

ROLE OF FORENSIC SCIENCE IN THE INDIAN CRIMINAL SYSTEM**Bhupendra Singh**

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Abstract

Forensic science encompasses a wide range of scientific disciplines, such as toxicology, digital forensics, ballistics, DNA analysis, and fingerprint analysis. Investigating crime scenes and gathering, compiling, and presenting evidence in court involve these areas. More lately, the role that forensic science plays in the Indian "Criminal Law Justice System" (CJS) have been apparent. Because it provides scientific evidence to help the investigation and resolution of criminal matters, it is crucial to the CJS. To improve understanding of the many forensic science specialties, the existing legislative framework of the Indian criminal justice system, and relevant court precedents, this research study will emphasize obstacles and offer suggestions for future improvement.

Keywords: Indian Criminal Justice System, Scientific Disciplines, Forensic Science

Introduction

The broad field of forensic science, which has gained substantial prominence within the international criminal justice system, deals with the application of scientific approaches to the investigation and resolution of criminal cases. It provides essential support for the collection, analysis, and interpretation of data that can be utilized to determine the truth, identify suspects, and detain criminals. Forensic science is also recognized as a crucial component of India's criminal justice system due to its application in investigations and court proceedings.

These days, forensic science is an integral component of the Indian Criminal Justice System (CJS), a fascinating field that uses science to solve the mysteries surrounding murders. This interdisciplinary field includes a broad spectrum of scientific methods and procedures to make the gathering, preserving, testing, and presenting of evidence in court easier. Because forensic science may provide light on the truth even in complex instances, it is essential to the investigation and prosecution of criminal cases in India. Applications for it consist of fingerprint analysis and DNA profiling. These days, it's a highly helpful tool for finding criminals, creating a link between them and the crime scene, and gathering evidence for a court case.¹

¹ Shali, Sonia Kaul, Applicability of Forensic Science in Criminal Justice System in India With Special Emphasis on Crime Scene Investigation (June 25, 2018). Medico-Legal Desire Media and Publications, Medico-Legal

Objectives

- Acquire knowledge of forensic science and criminalistics;
- Examine the role and importance of forensic evidence.
- To draw attention to the legislative measures that support criminal investigations
- To look into the restrictions on the application of forensic evidence in Indian courts

Research Methodology

This study employed an interpretive, positivistic research paradigm grounded in observation and text analysis. The research on forensic evidence and its connection to court decisions, as well as the legal systems of the United States, the United Kingdom, India, and other nations, were all critically analysed for this study. The main theoretical basis of this thesis was an examination of how criminal case management differs and overlaps in Indian and Western courts.

Literature Review

The criminal court system exists to protect victims' rights and to use law enforcement to help offenders get back on their feet. The system of criminal justice seeks to deter crime by providing moral support to offenders. The prosecution, the courtroom, the jail, the authorities, and the legal system are the main institutions that make up the criminal justice system. Governmental institutions and agencies collaborate as a system to handle criminal matters. All the criminal justice professionals work in the criminal justice system, alongside police officers, judges, attorneys, prison employees, paramedics, and other medical experts. Every position in the criminal justice system's department is reputable. (Ezeli, R. A. (2016) ²

Zapp, P. A. (2017)³ In criminal justice proceedings, forensic evidence is required to prove the commission of crimes and the scope of illegal activity. Forensic science provides a multitude of techniques for examining the evidence and its details. Advanced forensic techniques are used by forensic science experts to get additional insight into crimes and help identify those responsible. DNA testing and fingerprinting are the most advanced techniques available in forensic labs. The technologies precisely identify the perpetrators through expert analysis. These exact techniques are capable of identifying private data.

Application of forensic science in law

Application of state-of-the-art science to all fields, including DNA fingerprinting, ballistics,

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² . R. A. Ezejio, N. P. Nwakoby, et.al., —Impact of forensic accounting on combating fraud in the Nigerian banking industry, International Journal of Academic Research in Management and Business1-19 (2016).

³ P. A. Zapf and I. E. Dror, Understanding and mitigating bias in forensic evaluation: Lessons from forensic science, International Journal of Forensic Mental Health227-238 (2017)

physics, chemistry, biology, and toxicology. It is well acknowledged that the application of forensic science to the legal disciplines includes methods like drug analysis, brain fingerprinting, and other criminal law procedures. Forensic evidence is the application of one or more forensic disciplines for purposes related to criminal justice or law. In any case, the primary application of this state-of-the-art science is at the scene of the incident. Forensic science's primary duties include the identification, gathering, packaging, transfer, and assessment of biological samples and tangible evidence. If all is done following recognized norms, it will become legally sane.

The legal system acknowledges the involvement of forensic evidence in the criminal trial process as a whole. This is so that there is less room for unfairness or bias when applying scientific approaches and methodologies. That's why forensic evidence—like DNA profiling—is routinely admissible in courts all across the world. It's interesting to learn that the Chinese, in 650 A.D., developed the first forensic method that used finger and palm print identification.

Furthermore, the area of forensic evidence is subject to limitations imposed by the Indian legal system. Modern forensic science employs state-of-the-art scientific methods in both criminal and civil investigations. It is a crucial component of the criminal justice system and may provide insightful information on various issues. It covers all of the well-known techniques, including culture, DNA and fingerprint analysis, explosives and ballistics, and weaponry. When combined with other information, these findings indicate one conclusion. Expert witness testimony typically suffices to conclude a case, particularly in situations when direct proof is not available. It makes it easier for criminals to be found guilty and for innocent people to be pardoned.

Methods Commonly Used In Criminal Investigation

- 1. Fingerprint Analysis:** Fingerprint evidence is commonly considered to be the finest in the area of forensic science. Experts in fingerprint analysis use scientific methods to analyse fingerprints found on firearms, and other objects, and at crime scenes to identify suspects. The examined prints are then contrasted with known prints.
- 2. DNA Profiling:** Using the analysis of DNA samples, this cutting-edge technique establishes individual identities, connects suspects to crime scenes, and determines familial relationships. DNA profiling has revolutionized criminal investigations in India and has been instrumental in solving some difficult cases.
- 3. Examination of Ballistics and Weapons:** This field of study examines ammunition, weapons, and ballistics evidence to ascertain the type of weapon used in a crime, the bullets' trajectory, and other crucial details that assist put together the events leading up to the crime. It is a vital pillar in the struggle for justice and the truth, illuminating the risks concealed in the field of ballistics and offering data that aids in the investigation of crimes and the capture of those responsible.

4. **Questioned Document Examination:** This area of study examines the handwriting, signatures, paper, ink, and other features on documents to detect forgeries and frauds, as well as to establish their validity and connect them to potential suspects.⁴

5. The rapidly developing science of **forensic entomology** in India examines insects and other arthropods in the context of criminal investigations. It may be used to find timelines connected to accidents or injuries, identify medications and toxins, and ascertain the time and date of incidents. Though it is still in its early phases, ongoing investigation and experimentation are opening the door to new developments in criminal law.

6. **Forensic psychiatry** is a distinct area of law and medicine within Indian judicial systems, concentrating on the complex topic of mental health. Forensic psychiatry uses its specific expertise to evaluate the accused's mental condition, provide expert views, and help the legal system come to a reasonable conclusion. Thanks to its deep insights and expertise, it supports the pursuit of justice by providing clarity to difficult questions at the nexus of psychiatry and law, from evaluating criminal guilt to determining readiness for trial.

7. **Cyber Forensics:** This is the skilful use of cutting-edge analytical and investigative techniques to collect and preserve digital device evidence for use in court. The primary goal of cyber forensics is to determine the true events that occurred on a digital device and to identify the responsible party or parties by performing a rigorous investigation while upholding the chain of custody. It would be most accurate to characterize the process as exact and methodical. This applies to the collection, preservation, retrieval, analysis, and presentation of evidence from digital sources, including computers, mobile devices, cameras, and other digital media.⁵

8. **Odontology in Forensics** Identification of victims whose bodies are rendered unidentifiable is aided by forensic dentistry. Examining their teeth, oral alignment, and general mouth anatomy makes this feasible. Orthodontists, often known as forensic dentists, utilize comparative analysis to determine an individual's identity by examining tooth development and form as well as any restorative dental work, such as fillings. In criminal investigations, bite mark analysis also takes advantage of this.

9. **Examination of Forensic Pathology and Medical-Legal Deaths** A branch of pathology called forensic pathology analyses dead bodies to ascertain their cause of death. Thus, the task of determining whether evidence is acceptable in court falls to forensic medicine. processing and examination of medical samples. For instance, wound pattern recognition might help identify the weapon that first caused the wound. In addition, forensic pathologists are qualified to examine victims' entrance and exit wounds resulting from gunshots or other projectiles. Consequently, crucial conclusions regarding the cause of death—whether accidental, criminal,

⁴ Lovanshi, M. and Bansal P. "Comparative Study of Digital Forensic Tools" in Springer Nature Singapore, 2019. 2(1), pp. 195-204. Available at: <https://doi.org/10.1007/978-981-13-6351-1>, (2019)

⁵ V. R. Dinkar, 'Forensic Scientific Evidence: Problems and Pitfalls in India', 79-84, IJFSP Vol. 3 (2015).

or natural—can be made by a forensic scientist.

Provisions In Indian Legislation Related To Forensic Science

INDIAN PENAL CODE, 1860 (BHARTIYA NANYA SAHNITA,2023)

The Act is a comprehensive criminal code that enumerates several offenses in India along with the corresponding punishments. On the other hand, forensic science collects, examines, and assesses evidence in criminal investigations using scientific methods and techniques. The Act and forensic science are closely linked, as the investigation and prosecution of crimes usually depend on forensic analysis. A legal foundation for the use of forensic evidence in criminal trials is provided by the pertinent sections of the IPC, which aid in determining guilt or innocence and guaranteeing the administration of justice.

Section 328⁶: This section covers the offenses and penalties for employing poison, caustic compounds, or other dangerous items to hurt or injure someone.

Sections 272 to 278⁷ deal with the offenses of adulterating food or drink, smuggling drugs, and transmitting diseases. Forensic inquiry could be necessary in some circumstances to ascertain whether dangerous materials are present.

Sections 195⁸ and 463⁹ address document tampering and forgery, which may need forensic analysis of handwriting, signatures, and other paper-related data.

Since the former establishes guidelines for the admission, weight, and importance of evidence in Indian courts, especially forensic evidence, forensic science and the law are intimately related. However, "forensic experts" are crucial in helping the courts come to just and reasonable decisions in criminal cases by offering expert opinions, interpretations, and evaluations of forensic evidence.

EVIDENCE ACT, 1872 (BHARATIYA SAKSHYA ADHINIYAM, 2023)

The **Indian Evidence Act, Section 73¹⁰**, grants the court the power to order the taking of fingerprints from anybody, even the accused. Moreover, the Supreme Court has ruled that the constitutional safeguards mentioned in Art. 20(3) are not violated by forcing someone to provide their fingerprints. Regarding whether or not forensic evidence violates Article 20(3) of the Indian Constitution, there is a great deal of dispute.

⁶ The Indian Penal Code, 1860, Sec. 328

⁷ The Indian Penal Code, 1860, Sec. 272-278.

⁸ The Indian Penal Code, 1860, Sec. 195.

⁹ The Indian Penal Code, 1860, Sec. 463

¹⁰ The Indian Evidence Act, 1872, Sec. 73

The court determined that providing a specimen signature, thumb imprint, blood, hair, semen, etc. by the accused does not qualify as "being a witness" in the context of the aforementioned Article in **The State of Bombay v. Kathi Kalu Oghad & Others**. Thus, in order to support an investigation and trial, the accused cannot oppose to a DNA test.

Expert opinion is included in Section 45¹¹. It allows expert expertise, including forensic testimony, to be admitted into evidence in court. Forensic professionals can be consulted on a variety of areas, such as ballistics, DNA profiling, fingerprinting, handwriting analysis, and other scientific or technical difficulties.

Section 47¹²: This section discusses the examiner's perspective on electronic evidence. It allows the opinion of experts in digital forensics or related fields to be entered as evidence in court cases involving electronic data, including computer-generated documents, emails, and other digital evidence.

CODE OF CRIMINAL PROCEDURE, 1973 (BHARATIYA NAGARIK SURAKSHA SANHITA (BNSS),2023)

The 1973 Code of Criminal Procedure was amended in 2005 to facilitate the acquisition of suspects' medical data at the moment of arrest. According to Section 53¹³ of the Criminal Procedure Code of 1976, an accused individual may be subjected to a medical examination while in detention if there are "justified reasons for believing" that they might be used as evidence of the crime. In addition to any additional tests that the licensed medical professional determines appropriate in a particular case, the scope of this assessment was expanded in 2005 to include the use of modern, scientific techniques like genome sequencing to analyse blood, blood stains, semen, sputum, and sweat; samples in cases of sexual offenses; hair samples; and fingernail clippings.

In a similar vein, **Section 164A¹⁴** of the Code of Criminal Procedure, 1973 grants a woman who is accused of rape a 24-hour window for a medical evaluation, including DNA testing. Both sections allow for the collection of a DNA sample from any medical practitioner as specified by the Indian Medical Council Act, 1956 Sec. 2(h). Is there a medical practitioner who is qualified to collect and preserve DNA evidence? It is well known that appropriate sample preparation and preservation are necessary to ensure the reliability of DNA evidence. A sample that has been contaminated is worthless and can be tainted by even the tiniest error or negligence.

Section 207¹⁵: Copies of documents and statements are to be provided to the accused. The

¹¹ The Indian Evidence Act, 1872, Sec. 45

¹² The Indian Evidence Act, 1872, Sec. 47

¹³ The Code of Criminal Procedure, 1973, Sec. 53

¹⁴ The Code of Criminal Procedure, 1973, Sec 164A

¹⁵ The Code of Criminal Procedure, 1973, Sec. 207

accused may be provided with forensic reports, lab findings, and other relevant papers as part of the due process, allowing them the chance to dispute or question the forensic evidence used against them.

Section 293¹⁶: Reports from scientific experts hired by the government are permitted under this section. Scientific research or forensic studies written by government experts may be allowed into evidence in court under certain conditions.

THE NARCOTIC DRUGS AND PSYCHOTROPIC SUBSTANCES ACT, 1985

Section 50¹⁷: This section addresses the processes that must be followed in addition to the authority granted to an authorized officer to carry out illegal searches and arrests without a warrant. Critical forensic science techniques that assist in determining the type and quantity of drugs or narcotics that have been confiscated include drug identification, analysis, and weighing.

Section 67¹⁸: This section addresses the repercussions of disseminating or publishing information that encourages the use of opioid prescription pharmaceuticals or other psychoactive substances. To determine the type and content of digital or printed items, forensic investigation is required.

Landmark Judgments

Only a little piece of one palm with fingers that were uncharged made it impossible to identify the deceased victim in the **Nitish Katara murder¹⁹** case. Because the DNA profile of the deceased's parents matched the body remains' profile, the Delhi High Court was able to maintain the accused's conviction in this case.

DNA fingerprinting was used to connect the perpetrator of a horrible act of sexual violence with a four-year-old child living in a slum house in case of severe rape and unnatural sexual act. The case was looked into by the Delhi police. The court found the accused guilty and overturned the trial court's decision to acquit after closely reviewing the child's testimony and the various techniques employed in the inquiry. Additional evidence and data from DNA testing corroborated the conclusions²⁰.

The Apex Court established rules on the admissibility of brain mapping, lie detector tests, and narcoanalysis as evidence in court in the **Selvi v. State of Karnataka case²¹**. The court determined that these tests cannot be administered to an accused person without their agreement and that they infringe upon their right to self-incrimination as guaranteed by Article 20(3) of the Indian Constitution.

¹⁶ The Code of Criminal Procedure, 1973, Sec.293

¹⁷ The Narcotic Drugs and Psychotropic Substances Act, 1985, Sec. 50.

¹⁸ The Narcotic Drugs and Psychotropic Substances Act, 1985, sec. 67

¹⁹ Vishal Yadav v. State of Uttar Pradesh (2014) SCC Online Del. 1373.(India)

²⁰ State of NCT Delhi v. Sujeet Kumar, 2014 SCC Online Del 1952,(India)

²¹ Selvi vs. State of Karnataka, (2010) 7 S.C.C. 263 (India)

The Hon. Supreme Court said in the **Tomaso Bruno and Anr. v. State of Uttar Pradesh's**²² decision that scientific knowledge and information technology should be smoothly incorporated into the investigative process. This is due to the possibility that electronic evidence will prove to be an invaluable resource for law enforcement in proving truth beyond a reasonable doubt.

The facts in the gripping case of **Sushil Kumar v. State (N.C.T of Delhi)**²³ were quite dismal. Using a handgun, the accused, Sushil Sharma, brutally killed his wife Naina Sahni. He then tried to hide his horrible deed by trying to burn her corpse in a tandoor. A handgun and blood-stained clothes were found thanks to the careful work of the investigating authorities, and they were wisely examined by forensic experts. In addition, the victim's parents' blood samples were collected, and the resulting DNA report unequivocally established that the burned remains were that of their (dead) daughter.

Restrictive Use Of Forensic Science In Indian Courts.

Just 2.3% of rape and murder prosecutions and 4.7% of murder trials have utilized DNA evidence. The author of new research on rape cases over the last ten years discovered that, in spite of the shockingly low number of instances and the necessity of making deliberate attempts to integrate scientific proof in all criminal issues where relevant, Indian courts are currently relying more on forensic testimony and DNA.

The discipline of crime scene investigation in India remains fragmented even with a wealth of options, expert judgment, great potential, and an integration of the newest methods, modalities, and research. Forensic science sometimes lacks an inter-professional approach since it is multitasking, multi-professional, and multi-degreed.

Based on the combined use of the fingerprint bureau and FSLs, the Committee on Reforms of the Criminal Justice System also reported that only 5-6% of registered crime cases involve the use of forensic science in the context of criminal investigation. Significant progress must be made, particularly because the country's conviction rate has been falling for some time and that forensic evidence—which is often conclusive—will only partially reverse this trend.

The courts have often cited the following as justifications for their unwillingness to use evidence from forensics in criminal investigations: misdirection of physical evidence, incorrect assortment, storage, non-collection of clue proof, lack of upkeep of chain of custody, and delayed send out of physical proof for scientific analysis. If the suspect, an associate in nursing, had not been taken for a medico-legal examination, had not been taken out for fingerprints by the officer conducting the investigation, or had not been sent a bloodstained ethical object for

²² Tomaso Bruno and Anr. Vs. State of Uttar Pradesh, (2015) 7 S.C.C. 178(India)

²³ Sushil Kumar vs. State (N.C.T of Delhi), (2014) 4 S.C.C. 317(India)

chemical analysis without a cover, the court would surely reject the report.²⁴

Difficulties faced by associated subsidiaries

Forensic evidence is still an underutilized area of technology since even the investigating officer is inexperienced and unskilled. So far, studies have been carried out with outdated, non-scientific techniques.

In laboratories, basic infrastructure and even forensic personnel are insufficient. A few significant challenges facing this field are finance, coordination between law enforcement and forensic specialists, and inadequate equipment. The committee studying the draft national policy found that the framework ought to take forensic science oversight, professionalism, research, and development into account.²⁵

The Malimath committee study also suggested giving special importance to the establishment of forensic laboratories outfitted with cutting-edge equipment. Certain criteria must also be created to provide recommendations during DNA profiling of the samples for analysis.

Suggestions

Encourage Research and Innovation: In forensic science, fostering research and innovation may lead to improvements in best practices, technology, and methodology. Innovative forensic science methods that improve the investigation, prosecution, and adjudication processes can be fostered by providing funding for research initiatives, forming research partnerships, and offering incentives for creativity.

Improve Forensic Infrastructure and Facilities: Investing in cutting-edge forensic infrastructure and facilities can increase India's capacity for forensic science. Forensic science infrastructures may be strengthened by modernizing labs, offering cutting-edge tools, guaranteeing sufficient funding, upholding high standards, and maintaining standards of excellence. This will allow forensic specialists to carry out their tasks accurately and efficiently.

Conclusion

In conclusion, evidence and forensic science are essential parts of the legal system. The discipline of forensic science is developing quickly as a result of scientific and technological advancements. According to several commission conclusions, courts that incorporate scientific evidence into their rulings have the potential to enhance democracy's core value of justice. However, courts have been hesitant to employ forensic science in their procedures due to their

²⁴ Roman, J. K., Reid, S. E., & Reid, J. , "Forensic Science Evidence and the Policing of Crime: The Case for a New Conceptual Framework for Understanding the Impact of Forensic Science Evidence.," *Criminology & Public Policy*, 17(2), 505-536.(2018).

²⁵ Prachi Kathane, Anshu Singh, J.R. Gaur, Kewal Krishan, "The development, status and future of forensics in India", *Forensic Science International; Reports*, 3, (2021)

prior experiences with tainted evidence and falsified outcomes. Even while this industry benefits the legal system, there are still holes that need to be filled. We have to make sure that the benefits of forensic science are fully utilized by all parties engaged in the legal system.