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Role of Forensic Science and Digital Evidence in Criminal Justice

ABSTRACT

The integration of law, science, and technology in the evolving criminal justice environment has re-established the way guilt and innocence are established. Justice cannot simply be done but must be seen to be done and as rightly pointed out this philosophy is more so applicable in an age where scientific accuracy and electronic footprint are becoming more and more the deciding factor in a judicial process. The use of oral testimony and circumstantial evidence which has been in existence since time immemorial is being supplemented and sometimes supplanted by evidential science and digital evidence, redefining the norms of evidence and legal reasoning. In this paper, the critical examination will be made on how forensic science including DNA profiling, fingerprint analysis and forensic pathology is increasingly becoming important in offering objectivity and scientific certainty in criminal trials. Likewise, it looks at the role of digital evidence, such as electronic documents, phone records, surveillance video, and social media communications, which is becoming more significant under the Indian Evidence Act, 1872, in particular, in the laws on electronic evidence. The paper also examines the jurisprudential change into scientific evidence to emphasize how the courts are turning to expert opinions and computer trails more and more to support facts, minimize wrongful convictions, and bolster the reliability of the adjudicatory system. It concludes that the incorporation of forensic science and digital evidence is not only a technological development, but also a legal change that needs to take place to bring about fairness, accuracy, and integrity to the contemporary criminal justice system.

KEYWORDS

Forensic science, Digital (electronic) evidence, Criminal Justice System

INTRODUCTION

A criminal justice system is the foundation of any society that aims to uphold order and safeguard rights as well as to make sure that justice is served in a fair manner. This system has traditionally been highly dependent on oral evidence and witness testimony as a means of proving facts during a criminal trial. Human memory, oral testimony, and circumstantial evidence to ascertain guilt or innocence have long been

relied upon by courts. Such methods have been vital, but are usually limited by factors like memory failures, bias and manipulation.

Over the past years, there has been a radical change with the incorporation of science and technology in the legal process. The use of forensic science has brought about objective and scientific approaches like DNA profiling, fingerprint examination and forensic pathology, which assist in proving facts with more confidence. Meanwhile, the advent of digital technology has also given way to the emergence of electronic or digital evidence, such as emails, call records, CCTV footage, and social media data. This has widened the area of evidence and changed the way investigations and trials are carried out.

This change is especially applicable to the current scenario, as crimes have become more sophisticated and technology-oriented. The fast growth of cybercrime, organized crime, and more technologically advanced crimes has rendered traditional types of evidence inadequate in most instances. This has been accompanied by an increasing demand towards accuracy, reliability and speed of administering justice, which is more suited to scientific and digital evidence.

It is against this backdrop that this paper seeks to discuss the place of forensic science and digital evidence in the current criminal justice system. It aims to examine their increasing significance, legal status, and the effect they have on promoting fairness, accuracy and integrity in the criminal adjudication process.

RESEARCH QUESTIONS

- What can forensic science do in contemporary criminal trials?
- What are the ways of identifying digital evidence in Indian law?
- How effective are forensic and digital evidence in enhancing justice administration?
- What are the challenges in admissibility and reliability of such evidence?

RESEARCH OBJECTIVES

- To research the significance of forensic science in criminal justice.
- To examine the legal system of digital evidence in India.
- To determine the importance of expert opinion in judicial decision making.
- To find difficulties in using scientific and digital evidence.
- To propose ways on how to improve the implementation.

ELECTRONIC AND SCIENTIFIC EVIDENCE

Forensic Science

Forensic science is the use of scientific methods and techniques in detecting crime. It is a mediator between law and science as it helps courts to establish facts using objective and verifiable means. It is based on empirical data as opposed to human perception unlike the traditional evidence.

It includes a number of specialized divisions. DNA profiling allows people to identify individuals based on genetic material, and is regarded as one of the most reliable evidence types. Personal identification is common with the use of fingerprint analysis which is founded on the distinctiveness of ridge patterns. Ballistics is the study of guns, bullets and trajectories to establish the usage and source of weapons. Forensic pathology is concerned with finding out the cause of death by medically examining the body.

An example is that DNA taken at a crime scene can be compared to a suspect with almost certain accuracy, and thus either give a verdict of guilt or a verdict of innocence. This scientific precision results in greater reliability of the adjudicatory process.

Digital Evidence

Digital evidence is any probative information in electronic format that is either stored or transmitted. As the society continues to be more digitized, this evidence has become essential in traditional as well as cyber-related crimes.

It encompasses different types like emails, CCTV video, call detail records, and social media messages. These are usually a chronological and factual account of events, and they can be used to reestablish the chronology of a crime.

Digital evidence is determinant in the face of cybercrime and technologically advanced crimes. When authenticated correctly, electronic records (not to mention that they assist in investigation) enhance the evidentiary structure by offering accurate and time-stamped data.

LEGAL FRAMEWORK: BHARATIYA SAKSHYA ADHINIYAM (BSA)

The BSA is the mainstay of admissibility of evidence in the Indian courts. In case of a research paper on forensic and digital evidence, the following

transitions are crucial:

Section 39 - Expert Opinion (Previously Section 45 IEA)

This part enables the court to come up with an opinion guided by the testimony of people who are experts in certain areas.

Relevance: It is the entry point to Forensic Science. It includes views on foreign law, science, art, finger impressions, and most importantly handwriting and digital signatures.

Application: In the case where a forensic expert is analyzing a DNA sample or a ballistics report, his or her testimony is introduced under this section.

Section 63 - Electronic Records (previously Section 65B IEA) Admissibility

It establishes that electronic records are considered “documents” and are admissible as evidence if they meet specific criteria.

The Certificate Requirement: Section 63(4) requires any information stored in an electronic record to be accompanied by a certificate. This certificate must:

- Determine the electronic record.
- Explain how it was manufactured.

Be signed by a person in charge of the device or a relevant expert.

Admissibility: BSA has made this easier by accepting that paper records are equal before law as their digital counterparts, as long as the integrity (provenance) of the digital record is certified by this certificate.

Section 22 - Oral Admissions (Previously Section 22A IEA)

In this part, it is provided that oral admissions as to the contents of electronic records are not normally to be relied upon, unless the authenticity of the electronic record itself has been produced and established. It safeguards the best evidence rule, which means that the electronic file is self-evident and does not need hearsay.

Section 71 - Signature/Fingerprint Verification (Previously Section 73 IEA)

This section gives the court the authority to make comparisons of a signature, writing or finger impression that is in dispute with that which has been shown or proven to be true. This can be carried to the digital

age of biometric verification and forensic linguistics.

Position within the Criminal Justice System.

The change to BSA is a shift to a Digital First approach. Forensic science serves as the silent witness, offering objective facts that may be twisted by human testimony.

- **Digital Evidence:** The definition of evidence provided under the BSA has been broadened to include digital logs, emails, GPS data and social media messages.
- **Forensic Mandatory Provision:** It is noteworthy that under the corresponding procedural law (BNSS) the forensic examination now becomes obligatory in case of crimes that are punishable by seven years or more, which considerably increases the significance of Section 39 and Section 63 of the BSA.

The BSA removes the “secondary” status of electronic records. The legal system has become as quick as the technology of crime itself, with certified digital files as primary evidence, making forensic information not an incidental add-on, but an essential part of the trial.

LANDMARK CASES

P.K. Basheer v. Anvar P.V. (2014) Confirmed that digital evidence could not be used without the certificate of Section 65B (since changed to Section 63 BSA).

Tomaso Bruno v. State of U.P. (2015) Cited that where CCTV footage is not produced by the prosecution, but it exists, there is a severe of custody gap.

Selvi v. State of Karnataka (2010) An important forensic case on Narco-analysis and Polygraph tests that a forced forensic test contravened Article 20(3) (Right against self-incrimination).

ROLES WITHIN CRIMINAL JUSTICE SYSTEM

Enhancing Accuracy

Forensic science also brings in an aspect of accuracy that is normally lacking in conventional evidence. Scientific evidence is based on objective analysis unlike human testimony that can be affected by lapses of memory, prejudice, or pressure. Such methods as DNA profiling and fingerprint analysis offer results which are rooted in quantifiable data as opposed to subjective perception.

This change minimizes the reliance on untrustworthy witnesses. The courts no longer have to depend on the oral statements which might be conflicting or inconsistent. Instead, scientific discoveries serve as a self-check, which enhances the persuasiveness of the evidence and makes sure that the conclusions are made based on truth and not on presumption.

Preventing Wrongful Convictions

Prevention of wrongful convictions is one of the greatest contributions of forensic and digital evidence. In the case of the guilty and the innocent, DNA analysis has turned out to be a potent instrument in both the guilty and the innocent. It is an objective and unprejudiced kind of evidence, and it can help to rectify court mistakes.

Likewise, electronic data, like call logs, GPS positioning, and electronic transactions can be used to create an accurate timeline. Such digital footprint can verify or refute allegations in court, thus minimizing the possibilities of false implication. Scientific and electronic evidence in this manner serves as a fence against miscarriages of justice.

Strengthening Investigation

The field of forensic science plays a significant role in improving the quality of criminal investigations. It allows the criminal investigating officers to recreate the crime scenes more clearly and correlate the suspects to a particular action by physical evidence like blood samples, weaponry analysis, or ballistic report. This scientific reconstruction makes investigation more speculative to become a methodical process.

Meanwhile, the digital evidence is also valuable in monitoring movements and interactions. Location data collected through mobile devices, CCTV video and social media usage give a real-time account of the activities of an individual. These online footprints can help the police to recognize suspects, create links and detect concealed trends, which makes the investigation process more effective and trustworthy.

CHALLENGES AND ISSUES

Although the role of forensic science and digital evidence is increasingly becoming important in India, there are limitations to its use. These issues have implications on the credibility of evidence as well as the effectiveness of the criminal justice system.

Lack of Forensic Infrastructure

India is still experiencing the problem of lack of well-trained lab specialists with well-equipped laboratories. Several states depend on few

labs, which results in overworking and insufficient scientific assistance in the course of investigations. This poor infrastructure usually undermines quality and timely gathering of evidence.

Failure in timely forensic reports

Delay in getting forensic reports is one of the most endemic problems. Reports can take months or even years due to backlog and shortage of manpower. These delays do not only slow down trials, but also undermine the evidential worth especially in cases where time-sensitive analysis is needed.

Possibility of Interfering with Digital Evidence

Digital evidence is incredibly susceptible to manipulation, as powerful as it is. Without proper precautions, electronic records can be manipulated, erased or even forged. There is no strict chain of custody and poor cybersecurity practices, which cause the possibility of misuse, casting doubt on authenticity.

Insufficient Awareness and Education

Scientific evidence should be used effectively and this is only possible with the right understanding. Nevertheless, a significant disparity in technical expertise between the police officers, prosecutors, and even the judiciary is still evident. This usually results in mishandling, misinterpretation or underuse of important evidence.

Strict Legal Requirement of Section 65B and BSA

Section 65B of the Indian Evidence Act which is now the Bharatiya Sakshya Adhinyam has made the admissibility of electronic evidence subject to the strict procedural requirements. Although these rules are put in place to achieve authenticity, they are inflexible in safeguarding the same, and thus, such strictness leads to the exclusion of valid evidence due to technical reasons, thus impacting substantive justice.

All in all, forensic and digital evidence can empower the justice system, but these practical and legal issues need to be tackled to make their effective and fair use.

CHANGE IN THE LAW: IT IS NO LONGER TESTIMONIAL EVIDENCE BUT SCIENTIFIC EVIDENCE.

The criminal justice system in the past was very dependent on oral testimony and witness accounts. Judgment of any case usually rested on perception, memory, and narration which are subjective and are

susceptible to inaccuracy.

The modern legal system has a definite shift towards the scientific and technological evidence. Courts have increasingly become dependent on forensic examination, computer records and expert opinion that help them to determine facts in a precise and objective manner.

The change is an indication of change to subjective assessment to objective verification. Scientific evidence, like DNA profiling or electronic data, provides quantifiable and repeatable outcome, minimizing the extent of bias and inaccurate interpretation.

Consequently, experts and technology have taken the center stage in the process of judicial decision making. The law is slowly changing so that the justice is not only founded on what is said, but what can be scientifically established.

SUGGESTIONS AND RECOMMENDATIONS

Strengthening Forensic Infrastructure

Scientific justice rests on a strong forensic system. The urgent need is to modernize the laboratories with the latest equipment, timely analysis, and improving forensic facilities in the region. This will minimize the time wastage and make forensic reports more believable in a criminal trial.

Police and Judiciary capacity building

The scientific and digital evidence should be used properly based on the knowledge of the people involved. The police officers, prosecutors and judges should undergo regular trainings to ensure that such evidence is collected, preserved and appreciated within the legal system.

Simplification of Electronic Evidence Rules

The admissibility of electronic evidence, more so under the Indian Evidence Act, 1872, ought to streamline its procedural requirements. Although there is need to provide safeguards, over technical demands can be counterproductive to justice. There must be a moderate stance to guarantee both genuineness and promptness.

Assuring Custody and Data Integrity

It is important to maintain integrity of evidence. There should be strict procedures of maintaining the chain of custody to avoid tampering or contamination. Digital evidence, specifically, must be handled under secure handling systems in order to preserve the value of evidence.

Emerging Technologies Responsible Use

The incorporation of artificial intelligence and improved analytical resources must be treated carefully. Although they are efficient, the implementation of these technologies should not be done at the expense of such values as fairness, transparency, and accountability to avoid misuse and over-reliance.

CONCLUSION

The increasing application of forensic science and computerized evidence has essentially empowered the criminal justice system by bringing scientific accuracy in the fact-finding process. In these times where crimes are increasingly becoming more intricate and technologically advanced, the use of objective and verifiable evidence is no longer a choice but a necessity. These are the tools that have transformed the determination of guilt and innocence.

Increased accuracy and credibility of criminal trials is achieved through forensic methods like DNA profiling and fingerprint analysis, as well as electronic communications and surveillance information. They make less use of fallible human testimony and assist in making sure that the decisions made are grounded on reliable and accurate information. This change will help in bringing fairness by reducing the number of mistakes and improving the level of transparency in court verdicts.

Meanwhile, the incorporation of such evidence requires appropriate management, consciousness, and legal protection in order to preserve its integrity. Responsibly used, forensic and digital evidence is not only useful in the investigation, but also helps to maintain the principles of justice.

After all, the future of criminal justice is the adoption of scientific and technological solutions. Justice must not simply be done but must show, by evidence, that is credible, objective and trustworthy.