetrator of the crime. Further, if fingerprint evidence is not properly handled, it can become contaminated by the fingerprints of the investigators collecting the fingerprint evidence.

2.2.3.1 Automated Fingerprint Identification System (AFIS)

Automated fingerprint identification is the process of automatically matching one or many unknown fingerprints against a database of known and unknown prints. The Automated Fingerprint Identification Systems (AFIS) is primarily used by law enforcement agencies for criminal identification initiatives, the most important of which include identifying a person suspected of committing a crime or linking a suspect to other unsolved crimes. The AFIS is a national fingerprint and criminal history system maintained by the FBI's Criminal Justice Information Services (CJIS). It is a biometric identification methodology that uses digital imaging technology to obtain, store, and analyze fingerprint data; it holds all fingerprint sets collected in the country. AFIS has also been used to track and catch terrorists. Fingerprints are voluntarily submitted to the FBI by local, state, and federal law enforcement agencies.

²⁵ Forensic Science - History, Fingerprints, Genetic Fingerprints, Evidence And Tools Used In Forensic Science. 23rd November 2010.

Fingerprints are also collected through criminal arrests or from non-criminal sources, such as employment background checks. The FBI then catalogues the fingerprints along with any criminal history linked with the subject.²⁶In Zambia, the AFIS is used by the Fingerprint Bureau in criminal investigations to store and identify fingerprints in criminal investigations.

2.3 CONCLUSION

In this chapter, it has been shown that forensic science has a very wide application in solving crime. The nature of forensic science is based on Locard’s Exchange Principle which states that every contact leaves a trace. This can be seen from forensic ballistics which deals with the unique tool marks that are left on bullets and bullet casings when a gun is fired created by the contact between the bullet and the barrel of a gun surfaces is what creates the tool marks that is used as an investigation tool by forensic experts and law enforcement agencies. Further, through DNA analysis and profiling, forensic science allows for biological evidence such as blood, hair, saliva, semen, skin to be collected and analysed from a crime scene in order to establish a connection between a suspect and a crime scene, or to identify a suspect where there is none. DNA evidence is so accurate based on the unique quality of each individual’s DNA such that it is not possible for the perpetrator to deny involvement in a crime once the DNA evidence establishes a connection between the suspect and the crime scene. Through forensic fingerprint analysis, forensic experts are able to analyse fingerprints left at a crime scene in order to establish the identity of the suspect, a connection between the suspect and the crime scene and a connection between the suspect and other crimes.

Forensic science, by using the Locard’s Exchange Principle, allows law enforcement agencies to establish the identity of the perpetrator where there is none in custody and the identity is not known as well as establish evidence to convict a suspect in a crime, even where there is no confession from the suspect or witness testimonies. Having discussed the three fields of forensic science that are the focus of the research, the following chapter will consider the importance of forensic science to the Criminal Justice System. This is in order to highlight the intrinsic relationship that exists between forensic science and criminal justice.

²⁶Integrated Automated Fingerprint Identification. An Article by the CJIS of the FBI (July, 2009)

CHAPTER THREE

THE IMPORTANCE OF FORENSIC SCIENCE TO THE CRIMINAL JUSTICE SYSTEM

3.0 INTRODUCTION

This Chapter focuses on the importance of forensic science to the Criminal Justice System by considering the different uses of forensic science in the Criminal Justice System, admissibility of forensic evidence as evidence and matters relating to the administration of forensic science.

3.1 THE CRIMINAL JUSTICE SYSTEM

The Criminal Justice System encompasses the network of courts and tribunals which deal with criminal law and its enforcement. It is the system of practices and institutions of government directed at upholding social control, deterring and mitigating crime and sanctioning those who violate laws with criminal sanctions and rehabilitation efforts.²⁷ The Criminal Justice System includes major subsystems composed of public institutions and their staffs, these include police and other law enforcement agencies, trial and appellate courts, prosecution and public defender offices, probation and parole agencies, custodial institutions (such as jails, prisons, reformatories, halfway houses), and departments of corrections which are responsible for some or all probation, parole, and custodial functions.

Additionally, there are numerous administrative agencies whose work includes criminal law enforcement for example the Ministry of Justice. The Legislation through legislators and other elected officials, even though they lack any direct role in individual cases, have a major impact on the formulation of criminal laws and criminal justice policies. The policies formulated by the Legislation are also strongly influenced by the media and non-governmental organisations (NGO's) and public-employee labour organizations, which have a major stake in criminal justice issues. Each of the institutions and individuals listed above has its own set of goals and priorities that they play in the operation of the Criminal Justice System; they exercise substantial unregulated discretion in making particular decisions which

²⁷ R.S Frase and R. Wiedner Criminal Justice System - Structural And Theoretical Components Of Criminal Justice Systems, The Systems In Operation, The Importance Of Viewing Criminal Justice As A System (2006)

may sometimes conflict with those of other institutions and actors, or with the supposed goals and priorities of the system as a whole.

3.2 ELEMENTS OF AN EFFECTIVE CRIMINAL JUSTICE SYSTEM

Different countries have different ways of ensuring that their criminal justice systems are effective. There are certain considerations that are to be made in order to determine whether or not a Criminal Justice System is effective:²⁸

- a) **Public confidence in criminal justice agencies and other government agencies-** Public confidence in criminal justice agencies is an important factor in determining the effectiveness of a Criminal Justice System in that it is a reflection of how effective the system is. If the public have confidence in the system they will use it often because it means that the system is able to meet their needs. An effective Criminal Justice System is able to meet the needs of the public by offering quick response to, and effective investigations of crimes, free and fair trials, access for all to the court system which requires that the cost of litigation should be affordable and aid provided for those who cannot afford it and court judgments that are easy to understand and interpret.
- b) **Public fear of crime-** If a Criminal Justice System is effective, it is able to provide penal sanctions for crimes that are committed in a society. The level of public fear of crime in a society is a determinant of the effectiveness because an effective Criminal Justice System by providing penal sanctions for crimes committed acts as a deterrent to members of society from committing crimes. If the system effectively provides sanctions and punishment for crimes, members of the society will be afraid to commit crime.
- c) **The crime rate-** A Society with Criminal Justice System that is effective has a low crime rate. This is because people are afraid to commit crimes due to fear of facing the penal sanctions which have been established and are administered by the Criminal

²⁸ C. Lewis, How Effective Is Criminal Justice? University of Portsmouth, UK, August 2003.

Justice System in response to the commission of crimes. It is based on the knowledge that each crime has a penal sanction.

- d) **The proportion of the population who are criminals-** As a reflection of a low crime rate and public fear of crime, where the Criminal Justice System is effective, a lower proportion of the population are criminals.
- e) **Proportion of taxes or national expenditure going to justice agencies-** In order for a Criminal Justice System to be effective, the agencies and departments composed in it must be well funded in order to ensure that their duties are easily and effectively carried out and to ensure that the objectives for which it was created are met.
- f) **Number of cases of infringement of human rights by justice agencies-** One of the main requirements of an effective Criminal Justice System is that the agencies and individuals who compose it should uphold and enforce the law. It is also their role that in upholding and enforcing the law, it should be done in recognition and respect of human rights. As a matter of fact, a way that the Criminal Justice System enforces the law is by ensuring that when enforcing the law, there is no violation of human rights. It requires that rights such as the right to free and fair trial, to legal representation in a case and the right to appear before a court of law are respected.²⁹

3.3 USES OF FORENSIC SCIENCE IN THE CRIMINAL JUSTICE SYSTEM

The importance of forensic science to the Criminal Justice System cannot be overly emphasised. Forensic science's most important use is that it can be used in almost any criminal case to provide the determining factor in the ability of evidence to adequately represent the facts of a case. In complicated cases, and even in relatively simple ones, the most minute details can become paramount to a successful prosecution or defence. It is forensic science that provides the means to analyze crime scenes, evidence, and personal testimony in order to create a visualization of how a crime occurred. Forensic science has in the following ways, allowed law enforcement agencies to communicate via one system

²⁹ C. Lewis, How Effective Is Criminal Justice? University of Portsmouth, UK, August 2003

without losing sight of their evidence and also allows them to better solve cases and find connections between cases:

3.3.1 CRIME SCENE INVESTIGATION

Crime scene investigation (CSI) refers to the series of steps taken to investigate a crime scene. It consists of the detailed examination of a crime scene, and detection, recognition, and collection of pertinent evidence, as well as permanent documentation of the scene. Although the methods and techniques used may differ, the aim is to reconstruct the exact circumstances of the crime through the identification of the sequence of events and to gather physical evidence that can lead to the identification of the perpetrators.³⁰

CSI usually begins at the place where the crime was committed. It requires that the area around the crime scene be isolated and secured to prevent the destruction or contamination of crucial physical evidence that can lead investigators to link the perpetrators to the victim. The crime scene technician is an expert who processes the crime scene and assists in finding and identifying physical evidence such as hairs, fibres, bullet casings, bloodstained objects, and body fluids which may be found in carpets, on furniture, on walls at the crime scene. The crime scene and each piece of evidence is carefully photographed and then properly collected and conditioned to avoid contamination, to be later analyzed at the crime laboratory. The technician writes a thorough report of the scene and describes the evidence found. This report can be used as evidence in court to corroborate the testimony of the technician. The crime scene investigator discusses with the prosecutor's office the available evidence, the technician's report and other information to determine the legal direction of the investigation, since both are responsible for the entire investigative process and for building a case when prosecuting persons charged with the crime.

Popular television shows such as CSI, Law and Order, Criminal Minds, NCIS depict an almost accurate but glamorized versions of the activities of 21st century forensic science particularly crime scene investigation and as such, these TV shows have changed individuals' expectations of forensic science, an influence termed as the "CSI effect". This has had both positive and negative effects on the practice of CSI as it has led to the standard of CSI

³⁰ Strengthening Forensic Science In The United States: A Path Forward. National Research Council Of The National Academies (Washington D.C: at The National Academies Press, 2006), page 8

practice being high to meet public expectations while at the same time, has led to people being more intelligent and sophisticated when committing crime, so as to avoid being caught using CSI.

3.3.2 CRIME SCENE RECONSTRUCTION

Crime scene reconstruction is the most important aspect of forensic science; it involves the reconstruction of the circumstances and behaviours involved in a crime.³¹ Crime scene reconstruction involves the careful and competent examination of the physical evidence and the documentation of the crime scene through the examination of the available physical evidence, in addition to those materials left at or removed from the crime scene, victim or accused. Crime scene reconstruction encompasses the scientific analysis of the crime scene, interpretation of scene pattern evidence and laboratory examination of physical evidence and the systematic study of related information and the logical formulation of a theory about how a crime occurred. The utilization of physical evidence is critical to the solution of most crime because physical evidence is infallible, but only when it is properly recognized, studied, and interpreted. As already stated in the previous chapter, the cornerstone of forensic science is Locard's Exchange Principle which states that every contact leaves a trace. The principle is cardinal to crime scene reconstruction because crime scene reconstruction takes into consideration evidentiary exchange of fingerprints, footprints, hair and clothing fibre that the perpetrator may have unconsciously left behind or collects while at the crime scene. These materials are used to establish contact between the suspect and victim or scene based on Locard's Exchange Principle and are considered in light of available and reliable witness, victim, and offender statements. The physical evidence left behind at the crime scene plays a crucial role in reconstructing the events that took place surrounding the crime and the collection and documentation of physical evidence is the foundation of a reconstruction.

In conjunction with agreeable witness accounts, crime scene reconstruction may be a powerful instrument of corroboration. In instances of conflicted witness accounts, crime scene reconstruction provides an objective view that point to one possibility over another and in the absence of witness accounts, crime scene reconstruction can be used to investigate and establish the actions that occurred at the scene of a crime. The utility of crime reconstruction is it establishes the general circumstances of a crime, demonstrating links between victims,

³¹ E.A. Martin, Oxford Dictionary of Law: Fifth Edition, Oxford University Press, New York, 2002.

suspects, and offenders, corroboration of witness statements, providing investigative leads, and identifying potential suspects. Circumstances can arise where the physical evidence excludes, fails to establish, or equivocates a connection between the crime and the accused, as such crime scene reconstruction is of great investigative and legal importance as reconstructive evidence gathered through crime scene reconstruction is relevant to understanding what actually happened at the crime scene and the sequence of events. Forensic analysis and crime reconstruction in particular, are concerned with those conclusions that can be logically drawn from the evidence, as well as with those that cannot. As such, the consideration of both the strengths and limitations of available physical evidence are an important part of crime reconstruction.³²

3.3.2.1 The Assumption of Integrity of Evidence

The process of crime reconstruction is built on the assumption that evidence left behind at a crime scene, which has been recognized, documented, collected, identified, compared, individuated, and reconstructed, is pristine which ensures the integrity of the evidence found within. Subsequently, any conclusions reached through forensic examinations and reconstructions of that evidence are assumed to be a reliable lens through which to view the crime.

3.3.3 FORENSIC INVESTIGATION AND ANALYSIS

This refers to the practice of lawfully establishing evidence and facts that are to be presented in a court of law and analyzing them in order to establish relevance to the facts to be presented before a court of law. This is achieved through the use forensic science in order to uncover scientific evidence that may convict an accused person of a crime or exonerate a person who has been wrongfully convicted of a crime.³³ Forensic investigation and analysis helps law enforcement agencies and the Judiciary to ensure that the purpose of justice is fulfilled by firstly convicting the correct person, ensuring that the evidence collected at a crime scene is contamination free and that the evidence does not present a bias that is prejudicial to the case of the accused as a way of ensuring a fair trial.

³² M. Sidebottom, The Importance of Forensic Science in Criminal Justice (30th March 2008)

³³ Forensic Identification (wisegeek.com) Accessed on 23rd November, 2010

3.4 FORENSIC EVIDENCE AS EVIDENCE

Evidence is any item or information gathered at the scene of a crime, or at related locations, which is found to be relevant to an investigation.³⁴ Evidence has many different roles in the investigation of a crime. It can link a suspect to a crime scene if, for instance, a footprint found at the crime scene matches the shoe of the suspect. Evidence such as DNA or fingerprints can provide for a firm identification of a perpetrator or suspect because of their unique nature. Evidence can also eliminate a suspect if the evidence found at the crime scene does not match or provide a link between the suspect and the crime scene. Evidence can back up or contradict a witness statement, which may help guide the law enforcement agencies in further investigations and ensure that an accurate account of the crime is attained.

Forensic science places evidence into two categories; direct evidence is evidence which establishes fact without the need for further analysis. Perhaps the most important form of direct evidence is an eyewitness account of a crime. Indirect evidence, usually circumstantial evidence is more indirect as it does not immediately establish facts and as such requires further analysis in order to establish that fact. Forensic science strives to provide an explanation of the evidence through scientific investigations. Most of the evidence obtained through the use of forensic science is circumstantial evidence which is why it requires corroboration by expert witness testimony. Forensic evidence is further divided into two basic classes, physical and biological evidence. Physical evidence covers items of non-living origin, such as fingerprints, tire marks, footprints, fibres, paint, and building materials. Biological evidence comes from a living source, usually the victim or perpetrator and includes DNA extracted from blood or other bodily fluids, semen, hair, and saliva.³⁵

3.4.1 ADMISSIBILITY OF FORENSIC EVIDENCE

In court, forensic evidence is admitted to support a fact of truth asserted. Forensic evidence is admitted as evidence corroborated by an expert witness testimony because it is circumstantial in nature. The approach to the admissibility of forensic evidence as evidence in the courts of law in the UK and US has generally been a laissez-faire one, allowing the evidence to be put before the tribunal of fact or court, as long as the evidence is relevant and

³⁴ E.A Martin, Oxford Dictionary of Law: Fifth Edition Oxford University Press, New York, 2002

³⁵ R.S Frase and R. Wiedner, Criminal Justice System - Structural And Theoretical Components Of Criminal Justice Systems, The Systems In Operation, The Importance Of Viewing Criminal Justice As A System (2006)

does not offend the rules of evidence. This leaves the responsibility with the judge or jury to decide how much weight should be given to the expert testimony to which they have been exposed. There are two very important questions that should underlie the law's admission of and reliance upon forensic evidence in criminal trials:

- (1) To what extent is the particular forensic discipline is founded on a reliable scientific methodology that gives it the capacity to accurately analyze evidence and report findings and;
- (2) To what extent do practitioners in a particular forensic discipline rely on human interpretation that could be tainted by error, the threat of bias, or the absence of sound operational procedures and robust performance standards?

These questions are significant because the goal of law enforcement actions is to identify those who have committed crimes and to prevent the Criminal Justice System from erroneously convicting the innocent. Therefore, it matters a great deal whether an expert is qualified to testify about forensic evidence and whether the evidence is sufficiently reliable to merit a fact finder's reliance on the truth that it purports to support.³⁶

There are two very important rules which determine and govern the admissibility of forensic evidence as evidence in the courts of law. The first rule which is the **Frye Rule** is based on the **general acceptance principle** espoused in the case of **Frye v. United States.**³⁷ It states that:

“And while courts will go a long way in admitting expert testimony deduced from a well-recognized scientific principle or discovery, the thing from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field in which it belongs.”

The *Frye* case involved a murder trial in which the defendant sought to demonstrate his innocence through the admission of a lie detector test that measured systolic blood pressure. The court rejected the evidence and held that the lie detector test was unreliable because it had not gained “general acceptance” in the relevant scientific community. The general acceptance principle requires that in order for a scientific principle to be admitted as part of expert testimony before a court of law, the principle in question must have been generally accepted within the field it belongs.

³⁶ R.S Frase and R. Wiedner, Criminal Justice System - Structural And Theoretical Components Of Criminal Justice Systems, The Systems In Operation, The Importance Of Viewing Criminal Justice As A System (2006)

³⁷293 F1013, 1014 [1923]

This requirement goes to the root of the evidence submitted in the testimony because the weight of such evidence and whether it can be admitted as evidence will depend on whether the principle and the evidence deduced from it are accepted as conclusive of the fact within the particular field. The reliability of forensic science methodologies must be properly studied and accurately verified in their field before they can be relied on in court. Since its formulation in the Frye case, the general acceptance principle is applied more frequently to criminal cases and has been widely accepted as the dominant standard for determining the admissibility of novel scientific evidence at trial.³⁸

The general acceptance principle in the Frye case was further qualified in the case of **Daubert v. Merrell Dow Pharmaceuticals, Inc.**³⁹ in which the Court ruled that a trial judge must ensure that any and all scientific testimony or evidence admitted is not only relevant, but reliable. **The Daubert Principle** requires the trial judge to ensure that the expert's testimony rendered at trial in court is relevant to the task at hand and that it rests on a reliable foundation. The Court indicated that the subject of expert testimony should be scientific knowledge based on the general acceptance rule in the Frye and also reliable as capable of establishing truth of a fact asserted in a case. Therefore, the evidentiary reliability of the evidence will be based upon scientific validity. The Court also emphasized that, in considering the admissibility of evidence, trial judges should focus solely on experts' principles and methodology and not on the conclusions that they generate. Further, in **Melendez-Diaz v. Massachusetts**,⁴⁰ the Courts stated that crime laboratory reports may not be used against criminal defendants at trial unless the analysts responsible for creating them give testimony and subject themselves to cross-examination. This is because forensic evidence is not uniquely immune from the risk of manipulation.

There a number of questions which arise concerning the testimony of a forensic science expert or about the forensic evidence presented in court, these include questions as to the relevance of the evidence, the qualifications of the expert, the adequacy of the evidentiary sample about which the expert will be testifying, and the procedures followed in the handling

³⁸E.A Martin, Oxford Dictionary of Law: Fifth Edition, Oxford University Press, New York ,2002

³⁹ 509 U.S. 579 (1993)

⁴⁰ (No. 07-591) 69 Mass. App 1114 (2009)

and processing of the evidence. Evidence must not mislead or prejudice the jury or unduly waste time. Moreover, the judge must decide whether evidence fits with an asserted claim or action and he may exclude the evidence in whole or in part, prevent or limit the testimony of the expert witness, or deny the challenge of evidence. Because the Daubert's and Frye's tests are not conclusive determinant or reliability of an expert testimony in a case brought before the court, the law grants the trial judge broad latitude to determine this. However, the admissibility factor is simply one of the steps forensic evidence must satisfy to be utilized in the justice system.

3.5 ADMINISTRATION OF FORENSIC SCIENCE

Forensic science administration studies how to reduce error rates in forensic science by reorganizing the system of forensic work. It deals with the management of forensic labs and workers and studies the organization of forensics labour in the criminal justice system, using the tools of social science and business administration.⁴¹ Forensic science administration studies forensic science within its legal and political context and demands higher standards of performance. The environment for forensic science administration is evolving which has placed pressure on lab managers to adopt new and higher standards of professionalism, verifiability, and scientific rigor in relation to forensic science. The knowledge and skills of lab managers must now go well beyond familiarity with scientific techniques of forensic testing and they must be up to date with changes in the legal, political, and social environment of forensic science and how the Criminal Justice System might respond to such changes.

Forensic science administration promotes an improved understanding of forensic science as a legal, social, and political phenomenon and improves the management of forensic science within the Criminal Justice System. An example of a case of failed forensic science administration is the Houston Police Department Crime Laboratory-DNA/Serology Section where after an FBI Audit in 2002, it was reported that one of the problems found with the Laboratory was that "on one occasion the roof leaked such that items of evidence came in contact with the water"⁴² The FBI Report led to the voided conviction of Josiah Sutton, who was convicted principally on the basis of the discredited DNA evidence from the Houston

⁴¹ What is Forensic Administration? Article by the Institute of Forensic Science Administration, Farleigh Dickinson University, Madison , 2010

⁴² W.C Thompson, A Sociological Perspective on the Science of Forensic DNA Testing ,1997 page 12

lab. Failures of forensic science administration can expose state to expensive litigation for wrongful conviction and the possible voiding of prior convictions. It also has a tendency to reduce the actual and perceived value that forensic science adds to the Criminal Justice System as the perception the forensic science is that it is unreliable, which weakens its evidentiary value, which, in turn, reduces the value it really adds to the judicial system. The following matters are taken into account in relation to the administration of forensic science:

3.5.1 INFORMATION POLLUTION

This arises when a forensic worker or expert knows extraneous details of a case which leads him or her to draw inappropriate conclusions from the evidence, in violation of forensic practice. Information sharing between police investigators and forensic scientists creates the strong possibility of unconscious bias and also helps dishonest scientists to act on any self-conscious biases they may have. Research in forensic science administration suggests that “information hiding” will reduce the number of such bogus inferences and thereby reduce the error rate in forensic science.⁴³

3.5.2 CHAIN OF CUSTODY

Chain of custody involves tracking evidence that comes up in a court trial from the time it is collected from the crime scene until it is presented in court. It aims to show that the evidence has not been tampered with in the meantime.⁴⁴ It is one of three ways used to authenticate real or physical evidence in court, according to the Rules of Evidence. The other two methods involve either a unique piece of evidence or an item of evidence that is made unique for example, by a witness having marked it at time of the crime. The purpose of a chain of custody procedure is to preserve evidence. From the instant a piece of evidence is removed from a crime scene, to the time it is introduced as an exhibit in the subsequent court case, the whereabouts of the evidence must be able to be accounted for at all times in between. Each item of evidence is packaged separately to avoid contamination and damage. Every time an item of evidence is transferred from one person to another, it is signed and accounted for. The evidence is handled through a strict chain of custody. Any gap in the continuity of the timeline can render evidence useless because there is no longer any guarantee that the item was not contaminated in some way during the gap period, or if it is even the same piece of

⁴³ M. Sidebottom, The Importance of Forensic Science in Criminal Justice ,30th March 2008.

⁴⁴ World of Forensic Science: Evidence, Chain of Custody. Enotes.com/forensic-science accessed on 23rd November, 2010

evidence. A break in the chain of custody can also invalidate the claim that the item of evidence was present at the scene or on the suspect and is relevant to the crime. The accuracy and completeness of the chain of custody for physical evidence can determine its admissibility but, more significantly, the failure of an element of the chain of custody can taint a key element of a case, resulting in a wrongful acquittal or conviction.

Even though a reliable chain of evidence may be established, physical evidence may have been altered prior to or during its collection and examination. **Evidence Dynamics** refers to any influence that changes, relocates, obscures, or obliterates physical evidence, regardless of intent.⁴⁵ Evidence Dynamics comes into play during the interval that begins as evidence is being collected and transferred, and ends when the case is ultimately adjudicated. Unless the integrity of the evidence can be reliably established, and legitimate evidentiary influences accounted for, the documentation of a chain of evidence, by itself, does not provide acceptable ground upon which to build reliable forensic conclusions. Physical evidence is handled by a number of people, including investigators, technicians, forensic specialists and storage clerks. How these individuals maintain the evidence placed in their hands and how well they keep a record of its movements will determine whether it will be accepted in court. They must keep an accurate record of where, under what conditions evidence has been kept, who has had possession of it, for what purpose and what tests or procedures have been performed on it. The custodian of the evidence is responsible for managing the movement of the evidence and delivering it to the court with a complete, accurate provenance of its history from its discovery to its appearance in court.

Even if the chain of custody is clean, the evidence must still be proven relevant and material, that is, having to do directly with the case in question) to be admitted as real evidence. Detectives, technicians and custodians

3.5.3 CROSS CONTAMINATION

Trace evidence like hair, fibres, paint, and blood, is by its very nature readily transferred from item to another. This raises the problem of cross contamination, where the source of trace evidence found on a significant item is uncertain. The trace evidence may have attached itself to a relevant item during the crime itself, in which case it becomes significant evidence. However, it is also possible that the evidence was transferred to the item via a third party

⁴⁵ World of Forensic Science: Evidence, Chain of Custody. Enotes.com/forensic-science accessed on 23rd November, 2010

during the investigation. This would be cross contamination, and such evidence is detrimental to an investigation. Cross contamination could also occur if packaging and re-packaging of items is not done correctly. It is essential to package each piece of evidence separately in an unused container. Obvious sources of cross contamination should always be kept well separated. For example, the clothing of the suspect should never be packaged or handled in the same room as that of the victim in order to avoid trace evidence specifically located on the victim's clothes from being transferred to the accused clothes and vice versa. Such an occurrence would lead to cross contamination which compromises the quality of the evidence collected. Following such procedures will prevent cross contamination and ensure that the true value of trace evidence is maintained and revealed in court.

3.6 CONCLUSION

The chapter illustrated that the field of forensic science inextricably tethered to the administration of criminal justice especially in relation to law enforcement. This can be evidenced by the Criminal Justice System's reliance on forensic evidence in criminal prosecutions. The goal of law enforcement actions is to identify those who have committed crimes and to avoid erroneously convicting the innocent and to achieve this, the Criminal Justice System utilizes forensic science through crime scene investigation and crime scene reconstruction which help to determine how a crime occurred. Further, forensic science is used in the investigation and analysis of evidence so as to determine a connection between the suspect, victim and the crime scene, which is important for solving a crime.

In recognition of the important role that forensic science plays in criminal justice, coherent rules; the Daubert and Frye Rules governing the admissibility of forensic evidence, have been developed. These rules were developed because the interpretation of forensic evidence is not infallible. The Chapter also outlined the various matters considered in the administration of forensic science. These are necessary so as to ensure that the evidentiary quality of forensic evidence obtained from a crime scene is not compromised for it to be admissible evidence. Chapter Four will focus on the status of forensic science in Zambia. Consideration of the status of forensic science in Zambia is important as it will show the extent of development of forensic science in Zambia, as well as the shortcomings and areas that require further development in relation to the administration of criminal justice in Zambia.

CHAPTER FOUR

THE STATUS OF FORENSIC SCIENCE IN ZAMBIA

4.0 INTRODUCTION

The preceding chapter discussed the importance of forensic science to the Criminal Justice System. The efficiency of the administration of criminal justice is dependent on the ability of the Criminal Justice System to investigate and prosecute the correct offenders for a crime using admissible evidence and one way in which this is achieved is through forensic science and in particular, forensic evidence. Ultimately, the aspect of forensic science that is of interest to practitioners and the courts is the field's potential to produce forensic evidence or facts which when combined with theories of the defendants participation in a crime, aid in establishing one or more elements of the crime required for a conviction.⁴⁶ Elements such as *actus reus* (the act), *mens rea* (the intent or mental element) and causation must be proved beyond reasonable doubt in order for a suspect to be convicted which can be attained through forensic evidence. Forensic science provides the link a potential offender to the crime scene through testimonies as to individual characteristics and physical evidence collected from the crime scene.

The discussion thus far has focused on forensic science in general and the present chapter will discuss the status of forensic science in Zambia in order to clearly analyse how the current status of forensic science in Zambia affects the administration of criminal justice. It presents a discussion on the Forensics Department of the Zambia Police Service, the different departments composing the Forensic Department and their functions. Further, the Chapter brings to light the challenges that are faced by the Forensic Department and how these have affected criminal justice in Zambia.

⁴⁶ K. Pyrek, *Forensic Science Under Siege: The Challenges of Forensic Laboratories and the Medico- Legal Investigation System*, Elsevier Academic Press, San Diego 2007, page 341

4.1 EXTENT AND STANDARD OF PRACTICE OF FORENSIC SCIENCE IN ZAMBIA

4.1.1 THE FORENSICS DEPARTMENT

Although the field of forensic science is existent in Zambia, it is not fully developed in comparison to the UK and US Forensics. The Forensics Department is a small but rapidly growing department of the Zambia Police Service, established in 1970. An interview conducted with the Head of the Forensics Department revealed that under the Zambia Police Department, investigations are divided into three different departments to deal with specific crimes.

Crime One deals with general investigations and violent crimes such as armed robbery, Crime Two is in charge of white collar crimes such as money laundering and fraud. Finally, Crime Three deals with scientific investigations, which consists of forensic science, fingerprints and criminal records. The Forensics Department falls under Crime Three but it is interrelated with the other departments in Crime One and Two. For example if investigators from the General Investigations Department which falls under Crime One collect DNA samples from the crime scene when investigating a crime, the sample is sent to the Forensics Department to be processed before being sent to criminal records to be filed. The Forensics Department is divided into units consisting of ballistics, chemistry, forensic scenes of crime, question documents, biology and cyber. It must be noted that unlike in other jurisdictions, the Fingerprints Bureau in Zambia which deals with fingerprints is not a unit under the Forensics Department but is an independent department under Crime Three.⁴⁷ In relation to the focus of this research, the Zambia Police Service has departments that specifically deal with the three fields under consideration:

4.1.1.1 The Ballistics Department

The Ballistics Department was established to specifically deal with firearm related crimes in Zambia. Originally, the comparison of bullets and shell casings collected from crime scenes was done manually but in 2004, the Government of the Republic of Zambia acquired the IBIS which was a computerised system and database for storage of firearm related information.

⁴⁷ Interview with Mr. Nsofwa, Head of The Forensics Department at The Zambia Police Headquarters in Lusaka. Conducted on 13th December, 2010

However, the strides made in the advancement of technology led to the acquisition of the ABIS which according Mr Illunga, an investigator in the Ballistics Department, has been recommended by the European Union as a more effective system for ballistics identification. The ABIS is composed of a microscope which is attached to a computer, in which scanned copies of photographs taken of bullets and shell casings from crime scenes are kept as records and are referred to when investigating firearm related crimes. When a shell casing or bullet is recovered from the crime scene, a three dimension (3D) photo is taken of the bullet or shell casing, scanned and placed on the computer system, which is then compared to the samples that are already contained in the database in order to establish to whom the firearm belongs or whether it has previously been used in another crime.⁴⁸

In the interview, it was further discovered that currently, the efficiency of work of the department has been impaired because there is no law which compels owners of firearms and firearms dealers to register samples of the bullet and shell casings of the gun upon purchasing it or registering it. This has limited the record samples that the Ballistics Department to have to compare to bullets and shell casings collected at crime scenes. The effect of this has been that in an instance where there is no matching sample, it is difficult to convict a suspect based on that evidence.⁴⁹ Additionally, the ABIS stationed at the Zambia Police Service Headquarters in Lusaka is the only computer and system of its kind in the whole country and as such services all the nine provinces of the country, which has proved to be an impediment on the ability of the department to expediently meet the demands of the whole country.

4.1.1.2 The Finger Print Bureau

As previously stated, unlike in other jurisdictions such as the UK and US where the fingerprint department is usually a unit under forensics, the Fingerprint Bureau in Zambia is an independent department from the Forensics Department. The Fingerprint Bureau is part of the Criminal Investigations Division of the Zambia Police Service. In an interview conducted with Mr. Mphande, the Officer in Charge of the Fingerprints Bureau, Mr. Mphande stated that the Bureau is the only office in the entire country with the equipment and capacity to process fingerprints, with a few trained officers stationed in each province who help in the

⁴⁸ Interview with Mr. Illunga, an Investigator in The Ballistics Department at The Zambia Police Headquarters in Lusaka. Conducted on 13th December, 2010

⁴⁹ World of Forensic Science: Evidence, Chain of Custody. Enotes.com/forensic-science accessed on 23rd November, 2010

lifting of fingerprints at provincial level. The Bureau's major role is to process and clear fingerprints that are collected for two main purposes.

Firstly, fingerprints are collected in non criminal instances. This is where the fingerprints collected are intended for non criminal purposes such as police clearance for visa applications, employment, work permits, firearms permits and resident travel documents among other instances. The main aim of the non criminal fingerprints is simply to check whether or not the person from whom the fingerprints have been collected for any of the above stated purposes has a criminal record because should a person in such an instance be found to have a criminal record, the application for which the fingerprints are collected will not be granted. The fingerprints collected for non criminal purposes are kept in what is known as the Non Criminal Database. The second instance in which fingerprints are collected is in criminal instances which usually arise where a person has been indicted for an offence and charged. After being charged, fingerprints are lifted from the offender and are sent to the Fingerprint Bureau to be processed through the criminal records in order to establish whether the person is a first or second offender. This is important as an endorsement will be made on the person's criminal record as to whether they are a first or second or even third offender which helps the court in deciding the sentence to be passed on the person. The fingerprints collected for criminal purposes are kept in the Criminal Records Database. It must be noted that Juvenile offender fingerprint records are kept separately.⁵⁰

The process of collecting fingerprints is complex and requires that the fingerprints being collected are not contaminated. Fingerprints which are left behind as trace evidence at a crime scene are as result of the sweat left behind in the ridges present on the fingers. These are unique to each individual which makes it easier to identify to whom they belong. Fingerprints are invisible to the naked eye so in order to establish their existence, fingerprints are developed at the crime scene using special methods and through use of chemicals such as minihydrine, black powder or silver which make them visible to the naked eye. Afterwards, the fingerprints are lifted from the surface using an instrument called the hinge lifter, photographed and then documented. In order to identify to whom the fingerprints lifted from the crime scene belong, the Bureau uses the 16 Points identification system which entails

⁵⁰ Interview with Mr. K.A Mphande, Officer in Charge of the Fingerprints Bureau at The Zambia Police Service Headquarters in Lusaka. Conducted on 13th December, 2010

meticulous consideration of 16 unique features (regions) of the fingerprint collected from the crime scene and comparing them to those of the suspect or the samples in the database. If all 16 regions are present, then the two fingerprints are from one source, if not, then the fingerprints are unlikely from the same source. The 16 point system is a very accurate method of identifying fingerprints, but because it imposes such a high standard of accuracy, it can also be difficult to prove which can detriment a case where the fingerprint is the key evidence.

The last step of fingerprint processing is entering them in the fingerprint database; Zambia is currently using the Automated Fingerprint Identification System (AFIS) which is a computerised database containing different fingerprint samples. Originally, the comparison of fingerprints collected from the crime scene and the samples was done manually which led to slow processing and identification of fingerprints. With the acquisition of the computerised system, the process is now computerised. However, currently, both manual and computerised methods of identifying fingerprints are being used as efforts by the Bureau to put all fingerprint records collected from 1963 to date on the computer database are currently underway, a process which has proved to be long and rigorous.

4.1.1.3 The DNA Department

Currently, Zambia does not have its own laboratory facilities for processing and analysing DNA. Under an agreement entered into with South Africa, Zambia sends all DNA related evidence to be processed at the South African Police Forensics Laboratory in Pretoria. The implication of this is that in cases where the DNA evidence is a key component of the trial, the trial cannot proceed until the DNA is processed and the results are sent back to be used as evidence in court. This can take months or even years due to the fact that South Africa has its own DNA related crimes which it has to consider before considering DNA evidence from Zambia as a matter of priority. Further, since DNA evidence is admitted as expert witness testimony in Zambia, the expert who processed the DNA in South Africa must travel to Zambia to testify at the trial. The Zambian government incurs the cost of upkeep for the experts while they are in Zambia. If the expert is not available to testify, it means that the trial will not proceed until such a time that he or she is available to testify.⁵¹

⁵¹ Interview with Mr. Nsofwa, Head of The Forensics Department at The Zambia Police Headquarters in Lusaka. Conducted on 13th December, 2010

4.1.2 CHALLENGES FACED BY THE FORENSIC DEPARTMENT

It was discovered during an interview Mr. Nsofwa at the Forensics Department that in spite of the role that forensic science plays in the discovery of incriminating evidence, the field still faces major challenges in its proper practice in Zambia:⁵²

- a) **Limited Equipment-** A visit to the Forensics Department revealed that one of the major challenges that the Department faces is lack of equipment. An example would be the Ballistics Department which only has one ABIS computer intended to service the needs of the entire country. Given the magnitude of the firearm related cases that the Zambia Police Service deals with, and the cases by the Zambia Wildlife Authority who also use the services of the Department particularly in cases of poaching, the lack of equipment has made their work very slow. If one investigator is using the system to work on a case, the other investigators have to wait their turn, until that investigator is done using the computer.
- b) **Absence of Enabling Legislation-** The nature of forensic science usually results in certain public policy considerations such as the constitutional right to privacy. As such, it is important to have legislation in place that allows forensic investigators to transcend beyond the walls of the right to privacy. The existence of legislation enables investigators to access private records and access DNA samples of suspects and civilians such as hospital records without it being an infringement of the right to privacy. There is currently no specific legislation relating to the field of forensic science in Zambia. Legislation is also needed to compel owners and traders in firearms to register a sample of bullet and shell casings upon purchasing the weapons. This will help increase the samples in the Ballistics Department's ABIS database and make for wider reference points during investigations of firearm related cases. The enactment of legislation will also allow for the recognition of the Forensic Department as an independent and autonomous body. It currently functions as a body under the Zambia Police Service and one of the implications is that it is not given priority in terms of funding and budgetary allocation by the Ministry of Finance.

⁵² Interview with Mr. Nsofwa, Head of The Forensics Department at The Zambia Police Headquarters in Lusaka. Conducted on 13th December, 2010

The lack of priority in funding is also as a reflection and a result of a lack understanding of the importance and functions of the Department, especially to criminal justice in Zambia.

- c) **Limited Trained Personnel and Local Training Facilities-** One of the major shortcomings in relation to forensic science in Zambia was found to be the lack of local training facilities. Mr. Nsofwa stated that all the forensic experts that the Department has were trained abroad in countries such as China, Russia, Germany, UK and the US, a venture which has proved to be expensive. Consequently, only a handful of personnel can be trained at a given time depending on available financial resources. It has also led to there being a limited number of personnel who are competent and trained in the field of forensic science. For example, the Ballistics Department only has four people in the entire country who are trained to operate the ABIS.⁵³
- d) **Absence of Local DNA Laboratory-** The effects of the absence of a local DNA laboratory have already been espoused above. It causes delay in the trial process as sometimes the trial may depend on the results of the DNA evidence being processed in South Africa or on the availability of the specific forensic expert to testify. It also becomes an expensive venture since it is the Zambian the government that has to sponsor the stay of forensic experts from South Africa who come to testify at trials. It is the considered view of the author that the presence of a local DNA laboratory would benefit the Zambian Government, the Forensic Department and the Judiciary as the current absence has made the work of the Judiciary and Forensic Department slower, and more expensive than it would be if there was a local DNA laboratory.
- e) **Lack of a Local Computerised DNA Database-** As a result of the absence of a local DNA lab in Zambia, there is no local DNA Database in Zambia. A DNA Database is a computerised system containing DNA information collected from criminal offenders and members of the public. Such a database is important because it contains DNA evidence samples which are referred to during criminal investigations to solve a crime. It is important that the DNA database should not only be limited to criminal

⁵³ Interview with Mr. Nsofwa, Head of The Forensics Department at The Zambia Police Headquarters in Lusaka. Conducted on 13th December, 2010

offenders because not all offenders have a prior criminal records so if the database is limited to criminal offenders it would lead to cold hits and criminal investigations would miss links between the crime and the actual offender.

- f) **Limited Financial Resources-** The interview at the Forensic Department revealed that one of the major reasons why the Forensics Department is underfunded is due to the lack of appreciation and understanding of the work that is done by the Department and its importance. The lack of funding has resulted in the Department not being able to purchase the necessary equipment required. It has also resulted in the Department only being able to send a select few abroad for training as the number of those sponsored is highly dependent on the available financial resources at that particular time. This has in turn limited the workforce of the department as there is only a limited number of personnel that is adequately trained, to employ⁵⁴

4.2 THE STATUS OF FORENSIC SCIENCE IN ZAMBIA AND ITS EFFECTS ON THE CRIMINAL JUSTICE SYSTEM IN ZAMBIA

The importance of forensic science to the administration of criminal justice can be summarised in the simple statement that a society where there is no forensic science has an incomplete justice system.⁵⁵ The role of the law in any society in which it exists is the resolution of human conflict, that is, conflict between man and fellow man and man and society. Therefore, the most vital role of the Judiciary is the administration of justice through adjudication of court cases and determination of the innocence or guilt of individuals. There is a strong link between forensic science and criminal justice as forensic science is a way of establishing evidence in a crime which is used by the Courts to adjudicate on a case. It provides the determining factor in the ability of evidence to adequately represent the facts of a case. In Zambia, forensic science though having been in practice since post independent period, has only recently started developing towards the standards that are existing in other jurisdictions such as the UK and the US. However, the extent of development has had some positive outcomes on the administration of criminal justice in Zambia.

⁵⁴ Interview with Mr. Nsofwa, Head of The Forensics Department at The Zambia Police Headquarters in Lusaka. Conducted on 13th December, 2010

⁵⁵ Strengthening Forensic Science In The United States: A Path Forward. National Research Council Of The National Academies. The National Academies Press, Washington D.C, 2006. Page 10

Court rulings are made easier when there is a confession from the accused or if there is a witness account which provides probable or conclusive evidence of the guilt of the accused. However, situations may arise where there is neither a witness account nor a confession from the accused. In such an instance, it requires a third means of establishing the innocence or guilt of the accused, and forensic science provides such means. The implication is that without the existence of forensic science, the Police investigators and the Courts would have no way of linking a suspect to a crime resulting in an inability to administer justice to the accused individual and protect society at large in the absence of witness accounts and confession from the accused. It must be noted that in order to adjudicate on a case, evidence is required to establish motive, *actus reus* (the guilty act), *mens rea* (the mental element) and causation by the accused. These elements are not always easily established especially that with the development of technology and free access to information on the internet and television which has led to crime becoming more complex and sophisticated.

Through the use of forensic investigation and analysis, the Forensic Department has been able to find evidence at crime scenes in circumstances in which it would otherwise be difficult or near impossible to establish which has made the ability of the Forensics Department to solve crimes more efficient. An example is where an accused person has wiped down the crime scene thereby eliminating any fingerprints at the crime scene. Through forensic investigation, experts can look for other forms of evidence such as DNA from hair samples, skin, sweat which can be used to place the accused at the crime scene. Due to the wide access to information combined with a lack of public knowledge about the existence or extent of development of forensic science in Zambia, there is a tendency to commit crimes which can only be solved through the use of forensic science with the mind that because 'there is no forensic science in Zambia,' the perpetrators will not be caught. This misconception comes from public expectation known as the CSI Effect which refers to the increased public awareness of the role of forensic science in criminal investigations which has led to the public expecting forensic science to be the standard that is portrayed in popular television shows such as CSI, Forensic Files and Law and Order. The fact that the public has not seen or been exposed to the standard of forensic science as seen in the television shows, the current status of forensic science in Zambia has made it easier for the Police Service to identify criminals in such circumstances with overwhelming evidence to convict because there exists a tendency by criminals to be casual when committing crimes.

Therefore, forensic science provides a modern means of solving crimes in light of the modern mind set of society today.

Forensic analysis and investigation is a more accurate means of identifying criminal offenders seeing that it produces evidence which helps exonerate a person wrongfully accused and convicted for a crime; it can be the difference between a conviction and an acquittal. An example is the U.S case of the "snaggletooth killer," in which Ray Crone who was convicted of the murder of a Phoenix cocktail waitress in 1991 and sentenced to death, was proved innocent of the crime after serving ten years in prison through a bite mark test that not only established that he was not involved in the fatal stabbing, but that also identified the true perpetrator – a person already incarcerated on another unrelated offense.⁵⁶ The aim of the Criminal Justice System is to not only convict an accused person but to ensure that the correct person is convicted of a crime. Forensic evidence gathered through forensic investigation and analysis provides the Criminal Justice System a new realm of evidence outside the commonly used witness testimonies and confessions from the accused.

The nature of forensic evidence has transcended the original reservations about the admissibility of scientific evidence in Court. Forensic evidence is admissible as circumstantial evidence which according to the rules of evidence, including the Zambian rules of evidence, requires that whenever circumstantial evidence is being admitted as evidence in Court, it must be corroborated, and since forensic evidence of an expert nature, it must be corroborated by testimony from the expert.⁵⁷

Regardless of the stated positive effects of forensic science in the administration of criminal justice, the current status has had unfavourable effects on the Criminal Justice System in Zambia. As a result of the absence of a local DNA Laboratory and a computerised DNA Database there have been delays in the settlement of court cases because the Courts have to wait for the results to be processed and brought from South Africa in order for them to consider the DNA evidence in delivering judgement. The pace at which the case is decided depends on how fast the results are received. Consequently, it means that if there is a suspect in custody, he will have to remain in custody awaiting trial for as long as the DNA evidence is not available before the Courts; this goes against the maxim that justice delayed is justice denied, and the role of the Judiciary to speedily and efficiently adjudicate cases.

⁵⁶ State v. Krone, 182 Ariz. 319, 897 P.2d 621

⁵⁷ H. Hatchard, M. Ndulo, The Law of Evidence in Zambia: Cases and Materials, Multimedia Publications, Lusaka 1991

Delay in trial has been noted as one of the most detrimental effect of the underdevelopment of forensic science on the Criminal Justice System in Zambia. Further, since forensic evidence is admissible as expert evidence, the requirement that the expert must present evidence before the Court implies that the case cannot proceed if such an expert is not available to testify, which causes a further delay in the dispensation of justice. However, since accused persons in criminal cases are convicted on the basis of testimony from forensic science experts, consideration must be made of whether the techniques used and the evidence offered are reliable.

Owing to the limited personnel qualified in the field of forensic science coupled with the limited specialised equipment, the Department cannot efficiently match the nation's forensic workload at a pace which would result in efficiency. This has led to criminal investigations proceeding for long periods of time, sometimes with a dead end or no result conclusive enough to secure a conviction. The trickledown effect is that only upon the conclusion of the investigation can a case be established and brought before the Courts based on the evidence deduced from the investigation. If an investigation is inconclusive, even where the police have someone in custody, they have no grounds on which to hold the suspect in custody. It becomes a flaw on the Criminal Justice System as it is not able to protect society from people who have committed criminal acts.⁵⁸

Ideally, well-trained forensic scientists, investigators and medical examiners can be the determining factor in the ability of evidence to adequately represent the facts of a case. However, the Forensic Department only has limited qualified trained personnel majority of who are based in Lusaka and Ndola. As a consequence, in instances where a crime is committed outside Lusaka and Copperbelt Province, the personnel who handle the crime scene and collect evidence may not have the requisite training required which will lead to the possible contamination and compromise of the quality of evidence collected. Evidence that is compromised cannot be used in Court as the integrity of the conclusion it proposes is questionable.

⁵⁸ Interview with Mr. Nsofwa, Head of The Forensics Department at The Zambia Police Headquarters in Lusaka. Conducted on 13th December, 2010

The mishandling or misinterpretation of evidence can be devastating to the goals of the Criminal Justice System and can result in the wrongful conviction of innocent persons and the failure to convict the true perpetrator.⁵⁹

4.3 CONCLUSION

Contrary to popular belief, forensic science has been in existence since post independence Zambia, albeit that the extent of its development till today has been marginal in comparison to the US and the UK. This may be attributed to the late introduction of the field in Zambia in comparison to the two jurisdictions. Yet even with the limited development, forensic science as it stands has been of great benefit to the dispensation of criminal justice in Zambia as has been illustrated in this Chapter. Consequently, the underdevelopment of forensic science has affected the administration of criminal justice to a lesser extent although there is an urgent need to improve on the status of forensic science in order to make the administration of criminal justice in Zambia more efficient. It has been shown that the current status of forensic science has also had adverse effects which have affected the efficiency of the dispensation of criminal justice in Zambia.

Having considered the current status of forensic science in Zambia and how it has affected the administration of criminal justice in Zambia, Chapter five will give an overall conclusion as well as recommendations on how the current status of forensic science can be improved which will in turn improve how criminal justice is administered in Zambia.

⁵⁹ M. Sidebottom, The Importance of Forensic Science in Criminal Justice (30th March 2008), Scandinavian Studies in Law.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.0 INTRODUCTION

Thus far, the dissertation has defined forensic science and discussed the fundamental connection that exists between forensic science and criminal justice as well as the status of forensic science in Zambia. A conclusion will be drawn in this Chapter on how the current status of forensic science in Zambia has affected the administration of criminal justice in Zambia with special focus on whether there is need to further develop forensic science. Recommendations on how the current status of forensic science can be improved and sustained will be made.

5.1 GENERAL CONCLUSIONS

In the study, it was shown that forensic science involves the application of scientific methods in the investigation of crimes and legal problems. The nature of forensic science is that it involves the application of scientific methods in the authentication of evidence and crime scenes so as to determine if a crime is what it purports to be or is alleged as being. The *raison d'être* for the use of forensic science in criminal investigations is that when a crime occurs, there will not always be a direct or obvious connection between the suspect and the crime on the basis of a confession from the accused or a witness testimony; forensic science through scientific methods provides a means of establishing that connection.

It was conceded that there is a significant connection between criminal justice and forensic science. The Criminal Justice System is composed of the Courts which adjudicate questions of criminal liability and the police force and other enforcement agencies which exist not only to maintain law and order but also to detect and prosecute violations against the criminal law set out in the laws of any given society.⁶⁰ The courts achieve this through the use of evidence which can be attained through the use of forensic science. The foundation of forensic science is Locard's Exchange principle which states that every contact leaves a trace. The principle connotes that even where there is no immediate physical evidence at the crime scene to connect the accused to the crime or the victim, the use of forensic science allows

⁶⁰ C. Anyangwe. An Outline of The Study of the Law of Jurisprudence. UNZA Press, Lusaka, 2005. Page 75

investigators to obtain evidence from the crime scene which is not visible to the naked eye or present unless scientific methods are used. Processes such as crime scene investigation, crime scene reconstruction and forensic investigation and analysis allow the Criminal Justice System to obtain evidence from a crime scene which will provide the determining factor for an accurate representation of the facts of the case. It was concluded that the accuracy of forensic evidence can be the thin line between a wrongful conviction and a correct one.

It was found that in spite of the important role of forensic science to the administration of criminal justice, the current status of forensic science in Zambia is that although it exists, it is underdeveloped, more so in comparison to the current status of forensic science in UK and US. The underdevelopment can be attributed to the later introduction of forensic science in Zambia. This has had both positive and negative effects on the administration of criminal justice in Zambia. On a positive note, forensic science provides forensic evidence founded on Locard's Exchange principle; evidence obtained through forensic investigation and analysis, crime scene investigations and crime scene reconstruction. Forensic evidence is a form of evidence outside the usual realm of evidence admitted by the courts, but it is still evidence used by the courts to prove the guilt or innocence of an accused person when there is no direct evidence available to link them to the crime. Forensic evidence is circumstantial in nature and is therefore admitted as expert testimony. The advent of technology has led to society developing a modern mindset in all aspects of human endeavour including crime, forensic science has provided a more modern method of solving crime tallying with the modern mindset of society

The research also concluded that the most devastating effect of the underdevelopment of forensic science in Zambia is delay in court proceedings. This is particularly due to the absence of the results of processed forensic evidence from the crime scene at the time of trial because it is still being processed in South Africa or inconclusive evidence due to lack of equipment, samples and information to use to yield a concrete conclusion. This results in a failure to conclusively prove guilt, that is, beyond reasonable doubt. Further, delays in trials can also be attributed to the unavailability of the forensic expert from South Africa, to testify and give expert testimony about the forensic evidence at the time of the trial.

Through interviews conducted at the Forensics Department, the research deduced that the work of the Forensics Department is inefficient which is greatly due to limited trained personnel who have a large workload disproportionate to the personnel who are qualified and limited specialised equipment required to adequately carry out forensic work for the Country.

Additionally, it was further observed that there is no proper system of forensic science administration in place in Zambia. The rationale for forensic science administration is to ensure that the forensic evidence presented before court has not been compromised or contaminated and as such is of evidentiary value to the court. Failures of forensic science administration can water down the evidentiary value of forensic evidence thus leading to wrongful convictions or voiding prior convictions and acquittals even if a person is in theory guilty. This amounts to a failure of the courts of the role of protecting society from those who commit criminal offences. Further, absence of forensic administration can expose the state to expensive litigation for wrongful conviction and the possible voiding of prior convictions. The absence of a proper system of forensic science has led to a compromise of the quality and evidentiary value of forensic evidence submitted in court, and has led to dismissal of cases for lack of evidence. If properly handled, forensic evidence is used as tool through which a crime can be viewed; it offers tangible, direct, and precise results and constitutes a primary source of information for the court when determining a verdict for a case thus it is highly trusted. But it requires that forensic evidence should be carefully studied and examined thoroughly in order for justice to be properly achieved.

5.2. IS THERE NEED FOR THE FURTHER DEVELOPMENT OF FORENSIC SCIENCE IN ZAMBIA?

Even though forensic science in Zambia is currently underdeveloped, the tremendous benefit to the Criminal Justice System in Zambia cannot be faulted, as opposed to if it was completely none existent. However, there is need to further develop forensic science practice in Zambia especially the Forensic Department because the evidence used by the courts in determining cases is obtained by the crime investigators sometimes through the use of forensic science and forensic science if properly administered produces accurate evidence. This will in turn improve the standards of justice meted out by the court and make the Criminal Justice System more effective. The successful further development of forensic science is a long term investment benefiting current as well as future generations of society.

5.3 RECOMMENDATIONS

In order to improve the current status of forensic science to more adequate levels and improve the quality of criminal justice administered in Zambia, the following changes need to be made to current state of forensic science:

5.3.1 POLICY RECOMMENDATIONS

- a) **Acquisition of Specialised Equipment-** There is a critical and urgent need to provide the Zambia Police Service, and in particular, the Forensics Department with the latest scientific technology in order for them to expeditiously and accurately identify, apprehend, arrest criminal offenders, as well as to allow for the Judiciary to convict criminal offenders and exonerate persons wrongly suspected and accused of crimes.
- b) **Establishment of a Computerised DNA Database-** It is important for the government to also provide for the establishment of a computerised DNA Database in which all the DNA related information of criminal offenders, whether minor or major offenders, will be stored. This database is aimed at substantially reducing the number of unsolved crimes, stop serial crime as it will provide a means of comparing DNA profiles and evidence samples collected from previous crime scenes which is necessary to solve crimes and apprehend perpetrators and exonerate persons falsely accused and convicted. Furthermore, the DNA database will also be used to store DNA information of civilians who voluntarily admit their DNA into the database. The intended purpose for this is to allow for the identification of missing and unidentified persons.
- c) **Increased Funding to the Forensics Department-** Currently, the Forensic Department operates under the Zambia Police Service which is under the auspices of the Ministry of Home Affairs. As such, it is not an autonomous body and that, coupled with a general lack of understanding about the importance of the functions of department, has resulted in funding to the department not being a priority. This has hindered the work of the department because it cannot purchase adequate equipment or employ adequate personnel to further the department's purpose. Increased funding to the department would improve efficiency of the department as it will enable it

employ more personnel and purchase equipment that will ensure high quality and standard forensic evidence is produced for presentation in court.

Increased funding will also allow the department to send more personnel abroad for specialised training related to forensic science. Inadequate funding has limited the number of personnel that the department sends abroad for training and has led the department to enter into Public Private Partnerships (PPP's) with different stakeholders such as Celtel (now Airtel), who have funded personnel training abroad. In the event that the department is not able to employ any more personnel, increased funding will enable the department to pay more employees to work in shifts. Currently, the employees work a regular 8am to 5pm shift, which means that in the event of a crime after those hours, the evidence collected from the crime scene can only be processed the following day. If there were two shifts, it would allow for forensic evidence to be processed irrespective of what time the crime was committed and evidence collected.

- d) **Establishment of Localised Training of Personnel-** An alternative to the department sending personnel training abroad is to offer specialised training in Zambia. This can be achieved by offering training as a course at higher learning institutions such as the University of Zambia and Copperbelt University. Localised training would allow other people who are interested in a career in forensic science but cannot afford training abroad access the training and knowledge locally. This will increase the personnel base from which the department can employ forensic experts and investigators, and refocus the funds which would have otherwise been used to send personnel for training abroad, on the development of other priority sectors of the department.
- e) **Establishment of Provincial Offices-** Currently, the Forensic Department is only based in Lusaka with a branch in Ndola on the Copperbelt Province which means that all forensic evidence cannot be processed anywhere else in the country, and need to be transported to either Ndola or Lusaka. This tends to compromise the quality of evidence being brought in especially from remote areas of the country because of poor storage during transportation and the distance from such areas. As a form of forensic science administration, it is important that provincial offices be established in

the provincial headquarters of each province with proper storage facilities, specialised equipment to process evidence such as DNA which requires quick processing and manned by well trained and qualified personnel. This will allow for easy access to storage and forensic processing facilities nationwide as well as reduce the strain on the Forensic Department of having to travel long distances to collect evidence processed from crime scenes in remote areas. It will also ensure that evidence collected is not compromised and is of evidentiary value when admitted before the courts.

5.3.2 LEGAL RECOMMENDATIONS

- a) **Enactment of Enabling Legislation-** There is currently no legislation specifically providing for and regulating forensic science in Zambia. The need for the enactment of enabling legislation is a result of two main factors. Firstly, the nature of forensic science is that it raises public policy considerations such as the constitutional right to privacy.⁶¹ There is no legal instrument from which the Forensics Department currently obtains the authority to collect private information such as DNA. As a consequence, any such actions are unconstitutional if there is no consent from the person from whom the DNA is being collected. However, Article 17 (2) provides that nothing contained in any written law shall be held to be inconsistent with or contravention of the right to privacy if the said law makes provision that such an act is required in the interests of public safety.⁶² The enactment of enabling legislation will legalise any such actions of the Forensics Department because it will expressly provide for the exercise of the power to collect DNA and other private information from individuals and provide for the ambit within which such power is to be exercised and the information is to be used. However, such authority and power provided for under the legislation should be reasonably justifiable in a democratic society.

It is clear that collecting such information is in the pursuit of public safety as it is important for the Forensics Department to be able to establish a connection between a suspect and the victim or crime scene; information that will be used to convict such persons, which will in turn protect the public from those who have violated the law and are a danger to the public.

⁶¹ Article 17(1) of the Constitution, Chapter 1 of the Laws of Zambia (1996 Edition)

⁶² Article 17 (2) of The Constitution, Chapter 1 of the Laws of Zambia (1996 Edition)

The legislation enacted should still protect and recognise the citizens' right to privacy by for example, providing that a person will only be compelled to submit DNA and other private information to the Forensics Department upon the issuance of a warrant from the court, as is the case in the UK and US.⁶³ Without such a warrant, consent must be obtained from the individual in question. The legislation enacted should also provide for the establishment of a computerised DNA database containing DNA information of offenders as well as civilians, which, as already stated, will allow for a broader reference base for the Forensics Department during investigations because not all offenders have prior convictions. But the DNA database must be established in consideration of the matters set out above related to the right to privacy.

Secondly, the enabling legislation will also allow the Forensic Department to perform its functions by defining and regulate the circumstances under which such private information will be obtained and how it is to be used. It is also important to enact legislation which will recognise the Forensic Department as an autonomous and independent body from the Zambia Police Service as this will allow for it to receive budget allocations in the annual budget which will increase funding to the department.

⁶³ Strengthening Forensic Science In The United States: A Path Forward. National Research Council Of The National Academies (Washington D.C: at The National Academies Press, 2006)

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