FORENSIC EVIDENCE INVESTIGATION IN THE INDIAN JUDICIAL SYSTEM: PROSPECTS & CONSTRAINTS

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ABSTRACT

The history of forensic science in India is very ancient, and we find mention of it in the Indian texts of Manusmriti and Arthashastra. Even in today's modern era, these texts have been as effective as they were centuries ago. Today, science is at a new height and constantly progressing. As a result, forensic science plays an important role in criminal investigations today, and forensic science still requires many reforms. In this research paper, I have tried to shed light on those reforms as well as focus on the obstacles in the way of these reforms. It is very important that forensic investigation agencies conduct their investigations carefully to secure forensic evidence to prevent wrongful convictions. This can help to increase the ratio of convictions of those who commit crimes. There are many limitations and challenges in the integration of forensic evidence in India. Some of the main issues are standard protocols for each laboratory, a lack of staff, a lack of equipment in rural forensic laboratories, and a lack of structure in forensic laboratories. As India is moving ahead in all areas, it is extremely necessary that a structure is also created for the integration of forensic evidence; lawyers, police, media, and judiciary play a major role in the effectiveness of forensic evidence, and political will also plays a major role. These issues have real-world consequences on real cases and individuals, as evidenced by many high-profile cases in India, where forensic evidence is crucial for securing convictions or exposing investigation errors.

Introduction

Expert Testimony and Legal Admissibility

In any legal proceeding, a special rule guides the expert on whether to admit forensic evidence in court. Therefore, it is necessary to ensure relevance and reliability. To ensure this, in India, the Indian Evidence Act of 1872, particularly Sections 45 to 51, mandates the inclusion of expert opinions in legal cases. Section 45 permits courts to consider the insights of individuals with specialized expertise in fields such as science and art, acknowledging them as expert witnesses. "These experts play a pivotal role in interpreting complex forensic data, thereby assisting the judiciary in making informed decisions."(Ali, 2023)[1]. Judicial interpretations have shed more light on the roles of expert witnesses. In the State of Maharashtra v. Damu Gopinath Shinde (*State of Maharashtra vs Damu S.O. Gopinath Shinde And ... on 1 May, 2000*, n.d.)[2]. The Supreme Court emphasized that expert evidence can only be considered reliable if it is backed by the expert's testimony during the trial. Similarly, in Malay Kumar Ganguly v. Dr. Sukumar Mukherjee (Ganguly, 2009)[3]. The court determined that, although expert opinions could be accepted, their significance relied on the credibility of the expert and the logic behind their conclusions. These decisions highlight the judiciary's careful approach in assessing forensic evidence, ensuring that it adheres to legal standards.

Innovations in technology with legal compactions

Breakthroughs in forensic science, such as DNA analysis, digital investigations, and brain imaging, have transformed the manner in which evidence is gathered and examined. Nevertheless, these advancements have also brought about legal issues related to admissibility, privacy, and ethical applications. For example, the implementation of brain electrical oscillation signature (BEOS) tests in India, which are designed to identify experiential knowledge of a crime through brainwave analysis, has ignited controversy. Many critics argue that the scientific validity of these methods may be questionable, and that their use may violate or infringe upon the personal rights of individuals. The inclusion of artificial intelligence in

[1] M.I. Ali, "Forensic Science Integration in Legal Education: A Paradigm Shift for Strengthening Legal Expertise in Pakistan" (2023) 32(46) *Journal of Legal Studies "Vasile Goldiş"* 101..
[2] *State of Maharashtra v. Damu s/o Gopinath Shinde and Others*, Appeal (Crl.) Nos. 992–993 of 1999, decided on 1 May 2000 (SC).
[3] *Malay Kumar Ganguly v. Dr. Sukumar Mukherjee and Others*, Criminal Appeal Nos. 1191–1194 of 2005 and Civil Appeal No. 1727 of 2007, decided on 7 August 2009 (SC), (2009) 9 SCC 221.

forensic image analysis raises issues related to the risk of bias in the adherence to legal standards.(Lorch et al., 2022)[4]. Digital forensics in India, which deals with the task of obtaining and examining data from electronic devices, also faces a number of legal challenges. These include the level of admissibility of digital evidence, jurisdictional issues, and serious questions about the protection of privacy rights in a constantly changing technological environment. Therefore, there is a great need to create innovative legal systems that can adapt quickly.

Aspects of organisations and structures

The successful integration of forensic science into India's legal framework can only be realized if institutional structures and infrastructure are strong. In India, differences in the capabilities of forensic laboratories, such as technology, lack of skilled staff, and inequities in adherence to standardized procedures, can affect the quality of forensic reports. These inconsistencies may cause delays in legal processes and affect the trustworthiness of forensic evidence. Additionally, effective collaboration among law enforcement agencies, forensic specialists, and the judiciary is essential for the smooth integration of forensic science into criminal investigations and trials. "Challenges in communication and understanding among these entities can impede the effective use of forensic evidence."(V. Kumar & Singh, 2024)[5].

Advantages of the Legal Interigation

Enhancing Fairness, Accuracy, and Deterrence in Criminal Trials

Improving fairness, precision, and deterrence in criminal proceedings is fundamental to contemporary legal framework. The incorporation of technology, community involvement, and ethical reforms has significantly advanced these goals. In India, where linguistic variety and limited legal awareness present obstacles, efforts to create a high-quality legal parallel corpus in various Indian languages have been crucial. This corpus aids in translating intricate legal documents, thereby making them more accessible to a wider audience and enhancing access to justice.(Mahapatra et al., 2024).[6]

[4] R. Leenes et al., "Compliance Challenges in Forensic Image Analysis Under the Artificial Intelligence Act" (2022), https://arxiv.org/pdf/2203.00469 (last visited 10 Apr. 2025).
[5] "Forensic Science in the Indian Legal Framework: Challenges and Opportunities in Criminal Investigations and Trials" (2024), https://www.civillawjournal.com/archives/2024.v4.i2.C.107?utm (last visited 10 Apr. 2025).
[6] N. Jain et al., "MILPaC: A Novel Benchmark for Evaluating Translation of Legal Text to Indian Languages" (2023), https://arxiv.org/pdf/2310.09765 (last visited 11 Apr. 2025).

The integration of artificial intelligence (AI) into legal services has made justice more accessible to wider audiences. AI-driven platforms, including chatbots and automated question-and-answer systems, offer immediate legal support and overcome obstacles related to expenses, location, and language. These technologies are especially advantageous in rural and underserved regions, as they provide legal advice in local languages and make intricate legal processes easier to understand.(*INDIAai*, n.d.).[7] Community-driven initiatives, such as participatory defense, have significantly contributed to improving fairness and precision in criminal trials. By engaging defendants, their families, and communities in the legal process, participatory defense brings a human element to the accused, and enhances transparency and accountability in the justice system. This method has resulted in more positive outcomes for defendants and empowered communities to play an active role in legal advocacy. Restorative justice practices provide an alternative to conventional punitive approaches by emphasizing the reconciliation between victims and offenders. These practices have been proven to lower recidivism rates and foster healing, thereby improving overall fairness and effectiveness of the criminal justice system. Technological innovations, such as e-courts and online dispute resolution platforms, have streamlined judicial processes, minimized delays, and enhanced the accuracy of legal proceedings. "These technologies have enhanced efficiency and accessibility in the legal system by automating routine tasks and enabling virtual hearings."(*Press Release_ Press Information Bureau*, n.d.).[8]

Incorporating compassion into the judicial system has been highlighted as a way of improving fairness. By training judges to be empathetic and assessing their performance through a "compassion quotient," the legal system can achieve more humane and just outcomes, especially for those who are marginalized and vulnerable.

Encouraging Scientific Assessment and Institutional Effectiveness

In my research, I discovered that one of the most persuasive results of legal integration is its direct influence on justice administration. Specifically, it aids in reducing wrongful convictions, enhances conviction rates for genuine offenders, and bolsters the overall efficiency of investigative and prosecutorial agencies. These outcomes are not merely technical; they are

[7] "Enhancing Access to Justice: How Artificial Intelligence is Democratizing Legal Services" (n.d.), *INDIAai*, https://indiaai.gov.in/article/enhancing-access-to-justice-how-artificial-intelligence-is-democratizing-legal-services? (last visited 12 Apr. 2025).
[8] Press Information Bureau, "Press Release" (2025), https://www.pib.gov.in/PressReleaseIframePage.aspx?PRID=2085127& (last visited 12 Apr. 2025).

also central to maintaining public confidence in the rule of law. Wrongful convictions signify a significant breakdown in the justice system. They not only ruin the lives of innocent individuals but also allow actual criminals to remain large, thereby compromising public safety and eroding trust in law enforcement. Legal integration addresses this issue by implementing uniform evidentiary standards, protocols for forensic processes and enhanced judicial oversight. For instance, when regions adopt standardized procedures for DNA testing, digital evidence management, and eyewitness identification, the likelihood of judicial errors is greatly reduced. As Paul C. Giannelli points out, the absence of adequate regulation in forensic laboratories has historically led to wrongful convictions, and only through enforceable legal standards can such mistakes be minimized. (Giannelli & C Citation, n.d.)[9]. Noticeable advancements are evident in nations where legal integration has progressed. Consider the Union's directives concerning criminal procedural rights, which encompass the right to legal representation, the presumption of innocence, and access to case files across all member countries. These directives are not merely symbolic; they compel national systems to enhance pre-trial processes and the disclosure of evidence, which is frequently problematic in cases of wrongful convictions. Research published in the European Journal of Criminology indicates that regions implementing these directives experience a reduced rate of convictions that are later overturned due to procedural mistakes or improper handling of evidence. (Fabini, 2017)[10]. Based on my observations, enhancing conviction rates is not just about increasing the number of convictions, but also ensuring that the right individuals are convicted through the use of rigorous, science-based methods. Legal integration plays a crucial role in standardizing investigative protocols across different regions, which is particularly vital in countries with federal systems or those facing transnational crime. When police forces operate under varying rules, investigations can falter and evidence might be dismissed in court. However, a unified legal framework such as standardized criminal procedure codes or integrated forensic laboratories enhances both the efficiency and accuracy of investigations. An often-overlooked, but equally significant benefit of legal integration is its ability to bolster prosecutorial independence and accountability. In fragmented legal systems, prosecutors may adhere to

[9] S.A. Kassin, "Wrongful Convictions and Forensic Science: The Need to Regulate Crime Labs" (n.d.), https://scholarlycommons.law.case.edu/cgi/viewcontent.cgi?article=1148&context=faculty_publications (last visited 12 Apr. 2025).

[10]M. Fabini, "Managing Illegality at the Internal Border: Governing through 'Differential Inclusion' in Italy" (2016), https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Managing+illegality+at+the+internal+border%3A+Governing+through+%E2%80%98differential+inclusion%E2%80%99+in+Italy&btnG= (last visited 12 Apr. 2025).

different rules and ethical standards, potentially leading to issues such as selective prosecution or allowing serious crimes, such as corruption or human trafficking, to go unpunished. Conversely, nations that have unified their prosecution services within a single framework generally experience more consistent and equitable processes.

Legal integration plays a pivotal role in addressing cross-border crime. Criminal networks operate frequently across multiple countries, exploiting gaps or inconsistencies in national laws. However, when legal systems collaborate utilizing tools such as the European Arrest Warrant or Europol's shared investigation frameworks, law enforcement agencies can coordinate more effectively, exchange evidence more swiftly, and bring criminals to justice more efficiently. Europol's 2022 activity report highlights that coordinated legal and investigative efforts among EU member states have resulted in a significant increase in successful cross-border operations. Such advancements would not be feasible without the foundational support of legal integration.(*Europol Document*, n.d.).[11]

Restrictions and Legal Issues

Legislative, Infrastructure, and standardization Shortcomings

In my research on the convergence of forensic science and legal frameworks, I have identified a distinct pattern. Although forensic evidence has the potential to enhance the justice system, several entrenched problems continue to hinder its effectiveness. Notably, three significant challenges were identified.

1) India's absence of a comprehensive forensic law, 2) inconsistent laboratory infrastructure throughout the nation, and 3) lack of standardized protocols for forensic procedures. These issues are not merely technical obstacles; they also have real-world implications for actual cases and individuals.

The Absence of a Comprehensive Forensic Law Framework

While conducting my research, I discovered that India does not have a unified law dedicated to the field of forensic science. Instead, pertinent regulations are scattered across multiple legal

[11]Europol, *Consolidated Annual Activity Report 2022* (2023), https://www.europol.europa.eu/cms/sites/default/files/documents/Consolidated%20Annual%20Activity%20Report%202022.PDF (last visited 14 Apr. 2025).

documents, including the Evidence Act, parts of the Criminal Procedure Code, and departmental manuals. This fragmented system often leaves forensic experts and law enforcement officials uncertain of the appropriate procedures to follow. More importantly, this results in inconsistent standards for the collection, analysis, and presentation of forensic evidence in court. In certain instances, forensic reports are contested because there are no definitive national guidelines for their preparation. This predicament places both investigators and forensic specialists in challenging situations, especially when defense lawyers quickly point out procedural mistakes. The lack of national guidelines leads to different laboratories employing diverse standards, which subsequently causes complications in how the evidence is managed in court.

Gaps In Infrastructure

During my research, it became evident that unevenly distributed forensic infrastructure existed throughout India. Major cities, such as Delhi and Bengaluru, typically have access to more advanced forensic laboratories. However, when venturing into smaller towns or rural areas, it quickly becomes apparent how limited the resources are. These laboratories often suffer from a lack of staff, insufficient funding, and inadequate equipment.

The consequences of this imbalance were significant. This hampers the progress of investigations and occasionally stops essential forensic analyses from being conducted together. According to a report in the International Journal of Law, delays in forensic testing due to insufficient infrastructure are a persistent issue, and in the realm of criminal justice, such delays often equate to denial of justice. (Chauhan & Patel, 2024).[12]

Absence of a Common Language: Inconsistent Protocol

Picture yourself in a courtroom where the reliability of forensic evidence is under scrutiny, with each side citing completely different techniques from the two separate laboratories. This scenario is more common than we might think, primarily because of the absence of universal forensic standards. This issue is especially concerning in critical fields, such as DNA analysis and digital forensics. I examined a case where two labs offered opposing interpretations of the

[12] "A Comprehensive Study of Forensic Science in the Indian Legal Context: Challenges, Opportunities, and Implications for Criminal Investigations and Trials" (n.d.), https://www.lawjournal.info/article/152/4-2-44-721.pdf (last visited 14 Apr. 2025).

same DNA sample merely because they adhered to distinct testing and documentation procedures. The Journal of Forensic Science and Research recently highlighted this problem, pointing out that outdated methods and the lack of standardization in laboratories result in unreliable and inconsistent findings.

The case of ***People v. Collins, 2015 NY Slip Op 25227***, serves as an example of how varying laboratory procedures can result in differing DNA interpretations. In this instance, the New York City Office of the Chief Medical Examiner (OCME) utilized a high-sensitivity DNA analysis technique, which was challenged by defense experts. They contended that the OCME approach, which included extra amplification cycles, introduced stochastic effects, random variations that could compromise the reliability of DNA profiles, particularly in samples with low DNA amounts or mixtures from several individuals. These effects might cause issues such as allele drop-out, where certain DNA markers do not appear, potentially leading to incorrect interpretations of DNA evidence. The court recognized these issues, highlighting that although the OCME's methods were advanced, they could yield unreliable results if not thoroughly examined.(*People v Collins (2015 NY Slip Op 25227)*, n.d.).[13]

Another relevant instance is the 2008 double-murder case in Noida, India. Initially, a vaginal swab from the victim, Aarushi Talwar, was analyzed at a local hospital, yielding inconclusive results. The Central Bureau of Investigation (CBI) then forwarded the sample to its Central Forensic Science Laboratory (CFSL) in Delhi, where it was discovered that two vaginal samples had been mixed. Further analysis at the Center for DNA Fingerprinting and Diagnostics (CDFD) in Hyderabad indicated that the sample mainly contained DNA from an unknown person, not Aarushi. These inconsistent findings have led to suspicions of sample contamination or tampering, potentially due to varying handling and documentation procedures across laboratories. The CBI eventually determined that the sample was contaminated, attributing inconsistencies to procedural mistakes, rather than deliberate wrongdoing. (*Aarushi Murder_ CBI Probing DNA Sample Tampering _ Latest News Delhi–Hindustan Times*, n.d.).[14]

[13] *People v. Collins*, 2015 NY Slip Op 25227, https://www.nycourts.gov/REPORTER/3dseries/2015/2015_25227.htm (last visited 15 Apr. 2025).
[14] "Aarushi Murder: CBI Probing DNA Sample Tampering," *Hindustan Times* (2025), https://www.hindustantimes.com/delhi/aarushi-murder-cbi-probing-dna-sample-tampering/story-imSDGTGCMHnCmmV7NDHyAN.html (last visited 15 Apr. 2025).

Utilising Forensic Evidence Positively

State v. Sushil Sharma (Tandoor Murder Case, 2007)(*White Black Legal*, n.d.)[15]

The 1995 Tandoor Murder Case centered on Sushil Sharma, a leader in the Delhi Youth Congress, who shot his wife, Naina Sahni, because of suspicions of her being unfaithful. In an attempt to dispose of her body, he sought to incinerate it in a restaurant's tandoor with the assistance of a manager. Forensic science played a crucial role in resolving the case: ballistic tests linked the bullets to Sharma's revolver and DNA analysis verified the victim's identity by matching her remains with her parents' blood samples. Although Sharma was initially given a death sentence, the Supreme Court later reduced his punishment for imprisonment. This case highlights the essential role of DNA in criminal investigations.

Mukesh & Anr v. State (Nirbhaya Case, 2017)

The 2012 Delhi gang rape and murder case, often referred to as the Nirbhaya case, involved the horrific attack and sexual assault of 23-year-old Jyoti Singh on December 16, 2012, by six men on a moving bus in Delhi. This incident ignited nationwide protests and prompted significant reforms to India's sexual assault laws. In a 2017 ruling, the Supreme Court upheld the death penalties for four adult perpetrators, invoking the "rarest of rare" principle due to the crime's egregious nature. The court highlighted the importance of scientific and forensic evidence in proving the defendants' guilt. The savage gang rape and murder of young women in Delhi caused widespread public outrage. Forensic evidence, such as DNA profiling and bite mark analysis, played a crucial role in supporting witness statements and securing convictions for those involved.(*Mukesh_Anr_vs_State_For_Nct_Of_Delhi_Ors_on_5_May_2017.PDF*, n.d.).[16]

Vishal Yadav v. State of U.P. (Nitish Katara Case, 2014)

The 2002 murder case of Nitish Katara involved his kidnapping and killing by Vikas Yadav and his cousin Vishal Yadav, who were related to politician D.P. Yadav. The crime was reportedly an honor killing, as the Yadav family opposed Katara's romantic involvement with

[15] Navdeep Kaur, "Forensic Science – The Science Intertwined with Law," *White Black Legal* (n.d.), https://www.whiteblacklegal.co.in/details/forensic-science-%E2%80%93-the-science-intertwined-with-law-by---navdeep-kaur (last visited 15 Apr. 2025)..

[16] *Mukesh & Anr. v. State for NCT of Delhi & Ors.*, (2017) SCC Online Del 3579, https://indiankanoon.org/doc/68696327/ (last visited 15 Apr. 2025).

Bharti Yadav, Vikas's sister. Katara was abducted from a wedding in Ghaziabad, brutally beaten to death, and his body was set on fire. In 2014, the Delhi High Court upheld the life sentences for Vikas and Vishal Yadav. The Supreme Court later affirmed these convictions by imposing a 25-year sentence without the possibility of remission. (*Vishal_Yadav_vs_State_Of_U_P_on_2_April_2014.PDF*, n.d.).[17]

In this context, forensic science plays a crucial role. The victim's body was severely burnt, making identification challenging. The Central Forensic Science Laboratory in Kolkata conducted DNA profiling and matched charred remains with samples from Katara's parents. The DNA results conclusively identified the body as described by Katara. Additionally, personal items, including a wristwatch gifted by Bharti Yadav, were discovered, further linking the accused to crime. These forensic findings are essential for securing conviction.

Inappropriate Uses of Forensic Evidence

Arushi Talwar Murder Case – Rajesh Talwar & Nupur Talwar v. CBI (2017)

In 2008, Aarushi Talwar, a 14-year-old domestic worker Hemraj, was killed in Noida. Her parents, Drs. Rajesh and Nupur Talwar were found guilty in 2013 based on circumstantial evidence. However, in 2017, the Allahabad High Court overturned its conviction, citing a lack of sufficient evidence and flaws in the investigation. Inquiries are significantly affected by major forensic errors. For instance, Aarushi's vaginal swabs were replaced with those of an unknown woman, which compromised the potential evidence of sexual assault. This tampering obstructs the identification of clear motives and suspects. Furthermore, the crime scene was not properly secured, leading to contamination and the loss of vital evidence. The application of narco-analysis, a discredited method, further highlighted the misuse of forensic techniques in this case.(*Aarushi Case_ Central Forensic Science Laboratory Expert Says Vaginal Swabs Were Contaminated - Times of India*, n.d.)[18].

Manu Sharma v. State (NCT of Delhi) (2010) 6 SCC 1(Jessica Lal Murder Case)

In 1999, model Jessica Lal was fatally shot at a party in Delhi after she declined to serve alcohol

[17] *Vishal Yadav v. State of U.P.*, (2014) SCC Online All 1234, https://indiankanoon.org/doc/34613760/ (last visited 15 Apr. 2025).
[18] "Aarushi Murder: CBI Probing DNA Sample Tampering," *Times of India* (2025), https://timesofindia.indiatimes.com/city/delhi/aarushi-case-central-forensic-science-laboratory-expert-says-vaginal-swabs-were-contaminated/articleshow/15645445.cms (last visited 16 Apr. 2025).

to Siddharth Vashisht, also known as Manu Sharma. Although Sharma was initially acquitted in 2006 because of uncooperative witnesses and investigative errors, he was later found guilty by the Delhi High Court and sentenced to life imprisonment, a decision upheld by the Supreme Court in 2010. The patient also had major forensic deficiencies. The ballistic report was ambiguous, suggesting that the two cartridge cases originated from different guns, which the Supreme Court found unreliable. Furthermore, the failure to recover the murder weapon and signs of potential evidence tampering, such as the swapping of spent cartridges, compromised the investigation's integrity.(*Sidhartha Vashisht @ Manu Sharma vs State (Nct Of Delhi) on 19 April, 2010*, 2010).[19]

Ankush Maruti Shinde & Ors. v. State of Maharashtra (2019)

In a pivotal ruling, the Supreme Court of India exonerated six individuals who had been sentenced to death for 16 years, citing a miscarriage of justice because of a lack of credible forensic evidence and procedural errors. The case involved the horrific rape and murder of five family members in the Nashik district, Maharashtra, in 2003. The prosecution's argument was largely based on the testimonies of two eyewitnesses, PW1 and PW8, whose statements were inconsistent and unreliable. PW8 initially identified four people who were not accused, casting serious doubt on the identification process. Additionally, prosecution did not provide any forensic evidence, such as DNA or fingerprint analysis, to connect the accused to the crime scene. The Supreme Court noted that the investigation was plagued by major lapses, including the suppression of crucial evidence and failure to conduct a fair and impartial investigation. Stressing the importance of protecting the fundamental rights of the accused under Articles 20 and 21 of the Constitution, the Court acquitted all six individuals and ordered the state to compensate them with Rs 500000 each for their wrongful imprisonment. This case highlights the essential need for a thorough forensic investigation and the risks of relying solely on unverified eyewitness testimony.(*Ankush Maruti Shinde . vs State Of Maharashtra on 5 March, 2019*, 2019).[20]

State of Tamil Nadu v. Rajendran (1999)

Rajendran was found guilty due to circumstantial evidence and forensic discoveries such as

[19] *Sidhartha Vashisht & Manu Sharma v. State NCT of Delhi* (Jessica Lal Murder Case), (2010) SCC Online Del 2499, https://indiankanoon.org/doc/1515299/ (last visited 16 Apr. 2025).
[20] *Ankush Maruti Shinde v. State of Maharashtra*, (2019) SCC Online Bom 2641, https://indiankanoon.org/doc/54814974/ (last visited 16 Apr. 2025).

bloodstains and fingerprints. However, the Supreme Court overturned his conviction, highlighting that forensic evidence needs to be supported by strong circumstantial or direct evidence.(*State Of Tamil Nadu vs Rajendran on 22 September, 1999*, 1999).[21]

Conclusion

The integration of forensic evidence into the Indian legal system offers both opportunities and challenges. Today, owing to advanced technology, forensic science has reached a high position in terms of technological advancement as well as methods of evidence collection and investigation, but the court has also raised legal issues related to the admissibility of evidence and its confidentiality. The successful integration of forensic science into the Indian legal system today requires a strong basic institutional structure, as well as effective collaboration between law enforcement agencies, forensic experts, police, and the judiciary. Legal integration can enhance fairness, accuracy, and deterrence in criminal trials by making legal documents more accessible, providing legal aid through AI-powered platforms, and incorporating restorative justice practices. It can also promote scientific evaluation and institutional efficiency by reducing wrongful convictions, increasing conviction rates for genuine offenders, and increasing the overall efficiency of the investigation and prosecution agencies. However, there are limitations and legal challenges to the integration of forensic evidence in India. The role of evidence is vital in ensuring conviction; however, there are also cases of misuse or misapplication of forensic evidence, leading to wrongful convictions and failure of justice.

[21] State_Of_Tamil_Nadu_vs_Rajendran_on_22_September_1999 https://indiankanoon.org/doc/346377/ Accessed on 16.04.2025.