

A LEGAL PROGNOSIS OF THE SIGNIFICANCE OF FORENSIC EVIDENCE IN CRIMINAL INVESTIGATION IN NIGERIA AND SOUTH AFRICA

Y. FATOKI, D. ANYASI

Yewande Fatoki¹, Divine Anyasi²

^{1 2} Lead City University, Ibadan, Nigeria

¹ E-mail: fatoki.yewande@lcu.edu.ng

² E-mail: anyasi@gmail.com

Abstract: *Forensic evidence plays pivotal role in criminal investigation by offering scientific approach to uncovering and proving crimes. It contributes to the elucidation of complex cases and ensures the integrity of legal proceedings. The law recognises the importance of forensic evidence in prosecuting criminal cases, as its effective application enhances the accuracy and reliability of criminal investigations and resultant punishment imposed. This article critically analysis the role and influence of forensic evidence in criminal investigations in Nigeria and South Africa. Utilizing a qualitative, doctrinal approach, the study demonstrates the growing use of forensic evidence, assess the awareness levels among law enforcement agencies, and pinpoint the challenges and opportunities associated with its application. The ultimate purpose is to emphasize the importance of forensic evidence in improving the accuracy and reliability of criminal investigations and to suggest strategies for overcoming existing challenges to fully employ its potential within the criminal justice systems of both jurisdictions. The paper highlights the increasing utilisation of forensic evidence in crime detection and management, by underscoring its role as a valuable tool for investigators within the Police Force and other law enforcement agencies. Furthermore, the article evaluates the awareness level on the relevance of forensic evidence, it investigates the use of forensic evidence in criminal investigations, and identifies the challenges and opportunities in the utilisation of forensic evidence in both jurisdictions. While progress has been made, addressing existing challenges is crucial for maximising the potential of forensic evidence in the criminal justice systems of both countries. The findings collectively emphasises the pivotal role of forensic evidence in criminal investigations, urging continuous advancements and awareness campaigns to enhance its application in both jurisdictions.*

Keywords: *forensic evidence, investigators, criminal investigations, police force, Nigeria, South Africa*

1. INTRODUCTION

Forensic evidence in criminal investigations has evolved as a critical component of the legal landscape. Historically, the inception of forensic science traces back to the late 19th century when pioneers like Edmond Locard established the first crime laboratory in Lyon, France, providing a scientific foundation for criminal investigations (Weedn, 2017, p. 3-9). Over the years, forensic science has become integral to the identification, analysis, and

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interpretation of evidence, aiding law enforcement in solving crimes (Egenti, 2022). The recognition of the importance of forensic evidence in the legal system is evident in its widespread use across jurisdictions. It involves various scientific disciplines such as DNA analysis, fingerprinting, ballistics, and toxicology. The legal admissibility of forensic evidence is subject to rigorous standards, ensuring its reliability and validity in court proceedings. In contemporary criminal investigations, forensic evidence serves multiple purposes. It not only helps establish the guilt or innocence of a suspect but also contributes to the reconstruction of events, identification of perpetrators, and determination of the cause of death (Egenti, 2022).

The integration of technology and advancements in forensic techniques further enhances the precision and scope of forensic investigations. Understanding the historical development and multifaceted role of forensic evidence provides a solid foundation for exploring its legal implications in modern criminal justice systems. This paper evaluates the importance of forensic evidence in criminal investigations and also discusses the roles of forensic evidence.

A comparative analysis of forensic evidence in Nigeria and South is considered and the challenges involved are also examined. Necessary recommendations are made to enhance the use of forensic evidence in criminal investigations.

1.1. Practices and Procedures in the Collection of Forensic Evidence

In law, forensic science is invaluable in the pursuit of justice. This is because the proof of crimes is a very delicate transaction having at its center the innocence or guilt of an accused person. The law recognizes the importance of forensic evidence in prosecuting criminal cases. When scientific methods are rigorously used, without bias or prejudice, they can provide cogent evidence in uncovering and proving the crime (Atoyebi and Samaila, 2023). The vital role forensic evidence plays in the criminal justice system cannot be overstated. Forensic science offers insights by analyzing physical evidence and identifying culprits through personal markers such as fingerprints, footprints, blood drops, or hair. It establishes connections between criminals and crimes through objects left at or carried from the scene, linking them to the victim. Conversely, when recovered clues fail to connect the accused to the victim or the crime scene, it verifies the innocence of the accused.

Forensic evidence collection is a pivotal stage in criminal investigations, demanding meticulous practices and adherence to well-defined procedures. According to Sarki (2020), it necessitates adherence to legal protocols and ethical considerations which include obtaining evidence legally, ensuring privacy rights, and avoiding contamination. It is imperative to explore the intersection of legality and ethics in evidence acquisition. Preserving evidence is paramount to maintaining its integrity. Also, Lee and Pagliaro (2013, p.1-5) are of the view that proper storage conditions, preventing degradation, and safeguarding against contamination are critical aspects. Understanding advanced scientific methods for evidence preservation is essential. Different types of evidence demand specific collection methods. Whether biological, digital, or physical, the substrate upon which evidence is found dictates the techniques employed (Lee and Pagliaro, 2013, p.1-5). A thorough exploration of varied collection methods is crucial and comparing evidence collection practices across forensic events and jurisdictions are crucial and provides valuable insights. This includes evaluating the effectiveness of different methods and identifying best practices for optimal results.

2. EMERGING TRENDS AND INNOVATIONS IN FORENSIC SCIENCE

Forensic science is evolving rapidly and integrating cutting-edge technologies to enhance evidence collection, analysis, and crime resolution. Major emerging trends and innovations in forensic evidence include:

i. *Automation and Robotics*

Automated systems streamline evidence collection and analysis by improving efficiency and reducing human error. It seeks to accelerate processing time and enhance accuracy in forensic procedures. (Post, 2023)

Automation has been integrated into forensic DNA laboratories to establish DNA databases, drastically reducing the time required to process crime evidence samples. In digital forensics, automation combined with advanced analytical techniques for handling large datasets has proven highly effective. Automated forensic science enables the examination and comparison of extensive data sets, including fingerprints, handwriting, videos, images, and audio, with greater accuracy and speed (Bose, 2023). He further stated that intelligent automation agents, can compare, analyze, interpret, and correlate data collected during criminal investigations. Hence, this technology enhances resource efficiency in forensic labs by alleviating case backlogs and allowing investigators to address lower priority cases (Post, 2023). Automation facilitates parallel processing, enabling the simultaneous analysis of multiple evidence pieces. Once routine processes are swiftly completed by automation, examiners can focus directly on analyzing the processed data. While automation in forensic science does not replace the need for experts, it allows them to spend more time on data analysis and solving crimes. Also, according to Michelaet et al (2023), one requirement for the application of automation is the consistency of the input; it works well if the input has a defined structure.

ii. *Deoxyribonucleic Acid (DNA) Analysis*

Modern techniques have improve the analysis of fingerprints by utilizing advanced algorithms. Higher accuracy in matching prints aid in suspect identification and crime scene analysis. Siderska (2021) opined that the advancements in DNA analysis enable the prediction of physical traits from genetic information, aiding in suspect identification. This enhances the investigative process by providing additional characteristics for suspect profiling. This helps to identify individuals, solving cold cases, and preventing wrongful convictions. There is also the Next-Generation Sequencing (NGS) which improves comprehensive analysis of DNA samples, even from degraded or mixed sources. The Trace Evidence Chemistry an advanced technique used in analyzing trace evidence, including fibers and particles (Pollock, 2020). It gives an increased precision in linking suspects to crime scenes based on minute traces. Rapid DNA technology can generate DNA profiles within a few hours, facilitating the swift identification of suspects or victims. This is especially beneficial in urgent scenarios like mass disasters or when prompt identification is crucial for investigations (Roos et al, 2023). In addition, this technology allows for the collection and analysis of DNA from skin cells left on objects after they have been handled.

iii. *Machine Learning and Artificial Intelligence (AI):*

AI algorithms analyze vast datasets, aiding in pattern recognition, facial recognition, and behavior analysis. It assists in pattern recognition and aids evidence analysis. This gives room for a nuanced and rapid analysis of complex forensic data, leading to more informed

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investigative decisions. It accelerates data processing, facilitates the identification of patterns and trends (Aldoseri, Al-Khalifa and Hamouda. 2023).

iv. Cloud-Based Forensic Solutions:

This cloud platform facilitate secure storage, sharing, and collaborative analysis of forensic data. It leaves room for accessibility, data sharing among agencies, and collaborative investigations (Garnett, 2021). Preservation of Bone Proteins which is an innovative method to preserve proteins in bone samples, allowing for extended forensic analysis (Jenkins, 2017). This also improves the ability to extract valuable information from skeletal remains, aiding in cold case resolutions. High-resolution imaging techniques such as 3D scanning and photogrammetry enhance crime scene documentation and gives detailed visual records for accurate crime scene reconstruction (Barazetti et al, 2014).

There is also the digital forensics in cyber security which is used to expand digital forensics capabilities for the purpose of addressing cybercrimes, including data breaches and digital fraud (Alghamdi, 2021). These include Advanced data recovery has improved with enhanced software tools and techniques that enable the retrieval of deleted, encrypted, or damaged data from digital devices like mobile phones, computers, and cloud storage (Comp, 2023).

The benefit of this is that it will strengthen the capacity to investigate and prosecute cybercriminals.

There is a need to integrate smart technologies and Internet of Things (IoT) in forensic laboratories for enhanced connectivity and data management so as to improve the workflow efficiency, equipment monitoring, and overall laboratory management (Hutchinson et al, 2020).

v. Hair and nail analysis which allows forensic toxicologists to detect long-term exposure to drugs or poisons by providing a timeline of substance use or exposure, which is especially valuable in cases of chronic poisoning or drug abuse (Usman et al, 2019).

vi. With the use of 3D scanning and modelling technologies, crime scene investigators are able to reconstruct crime scenes in great detail and accuracy and this can be utilised in court to offer a visual depiction of the situation and facilitate a deeper comprehension of the spatial linkages (Raneri, 2024). According to Raneri, they also use sophisticated forensic light sources that may identify human fluids, fingerprints, and other invisible trace evidence. The light produce certain chemicals that glow at distinct wavelengths for the purpose of identification.

vii. *Biometrics:* With increased accuracy, facial recognition technologies are now often employed in identification, verification, and surveillance procedures. According to fraud.com, facial recognition devices are capable of comparing faces from pictures or videos to enormous databases of people who are known to exist. Through speech traits examination, voice recognition technology is utilised to identify suspects. When audio recordings of the suspect's voice are found, this can be especially helpful.

These emerging trends and innovations signify a paradigm shift in forensic science by equipping investigators with powerful tools to address the complexities of modern crime. General advancements in forensic science have enhanced the effectiveness of criminal investigations. These not only boost the accuracy and dependability of evidence but also enhance the speed and efficiency of solving crimes.

2.2. The Significance of Forensic Evidence in Criminal Investigations

Forensic evidence holds paramount significance within the legal context, serving as a cornerstone in criminal investigations and legal proceedings. According to Wullenweber and Giles (2021, p. 542-554), Forensic evidence significantly enhances criminal investigations by providing objective, scientific information. The utilization of forensic science contributes to effective crime detection and resolution. It offers a reconstructive approach, aiding in the understanding of crime scenes and events. They are also of the view that the impact of forensic science is evident in the conviction of criminals based on tangible, scientific proof. Forensic evidence being rooted in scientific methodology, lends credibility to legal proceedings. Its objective nature provides an unbiased means of corroborating or challenging testimonial accounts, fostering a more robust and reliable adjudication process. Also, in criminal investigations, forensic techniques such as DNA analysis and fingerprinting contribute to precise identification and linking of evidence to specific individuals or events (Bradbury and Feist, 2005). This precision aids law enforcement in building compelling cases and ensures a more accurate pursuit of justice. It also provides judges and juries with scientifically validated information, facilitating informed decision-making. Its inclusion in legal proceedings contributes to a more thorough and nuanced understanding of the facts, influencing the outcome of trials (Visser, 2021). Overtime, the integration of forensic evidence upholds the integrity of the criminal justice system. Its systematic and standardized application helps prevent miscarriages of justice by ensuring that verdicts are based on sound scientific principles and empirical data (Inyang and Goodwill, 53-65). The efficient use of forensic evidence expedites legal processes by providing swift and conclusive resolutions. This is particularly crucial in criminal cases where timely investigations and adjudications are imperative for maintaining public trust and confidence in the legal system.

3. THEORETICAL PRINCIPLES IN CRIMINAL JUSTICE FOR FORENSIC SCIENCE

Forensic science is a multidisciplinary field that integrates principles from various scientific disciplines to aid criminal justice. Hence, theoretical elements in forensic science incorporate the foundational concepts and frameworks that guide the collection, analysis, and interpretation of evidence. These include:

- i. *Locard's Exchange Principle*: Dr. Edmond Locard established this theory, stating that material is transferred between two objects anytime they come into contact (Thakar). Traces of evidence such as hair, skin cells, and fibres may be exchanged. The principle validates the idea that the perpetrator of a crime would almost always bring something into the crime scene and take something with them when they depart, this principle is essential to crime scene analysis. It validates the painstaking hunt for traces of evidence that can connect suspects to victims or crime scenes.
- ii. *Principles of Evidence*: This has to do with the forensic evidence's weight, relevancy, and admissibility in court. It covers the chain of custody, evidence preservation, and guaranteeing the accuracy and legitimacy of forensic techniques (Badiye et al, 2023). Maintaining the integrity and admissibility of evidence in court requires careful treatment and recordkeeping. The guidelines guarantee the validity and probative value of forensic evidence produced in court.

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iii. *Legal Frameworks and Ethics in Forensics*: These encompass the rules, laws, and ethical standards that govern forensic activities. It involves understanding individual rights, evidence admissibility, and the professional conduct required of practitioners. By adhering to legal and ethical guidelines it is ensured that forensic evidence is collected and presented in a manner that upholds the integrity of the legal system and respects individual rights (Sutherland, 2023. Pg.470). It also maintains public trust in legal system and prevents injustices.

The theoretical elements of forensic science are germane to its application in the criminal justice system. They establish the scientific groundwork and methodological precision essential for the accurate gathering, analysis, and interpretation of evidence. These principles support forensic scientists and legal professionals in ensuring justice is upheld through dependable and valid forensic methods.

4. FORENSIC EVIDENCE IN NIGERIA

In a country like Nigeria where criminal activities have been reported to be on the increase, and the government seems helpless in part due to the sophistication in terms of how such crimes are perpetrated, the need for modern approach of criminal investigation continue to beckon (Nwgbowaji, 2012). To ensure an evidential modern approach to solving crimes, a partnership between the law of science and the law of justice must maintain a powerful relationship. However, the judicial approach towards forensic evidence in Nigeria has largely been reported to be indifferent, and the present situation is in part due to the paucity of knowledge on forensics (Obafunwa, 2018).

Forensic evidence plays a pivotal role in the Nigerian legal system, yet the legal framework governing its use presents both strengths and challenges. There is no explicit definition given to forensic science in any legislature in Nigeria. Although the Evidence Act (2011) and Cyber Crimes Act (2015) and some other laws allows the evidence of an expert witness in relation to forensic evidence. However, this is not sufficient as a comprehensive legislation that specifically addresses the admissibility and criteria for forensic evidence is necessary, in criminal investigations trials (Alisigwe and Moses, 2019). There is a need to understand that the effect of legal processes on the evaluation of forensic evidence is crucial for ensuring fair trials and just decisions Osugba and Agbeyi, 2019 p.91-98). Hence, it is imperative that convictions and punishments especially for grave offences be applied with caution, thoughtfulness, and without undue delay, provided that there is unambiguous proof of the defendant's guilt.

Forensic evidence in Nigeria has not been placed in an exceptional epistemic space, and till present, no law has expressly provided for the application of forensic science in a criminal investigation (Alisigwe and Moses, 2019). However, in practice, the Nigerian courts are placed in a position to accept evidence relating to the use of scientific evidence, and the person empowered to present such evidence is regarded as an expert witness (Adegbite, 2014). Opinions of witnesses are generally considered inadmissible during court trials. This is contained in section 67 of the Evidence Act (EA 2011). However, there is an exception to the general rule provided for under section 68 of the Evidence Act (2011) which states *when the court has to form an opinion upon a point of foreign law, customary law, or custom, or of*

science or art or as to the identity of handwriting or finger impressions, the opinions upon that point of persons specially skilled in such foreign law, customary law, or custom or science or art or in questions as to the identity of handwriting or finger impressions are admissible. Such especially skilled persons are referred to as experts. In furtherance to the above, the court will customarily accept evidence of an expert witness except such evidence is contrary to common sense or perverse (Adegbite, 2014).

4.1. Admissibility of Forensic Evidence in Nigeria

Forensic evidence has become an integral part of judicial proceedings in Nigeria, offering scientific insights to aid in the resolution of criminal cases. However, the admissibility of such evidence is contingent upon several criteria, reflecting the need for reliability, relevance, and adherence to legal standards. Forensic evidence must be directly related to the issues at hand in a case to be considered admissible. The Nigerian legal system emphasizes the importance of relevance and materiality, ensuring that the evidence contributes meaningfully to establishing facts in the case (Sarki and Saat, 2020 p.21-34). Furthermore, because forensic evidence is often rooted in scientific methods, it has to meet standards of reliability and scientific validity. As a result, courts in Nigeria are cautious about admitting evidence that lacks scientific rigor, emphasizing the need for methodologies and techniques that are widely accepted within the scientific community.

It is of importance that the integrity of forensic evidence be maintained. Evidence are to be well protected and not tampered with during collection, analysis, and storage. This is necessary to ascertain the authenticity of the evidence presented. The role of expert witnesses regarding forensic evidence cannot be undermined as the credibility and competence of the expert witness plays a pivotal role in the admissibility determination (Inyang and Goodwill, 2020). Nigeria's legal system imposes specific standards for the admissibility of evidence and forensic evidence must comply with these legal standards, ensuring that its introduction aligns with procedural rules and regulations governing the presentation of evidence in court. While adherence to stringent criteria is essential, Nigerian courts retain a degree of discretion in evaluating the admissibility of forensic evidence. Judges weigh the probative value of the evidence against potential prejudicial effects, ensuring a fair and just trial. The admissibility of forensic evidence in Nigerian judicial proceedings is a multifaceted process that demands a careful balance between scientific validity, legal standards, and the overall pursuit of justice (Osugba and Ogbeyi, 2019). By upholding these criteria, the Nigerian legal system seeks to ensure that forensic evidence contributes meaningfully to the resolution of criminal cases while safeguarding the rights of the defendant.

4.2. Admissibility of Computer Generated Evidence in Nigeria

For a computer generated evidence to be admissible, it must be relevant to the fact in issue, it must be pleaded and it must be admissible in law (s.84, Evidence Act 2011). In the case of *Kubor & Anor v Dickson* (2016) the appellant without calling witness to lay proper foundations tendered in evidence print out of online Punch Newspapers and election result from INEC website, the Supreme Court dismissed the appeal on the basis that such evidence should have aligned with the provisions of sec 84 Of the Evidence Act (2011). Also, where the maker of the computer generated evidence is called as a witness, an oral evidence of a person familiar

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with the operation of the computer can be given of its reliability and functionality, albeit, such a person does not have to be a computer expert, and as a result, there is no need of electronic identification. However, where the witness who is called is not the maker of the computer generated evidence then letter of identification in line with Section 84 (2) of the Evidence Act (2011) becomes imperative (*Brila Energy ltd v FRN* (2018))

4.3. Admissibility of Fingerprint Evidence

To qualify as a fingerprint expert, the expert witness must have formal training and practical experience in reading, comparing, and photographing fingerprints. During the trial, they might need to provide photographic enlargements of developed latent fingerprints and comparison inked prints. Typically, at least 12 identical characteristic comparisons are necessary for admissibility, but partial fingerprints with fewer than 12 characteristics can still be considered admissible (Abiola, 2022).

4.4. Admissibility of Ballistic Evidence or Report

In Nigeria, ballistic report is admissible as expert evidence provided that such is relevant and the expert witness has laid proper foundation of his qualification, training and practical experience. The attitude of courts had been that where there are credible evidence to prove the fact that firearm was used, its make and functionality, then ballistic report is unnecessary (ss.68, 101, EA 2011). Forensic evidence can ultimately change the direction of a case, and often serves as pivotal in proving whether someone is guilty or innocent, or indeed, responsible, complicit, or liable. A case that highlights this contextual importance of forensic DNA analysis and science in general to Nigeria's criminal Justice system in the case of *Uchechi Orisa v. The State* (2018) where the Supreme Court discharged and acquitted the Appellant for failure to relate a bloodstain to the Appellant. It was the position of the Court that in this age of advanced technological know-how, a DNA analysis could have easily solved the question as to whether the bloodstain was from the appellant's body or not.

The Lagos State DNA and Forensic Center (LSDFC) laboratory, founded in 2017, was long regarded as the sole fully accredited and active Forensic DNA Laboratory in Nigeria. However, in 2021, the Adamawa DNA Forensic Laboratory was established in Yola state with a focus on Gender-Based Violence (GBV) investigations. This initiative is a collaboration between Modibbo Adama University, UNFPA Nigeria, and the EU-UN Spotlight Initiative and it aims to expedite justice for GBV survivors.

5. FORENSIC EVIDENCE IN SOUTH AFRICA

In South Africa, there is no unified law addressing the admissibility, collection, and analysis of forensic evidence. Instead, the legal landscape is shaped by a combination of general evidence laws and sector-specific regulations (South Africa Cybercrimes Act, 2021). The forensic science profession in South Africa currently operates without regulation, posing challenges to standardization and professional development. Unlike regulated environments in some countries, there is no national body overseeing the continuous advancement of forensic science practices (Olckers et al., 2013) In 1975, the *Federal Rule of Evidence* was enacted to guide criminal and civil litigations in Federal courts (Reports on Forensic Science, 2016). The

Rule 702 provides that *If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise.*

Forensic DNA evidence is considered the most esteemed benchmark in the realm of justice administration in South Africa. The primary law governing forensic procedures is the Criminal Law (Forensic Procedures) Amendment Act 37 of 2013 (THE DNA ACT, 2013). It aims to amend the Criminal Procedure Act (1977) and the South African Police Service Act (1995), to facilitate the collection of specific bodily samples for forensic DNA analysis, ensure rights protection during collection, regulate proof via affidavits, list offenses for mandatory DNA collection, establish the National Forensic DNA Database, determine retention and destruction rules, utilize DNA profiles in investigations and identification, safeguard children's profile rights, oversee the database, address complaints, repeal overlapping provisions, and provide for transitional provisions and related matters (DNA Act, 2013).

According to Giannelli (1980), the reliability of forensic evidence depends on three factors which are the validity of the underlying principle, the validity of the technique applying that principle and the proper application of the technique on a particular occasion. Once forensic evidence is established as reliable, the court may take judicial notice of the validity of the principles and techniques. In *S v Maqhina*, (2001) when a DNA evidence was brought before the court for consideration, it was held by the court that where an accused's guilt depends solely on the results of scientific analyses, it is of paramount importance that the testing process, including the control measures applied, be executed and recorded with such care that it can be verified at any time by an objective expert and the trial court.

In South Africa, there is the DNA Criminal Intelligence Database managed by the Forensic Science Laboratory's Biology Unit established by the South African Police Service. This database consists of two parts: a Reference Index holding DNA profiles of convicted individuals and suspects, and a Crime Index storing DNA profiles collected from crime scenes. The South African National Accreditation System (SANAS) also provides technical guidelines for forensic DNA testing laboratories. Forensic science, including the utilization of DNA evidence, plays a significant and continually expanding role in crime investigation and the effective conviction of perpetrators in South Africa. The significance of forensics in criminal investigations is of paramount importance, given the persistent requirement for a safe, peaceful, prosperous, and advanced society. The result of forensic investigation can make the difference between the acquittal and conviction in the court of law (Gowsia and Sheeba, 2018).

However, there are concerns about convictions based on a single piece of evidence in South Africa. Legal scholars emphasize the dangers of relying solely on individual elements without a robust legal framework guiding the evaluation and presentation of such evidence (Olaborode and Lirieka, 2020). However, DNA profiling, a powerful forensic tool, is explored within the legal context in South Africa. The biochemical nature of DNA and its application in criminal cases are examined, shedding light on the complexities involved in introducing advanced forensic technologies into legal proceedings (Prahlahd and Wyk, 2022). While South Africa recognizes the importance of forensic evidence in criminal proceedings, there is still a need for a dedicated legal framework to regulate its collection, admissibility, and presentation.

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The absence of comprehensive legislation and regulation for the forensic science profession poses challenges to standardization and professional development in both jurisdiction.

5.1. Admissibility of Forensic Evidence in South Africa

In South Africa, the cornerstone of admissibility is relevance. Hence, forensic evidence must directly relate to the issues at hand, ensuring its probative value in determining the facts of the case. This requirement aligns with the broader legal framework, emphasizing the necessity for evidence to contribute meaningfully to the resolution of disputes (Visser, 2021). Expert opinions, a common form of forensic evidence, are admitted if they assist the trier of fact in understanding complex matters beyond common knowledge. South African courts employ a liberal approach, allowing expert evidence when it aids in clarifying issues, thus broadening the admissibility scope (Olaborode and Lirieka, 2020). Judges are allowed to conduct their own inquiries into the reliability and relevance of scientific evidence (Visser, 2021). While this approach is not without challenges, it reflects a commitment to ensuring the admissibility of sound and trustworthy forensic evidence.

Apart from relevance, the probative value and reliability of forensic evidence are critical considerations. Courts must assess whether the evidence is trustworthy and whether its introduction serves the interests of justice. This evaluation prevents the admission of evidence that may unduly influence the trier of fact or mislead the court. In the South African context, the lack of an absolute requirement for reliability as a prerequisite for admissibility distinguishes it from some other legal systems (Edmond and Walt, 2014). This nuanced approach acknowledges that reliability concerns can be addressed through the weight assigned to the evidence during trial rather than through outright exclusion. The South African legal system exhibits flexibility in its admissibility criteria for forensic evidence. While adhering to fundamental principles, the courts recognize the evolving nature of forensic science and technology. This adaptability ensures that legal standards remain relevant in the face of advancements, promoting a dynamic and responsive legal framework (Chiwara, 2018).

The admissibility criteria for forensic evidence in judicial proceedings in South Africa reflect a delicate balance between ensuring relevance, probative value, and reliability while adapting to the evolving landscape of forensic science. The dynamic nature of the legal framework allows for the incorporation of advancements, ensuring that the pursuit of justice remains at the forefront. While challenges persist, the commitment to a fair and effective legal process underlines South Africa's dedication to upholding the integrity of forensic evidence in the pursuit of truth and justice.

6. CHALLENGES IN UTILISING FORENSIC EVIDENCE

Despite its advantages, the utilization of forensic evidence faces challenges. Admissibility criteria vary, in its impact in weight attached to matters during legal proceedings. The reliance on single pieces of evidence raises concerns about the dangers of convictions without considering the broader context (Olaborode and Lirieka, 2020). The further opined that reliability is a critical factor affecting the admissibility of forensic evidence. Hence, in South Africa, reliability is not a prerequisite, but it influences the weight given to the evidence. Evaluating the probative value of forensic evidence requires an understanding of its relevance

and impact on establishing facts in legal proceedings. Forensic evidence faces challenges in Nigeria due to the alarming rate of crimes and difficulties faced by law enforcement agencies in criminal investigations. Yet, there is a lack of awareness about the relevance of forensics in criminal investigations which contributes to the difficulties faced by investigators. Rapid advancements in technology pose challenges in keeping forensic methods up-to-date and ensuring compatibility with evolving digital landscapes (Ovie, 2017 p.25-38). Ensuring the reliability and validation of forensic disciplines is essential. Unreliable or invalid forensic practices can lead to miscarriages of justice. Also, limited financial resources and man power can hinder the implementation of comprehensive forensic techniques. Adequate training and state-of-the-art equipment are essential but often constrained as a result of lack of sufficient funds. The surge in digital evidence and cybercrime poses a formidable challenge, demanding continuous adaptation of forensic methodologies to address the intricacies of digital forensics (Egenti, 2022).

6.2. *Opportunities*

There is a need for interdisciplinary collaboration between forensic scientists, law enforcement, and technology experts presents an opportunity for holistic investigations. Leveraging diverse expertise enhances the effectiveness of forensic techniques. Continued technological advancements offer opportunities for more sophisticated forensic tools. DNA analysis, digital forensics, and advanced imaging techniques contribute to improved investigative capabilities (Maharaj, 2013). Increasing public awareness and education on forensic evidence's role in justice systems fosters trust. It also encourages individuals to cooperate with forensic investigations, thereby enhancing the pool of available evidence (Allen, 2023). Collaborative interdisciplinary research offers the chance to enhance forensic techniques. Integrating expertise from diverse fields, such as technology and law, can lead to innovative approaches in forensic investigations. Drone technology also presents a new opportunities in forensic investigations (Shappert, 2017).

7. CONCLUSIONS AND RECOMMENDATIONS

The critical analysis of forensic evidence utilization reveals its significant impact on criminal investigations. Challenges in admissibility and reliability show the need for ongoing research and standardized practices. The effectiveness of forensic evidence is context-dependent, emphasising the importance of tailoring its use to the specifics of each case. As forensic science continues to evolve, its integration into legal proceedings demands a careful balance between innovation and adherence to established principles. The importance of forensic evidence in the legal context lies in its ability to introduce objectivity, precision, and credibility into the intricate dynamics of criminal investigations and legal proceedings. There is a future prospects for the evolution of forensic evidence in criminal investigations. In Nigeria, legal recognition of the importance of forensic evidence in criminal investigations is evident. Future prospects involve continued legal reforms to enhance the admissibility and utilization of forensic evidence.

The ongoing Nigeria Police Reform places importance on forensic evidence in crime prevention and control. Thus, the integration of forensic techniques is a prospect for more effective criminal investigations. Ethical standards and considerations should also be adhered

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to in forensic evidence in order to ensure justice and maintain the integrity of the judicial system. Forensic professionals must maintain honesty, impartiality, and objectivity throughout the investigative process. There should be a complete and transparent reporting of methods, findings, and potential limitations if any should be reported. The privacy of individuals involved should be respected by confidentially protecting sensitive information. Furthermore, forensic experts should remain impartial, avoiding any bias that may compromise the objectivity of their findings. When necessary, informed consent should be gotten from individuals involved in forensic investigations. It is essential to comply with the legal standards governing the use of forensic evidence.

Based on the finding above, it is recommended that both Nigeria and South Africa require comprehensive training programs to enhance the skills of forensic investigators. This includes updating knowledge on advanced forensic techniques and technologies. Forensic investigation practices need a significant boost in technological integration. Emphasizing the use of modern tools, such as DNA analysis and digital forensics, can enhance the accuracy and efficiency of investigations.

Strengthening the legal framework surrounding forensic evidence is crucial. Ensuring proper admissibility of forensic findings in court and addressing legal challenges will contribute to more effective criminal justice outcomes. Investments in research and development are essential to keep pace with evolving forensic methodologies.

Establishing research institutions dedicated to forensic science can drive innovation in investigation practices. Collaboration between forensic institutions, law enforcement agencies, and international forensic communities is vital. Standardizing protocols and sharing best practices can contribute to consistency and credibility in forensic investigations. Increasing public awareness about the role and significance of forensic evidence is crucial. Educating the public on the importance of preserving crime scenes and cooperating with forensic investigators can improve the overall investigative process.

Legislative reforms in Nigeria should focus on strengthening the admissibility of forensic evidence in court proceedings. Clear guidelines and standards for the use of forensic evidence in criminal investigations are essential. Specific legislation should emphasize the scientific rigor required in the collection, analysis, and presentation of forensic evidence. This ensures the reliability and credibility of forensic findings. Legislation needs to keep pace with technological advancements. Implementing laws that address the admissibility of digital evidence and emerging forensic technologies is crucial for comprehensive legislative reforms. Ensuring procedural safeguards in the legislative framework is imperative. Legislation should guide the proper handling and preservation of forensic evidence to prevent contamination or mishandling. Legislative reforms in both countries should align with international standards and define the admissibility criteria for forensic evidence. Clarification on the legal status of various forensic techniques is essential. Legislation should address concerns related to data protection and privacy in the context of forensic evidence. Striking a balance between investigative needs and individual rights is crucial for effective legislative reforms.

Both Nigeria and South Africa are expected to witness technological advancements in forensic science, including DNA analysis and digital forensics. The evolution of technology will play a crucial role in enhancing the precision and scope of forensic evidence. Collaboration

between Nigeria, South Africa, and international forensic communities is a prospective avenue. Shared expertise and resources can contribute to the evolution of forensic evidence practices.

For South Africa, caution should be placed on relying on single evidence to avoid the dangers of convictions based on a single piece of forensic evidence while Nigerian courts should adopt a cautionary approach, recognizing the potential pitfalls of relying solely on individual pieces of forensic evidence.

Both countries should endeavor to establish regulations and standards to guide forensic practices, ensuring consistency and reliability. The storage of forensic evidence is crucial for maintaining its integrity. Adequate storage contributes to the reliability of findings. Hence, the two countries should prioritize proper storage facilities to preserve the integrity of collected evidence.

Research on the impact of medical evidence in South African rape cases highlights the influence of forensic findings on the criminal justice system. Nigeria should therefore prioritize the incorporation of forensic findings, particularly in cases of sexual assault.

The judiciary in both countries should always carefully consider expert evidence, recognizing its importance in forensic matters and ensuring a balanced approach to its presentation and acceptance. As technology progresses, forensic science is anticipated to advance as well to offer more powerful tools for law enforcement and the criminal justice system.

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