

Forensic Evidence in the Criminal Justice System: A Critical Analysis of Judicial Decisions

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Abstract

As an essential part of the current criminal justice system, forensic evidence has been a jack of precision and objectivity to investigations and judicial rulings. It critically discusses the applicability of forensic evidence in particular reference to what the courts have ruled, and more specifically on the subject of admissibility, reliability and inferences of evidence. It discusses some of these forensic methods including; DNA profiling, fingerprint analysis, digital forensics and toxicology together with how they are applied in practice. Another aspect that the research examines is approaches of the judiciary, both acceptance and scepticism in the case law. Although the judiciary is becoming more and more dependent on scientific evidence, issues like procedural failures, inadequate facilities and ethical issues still plague its efficacy. The paper highlights the importance of standardisation, capacity building and enhanced coordination between the legal and scientific realms. It concludes by arguing that the optimal way of delivering fair and accurate justice is through a moderate approach of combining forensic science and legal concepts.

Keywords: Forensic Evidence, Criminal Justice System, Judicial Decisions, Admissibility, DNA Profiling, Digital Forensics

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1. Introduction

The concept of forensic evidence has become one of the key elements of the modern criminal justice system, which offers a scientific basis of the investigation and judgment. It increases objectiveness and precision of legal processes, as it provides credible information based on such areas of discipline like biology, chemistry, and computer science. Compared to traditional evidence, that tends to have more subjective aspects (such as eyewitness) to it, forensic techniques are more based on scientific analysis that is verifiable and measurable. DNA profiling, fingerprint identification and digital forensics are techniques that have greatly enhanced capacity of proving the facts and linking the suspects with criminal activities. The increased use of forensic science is associated with a more general move towards evidence-based justice in which decisions of the court are increasingly based on empirical and objective evidence. This has led to increased acceptance of scientific evidence in courts because it can help minimize the

amount of uncertainty and enhance fairness in the results. Not just helping to avert convictions but also saving important lives by exonerating innocent people, forensic evidence helps to bolster the justice system. Nevertheless, there are challenges associated with the use of forensic evidence. It is still experiencing concerns related to its reliability, interpretation, compliance with procedural methods, and ethical issues. Any mistake in gathering or storage of evidence or in examination of the evidence may destroy the integrity and draw erroneous findings. Also, the sophistication of scientific evidence could create challenges to legal professionals to interpret and assess it. Consequently, critical analysis of forensic evidence especially by judicial ruling is needed to comprehend its efficiency and constraints, and its general influence on the delivery of justice.

2. Literature Review

Forensic evidence in the criminal justice system is a subject that has been greatly debated in the literature and especially on its reliability, admissibility and effects on

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the decision-making by the courts. Experts in the legal and scientific fields have stressed the growing value of forensic science in enhancing the accuracy of criminal investigations and trials. Through increased technology, forensic evidence systems, including DNA profiling, digital forensics, and toxicological analysis, have been of pride of place in establishing the facts of a criminal. Some of the researches point towards the fact that forensic evidence serves as a strong boost to the case of prosecution as it is objective and scientific. Studies show that DNA evidence has revolutionised the criminal justice system by allowing a perfect identification of suspects, as well as leading to a conviction. According to the scholars, forensic science makes evidence more acceptable and decreases the reliance on eyewitness testimony, which is generally declared to be unreliable (Razzaq et.al., 2025).¹

Nevertheless, scholarly literature also indicates that the forensic evidence is not always reliable. It has been raised that there are inaccuracies in some of the methods used in forensics, namely, where they are not conducted using the correct procedures. Research has revealed that sometimes wrongful collection, preservation or testing of evidence may result in false findings. Fraudulence of forensic evidence may happen due to sample contamination or the absence of standard procedures, for example. Consequently, scientists emphasise the need to observe rigorous scientific standards and quality control in forensic operations. One of the aspects of literature that has been extensively discussed is the reliability and admissibility of forensic evidence. Although the theory of scientific methods might be reliable, they should not be admitted in courts based on a legal standard. According to legal scholars, courts should make a careful decision on whether the forensic evidence can be relevant, reliable and expert as required. In most circumstances, the judges will extensively depend on expert testimony, and this can cause a problem of confusion in the event that the expertise is not properly

confirmed or when there are conflicting views (Bell and Suzanne, 2025).²

It is also covered in the literature how the judiciary interprets forensic evidence. Other reports indicate that judges tend to be inadequate in scientific knowledge, and this may impinge on their capacity to be critical towards technical evidence. It has been indicated that this mismatch between the scientific knowledge and the law interpretation is a major problem. As one of the recommendations, researchers suggest that judges and legal professionals should also be trained to improve their knowledge of forensic science and be able to make more informed decisions. The second major area of debate is the debate on variations in judicial treatment of forensic evidence. Though the introduction of scientific evidence in courts is considered to be readily accepted by some courts, others may be cautious, especially in waters where the evidence is not accompanied by high procedures. Comparative analysis has shown that most developed nations have well-organised systems to examine the forensic evidence, and developing nations have to deal with poor infrastructure, a lack of professionals, and a prolonged time in reporting on forensic tests (Saddique et. al., 2025).³

The literature has also touched on ethical issues and any possible mishandling of forensic evidence. According to the scholars, excessive dependence on forensic evidence without adequate questioning may result in a miscarriage of justice. The examples of manufactured or misread evidence indicate that the field of forensics needs to be more transparent and accountable. In addition, the potential involvement of investigative agencies in the cause of forensic reports casts doubts on the aspects of being objective and fair. In spite of the fact that the field of forensic science and its use in criminal justice is extensively studied, the literature on the particular role of judicial decisions in developing the relevance of forensic evidence has a significant gap. Although several researchers concentrate on the scientific or procedural perspective, there is a gap in outcomes because of

¹ Razzaq, Abdul, Tansif Ur Rehman, and Aliya Saeed. "The Role of Forensic Evidence in Criminal Trials." *The Critical Review of Social Sciences Studies* 3.3 (2025): 3103-3111.

<https://thecrssl.com/index.php/Journal/article/view/1005>

² Bell, Suzanne. *Forensic science: an introduction to scientific and investigative techniques*. CRC press, 2025. <https://api.taylorfrancis.com/content/books/mono/download>

<https://doi.org/10.4324/9781003407003&type=googlepdf>

³ Saddique, Amir Aleem, et al. "The Role of DNA as Forensic Evidence in Criminal Justice System. A Legal Analysis From Pakistan Perspectives." *Research Journal for Social Affairs* 3.3 (2025): 195-209. <https://rjsaonline.com/journals/index.php/rjsa/article/view/212>

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minimal consideration of the ways in which courts read, measure, and put forensic evidence into practice. There are also no in-depth reviews of case laws which show acceptance and rejection of forensic evidence (Wakili et al., 2025).⁴

Second, the relationship between science and law is usually not discussed dynamically in previous studies. Since forensic technologies keep on advancing, the law must do the same to ensure the sufficient use of such technology. The literature indicates that legal systems tend to be relatively slow to keep abreast of scientific changes, and therefore, there has been a disconnect between technology and its legal implementation. Thus, the proposed research will fill these gaps by critically evaluating court rulings and investigating the effect of courts on the applicability and usefulness of forensic evidence. The research will also aim at achieving a comprehensive understanding of how forensic science interacts with the criminal justice system through the provision of case law and judicial reasoning.

2.1 Conceptual Foundations

Meaning of forensic evidence

Forensic evidence, also known as scientific evidence, is scientific data and analysis that is utilised in legal contexts to prove facts and help in the process of administering justice. The word forensic means, in Latin, the Latin term forensic, which means, of the forum, and relates to its usage in courts of law. Forensic evidence refers to a broad scope of scientific practices, methods used to solve crimes, pinpoint those who committed the crime and aid in making decisions prepared for the judiciary. Forensic evidence has become an important instrument in the contemporary criminal justice system as it leads to accuracy and objectivity. In contrast to the conventional types of evidence and testimonies like eyewitnesses or confessions, which can be affected either by a human mistake or prejudice, the forensic evidence is based on scientific principles and factual evidence. This

scientific basis allows for increasing the credibility and reliability of evidence in court (Grundmann and Thomas, 2026).⁵

Forensic evidence may be in different forms, such as biological, chemical, physical and digital evidence. Examples of biological evidence are DNA sampling, blood, hair and body fluids which are analysable to determine people with a high level of certainty. Implications can be in the form of physical evidence, in the form of fingerprints, weapons or scrapings. One of the rapidly growing types is digital evidence, which entails retrieved information in the form of computers, mobile devices and others. Forensic evidence is important as it is used to determine a factual connection between the offence, the victim and the suspect. A case in point is the DNA profiling that can decisively implicate a suspect in a crime scene, whereas the use of fingerprinting can identify individuals using the distinctive pattern. These methods give objective evidence that can support claims presented in a trial or dismiss these claims (Budowle et. al., 2025).⁶

The first concept of forensic evidence, however, does not just cover the scientific results only when referring to forensics but extends to the procedures involved in gathering evidence, preserving evidence, examining evidence and presenting evidence. To ensure the integrity and admissibility of forensic evidence in a court of law, proper handling of forensic evidence is imperative. Any failure to undertake these steps, including contamination and incorrect storage, may compromise the reliability of such evidence and undermine its evidentiary quality. The other significant consideration of the forensic evidence is that it is interdisciplinary in nature. It is based on several scientific disciplines such as biology, chemistry, physics and computer science. This multifaceted nature of approach is able to offer holistic analysis as well as improve the overall quality of forensic investigations. Concurrently, it involves specialised knowledge and

⁴ Wakili, Saminu Abacha, et al. "Legal framework and challenges concerning forensic evidence in Nigeria." *Trunojoyo Law Review* 7.1 (2025): 33-64. <https://journal.trunojoyo.ac.id/trunojoyo-law-review/article/view/28599>

⁵ Grundmann, Thomas. *Expert authority and the limits of critical thinking*. Oxford University Press, 2026. <https://books.google.com/books?hl=en&lr=&id=G-LKEQAAQBAJ&oi=fnd&pg=PA1988&dq=Modern+Scientific+Evidence:+The+Law+and+Science+of+Expert>

[+Testimony&ots=y9aj0dPuAn&sig=EJ6CbbyMLujwarEyUJUPFWHainA](#)

⁶ Budowle, Bruce, Kristen Mittelman, and David Mittelman. "Genomics will forever reshape forensic science and criminal justice." *Genome Biology* 26.1 (2025): 296. <https://link.springer.com/article/10.1186/s13059-025-03798-x>

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expertise, which have to be conveyed effectively to the legal practitioners and judges.

Although this evidence in the case of a crime has merits, it is not devoid of constraints. Scientific procedures are prone to inaccuracy, and their accuracy would depend on their adequate application and use. Also, there is the growing abstraction of forensic technologies, which makes them difficult to access and comprehend by the legal system. Judges and attorneys might not have the scientific expertise needed to critically analyse forensic evidence, and can thus misinterpret it. Summing up, forensic evidence is an important area of convergence between law and science; it offers objective, trustworthy facts in the search for justice. The increased significance in the criminal justice system is evidenced by the necessity to have solid legal frameworks, procedures, and the ongoing cooperation of scientific specialists and the legal community (Bakhtiar et. al., 2025).⁷

Types of evidence

Evidence in the context of criminal justice simply reflects any material or information when it comes before a court to either prove or disprove a given fact of concern. There is a general classification of the evidence that should be presented in a process of adjudication, and each piece of piece of evidence falls under different categories. These types are important to understand in determining how forensic evidence is important in the greater evidentiary context. Direct and circumstantial evidence is considered to be one of the most important types of evidence. Direct evidence is the evidence that can demonstrate a fact without an inference. As an example, first-hand testimony of a crime, or a confession on the part of the criminal, is direct evidence. Circumstantial evidence, on the other hand, needs logical reasoning to create a linkage of the facts to the conclusion. Forensic evidence more

usually belongs to this category, as it frequently implies the inferences made on scientific consideration.

This will involve such physical things that are brought up in court, including weapons, clothing or fingerprints. Physical evidence frequently intersects with forensic evidence because it deals with how to analyse such materials scientifically to obtain pertinent information. Physical evidence is valuable in that it is objective in nature since it is less prone to manipulation than testimonial evidence. The other important category is the documentary evidence, which includes written or recorded materials, including contracts, reports and electronic records. The documentary evidence has been transformed by the use of digital evidence, which has become a part of the documentary evidence with the advancement of technology. The use of emails, text messages and the information collected in electronic devices is most often used in investigations related to crimes. Digital forensics is very important in examining and validating such evidence (Noor et. al., 2025).⁸

The testimony about witnesses who were sworn in is known as testimonial evidence. This is both lay and expert witnesses. Although testimonial evidence serves a crucial role in giving a context and explanation, it can be affected by issues like lapses in memory, prejudices, or someone pressuring it. Forensic evidence, on the other hand, does have a more objective foundation for determining the facts. Expert evidence is specialised testimonial evidence, given by people having expertise in a certain field. With forensic evidence, scientists can understand the results of science and can show them in a way that can be comprehended by the court. This is an indication of how evidence of other kinds is interrelated in crimes (Worasuwannarak et.al., 2025).⁹

⁷ Bakhtiar, Handar Subhandi, et al. "The utilisation of scientific crime investigation methods and forensic evidence in the criminal investigation process in Indonesia." *Egyptian Journal of Forensic Sciences* 15.1 (2025): 39. <https://link.springer.com/article/10.1186/s41935-025-00456-y>

⁸ Noor, Saima, Areeba Azeem, and Warda Maqsood. "Enhancing Forensic Evidence Management in Pakistan's Criminal Justice System: A Criminological Analysis." *Journal of Political Stability Archive* 3.4 (2025): 438-453. <https://www.journalpsa.com.pk/index.php/JPSA/article/view/344>

⁹ Worasuwannarak, Wisarn, et al. "A DNA Biometric Implementation Model to Promote Thailand's Criminal Justice System." *Science & Technology Asia* (2025): 241-255. <https://ph02.tci-thaijo.org/index.php/SciTechAsia/article/view/255916>

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Type of Forensic Evidence	Description	Common Applications	Evidentiary Value
DNA Evidence	Analysis of genetic material	Homicide, sexual offences, identification	Highly reliable, individual identification
Fingerprint Evidence	Ridge patterns on fingers	Theft, burglary, violent crimes	Unique and permanent identification
Ballistics Evidence	Study of firearms and ammunition	Gun-related crimes	Links weapon to crime
Digital Evidence	Data from electronic devices	Cybercrime, fraud, communication tracing	Reconstructs digital activities
Toxicological Evidence	Detection of drugs/poisons	Poisoning, overdose, DUI cases	Establishes cause of harm/death
Trace Evidence	Hair, fibre, glass, soil	Linking suspect to scene	Associative, circumstantial
Document Evidence	Handwriting, signatures, digital docs	Fraud, forgery cases	Establishes authenticity

Table 1: Types of Forensic Evidence and Their Applications

Further evidence may be either primary or secondary. Primary evidence is that which is original and documents or objects; secondary evidence is that which is a copy or a representation of the original. Primary evidence is more reliable and, therefore, as a matter of preference, courts have admitted the secondary evidence under specific

circumstances. Incident of evidence is also classified as either an incident of exculpatory evidence or an evidential incident. Inculpatory evidence helps the prosecution to prove the guilt of the accused, whereas exculpatory evidence helps the defence to prove innocence. Forensic evidence has the ability to support both with regard to findings and interpretation. To conclude, the different kinds of evidence all play a role towards the fact-finding process during criminal trials. The field of forensic evidence takes a special place in this scheme as it is both scientific and objective. Nevertheless, it has to be weighed against other types of evidence to make sure that a fully-fledged and all-encompassing assessment of the case is made (Fatoki et al., 2025).¹⁰

Role of expert opinion

The subjective test of forensic evidence is very sensitive and requires the input of experts in how that evidence is applied and interpreted in the criminal justice system. Considering the technical and scientific nature of forensic analysis, courts make use of experts to be in a position to justify complexities in ways that help them to understand the relevance of such complexities towards the case. Experienced testimony fills the gap between the knowledge of science and the reasoning of law. The expert is usually an individual who holds specialised know-how, skill or experience in a given field. Within the concept of the forensic evidence, specialists can be forensic scientists, medical professionals, digital analysts or ballistics skills experts. They are mainly used to analyse evidence through the use of scientific methods and explain their conclusions effectively and in an easy-to-understand manner. The admissibility of expert opinion is mostly controlled by law, which acknowledges that, in some instances, there must be specialised knowledge. Expert testimony in a court is permitted when a layperson cannot comprehend the topic, and there is a need to gather more information on the matter. The expert opinion is deemed to be relevant in cases where it aids the court in creating an opinion on matters that need technical knowledge.

Expert opinion interpretation is one of the major functions of the experts. An example is when a DNA

¹⁰ Fatoki, Yewande, and Divine Anyasi. "A Legal Prognosis of the Significance of Forensic Evidence in Criminal Investigation in Nigeria and South Africa." *AGORA Int'l J. Jurid. Sci.* 19 (2025): 19.

https://heinonline.org/hol-cgi-bin/get_pdf.cgi?handle=hein.journals/agoraijs2025§ion=6

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expert could provide evidence as to why a sample would match a suspect, and a forensic pathologist may prove the manner and time of death. The judges and lawyers would be unlikely to understand the raw data produced by the forensic analysis without such professional interpretation. The opinion of experts is also important in establishing the credibility of forensic evidence. The scientific results can very well rely on the qualification, experience and methodology of the professional concerned. These factors are evaluated by the courts to decide on the relevance of the expert's evidence to be accorded. In others, there might be conflicting expertise issues/opinions, and this implies that the court must consider their merits relative to each other (Refolo et al., 2025).¹¹

Nevertheless, there are no difficulties with the employment of expert opinion. One of the issues is possible prejudice or non-objectivity. When experts are approached by those engaging them, chances are that they may be influenced to such an extent that their testimony may not be objective. Also, varying interpretations or approaches may lead to different findings, and this leads to confusion in the court. The other problem is that there is a lack of scientific knowledge among lawyers. This can pose a challenge to judges and lawyers critically weighing expert testimony because, in some cases of complex or novel forensic methods, experts can be hard to assess. It underlines the necessity of specialised training and using more liaison between the legal and scientific communities. The courts have also highlighted that the expert opinion is not binding but only an advisory opinion. Although it is an important help, the rest is in the hands of the judge who has to judge all the evidence altogether. This allows the expert testimony not to be dominant over other pertinent considerations in the case (Houser et al., 2025).¹²

Moreover, expert opinion needs to be credible, which can be achieved by following the prescribed scientific

standards and procedures. Professionals have to adhere to strict procedures, be transparent and provide adequate records of their findings. Any of these standards violated may compromise the veracity of their testimony. Finally, the opinion of experts is an inseparable element of the criminal justice system; the absence of which makes it impossible to employ forensic evidence. It allows the interpretation of multidimensional scientific data and aids in making judgments in court. Nevertheless, to guarantee justice, it is also crucial to have the reliability, impartiality, and proper assessment of expert testimony.

2.2 Theoretical Perspectives

There are different theoretical orientations which seek to bring about a balance between law and science, which shape the usage of forensic evidence in the criminal justice system. Such views play a crucial role in the perception of how courts interpret scientific evidence and incorporate it in the judicial ruling. This discourse is affected by three main dimensions: the metaparadigm of legal and scientific normativity, the place of theories of evidentiary, and the law-science interface (in general). A key problem is that between legal standards and scientific standards, there is a difference. The scientific knowledge derives its basis on empirical observations, experiments and approximations through probabilities, which may be in terms of margin of error. However, the legal framework takes a more objective approach where certain standards of evidence are adhered to, e.g. beyond a reasonable doubt in a criminal case. This distortion can bring challenges; the scientific evidence could be that there is a great likelihood, and not necessarily certainty. However, it is necessary to apply a scientific finding to a legal framework, which can cause problems and may result in the misunderstanding of a statistical finding or excessively relying on the forensic evidence, a phenomenon sometimes called the "CSI effect (Rivera et.al., 2025).¹³

¹¹ Refolo, Pietro, et al. "Ethical issues in the use of genetic predictions of aggressive behavior in the criminal justice system: a systematic review." *Frontiers in Genetics* 16 (2025): 1599750. <https://www.frontiersin.org/journals/genetics/articles/10.3389/fgene.2025.1599750/full>

¹² Houser, Janet, and Kenneth Oja. *Nursing research: Reading, using, and creating evidence*. Jones & Bartlett Learning, 2025. <https://books.google.com/books?hl=en&lr=&id=g7AxE>

[QAAQBAJ&oi=fnd&pg=PP1&dq=Expert+Evidence&ots=bIvhtNgfmt&sig=C_TgXjbr-ChqYPfcGsmF2hy4sBU](https://www.frontiersin.org/journals/genetics/articles/10.3389/fgene.2025.1599750/full)

¹³ Rivera, Juan. "Limitations of Forensic Evidence in Criminal Proceedings in Ibero-American Countries." *Revista Electrónica de Ciencia Penal y Criminología* 27.1 (2025). <https://revistacriminologia.com/manuscript/index.php/REPC/article/view/115>

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The purpose of forensic evidence is also influenced by the nature of the evidence, based on the applied theories. The relevance theory presupposes that the evidence has to have a logical relationship with the facts in issue, which is why forensic evidence is valuable because of its objectivity. Relevance, however, is not enough, and this is where reliability is crucial. The theory of Reliability focuses on the correctness of the technique, the way evidence is handled and on the expertise of the professionals. The role of the courts is to limit what methods are admitted to courts, and only those that are scientifically valid and used properly should be admitted. The probative value versus prejudicial effect theory also demands courts to strike a balance between the utility of the evidence provided and the danger of deceiving or unfairly affecting the decision-makers. The law-science interface brings to the fore both the co-operation and the conflict between the two disciplines. DNA profiling and digital forensics are just some of the aspects of science that have greatly enhanced the realms of the law system to reveal the truth and serve justice. There is, however, a tendency for law to be conservative and precedent-based, but science is dynamic. This discrepancy may slow down the implementation of the new methodologies and introduce discrepancies in their use. Moreover, scientific evidence can be quite complicated, which can impede the communication between specialists and lawyers. The other aspect that is important is the dependence on expert witnesses. Although the forensic experts have a pivotal role to play in interpreting the forensic evidence, their views should also be faced with criticism to guarantee objectivity and reliability. The courts need to balance between admission and rejection of knowledge by the expert and independent judgment (Uade et.al., 2025).¹⁴

3. Research Objectives

- To critically discuss the role and importance of forensic evidence in the criminal justice system.

- To investigate the effects brought about by court rulings on the admissibility and reliability of forensic evidence.
- To assess landmark case laws in the foreground of the application and restriction of forensic evidence.
- To establish the most prominent issues and recommend a solution on how to use forensic evidence in courts effectively.

4. Research Questions

- What role does forensic evidence play in ensuring justice in criminal cases is accurate?
- What is the strategy used by the courts in consideration of the admissibility and reliability of forensic evidence?
- What are some of the critical constraints and issues known in practice about forensic evidence?
- What are the impacts of the judicial decisions on the application and interpretation of the forensic evidence in criminal cases?

5. Research Design

This research project has a systematic and structured research design where the critical analysis of the role of forensic evidence in the criminal justice system and its focus specifically on judicial decisions is adopted. The research design is developed to be concise, relevant and scholarly to warrant complete comprehension of the application and perception of forensic evidence in courts of law. It is a part of the four elements methodology, data source, analytical methodology and study limitations (Lunavath, 2026).¹⁵

Methodology

The study has a doctrinal and qualitative approach. The library-based research or doctrinal research is research which deals with studying and analysing legal principles, statutes and decisions made by the courts. The method is especially applicable in the current study because it aims at analysing the laws that regulate forensic evidence and how the courts receive and utilise forensic evidence in

¹⁴ Uade, Gideon. "Understanding the Place of Forensic Evidence in Criminal Law and its Litigation: Bridging the Gap Between Sciences and Law." (2025). https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5640510

¹⁵ Lunavath, Ramesh. "CHILD ABUSE AND THE CRIMINAL JUSTICE SYSTEM IN INDIA: LEGAL CHALLENGES AND REFORMS." *JOURNAL OF ADVANCE AND FUTURE RESEARCH* 4.2 (2026): 322-329. <https://rjwave.org/jaaf/viewpaperforall.php?paper=JAAFR2602501>

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criminal cases. Because of the qualitative nature of the research, the avenue of exploring judicial reasoning and circumstantial facts that can affect the application of the forensic evidence can be explored in depth. Qualitative research does not require the use of numerical data as was done in quantitative studies, but rather focuses on interpretation, analysis and critical evaluation. This is critical in learning the intricacies of forensic evidence, which mostly deals with technical, legal and procedural issues. A descriptive and an analytical approach complement the doctrinal approach. The descriptive part will entail the explanation of the important concepts on forensic evidence, evidence types, and expert opinion, whereas the analytical part will entail the appraisal of the judicial decision, trends, inconsistencies, and one of the emerging trends. The mixture of both financial statements assures that the study not only provides information but also critically analyses the information (McCarter et.al., 2025).¹⁶

Sources of Data

The study will also use both primary and secondary sources so as to have a balanced analysis of the study. The core of the study is the primary sources that comprise statutes, case laws and other legal provisions in the field of forensic evidence. The judgements of courts become one of the focal points, where the study will investigate how the courts assess and read forensic evidence. Important legislative frameworks to claim admissibility and application of expert evidence are also given to appreciate the legal aspect within which the forensic evidence takes action. Secondary sources allow for enriching the analysis of primary materials and also shed more light. These comprise academic journals, books, research articles and reports on forensic science and criminal law. The body of literature assists in the comprehension of the theoretical views, research gaps and situates judicial practice in the broader academic debate. The reports in forensic institutions and legal agencies are also factored in, in an attempt to have hands-on information concerning how forensic systems operate. By utilising primary and secondary sources, triangulation

has been achieved, and this adds credibility and reliability to the research. Adding scholarly commentary to the texts of law, the student attains a balanced view of the topic.

Analytical Approach

The analysis technique used in the research study is mostly qualitative and interpretative. It entails a critical review of court cases to learn about the evaluation and utilisation of forensic evidence in criminal cases. It is analysed most in formulating major themes, trends and patterns in judicial reasoning. Case law analysis is one of the significant aspects of the method of analysis. Several landmark cases in point are analysed to assess how forensic evidence has been used to affect court verdicts. The paper takes into consideration instances of cases where the forensic evidence was admitted, as well as cases where the evidence has been rejected or doubted. Such a comparative study assists in determining the influences on the use of forensic evidence by courts (Goswami et.al., 2025).¹⁷

Thematic evaluation is another aspect of evaluation used in the analysis. The research classifies the problems associated with forensic evidence into groups like reliability, admissibility, expert opinion, and procedure protection. The study of all these issues in various cases shows that there are some general problems and new directions of judicial practice. The paper is also comparative in the sense that where some differences are needed the paper takes on the comparative approach of understanding how the varying jurisdictions treat forensic evidence differently. This assists in formulating the best practices and ways through which the law system being studied could be enhanced. One of the components of the approach is a critical analysis. Instead of just explaining judicial rulings, the research determines their consequences, and whether they are in line with the ideals of fairness, accuracy and justice. This includes an inspection of the arguments of the courts; the value attached to forensic evidence and how far the scientific

¹⁶ McCarter, Susan, Gilbert Singletary, and Destiny Reyes. "Abolish or reform criminal justice in the United States? A forensic social work perspective." *Journal of Forensic Social Work* 9.1 (2025): 4-21. <https://journals.shareok.org/jofsw/ojs/jofsw/article/view/167>

¹⁷ Goswami, Parineeta, and Gurmanpreet Kaur. "FORENSIC EVIDENCE IN INDIA: A CRITICAL ANALYSIS OF LEGAL AND PROCEDURAL ISSUES." Available at SSRN 5226380 (2025). https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5226380

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standards can be taken into consideration (Moore et. al., 2025).¹⁸

Limitations of the Study

Although the study is comprehensive there are some limitations to it. The use of secondary data is one of the significant challenges. Being a doctrinal study, it does not imply any empirical data gathering and fieldwork. As a result, the study might be unable to fully reflect real-life challenges encountered by forensic practitioners and law enforcement. The other limitation is the discriminatory analysis of case laws. The few judicial decisions which can be studied are a result of time and scope. Although considerable attempts are undertaken to cover vital and representative cases, the conclusions might not apply to all potential judicial thinking. The research also lacks in the data and accessibility of data. Certain forensic reports and the records of a case or an institutional document may not be publicly accessible, limiting the extent of analysis. It is also possible that the differences in the legal system and practices of different jurisdictions would suppress the generalisability of the findings. Another challenge is that the field of forensic science is more technical. Although the research makes scientific concepts easy to understand and explain, there might be some flaws in determining the complexities of some of the forensic methods. This might impact the level of analysis of very specialised fields. Last but not least, the changing nature of forensic science and legal standards implies that the results of the study might be out of date over time. With the coming up of new technologies and changes in legal frameworks, there is a need to constantly conduct research in order to be in step with the new technology and legal regulations (Khatiwala et.al., 2025).¹⁹

5.1 Statutory and Procedural Position

The statutory and procedural status of forensic evidence is very important in deciding whether the evidence should be admissible, reliable and what the overall effects are on the criminal justice system. Legal provisions

define the framework on which the forensic evidence is gathered, examined and presented, and the procedural safeguards guarantee the integrity and fairness of the forensic evidence. These aspects combine to be the main pillars behind the incorporation of scientific evidence in judicial procedures.

Legal Provisions

Criminal proceedings which involve the use of forensic evidence are regulated by laws that acknowledge the significance of scientific know-how when it comes to determining facts. Most jurisdictions have specific legislation stating the admissibility of the expert opinion where it is necessary that the court form an opinion on matters outside common knowledge. As an example, expert evidence is provided, enabling the courts to trust the views of people who are specialised in such areas as forensic science, medicine, ballistics, and digital analysis. The Indian context does not have a major legal provision that regulates the admissibility of forensic evidence, and relies on the Indian Evidence Act, 1872. The relevance of expert opinion in issues dealing with science, art or technical knowledge (section 45 of the Act) is explicitly identified. This is so that experts doing forensics can present their findings, which will help the court to comprehend complicated scientific matters. Other sections, similar, deal with documentary and electronic evidence, which are gaining prominence when considering digital forensics (Gordon, 2025).²⁰

Other procedural legislations like the Code of Criminal Procedure, 1973 (BNSS), which are relevant to this issue, except for the Evidence Act, give the guidelines for collecting and examining forensic evidence. These rights enable the investigating agencies to enlist professional help, do medical tests, and gather samples to study them. As an example, the medical examination of the accused persons and victims is accompanied by the provisions which contribute to the gathering of biological evidence that could be key in potentially sexual offence cases. Moreover, new special legislation and amendments have

¹⁸ Moore, Cristopher, et al. "Concerning the Responsible Use of AI in the US Criminal Justice System." *Communications of the ACM* 68.8 (2025): 41-44. <https://dl.acm.org/doi/full/10.1145/3722548>

¹⁹ Khatiwala, Jeel Piyushkumar, Daniel Kwaku Ntiamoah Addai, and Weifeng Xu. "Evaluating the Reliability of Digital Forensic Evidence Discovered by Large Language Model: A Case Study." *2025 IEEE 49th*

Annual Computers, Software, and Applications Conference (COMPSAC). IEEE, 2025. <https://ieeexplore.ieee.org/abstract/document/11126744/>

²⁰ Gordon, Sara. "Old Habits Die Hard: Precedent, Psychology, and the Admissibility of Forensic Evidence." *University of Toronto Law Journal* aop (2025): e240095. <https://utppublishing.com/doi/abs/10.3138/utlj-2024-0095>

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been brought in to accommodate the dynamic aspect of forensic science. The fact that the provisions were included that refer to electronic evidence indicates the increased significance of the field of digital forensics in contemporary investigations. These legal systems are meant to ensure that the forensic evidence is duly acknowledged and applied in the court justice system.

Admissibility Rules

Admissibility in forensic evidence is that of certain legal standards, which are aimed at assessing the relevance, reliability and fairness of such evidence. Before the evidence can be taken into consideration during a trial, it has to be established whether the evidence satisfies these criteria by the court. The admissibility rules can be used as a preventive measure against wrongful use of scientific evidence, and can be utilised to preserve the integrity of the judicial system. Relevance is one of the main requirements of admissibility. The forensic evidence should be directly related to the facts at issue, and the evidence should help in demonstrating or refuting a material fact. Whatever evidence is irrelevant, irrespective of whether it is scientific or not, should not be admitted in court. This makes sure that only the evidence, which will help in determining the case, is used (Shevchuk et.al., 2025).²¹

Another important determinant factor of admissibility is reliability. The courts have to determine the level of scientific of the applied forensic technique and whether it has been used in the right manner. It includes such assessments as methodology, credentials of the professional and terms of gathering and examining evidence. Courts of certain jurisdictions have specified tests or criteria to ascertain the admissibility of scientific evidence, placing particular focus on required methods which must be established and accepted. The admissibility is also greatly dependent on the credibility

of the expert witness. The qualifications, experience and expertise of the person providing the evidence are taken into consideration by the courts. The opinion of an expert can be as valid as his or her competence and the soundness of his or her methodology. Thus, forensic evidence weight and admissibility solely depend on how credible the expert is (Ibrahim et.al., 2025).²²

An additional key element of admissibility is that it has to be properly documented and have a chain of custody. Chain of custody is the chronological account of the processing, storage and change of evidence. It makes sure that the evidence presented in the court remains the same as that which was taken at the crime scene and that they had not been tampered with. The interruption of the chain of custody can bring uncertainty in the belongings of the evidence, which can result in its rejection. Secondly, courts should make sure the forensic evidence is not admitted in violation of the principles of justice and fairness. The piece of evidence can be excluded even when it is scientifically valid, but was acquired illegally or even unethically. This is an indication of the law of the end not justifying the means in the dispensation of justice (Ezebuilo et.al., 2025).²³

Procedural Safeguards

The integrity and reliability of forensic evidence are crucial to the criminal justice process, and only with the presence of procedural safeguards. These protective measures regulate the gathering, storage, examination and reporting of evidence to ensure that it is not contaminated and valid. The appropriate gathering of evidence at the crime scene is one of the most important protective measures. The investigators also need to adhere to the standard procedures to prevent contamination and loss of evidence. This involves employing proper instruments, proper protective clothing and following up the scene properly. Lack of these

²¹ Shevchuk, Viktor, et al. "Forensic Examination and Criminalistics in Investigating War Crimes: European and Ukrainian Experiences." *Jurnal Media Hukum* 32.1 (2025): 59-77. <https://journal.umy.ac.id/index.php/jmh/article/view/25056>

²² Ibrahim, Tuan Muhammad Faris Hamzi Tuan, Nasrul Hisyam Nur Muhamad, and Ahmad Syukran Baharuddin. "Chain of custody parameters for digital forensic evidence in shariah criminal court

proceedings." *IJUMIJ* 33 (2025): 205. https://heinonline.org/hol-cgi-bin/get_pdf.cgi?handle=hein.journals/iujmlj33§ion=23

²³ Ezebuilo, Okwuenu Sunday, and Okechukwu Dominic Nwankwo. "FORENSIC EVIDENCE IN NIGERIA: THE LEGAL PSYCHODYNAMICS IN QUALITY, CREDIBILITY AND UTILITY VALUES." *JOURNAL OF PSYCHOLOGY AND BEHAVIOURAL DISCIPLINES, COOU (JPBDC)* 5.2 (2025). <https://nigerianjournalsonline.org/index.php/JPBDC/article/view/2928>

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procedures may undermine the quality of the evidence and undermine its admissibility. Maintaining evidence is also pertinent. Forensic samples should be preserved in proper conditions to avoid deterioration or alteration. To illustrate, biological samples (blood or tissue) must have controlled conditions in order to preserve their integrity. The evidence should also be identified and tracked properly by properly labelling and documenting it. The standards of scientific analysis of the presented forensic evidence need to be scientifically acceptable. Laboratories must exercise high standards as far as quality and procedures are concerned by following strict requirements in order to have their findings be accurate. High standards and improvements to the credibility of forensic reports are ensured by the accreditation of the laboratories and regular auditing. The other important protection is the documentation and reporting of discoveries. Forensic experts should give quality reports detailing the procedures applied, findings and inferences made. Such reports must be succinct, straightforward, and can be examined by the court and other parties involved. Good documentation leads to accountability and enables us to cross-examine effectively. One of the basic procedures safeguards the right to cross-examine expert witnesses. It enables the other party involved in a case to question the effectiveness and dependability of forensic evidence. By cross-examination, the court is able to verify the witness who presented the evidence to determine whether he or she is credible and the strengths and inconsistencies present in the evidence presented (Budowle et.al., 2025).²⁴

The control of the judiciary is another valuable protection. The judges are important in the process of forensic evidence being effectively considered and the principles of law being taken into account. They have to pay close attention to the evidence and evaluations of the qualifications of the expert and the overall reliability of the findings. The judge will probably avoid relying on invalid or suspicious evidence due to judicial scrutiny. Moreover, procedural rights are also granted to safeguard the rights of the accused. Application of forensic

evidence should not violate such basic rights as the right to privacy and the right against self-incrimination. The laws have to strike a balance between the necessity to conduct an effective investigation and the rights of individuals.

5.2 Forensic Techniques in Practice

The use of forensic tools in criminal investigations has become the cornerstone of criminal investigations in contemporary times as they seek an application of scientific methods to assemble, analyse, and interpret evidence. They also use evidence-based justice based on fields such as biology, chemistry, and computer science. The use of technology like DNA profiling and digital forensics has objective and reliable outcomes. Their application, however, requires the appropriate handling, advanced technology and skilled professionalism. Reliability can be impacted by errors or contamination and therefore very rigorous procedures are necessary. Further, with advancing technology, the forensic processes are also evolving such that they are more precise and have to evolve with constant training and readjustment in the system of law (Mollik, 2025).²⁵

DNA Profiling and Genetic Analysis

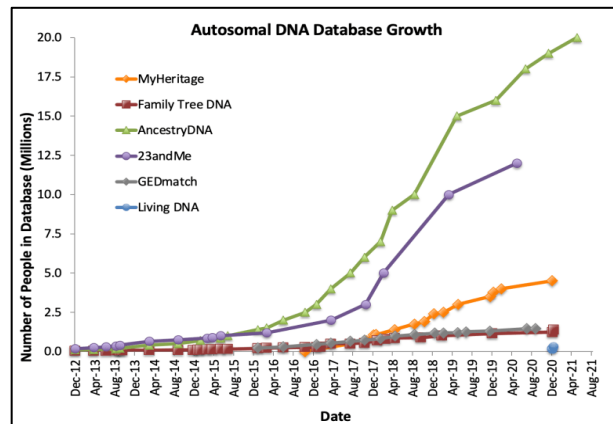


Figure 1: DNA Database Growth

(Source: The DNA Greek, 2025)

One significant improvement in forensics is DNA profiling, which has allowed for the accurate identification of individuals using their genetic makeup. DNA is found in virtually every cell of a human being,

²⁴ Budowle, Bruce, Kristen Mittelman, and David Mittelman. "Genomics will forever reshape forensic science and criminal justice." *Genome Biology* 26.1 (2025): 296. <https://link.springer.com/article/10.1186/s13059-025-03798-x>

²⁵ Mollik, Jadid. "Legal Framework to Introduction Forensic Evidence in Bangladeshi Courts: An Analysis." (2025). https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5610871

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making it very reliable as it is unique. This is done by taking samples of body fluids like blood, saliva or hair at the crime scene and later lab tests of the particular genetic markers. These indicators are subsequently contrasted to those of the suspects or databases to get a match. The high accuracy of DNA evidence is one of its strengths, thus being effective especially in serious crimes, like homicide and sexual offences. It has also been instrumental in acquitting the falsely convicted persons. The issue of its reliability is, however, limited to good collection and preservation, as well as to competent analysis. There is a possibility of contamination or degradation resulting in the results, and it raises ethical issues regarding privacy and DNA databases. Nevertheless, DNA profiling is one of the strongest weapons of the contemporary criminal justice system, despite its restraints (Du Pokoy et.al., 2025).²⁶

Fingerprint Examination and Identification

The examination of fingerprints is one of the oldest and most dependable methods in the sphere of forensics, which is grounded on the notion that every person has individual and invariable fingerprints. Crime scene latent fingerprints are often imperceptible and thus need to be detected by specialised techniques like powder dusting or treatment with different chemicals. Depending on the pattern of the ridges, these prints are compared with known samples or databases such as AFIS. Fingerprint evidence enjoys a lot of accepted usage in the courts because of its distinctiveness and devastation. It proves to be most applicable in crimes like theft, burglary and violent offences. Yet, that can only be accurate when the collection and analysis are performed. Incorrect or inconclusive results may be because of smudged or incomplete prints, environmental factors and human error. Despite these, accuracy and efficiency have been enhanced using technological advancements, and fingerprint analysis has become quite an important tool in the field of forensic investigations.

Ballistics and Firearms Analysis

The study of firearms, ammunition and their impact to aid in criminal investigations is known as ballistics and

firearms analysis. It is mostly applied in gun-related crimes. Ballistics is classified as internal, external, which concentrate on how the firearm works, the direction of the bullet and its effects on the target. The major part of this analysis is to detect individual marks on bullets and cartridge cases, also known as ballistic fingerprints. These indications assist in identifying an individual weapon with a bullet. Analysis of gunshot residue and study of injuries are also helpful in reconstructing, as well. Although ballistics is a very strong evidence source, it must be remembered as a type of evidence that can only be reliable when used by an expert in interpreting and properly handling evidence. Efficiency has been enhanced by factors such as technological tools, like much as the issue of subjectivity and standardisation is still a worry (McCarter et.al., 2025).²⁷

Digital and Cyber Forensics

Digital forensics concentrates on the detection, gathering and examination of electronic information to be utilised in a legal court. It plays a critical role in the investigation of cybercrimes, including hacking, fraud and identity theft, and in aiding conventional crimes with the help of digital information in the form of emails and location data. It involves data identification, acquisition, analysis, reporting and its integrity. The possibility of restoring lost or obscure data and recreating digital actions should be mentioned among the key benefits. But encryption, high rate of technological change and privacy are some of the issues that complicate investigations. Digital evidence should be treated with integrity because tampering with evidence can impact admissibility. Such evidence is interpreted by the use of expert testimony by courts to ascertain its meaning, and thus, digital forensics has become an important but challenging aspect of contemporary criminal justice.

Forensic Toxicology

Forensic toxicology is the field of study of analysing the biological samples to identify drugs, alcohol and poisons within the body. It is important in impaired driving, overdose of drugs and in cases of poisoning. Scientific methods like chromatography and spectrometry are used

²⁶ Du Pokoy, Chevaure. "Reconsidering the Admissibility of Expert Forensic Evidence in South African Criminal Proceedings." *Potchefstroom Electronic Law Journal (PELJ)* 28.1 (2025): 1-25. https://www.scielo.org.za/scielo.php?pid=S1727-37812025000100016&script=sci_arttext

²⁷ McCarter, Susan, Gilbert Singletary, and Destiny Reyes. "Abolish or reform criminal justice in the United States? A forensic social work perspective." *Journal of Forensic Social Work* 9.1 (2025): 4-21. <https://journals.shareok.org/jofsw/ojs/jofsw/article/view/167>

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to analyse samples like blood, urine or tissues to determine the substances and their concentrations. This would be used to determine cause and effect in the sense of whether a substance was a contributory cause of injury/death. Interpretation, however, may be complicated since there are issues such as metabolism, tolerance and interactions between substances. The accuracy also varies depending on the timing of sample collection. Following due care and professional treatment is the only way of having reliable results. Toxicology reports are seen as expert evidence used in court and contribute a great deal to the establishment of the legal outcomes (Khatiwala et.al., 2025).²⁸

Forensic Pathology and Medical Examination

Forensic pathology is concerned with the cause of death, the manner of death and the time of death by medical examination. The first one is the autopsy, which entails examination of the body externally and internally. It aids in determining injuries, diseases outcourses of death and categorises them into natural, accidental, suicidal or homicidal. Patterns of wounds and physiological alteration (rigor mortis) are examined to date the time of death by pathologists and recreate the events. There is also a medical examination of still living victims of an assault or sexual offence. But other issues like decomposition, environmental and lack of evidence may make it difficult to analyse. Results are reliable and depend on experience and following the procedures. Forensic pathologists are called on to give evidence in court to interpret medical evidence and help in judicial decisions.

Trace Evidence Analysis

Trace evidence is an important forensic science field that studies microscopic evidence like hair, fibres, glass, soil and paint that have been deposited at the site of a crime. According to the Exchange Principle, as developed by Lochard, it assumes that material transfer should occur between objects, which assists in creating connections

between suspects, victims, and locations. Collecting trace materials at crime scenes, on victims and on suspects using specialised instruments to prevent contamination starts the process. Laboratories are examined using the methods of microscopy, spectroscopy, and chemistry. Typical methods are hair and fibre testing, which can provide an association, and glass, paint and soil tests can provide an origin and location. Trace evidence can be used to infer a connection, not to identify. Actually, contact can be evidenced by the presence of fibres on a suspect who had contact with a victim. Yet it is not without limitations; it is small, it can easily be contaminated, and it relies on expert interpretation. It can be circumstantial and has to be backed by other pieces of evidence. Expert testimony in court presents trace evidence, and the reliability of the evidence is determined by how the evidence is handled, scientifically and through fair judgment of the jurist to reach a fair and accurate judgment (Ohazulike et.al., 2025).²⁹

Forensic Document Examination

Forensic document examination is a subdivision of forensic science that deals with the study and validation of documentation to establish its authenticity, provenance and integrity. It is more vital mostly in fraud, theft of identity, forgery, and disputed contracts. Among them are handwriting analysis, checking of signatures, finding out the changes, and studying printing techniques. The principles of handwriting analysis are that everyone has their own writing attributes in terms of letter-making, spacing in the writing, slant and pressure. Authentication of signatures has found wide application in court cases that deal with money and legal battles to determine authentic or counterfeit signatures. Alterations such as erases or overwrites are also detected by using other techniques, such as ultraviolet and infrared light. Moreover, the ink, paper and printing patterns can be standardised to ensure that the various sections of a document are done at different times. Digital documents,

²⁸ Khatiwala, Jeel Piyushkumar, Daniel Kwaku Ntiamoah Addai, and Weifeng Xu. "Evaluating the Reliability of Digital Forensic Evidence Discovered by Large Language Model: A Case Study." *2025 IEEE 49th Annual Computers, Software, and Applications Conference (COMPSAC)*. IEEE, 2025. <https://ieeexplore.ieee.org/abstract/document/11126744/>

AVAILABLE WITHIN THE NIGERIAN CRIMINAL JUSTICE SYSTEM AND ITS IMPLICATIONS FOR CRIME CONTROL IN SOUTH EAST NIGERIA." *JOURNAL OF INTERDISCIPLINARY RESEARCH IN EDUCATION, SOCIAL SCIENCES AND ARTS (JIRESSA)* 2.1 (2025). <https://www.nigerianjournalsonline.org/index.php/JIRESSA/article/view/3613>

²⁹ Ohazulike, Gladys Amaechi, and Bentina Alawari Mathias. "NATURE OF FORENSIC SCIENCE

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emails and electronic records are also subject to forensic investigation with the advancement of technology. The forensic document examination has an evidentiary value in that it is used to identify fraud and to prove authenticity. Nevertheless, these difficulties include the subjectivity of handwriting analysis, writing variability, and poor quality of documents and might interfere with accuracy. Thus, conformity to the standardised procedures and scrupulous judicial examination play a pivotal role in delivering credible results (Archibong et.al., 2025).³⁰

Crime Scene Investigation Techniques

The collection and preservation of forensic evidence mainly rely on crime scene investigation (CSI). The crime scene is the main source of physical evidence; it has to be properly secured and isolated to avoid contamination and tampering. Only authorised persons have access, and an initial survey is carried out by investigators to determine possible sources of evidence. To guarantee that the original state of the scene is maintained and will be used to reconstruct the scene later, appropriate documentation with photographs, videos, sketches and notes is necessary to capture the initial state of the scene. The collection of evidence involves specialised equipment and techniques that are used to process biological samples, fingerprints, weaponry, trace material and digital devices. All the evidence types have some set of procedures to preserve the integrity of the evidence. The chain of custody plays an important role as evidence has to be presented in its original form because it has to be untouched and original since the time it was gathered and the time it is presented in court. Scientific evidence, e.g., bloodstain pattern investigation, trajectory investigation, is useful to reconstruct the chain of events. CSI, a matter of importance, has its own set of problems; contamination, environmental and even human error as a

result of poor training. Such technological implementations as 3D scanning and digital mapping have increased precision and efficiency, but need resources for specialisation. Finally, the reliability and admissibility of evidence in the court of law directly depend on the quality of crime scene investigation (Archibong, 2025).³¹

6. Judicial Evaluation of Scientific Evidence

The scientific evaluation in the judicial system is an important part of the criminal justice system because it defines the degree to which the forensic results can impact the legal results. Courts have the burden to evaluate the admissibility, reliability and probative value of scientific evidence and to ensure that such evidence and its application do not conflict with ideals of fairness and due process. This assessment is influenced by factors of admissibility, the use of expert witnesses, judicial review, and case study.

Standards of Admissibility

Legal standards that regulate the admissibility of scientific evidence seek to ensure that scientific evidence is relevant and reliable. Courts are left to ascertain the credibility of the evidence provided to them to be of sufficient credibility to be used in a trial. In most jurisdictions, such as India, admissibility can be determined by statutory law that acknowledges expert opinion to be pertinent where the area of concern is such that laypersons lack the sufficient knowledge that expert opinion supplies. Relevance is a basic requirement for admissibility. The scientific evidence should be directly related to the facts of the matter and must help the court in answering a material question. Any evidence that does not help in determining the case is ineligible, such as its scientific nature. This helps to maintain a focus and efficiency in trials (Dubey et.al., 2025).³²

³⁰ Archibong, Emmanuel Iniobong, et al. "EXPLORING THE FORENSIC GAPS IN FEMICIDE DIGITAL EVIDENCE: A CASE STUDY OF NIGERIAN CRIMINAL JUSTICE SYSTEM." *FUDMA International Journal of Social Sciences* 5.2 (2025): 439-454.

<https://fudijoss.fudutsinma.edu.ng/index.php/fudijoss/article/view/76>

³¹ Archibong, Emmanuel Iniobong, et al. "EXPLORING THE FORENSIC GAPS IN FEMICIDE DIGITAL

EVIDENCE: A CASE STUDY OF NIGERIAN CRIMINAL JUSTICE SYSTEM." *FUDMA International Journal of Social Sciences* 5.2 (2025): 439-454.

<https://fudijoss.fudutsinma.edu.ng/index.php/fudijoss/article/view/76>

³² Dubey, Deepa, and Ms Medha Singh. "Integrating Science and Law: A Forensic Justice Perspective." *Cuestiones de Fisioterapia* 54.3 (2025): 2217-2227.

<https://cuestionesdefisioterapia.com/index.php/es/article/view/1399>

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Another criterion that is needed is reliability. The issue that the courts will have to consider is whether there is a valid scientific method employed and whether it was applied properly. This involves evaluating the correctness of the technique, the circumstances in which the evidence was taken and the chances of error. Certain tests include the general acceptance standard or reliability tests that are used in certain legal systems to define the widely recognised and reliable scientific method. Also, the chain of custody and adherence to the procedures are taken into account by the court regarding admissibility. It is essential to document properly the way evidence is handled and preserved so as to prove its authenticity. Interruption of the chain of custody can cast the evidence into uncertainty of its integrity and can be used to affect its admissibility. Admissibility of scientific evidence is also based on balancing the probative value against the possibility of prejudice. Although scientific evidence can be very convincing, it can also be misleading to the court when not clearly grasped. Judges should make sure that the evidence does not cause undue prejudice or dwarf any other applicable considerations (Sinha et.al., 2025).³³

Judicial Aspect	Key Considerations	Challenges	Impact on Cases
Admissibility	Relevance, reliability, expert opinion	Improper procedures, chain of custody issues	Determines whether evidence is accepted
Expert Testimony	Qualification, methodology, objectivity	Bias, conflicting opinions	Influences evidentiary weight
Judicial Reasoning	Corroboration, standard of proof	Misinterpretation, over-reliance (CSI effect)	Affects final judgment
Case-Based	Precedents, factual context	Inconsistent application	Shapes future legal

Evaluation			standards
Reliability Assessment	Scientific validity, error rate	Contamination, technical limitations	Determines credibility

Table 2: Judicial Approach to Forensic Evidence Role of Expert Witnesses

In the judicial processes, expert witnesses are front and centre in the judicial examination of scientific evidence. Courts need experts to make sense of the complex data and analyse its relevance in a way that can be understood, given the technical nature of forensic analysis. Experts help to fill the gap between scientific and legal knowledge, which allows judges to make judgments. One of the matters that is considered in establishing the weight of scientific evidence is the credibility of the expert witness. The qualification, experience and expertise of the expert and also the methodology to be applied in the analysis are evaluated by the courts. The opinion expressed by an expert can be accurate only when it is supported by the scientific principles and methods of its application. The opinions given by expert witnesses are supposed to be unbiased and objective. There are, however, concerns raised regarding the possibility of bias, especially when experts are called by either of the parties in a case. In an attempt to solve this problem, courts attach great importance to independence and can bring expert testimony under a straddling cross-examination. In this way, opposing sides will be allowed to question the validity of the findings and point out any loopholes or gaps. The other obstacle connected with expert testimony is whether opinions can be conflicting. Where two or more experts provide contrasting conclusions, the courts have to analyse the relative merits of the views. This should be done with great deliberation of methodology, evidence and reasoning of each finding made by the expert. Irrespective of these obstacles, an expert witness is still essential in the review of scientific evidence. Their skills in breaking down the technical information into simple language are critical in

³³ Sinha, Mrs Amrita, et al. "SECURE ENHANCEMENT FOR FORENSIC EVIDENCE USING BLOCKCHAIN." *JOURNAL OF ADVANCE*

AND FUTURE RESEARCH 3.12 (2025): 839-845. <https://rjwave.org/jaaftr/viewpaperforall.php?paper=JAAFR2512094>

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understanding that courts comprehend forensic evidence appropriately (Refolo, 2025).³⁴

Judicial Reasoning

Judicial reasoning is also very instrumental in arriving at the interpretation and application of scientific evidence in the law. There is a wide range of evidence that must be judged by the judges, not only on the technical side of the evidence, but also by evaluating and weighing the relevance of the evidence to the total case. It is a predicative balancing between scientific discoveries and legal principles and standards of proof. Credibility and weight are two of the most important elements of judicial reasoning. The courts have to determine the relative value of scientific evidence to that of other types of evidence, like eyewitnesses or circumstantial evidence. Forensic evidence, though deemed very reliable, is not taken as conclusive and has to be considered in relation to the overall case. Judicial reasoning is also related to the interpretation of the shortcomings of scientific evidence. Judges should understand that forensic methods are not fallacious and can be prone to error or ambiguity. This must be done in a very careful manner, especially where the evidence is multifaceted or disputed. The courts should not too closely base their decisions on scientific evidence because such should be supported with other types of evidence where needed. One more significant factor is the use of legal standards of proof. The prosecution has to prove the guilt beyond a reasonable doubt in criminal cases. Scientific evidence must thus, in turn, be compelling enough to satisfy this criterion. The judges need to evaluate whether reasonable doubt has been disproven by the evidence or not, or whether there are doubts. Precedents and legal principles also affect the judicial reasoning. The judicial system tends to use prior cases to inform its judgment of scientific evidence. This helps ensure uniformity and predictability in the outcome of judicial decisions, but can also impede the ability of the law itself to adapt in the case of new scientific discoveries (Azhar et.al., 2025).³⁵

Case-Based Evaluation

Case-based analysis offers concrete information about the ways in which courts can be used to analyse the application of principles of admissibility, expert testimony, and judicial reasoning to actual cases. Analysing decisions made in courts, we could trace some specific patterns and tendencies connected with the way scientific evidence is treated. A lot of times, the courts have taken scientific evidence as an efficient ground of conviction, especially when coupled with well-grounded expert eyewitness testimony and proper procedural guarantees. Indicatively, DNA evidence has been well established to be accurate and decisive in many of the cases. In the same way, fingerprint analysis and digital evidence have been utilised to make connections between suspects and crime scenes. Nonetheless, in some cases, courts have discarded or doubted scientific evidence as a result of reliability or procedural deficiencies. The existence of cases with a contaminated sample, inappropriate evidence handling or the use of unqualified specialists emphasises the need to keep the standards of forensic practice high. This indicates that the judiciary ensures that only credible evidence is considered because of the decisions made. Case-based assessment to a large extent shows an inclination to an expanded reliance on scientific evidence, and more questioning of its shortcomings. Courts are also becoming cognizant of the importance of finding a balance between scientific progress and the protection of the law, wherein the application of forensic evidence can lead to justice, rather than eroding it.

6.1 Critical Examination of Case Laws

The decisions of the courts are conclusive in determining the applicability, admissibility and trustworthiness of forensic evidence in the criminal justice system. Courts use case law to interpret scientific evidence, establish its evidentiary utility, and to establish precedents. Critical analysis of judicial rulings has brought out three significant dimensions, namely: acceptance of forensic

³⁴ Refolo, Pietro, et al. "Ethical issues in the use of genetic predictions of aggressive behavior in the criminal justice system: a systematic review." *Frontiers in Genetics* 16 (2025): 1599750. <https://www.frontiersin.org/journals/genetics/articles/10.3389/fgene.2025.1599750/full>

³⁵ Azhar, Sumia, Syed Arshad Ali Rizvi, and Usman Asghar. "Criminal procedure code in Pakistan: Evaluating the process and challenges in investigating crimes." *The Critical Review of Social Sciences Studies* 3.2 (2025): 789-799. <https://thecrsss.com/index.php/Journal/article/view/488>

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evidence, judicial scepticism and rejection and the emerging trends in judicial practices (Paul et.al., 2025).³⁶

Judicial Acceptance of Forensic Evidence

The role of forensic evidence in criminal adjudication has come under newfound realisation and gained acceptance by the courts as an objective and reliable tool. The judicial acceptance is also clear, especially in those cases where the DNA profiling, fingerprints and medical evidence are involved; scientific evidence makes a dominant corroborative backing of the case of prosecution. The evidence of DNA has been widely accepted because it is highly accurate. DNA profiling has helped courts to prove identity, connect suspects with crime scenes and ascertain relationships in sexual cases and homicide cases. The courts have recognised that DNA evidence, when collected and analysed appropriately, can be a source of powerful evidence and can greatly decrease the margin of error.

Likewise, fingerprint evidence has been presumed to be an effective identification tool in the past. Fingerprints have always been supported by courts on account of an evidentiary value in determining the presence of an accused at a crime scene. Fingerprints have been highly accepted in the court because of their uniqueness and irreversibility. Reporting by medical and forensic experts who have experience has also been considered credible evidence. Post-mortem reports, along with injury assessment of an individual, are usually used in courts to ascertain the cause and the manner of death. In most cases, eyewitness testimony has been supported by forensic evidence and fortified their case against a defendant. The trend towards evidence-based justice has been reflected in the judicial acceptance of forensic evidence. The courts are becoming more open to the importance of using scientific approaches to improve the accuracy and fairness of criminal trials. But this acceptance is usually conditional on following the right procedure, professional competence and dependability of procedures (Kowshikaa, 2025).³⁷

Judicial Scepticism and Rejection

Although its general acceptance has been increasing, courts have also exercised caution and scepticism towards the analysis of forensic evidence. One of the reasons that lead to the judicial rejection is when the evidence gathered is not reliable and is handled against the stipulated procedures, among others. This kind of scepticism lays emphasis on the role of the judiciary in safeguarding against wrongful convictions. The breakdown in the chain of custody is one of the major causes of rejection. Courts may also doubt the authenticity of evidence in case the prosecution fails to prove that the evidence has been well preserved and treated. The occurrence of contamination, alteration, or the presence of gaps in documentation may have a substantial impact on the sufficiency of evidence on the forensic presentation. There has also been the issue of the competency and integrity of expert witnesses raised by the courts. When expert testimony is more or less incongruent, partisan or not based on science, judicial scepticism is heightened. There is also an incongruence in the opinions of expert witnesses, which makes it more difficult to evaluate and could prompt the courts to dismiss this kind of evidence. The inappropriate use or overuse of forensic evidence is another issue of concern. Courts have also pointed out that the scientific evidence cannot be considered conclusive unless it is corroborated. AFR, especially in methods like fingerprint analysis or even in toxicology, has caused wrongful convictions, which have prompted the courts to have a more conservative stance. Judicial scepticism is also a key restraint on the application of forensic evidence and a means of satisfying the requirements of reliability and fairness. Courts that deny the use of improper or dubious evidence uphold the value of scientific findings, and these findings need to be critically viewed to avoid acceptance (Bhardwaj et.al., 2025).³⁸

Emerging Judicial Trends

³⁶ Paul, Tanko Shawulu, and Dominic Aondona Iornumbe. "Relevance of Criminal Profiling in Criminal Justice System in Benue State Nigeria." *Jurnal Restorasi: Hukum dan Politik* 3.1 (2025): 118-135. <https://seaninstitute.or.id/bersinar/index.php/restorasi/article/view/191>

³⁷ Kowshikaa, A. S. "India's Criminal Justice Reform: An In-Depth Look at The New Laws." *Journal of Law and*

Legal Research Development (2025): 21-27. <https://jllrd.com/index.php/journal/article/view/35>

³⁸ Bhardwaj, Jiya, Khushboo Goyal, and Aashna Narula. "Revolutionizing forensic science: The role of artificial intelligence in evidence analysis." *International Journal of Interdisciplinary Approaches in Psychology* 3.1 (2025): 101-116. <http://www.psychopediajournals.com/index.php/ijiap/article/view/643>

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The trends in judicial rulings have shown there is a slowly growing trend towards a more moderate and sophisticated attitude to forensic evidence. There is growing acceptance within the courts that scientific innovations hold value, yet some form of protection and critical examination is necessary as well. The increasing trend of using medium-level forensic methods like DNA profiling and digital forensics is one of these trends. Courts are recognising the increased accuracy and efficiency of these techniques, especially in high-level cases like those of cybercrime and organised crime. Concurrently, they are attaching special importance to correct procedures and professional skills. Corroboration is also another new trend. The courts are also becoming very demanding that forensic evidence be backed by other evidence, either in the form of witness testimonies or circumstantial evidence. This technique minimises the chances of a single piece of evidence being over-relied on and therefore results in a more comprehensive assessment of the case. There is also the background of judicial awareness of the constraints of forensic science. Courts are increasingly doubtful about accepting scientific evidence, with the possible error and the imperative of openness in practice. This has contributed to an increase in doubting expert testimony and forensic reports. Also, the focus on capacity building and reform is gaining momentum. Courts have pointed out how the display of better forensic infrastructure, professional training and standardisation of practice have to be addressed. The implemented actions are critical towards the increase of reliability and efficiency of forensic evidence (Lunavath, 2026).³⁹

7. Systemic Issues and Practical Constraints

Limiting factors and structural problems are major challenges towards the efficient application of forensic evidence within the criminal justice system. Although this has led to greater reliance on scientific methodology, their reliability is still marred by issues like poor infrastructure, time lag during the process, untrained personnel and issues with ethics. Most of the forensic

labs (mostly in developing nations) are not well equipped with modern machinery and facilities, resulting in low-quality analyses and report latencies. Both postponements in the processing of forensic evidence make investigations and trials ineffective, tend to reduce the significance of evidence and extend detention. Moreover, the fact that the number of trained specialists is scarce and that legal professionals lack an understanding of the forensic methods plays a role in the occurrence of mistakes in evidence work and interpretation. Such a discrepancy between science and law is damaging the efficacy of the forensic evidence. The integrity of the forensic investigations is questioned by ethical issues, such as bias, lack of transparency, and possible manipulation of evidence. Problems associated with privacy and data abuse, especially in DNA tests, also need to be critically controlled. Besides, there are no standardised procedures and accreditation regimes and this results in laboratory inconsistencies. Lack of coordination of investigative agencies, forensic experts, and the judicial system makes the process even more complicated. These issues should be tackled to make the forensic evidence in the justice system reliable, efficient and fair (Shevchuk et.al., 2025).⁴⁰

7.1. Synthesis and Policy Suggestions

The discussion of forensic evidence in the criminal justice system demonstrates that it is increasingly becoming an important tool of judicial decision-making, and yet it is also dependable and objective. The paper concludes that DNA profiling, digital forensics and medical examination are forensic methods that have greatly enhanced accuracy in the investigations and trials. Nevertheless, the success of this evidence is usually constrained due to admissibility problems, numerous procedural shortcomings, and inaccurate judicial interpretations. Although there is an emerging trend of increased acceptance of scientific evidence in courts, there is still apprehension about reliability, bias in experts and limitations in the methodological aspect. Based on these findings, some suggestions can be drawn in order

³⁹ Lunavath, Ramesh. "CHILD ABUSE AND THE CRIMINAL JUSTICE SYSTEM IN INDIA: LEGAL CHALLENGES AND REFORMS." *JOURNAL OF ADVANCE AND FUTURE RESEARCH* 4.2 (2026): 322-329.
<https://rjwave.org/jafr/viewpaperforall.php?paper=JAAFR2602501>

⁴⁰ Shevchuk, Viktor, et al. "Forensic Examination and Criminalistics in Investigating War Crimes: European and Ukrainian Experiences." *Jurnal Media Hukum* 32.1 (2025): 59-77.
<https://journal.umy.ac.id/index.php/jmh/article/view/25056>

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to ensure a better role of forensic evidence. To begin with, the forensic infrastructure has to be improved by developing well-equipped laboratories and providing access to cutting-edge technology. Second, forensic experts, investigators, and judicial officers should be provided with specialised training that will enhance their awareness and use of scientific evidence. Third, the collection, preservation, and analysis of the evidence need to be standardised to limit errors and provide uniformity in the different jurisdictions. Radical changes in policy are needed to overcome structural issues and enhance the interface of forensic science with the judicial system. The governments must focus on the formulation of clear guidelines for the admissibility and appraisal of forensic evidence, besides accreditation of the forensic laboratories. Also, it should have mechanisms that would promote transparency, accountability and ethics in forensic investigations. It is also important to enhance the coordination between the law enforcement agencies and the forensic institutions with the judiciary to ensure effective implementation.

8. Conclusion

Forensic evidence has turned out to be an inseparable part of the modern criminal justice system and contributed greatly to the precision, impartiality and persuasiveness of research and judicial results. This paper has shown that scientific methods like DNA profiling, fingerprint identification, digital forensics and toxicology have enhanced the process of evidence since they yield credible and quantifiable information. Cases in the courts indicate a growing acceptance of such evidence as these are seen to be very useful in proving facts and in assisting in fair adjudication. Nevertheless, the study also points out some very important issues that restrict the proper application of forensic evidence. Problems of inefficient infrastructure, bureaucracy, shortage of specialized personnel and ethical issues are still hampering its reliability and use. Certain cases of judicial scepticism are another reason why special attention should be paid to the assessment and compliance with the legal criteria of admissibility and reliability. The paper highlights the relevance of the balanced approach that incorporates both scientific innovations and legal protection. Enhancement of the forensic infrastructure, standardisation, professional training, and facilitation of coordination between the forensic specialists and the legal practitioners are some steps in the right direction. Finally, proper and ethical application of forensic evidence is crucial towards ensuring justice, prevention of wrongful

convictions and public trust in the criminal justice system.

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