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The Intersection of Forensic Science and New Criminal Laws: Bridging the Gap Between Investigation and Conviction

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Abstract: *Today the forensic science makes an important contribution in every domain to help and decide the guilt of a suspect. The application of the science and technology to the detection and investigation of crime and administration of justice is not new to India. Its reference is found in kautilya's Arthshastra and about 2300 years ago. All though during ancient Era forensic science is not known scientifically in its present form, but some scientific methods were followed to investigate the crime and to impart justice..*

Keywords: forensic science

I. INTRODUCTION

Today the forensic science makes an important contribution in every domain to help and decide the guilt of a suspect. The application of the science and technology to the detection and investigation of crime and administration of justice is not new to India. Its reference is found in kautilya's Arthshastra and about 2300 years ago. All though during ancient Era forensic science is not known scientifically in its present form, but some scientific methods were followed to investigate the crime and to impart justice. This progression holds particular significance in the light of new criminal laws which aim to confront modern challenges in crime detection and prosecution. The integration of forensic science into criminal laws not only enhances the investigative accuracy but also necessitates a re-evaluation of existing legal framework to accommodate emerging scientific techniques. The forensic methodologies evolve the law governing, their applications and its admissibility in the court, to determine the guilt or innocence, to ensure the standards of justice.Integrating forensic science into the legal process can improve the judicial system's credibility and transparency. When used effectively, forensic evidence this enhances the case for both the prosecution and defense, ensuring justice is founded on facts rather than preconceptions. Forensic science plays a crucial role in ensuring justice in criminal investigations and trials, providing empirical support for the legal process.

Forensic science in India confronts obstacles, including poor infrastructure, a lack of skilled workers, and delays in testing.To fully integrate the forensic science system, additional legislative, administrative, and institutional reforms are needed. Integrating forensic science into the justice system involves not only improving technical aspects of investigations, but also assuring improved access to justice, faster trials, and more accurate findings.

The legislative reform and forensic innovation ultimately contributes to build a more robust system capable of addressing complex criminal cases effectively. The new laws where incorporated to build a public trust in the existing legal system ensuring that justice is served fairly and transparently with the advancement in the forensic techniques as it focus on, use of technology.

The incorporation of advanced forensic techniques, such as DNA profiling, fingerprint matching, ballistic studies and digital evidence collection, along with the utilization of expert opinion, may be crucial in bolstering the new law's dedication to establishing an efficient and modern criminal justice system and legal framework in India. Most of the legislation in India's criminal justice system are derived from the legal traditions of different areas or originate from the period when India was under colonial administration. Furthermore, the new legislation stipulates that the entire event must be recorded on camera. Legislators are optimistic about improving the protocols for conducting investigations and criminal inquiries by implementing a team of specialists who will conduct on-site examinations and gather evidence in the most efficient manner feasible. This law replaces the CrPC. Under the new law, lawmakers promote the use of

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technology for trials, appeals, recording of submissions and use of video conferencing for every step of legal proceedings. Further, it empowers magistrates to take cognizance of offences based on electronic records such as email, SMS and instant messages, which can facilitate evidence collection and verification process. It is important to note that under the BNSS, lawmakers have introduced a new provision which states that 'a forensic examination will be mandatory in cases with offences that are punishable with imprisonment of seven years or more which are categorized under heinous offences'. Further, it is also mandatory under the new law to video record the entire proceeding.

By introducing this provision, lawmakers aim to enhance investigative processes and criminal investigations by ensuring that a team of experts conduct an on-site examination and gather evidence in the best possible manner.

Provision under new Criminal Laws

The use of technology and forensic science in the criminal justice system is stated in BNSS and the main provision that deals with, the use of forensic evidence under clauses 176 (3) ,349, 329 and 330.

To collect the evidence from crime scene Close 176 incorporated as a mandate to collect the forensic evidence at crisis by the forensic expert in the offences where the punishment is prescribed for 7 years or more. It also ensures that forensic expert must visit the crime scene, collect the evidence and investigate the crime.which standardized the collection and analysis of forensic evidence by minimizing the risk of tempering the evidences.For instances, in case of homicide forensic expert is required to visit the crime scene, collect the evidences and to give detailed report to magistrate.

The term forensic expert under clause 176 (3) includes government forensic laboratories officer or scene of crime officer (SoCos) working with the police as well as private forensic expert.In this section itrequires police to collect forensic evidence from crime scenes in major offenses. This evidence will be collected and preserved by experts, who will ensure that it is handled properly.

Forensic scientist working in forensic science laboratory also included within the term forensic expert under the provision for the crime scene examination.Forensic evidence gathered from a crime scene, such as fingerprints, DNA samples, and other physical evidence.

The same expert may proceed to examine the evidence collected from the crime scene. Therefor it lead to serious concern that the experts make, it is relevant information during the crime scene examination as accused person or witnesses are present during the crime scene examination.

Visiting the crime scene for forensic examination also increases the work load of forensic examiners.

Collection of evidence from individual. It has widened the scope of clause 349 where magistrate order to collect the forensic samples from individuals under section 311Aof CRPC by two ways

Firstly, where the samples which may be collected from signatures and handwritingit must include fingerprints and blood samples.

Secondly the magistrate can order the collection of samples from any person connected with the offence or investigation with reasons to be recorded in writing.

Collecting the individuals personal data or evidence raise the serious concern to right to privacy also regarding the validity and reliability of the forensic techniques.

Fingerprint analysis

The accuracy of fingerprint analysis is in question as error rate is as high as 28.1%. Besides the high rate of error in fingerprint examination, which impacts its reliability, there is also a lack of empirical evidence of the uniqueness of fingerprints.

Voice analysis

The condition for voice comparison such as relevant linguistic population status circumstances in which the voice recording was made, storage and transmission condition of the voice clip.

The characteristics of a single individuals voice in saying the same things varies accordingly, depending on various factors such as language ascent dialect, speaking styles and emotions.

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Lack of procedure of validation in forensic science laboratories

The reliability and accuracy of fingerprint and voice analysis pose concerns, as does the issue of quality management within Indian forensic practice, which has been successfully handled in certain cases. In the absence of established practices or norms, laboratories conduct such examinations.

Videography

Videography has been compulsory at the time of search and seizer which will be part of the case and this will save an innocent citizen from being implicated. Adding to this no chargesheet will be valid without such recording by the police. At the same time compulsory provision of videography by the police will ensure that fair play and integrity of law enforcing agencies are not compromised at any cost.

Exemption from judicial scrutiny

Under the new laws that is BNSS cl.329 and section 293 of CRPC allows submitting the report by forensic expert or government scientific expert need not appear before the court as a witness for oral testimony therefor scientific expert is exempted from the court deposition. Cl.329 widens the exemption from oral examination for forensic experts. Section 329 allows experts to submit reports to the court rather than testifying in person. This provision saves time and resources because experts can submit their opinions and findings in writing rather than in court.

Issues of fair trials

Section 45 of Indian evidence act permits to rely on the expert opinion including in the matter of science. But the code has that in spite of export of union the accuracy and reliability of the expert finding should be reviewed based on available data and materials.

In Rahul v State (NCT of Delhi)

The apex court this regarded the DNA evidences on the basis that , the lower court head field to examine the basis of DNA report and weather the expert had reliably conducted the examination.

The forensic evidence plays a very crucial role in administration of criminal justice system; lack of adequate scrutiny of forensic reports would adversely affect the right to fair trial of accused as well as the victim

cl.329(4) exemption from deposing before court is applicable to scientific government or scientific experts. There is no such distinction between forensic examiners, practicing the same forensic disciplines. Therefore lack of such specification and distinction may leads to arbitrariness.

cl.330(1) limits the parties to the trial (both accused and victims) from examining experts only to thematters regarding the genuineness of the report.

Forensic laboratories report is submitted by the prosecution during the course of trial or after recording the evidence by the prosecution or the statement of the accused under section 313 of CRPC. Under such circumstances the accused does not receive any opportunity to raise the objection to the genuineness of the report under section 294 of CRPC.

Mobile forensic labs and quick analysis Forensic Science in the Spotlight

Recognizing the increasing importance of forensic science in crime investigation, the Act mandates the involvement of forensic experts in relevant cases.

Mandatory Forensic Analysis: For crimes with severe penalties, the Act requires forensic teams to be involved from the outset, ensuring that evidence collection and analysis are conducted with scientific rigor.

Enhancing Conviction Rates: By integrating forensic science into the evidence-gathering process, the Act aims to strengthen the evidentiary basis for convictions, thereby improving the overall efficacy of the judicial system.

Emphasizing on the issue of forensic evidences the government has introduced the mobile forensic labs for quick analysis so that mobiles forensic labs perform the testing and reducing the time to process and improve the efficiency of criminal justice system.

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Challenges in adapting Forensic science to meet New Legal Requirements:-

Forensic science has its own importance and benefit but there are some challenges and limitations such as

Despite of Newly added provisions under Criminal laws it may subject to misinterpretation or misuse which tends to wrongful or acquittals conviction. Evolution of technologies to investigate the matter and gathered evidences which ensure the justice and maintain the fairness and integrity. However the courts often face difficulties to form an opinion due to complexity of forensic methods and techniques depends on expert witness whose interpretation differs. Therefore it raises the questionson expert opinion, the lack of reliability, impartiality and admissibility of Forensic evidence. Lack of Scientific knowledge and literacy amongst thelegal professions even there is a requirement for cross-disciplinary educations and collaboration.

Even the delays in complex processing of forensic evidences, which often leads to pendency in Crime laboratories.

1. Possibility of Human error: Biased report, properly not handling the evidences, flawed analysis can affect the creditability and reliability of the Forensic

2. Lack of means: - In various crime laboratories faces may problems such as delaying the analysis of evidence, preservation limitations etc.

Reliability and admissibility of Evidences: -The existing legal system differs from accepting the forensic evidences in court.

The techniques and advanced technology used for investigation.

We're not well equipped with it and forensic practitioners and police personalizes needs to upgrades and training to yield accurate results.

Administration of Justice and Existing Legal frame work.

The foremost and important principal of legal frameworks is due process is to which ensure the individual & rights is to be protected from arbitrary arrest, the presumption of innocence access to legal representation and right to be treated fairly and impartially within the legal system. So the procedure established by law does not set aside the fundamental rights of individuals.

Intersection of Legal frame works and forensic science .:- Issues and challenges forensic science must within the legal frame works and its importance in criminal justice is Structured by Law governing evidence, procedural justness and expert affirmation.

Expert Deposition: - Law must provide certain guidelines for the use of forensic experts in the court. The experts must ensure and stick up to the standards of impartiality and not to detriment the judicial process.

Validity and Reliability: The important aspect of scientific validity and Reliability of forensic evidence.The court must anticipate on the legal doctrines, such as Daubert standards. So as to minimize risk of wrongful convictions based on faculty or pseudoscientific practices.

Chain of custody: To meet the chain of custody, it requires handling protocols and strict documentation so as to ensure the integrity of forensic evidence.

Privacy and Ethical Concerns: The use of technology may affect the privacy of the individuals for example, the collection of DNA sample or Surveillance Therefore the existing legal framework show the concern for protecting the individual's rights.

Despite of advancements of use of technology in criminal justice system the existing legal framework has undetermined gap in technical and procedural aspects which affects the efficiency, reliability and fairness of judicial outcome. Even in absence of standardized practices it weakens admissibility as an evidence in the court. The gaps often arises have due to Judicial discretion as judges may limited Scientific literacy, accepting the outdated doctrines such as Frye or Dauberts test, which is not sufficient for enough for emerging technology like AI in digital Forensic.

Even there are certain resource constraints which leads to Backlogs in crime laboratories which affects the processing limited access to Advanced techniques such as next generation DNA or high-resolutionmass spectrometry, etc. Even so many regions were not having well equipped or furnished laboratories or forensic services therefore it create variations or gap in quality of the results which hinder the use of Forensic Sciences in criminal justice system.

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The Ethical and procedural is another concern or gaps need to be addressed as it includes bias in evidence analysis, favorable outcomes that with investigators expectations Improper handling of evidence or contamination of evidences raised uncertainly about its reliability.

In O.J. Simpson Case (1994-1995)

O.J. Simpson wasNFL player and actor, tried for the murder of his wife Nicole Brown. This Criminal trial case is one of the most famous in U.S. history. Where forensic evidence played a very crucial role. The use of DNA techniques is to linked with crime scene and Blood samples found in Simpson's car and home were matched with victims blood. Even they examined the hair fiber's gloves and foot prints. But due to mishandling, contamination of evidence and improper storage of blood samples became prominent for defence argument. Simpson was acquitted, due to the ability of defense to discredit the existing forensic evidence. From this case it shows, it is important to have handling protocols and minimizing external influences in the judicial process.

The Delhi Nirbhaya Case (2012)

It was a case of gang rape and Murder in Delhi. In this caseForensic Science played a vital role in convicting the offenders.

In CaseyAnthony (2008)

Casey Anthony was charged with the murder of 2 years old daughter. ButCasey was acquitted from the charge of murder. In this case it was highlighted the challenges of using emerging forensic techniques in court and need to have robust validation of method before their application in legal proceeding.

The Green River killer case (1980-20001)

Gary Ridgway was convicted for murdering 49 women. In this case it was highlighted how advancements of forensic science can solve cold cases.

II. CONCLUSION

The integration of forensic science and legal frameworks marks a pivotal evolution in the criminal justice system, offering immense potential to enhance its accuracy, efficiency, and fairness.

Despite its promise, significant challenges persist in fully realizing the potential of this integration. Inconsistencies in forensic practices, varying standards across jurisdictions, and gaps in judicial understanding of scientific principles often undermine the reliability and admissibility of forensic evidence in court. Judicial training is critical to bridging this knowledge gap, enabling judges and legal professionals to better evaluate the credibility and relevance of scientific findings. Additionally, forensic science is not immune to systemic issues, such as biases in evidence interpretation, inadequate funding, and unequal access to resources, which disproportionately affect marginalized communities.

The rapid pace of technological innovation adds another layer of complexity and opportunity. Emerging tools such as artificial intelligence, next-generation DNA sequencing, and digital forensics have revolutionized investigative capabilities, enabling law enforcement to solve cases with unprecedented speed and precision. However, these advancements also bring ethical and legal challenges, including concerns about privacy, data security, and potential misuse of technology.

Public perception of forensic science, shaped by media portrayals and the so-called "CSI Effect," has raised societal expectations for the role of science in justice. While this phenomenon can lead to unrealistic demands for scientific evidence in every case, it also highlights the importance of transparency and accountability in forensic practices. Increased public awareness provides an opportunity to advocate for greater investment in forensic infrastructure, education, and research

Ultimately, the convergence of forensic science and legal frameworks represents a transformative opportunity to redefine how justice is sought and delivered. By addressing current challenges and embracing technological and collaborative advancements, societies can create a more equitable, credible, and future-ready criminal justice system. In doing so, it lays the foundation for a system that serves the needs of all individuals, ensuring that the pursuit of justice remains steadfast, impartial, and aligned with the evolving realities of the modern world.

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