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THE GROWING ROLE OF FORENSIC SCIENCE IN CRIMINAL INVESTIGATION: ADMISSIBILITY IN THE INDIAN LEGAL SYSTEM AND FUTURE PERSPECTIVE

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Abstract: Forensic science is the application of scientific principles to legal investigations. It allows for an in-depth analysis of evidence and allows the investigating officials to make a detailed report of their findings. It involves a range of techniques which include analysis of DNA Samples and fingerprints, autopsies, pathology, toxicology and more. These assist in solving crucial problems in the investigation process and establish links which lead to the solving of the case. The investigating team plays a crucial role in the Criminal Justice System in India as it is the first step of the trial process in India. The case proceeds before the judiciary only after the evidence has been examined thoroughly and the investigation agency submits its report. In the recent years, with rapid strides in technology, Forensic Science has developed at a fast pace.

In the modern times, Forensics is heavily dependent upon the advancement of technology to be more useful. It is imperative that the Indian Legal System stays up to date with the latest developments in the field of Forensic Science and is ready for the coming times do accommodate the progress made in the field. The paper explores the role of Forensic Science in the Indian Criminal Justice System and the legal developments regarding the same. The major decisions made by the Indian Judiciary which have assisted in the development of Jurisprudence related to Forensic Science will be analysed. The future of Forensic Science in India will also be discussed. Furthermore, suggestions will also be provided to make Forensic Science as an effective domain of Criminal Investigations in India.

Key Words: Criminal Investigation, Forensic Science, Criminal Justice, Indian Legal System, Crime and Technology.

I. INTRODUCTION

Forensic Science is a critical element of the criminal justice system. The evidence from crime scenes and related areas is examined by Forensic Scientists to develop objective findings that can assist in the investigation and prosecution of perpetrators of crime or absolve an innocent person from suspicion. It has found great use in modern day criminal investigation across the globe. It is a branch which greatly benefits from the advancements in science and technology.

Forensic Science has been defined by the ***California Criminalistics Institute*** as:

"Forensic Science is the application of the methods and techniques of the basic sciences to legal issues. Forensic Science is a very broad field of study. It includes Crime Laboratory Scientists, sometimes called Forensic Scientists or, more properly, Criminalists, work with physical evidence collected at scenes of crimes."

Encyclopaedia Britannica has defined Forensic Science as, *"The application of the methods of the natural and physical sciences to matters of criminal and civil law. Forensic science can be involved not only in investigation and prosecution of crimes such as rape, murder, and drug trafficking but also in matters in which a crime has not been committed but in which someone is charged with a civil wrong, such as wilful pollution of air or water or causing industrial injuries."*

The main role of Forensic Science is the application of the techniques developed in natural sciences to the process of Criminal Justice Investigation. It involves the identification and recognition of key evidence through the use of scientific techniques in order to administer justice. It has been termed as, *"one of most energetic, charismatic and contemporary and exhilarating branch of science used in identifying crimes and criminals."*[1] It makes use of the advances in the field of science to aid in criminal investigations, allowing them to be faster and more efficient.

1.1. Development of Forensic Science in India

In India, technology has been used for investigation since ancient times. It can be traced back to the time of Kautilya's Arthashastra. Fingerprints were being used as signatures and for identification of criminals. In the 19th century, labs were established with the aim of compiling forensic reports. The first fingerprint bureau was established in Calcutta in the year 1897. It kickstarted the application of Forensic science in criminal investigations in India. It also led to the establishment of more Forensic Laboratories across the country. This was furthered by the introduction of courses related to Forensic Science in universities as course which piqued the interest in the field. This was furthered by the development of modern facilities for Forensic Science and its training like the Central Finger Print Bureau and the Central Detective Training School at Calcutta. They allowed for the development of the necessary skillset needed to properly implement the techniques of Forensic Science and reap their rewards. The Indian laws were also amended or interpreted in such a manner by the Judiciary so that the Forensic Evidence is admissible. The validation of methods by the Judiciary was a turning point for Forensic Science in India as its application gained prominence in Criminal Investigations and the Courts also started to understand its intricacies.

As of now, there are *twenty-nine* Fingerprint Bureaux and about *thirty-seven* State and Seven Central Forensic Science Laboratories in India. In addition to this, Regional Forensic Science Laboratories and District Mobile Forensic units have been established in several states. In addition to this, centres for advanced forensic techniques like DNA profiling for Criminal Cases have also been set up in India. These include the Centre for Cellular and Molecular Biology (CCMB) Hyderabad, CFSL Hyderabad, and CFSL Kolkata. Therefore, there has been promotion of development of Forensic Science by the Indian Government and its applicability in the investigation of criminal cases in India has consistently increased over the last few decades.

1.2. Nature of Forensic Science in criminal investigation

Forensic Science is not an isolated subject. It uses techniques from multiple branches of science and uses them for the purpose of law. It has now evolved and developed into a separate discipline which plays a key role in the process of criminal investigation. It gained traction when a number of advanced techniques for Forensic Science were developed which include serology, voice analysis, odour analysis and studies relating to pattern recognition with digital photograph.

It is an important feature of the criminal justice system. It deals with the exploration of scientific and physical clues collected from the crime scene. This is done using a number of methods which are present under the Forensic Science. The aim with gathering evidence is to understand the essence of the crime that has been committed. The Forensic Evidence is useful to understand the location of the crime. Moreover, investigation carried out using the Forensic methods of investigation allows to determine the process followed by the offender and can even lead to the discovery of the motive of the crime.

1.3. Scope of Forensic Science under Criminal Justice System

The scope of Forensic Science is immense. It has become a major component of Criminal Justice Systems around the globe due to its accuracy and utility in the investigation process. In India, the current scenario related to investigation of crimes and prosecution of criminals is not sufficient. There are large number of trials which result in the acquittal of the accused for the lack of evidence. The ***Best Bakery Case***[2] was one of the major cases in the history of India where all the accused were acquitted by the court due to lack of proper evidence. It is not an isolated case and there are several other cases, including the Muzaffarnagar Riots, where twenty people had to be acquitted by the court due to lack of evidences.[3] There have been several instances of acquittal even in the rape cases merely due to the lack of evidence. In a society, where there is social stigma attached to the victims of heinous crimes such as rape and their voices are silenced,[4]

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[1] Nayan Joshi, *Medical Jurisprudence & Toxicology* (Kamal Publishers 2014).

[2] *Zahira Habibulla H Sheikh and Anr* v. *State of Gujarat and Ors,* Appeal (crl.) 446-449 of 2004.

[3] Express News Service, "Muzaffarnagar Riots: 20 Acquitted over 'Lack of Evidence due to Witness Hostility'" (*The Indian Express* September 22, 2021) <https://indianexpress.com/article/cities/delhi/muzaffarnagar-riots-20-acquitted-over-lack-of-evidence-due-to-witness-hostility-7525930/> accessed January 30, 2022.

[4] Mehak Dhiman, "High Rate of Acquittal in Rape Cases: Cause and Concern" (*Latest Laws*August 27, 2021) <https://www.latestlaws.com/articles/high-rate-of-acquittal-in-rape-cases-cause-and-concern> accessed January 30, 2022.

Forensic Science can prove to be the game changer by providing accurate and scientifically sound evidences. It is not uniformly used across the country and there are several obsolete techniques that are still being used for criminal investigation which can lead to the acquittal of the guilty and conviction of the innocent at times. Therefore, the adaptation to scientific methods for Criminal necessary for the Criminal Justice system to be truly effective. It provides definitive evidence, often provides key information which relates suspects to the crime scene and provides verifiable evidence.

DNA profiling to identify individuals was one of the biggest achievements of Forensic Science in the 20th Century. The application of Forensic Science requires the presence of skilled professionals who are capable of using it effectively to collect evidence. The lawyers and the judges should also have the technical knowhow to co-relate Forensic Evidence with other evidence. The support from laboratories and scientific experts is also essential in order to streamline the entire process and ensure the accuracy of the evidence collected. The development of the related facilities has been prioritized by nations across the globe including India in the recent times. Moreover, the research and development of methods to enhance the capability of Forensic Science as a discipline is being supported by Governments in different countries worldwide. The cyber revolution further opens up more room for the development of modern techniques related to Forensic Science which can be assisted by technological developments like Artificial Intelligence and Machine Learning. This can result in development of systems that can be useful to pre-emptively stop criminal activities or recreate crime scenes by inputting the Forensic Evidence into the system.

II. FIELDS OF FORENSIC SCIENCE UNDER INDIAN CRIMINAL JUSTICE SYSTEM

There are a number of fields of Forensic Science which have great utility in the process of Criminal Investigation in India. These include: *"Forensic Entomology, Forensic Toxicology, Ballistics, Forensic Chemistry, Forensic odontology, Forensic Anthropology, DNA Profiling, Fingerprinting, Forensic Engineering, Forensic Psychiatry, Document Examination."*[5] Some of the major fields of Forensic Science which are useful in solving crimes have been discussed below.

2.1. Forensic Entomology

It primarily deals with study of insects and other arthropods. It finds application in investigations related to death through the identification of a number of drugs and poisons. It also identifies application in finding the location of an event, discover the extent of a period of neglect in the adults or children, and catch the occurrence and time of the infliction of injuries. In India, Forensic entomology is in its infancy stage but researchers are constantly probing and experimenting in this field. This is a welcome step that paves way for further evolutions and progress of Forensic Entomology in India, especially with regard to the criminal jurisprudence.

2.2. Forensic Toxicology

It is the study of poisons. It is very useful in investigations which involve medico legal deaths. It helps establish if the toxins that had been administered were capable of causing death or causing behavioural changes. It can also detect the poison in stomach washings, blood samples, etc or in post-mortem material.

For example, **Section 85** of the Indian Penal Code, 1860 provides for involuntary intoxication as a defence to a crime. Forensic Toxicology helps to determine if the person was under the influence of a substance which was effective enough to cloud their judgment. In criminal investigations, the primary aim is to find out whether a person died of poisoning or lethal overdose using Forensic Toxicology. In the Western countries, it has also been used to determine cases of Drug Facilitated Sexual Assault (DFSA). The victims in these cases hardly remember anything but toxicological screening can be used to find if there was the presence of the drugs mentioned above in their system. Section 320 of Indian Penal Code, 1860 also provides for punishment in case of intoxication with substances which cause ill health or bodily harm. Therefore, Forensic Toxicology finds great scope and application in the criminal jurisprudence.

2.3. Forensic Psychiatry

It has been defined as, *"The study of human behaviour in legal settings or relevant legal environment."*[6] It is the application of Psychiatry in the administration of justice. In criminal law, it focusses on the assessment of mental illness and the capability of committing a crime. **Section 84** of the Indian Penal Code, 1860 provides that, *"Nothing is an offence which is done by a person who, at the time of doing it, by reason of unsoundness of mind, is incapable of knowing the nature of the act, or that he is doing what is either wrong or contrary to law."* Forensic Psychiatry provides a way to determine of the unsoundness of mind

[5] Gowsia Khan and Sheeba Ahad, "Role of Forensic Science in Criminal Investigation: Admissibility in Indian Legal System and Future Perspective" (2018) 4 IJARSE.

[6] Matthew Fanetti and others, *Forensic Child Psychology : Working in the Courts and Clinic* (Wiley 2015).

was severe enough to cloud the judgment of the person to the extent that they were incapable of knowing the nature of the act committed by them.

Under the Indian Evidence Act, 1872, an expert witness under **Section 45** of the Act may testify to either a fact or to their opinion in a field of expertise. A forensic psychiatrist expert may either be a *fact witness* or an *expert witness.* The role of the forensic psychiatrist is to *"assist the trier of fact to understand the evidence or to determine a fact in issue."* When a court trying an offence is faced with the questions revolving around insanity as a defence or a deeper understanding and technical knowledge is required on a specific psychological subject it may take help of the forensic psychiatric experts for their expert opinion. On the other hand, when the court requires the psychiatrist to testify as to the mental competence of the accused person or suspect, the psychiatrist has to opine as to such fact and is deemed a fact witness.

The expert opinion of a psychiatrist has been greatly valued by the Indian Courts when it comes to the determination of the mental state of the accused. In the case of ***Paneerselvam* v. *State Criminal Appeal***,[7] the Madras High Court acquitted the accused in a case of murder under **Section 302** of the Indian Penal Code, 1860, based on the testimony of the psychiatric expert and directed that the accused should be placed in a mental care facility where he receives proper treatment.

2.4. Forensic Anthropology

Anthropology is primarily the study of human behaviour. There are a number of subdivisions of Anthropology since it is a very diverse field. The ones which find applications in criminal investigation are:

- Forensic Osteology – It is the *"study of bones in individual and skeleton as a whole."*
- Forensic Archelogy – It involves, *"the controlled assemblage and diggings of human remnants and other evidences from the scene of crime."*
- Forensic Taphonomy – It is the, *"study of deviations occurring to the human remains at the time of and after the time of death, comprising of trauma, putrefaction and environmental alterations."*[8]

They are most useful in murder cases and determining the cause of death during the process of criminal investigation. Its application has grown immensely in the recent years. It allows to identify persons from CCTV footage/images. India has experienced a number of disasters such as the Gujarat Earthquake (2001), the Indian Heat Wave (2002), the Indian Ocean Tsunami (2004) and more. Forensic Anthropology is useful in victim identification who succumb to these events. It also aids in solving criminal cases which relate to the death of persons.

2.5. DNA Profiling

It is one of the most significant developments in the field of Forensic Science in recent years. It is also referred to as *"DNA fingerprinting"* or *"Geneting Typing".* It is one of the popularly known fields of Forensic Sciences. It has multi-faceted application in the field of criminal investigations. Some of these include:

- Identification of Rapists in cases of Rapes and Gang Rapes.
- Identification of the mutilated remains of dead bodies in cases of murders, explosions and more.
- Establishing the presence of a person at the scene of crime.
- Identification of suspects and establishing innocence or guilt during the trial proceedings.

These are few major fields of Forensic Science which have great utility in the process of investigation of crimes. The development of this field was primarily driven by the scientific research during the early stages of Criminal Jurisprudence. However, as the field developed and its application in the investigation of crimes increased, efforts were being made to develop new technologies specifically to combat new species of crimes. The constant efforts for technological advancements can catalyse the growth of Forensic Science in India, especially with regards to criminal jurisprudence.

III. LEGAL PROVISIONS RELATED TO FORENSIC SCIENCE IN INDIA

There are a number of provisions in the Indian Legal System which relate to the use of Forensic Science in Criminal Investigation. The admissibility is within four aspects: Witness, Admission, Facts and Circumstantial evidence. Some of the major laws which relate to the admissibility of Forensic Evidence in India have been discussed.

3.1. DNA Testing

There is no specific law in India related to DNA Testing. However, **Section 53** and **Section 54** of the Criminal Procedure provide that in case the medical examination of a person can provide further evidence related to the commission of an offence and assist in solving of the case, it can be ordered. This can include

[7] *Paneerselvam* v. *State Criminal Appeal* (MD) No. 317 of 2016

[8] Stephen P. Nawrochi, An outline of Forensic Science available at archlab.uindy.edu.

DNA Testing and the application of other fields of Forensic Science to carry out a comprehensive investigation.

3.2. Forensic Toxicology

It is a branch of Forensic Science where a number of separate Acts have been introduced to deal with poisons, corrosive substances, adulterants, chemicals and more. The Indian Penal Code, 1860 has specific provisions that deal with poisoning. They are mentioned under Section 272 to Section 278, Section 284 and Section 328 of the Code. The other Special Acts that have been enacted to provide laws dealing with such substances are:

- The Poison Act, 1990
- Drugs and Cosmetics Act, 1940
- Narcotic Drugs and Psychotropic Substance Act, 1985
- The Pharmacy Act, 1948
- The Drug control Act, 1950

They specifically provide laws dealing with specific substances and procedures to deal with such substances.

3.3. Fingerprints

They have been a key part of Forensic Investigation for a long time. **Section 73** of the Indian Evidence Act, 1872 further allows that a person can be compelled to give their fingerprints on orders from the court. Section 5 and Section 6 of the Identification of Prisoners Act, 1920 also allow for the acquisition of thumb prints and handwriting samples. The collection of the samples of Fingerprints does not result in a breach of the rights of the accused as per the Indian Supreme Court. It stated that, *"Any person can be directed to give his footprints for corroboration of evidence and the sae cannot be considered a violation of protection guaranteed under Article 20(3) of the Indian Constitution."*

3.4. Rape Victims

Section 164-A of the Code of Criminal Procedure, 1973 gives the medical examiner the authority to examine the victim of a rape case within twenty-hours from the occurrence of the rape. Moreover, the Courts have often ordered for DNA test in the cases of rape and even of the Foetus of the rape victim if the rape results in pregnancy.[9] This is useful in determining the rapist and providing justice to the rape victim. Moreover, it also allows for identification of any physical injury suffered by the victim and appropriate medical treatment can be provided for the same.

IV. JUDICIAL DECISIONS AND FORENSIC SCIENCE

The methods of Forensic Science are only useful in Criminal Investigation if they are recognized and appreciated by the Judiciary. The Indian Judiciary has been very progressive and ensured that the developments in Forensic Science are appropriately utilized in the Indian Criminal Justice System. Some of the key decisions by the Indian Courts relating to the development of Forensic Science and its acceptance as Forensic Evidence have been discussed below.

4.1. Collection of Forensic Evidence not a violation of Article 20(3)

Article 20(3) of the Indian Constitution seeks to provide immunity to the accused against self-incrimination. It states that, *"no person accused of an offence shall be compelled to be a witness against himself."* However, in the case of ***The State of Bombay* v. *Kathi Kalu Oghad and Others***,[10] the Supreme Court held that, *"compelling any person to give any sort of forensic evidence like fingerprints, blood, hair semen, does not violate the provision of Article 20(3)."* Therefore, the collection of Forensic Evidence does not result in the violation of Fundamental Rights of a person. This is a major win for the investigation agencies since such evidence can be significant when solving a Criminal Case. The decision of the court guarantees them unfettered access to such evidence.

4.2. Determination of Age

In the case of ***Harpal Singh* v. *State Of H.P***,[11] the Court was faced with the question of determination of the age of the girl. In order to determine the age, Forensic Science was used and its results were corroborated with the school records and her birth certificate to confirm her age. This was very useful in determining the true age of the girl as the Court needed to ascertain if she was a minor or not at the time when the offence was committed. Forensic Science helped in proving the difference between her being tried as a minor under the Indian Penal Code instead of an adult which would have resulted in a much more stringent punishment.

[9] *Geeta Saha* v. *NCT of Delhi*, 1999 (1) JCC 101 (DB).
[10] *The State of Bombay* v. *Kathi Kalu Oghad and Others*, 1961 AIR 1808.
[11] *Harpal Singh* v. *State Of H.P*, (1999) 8 SLC 679.

4.3. Aiding in the Resolution of Miscarriage of Justice

The ***Priyadarshini Matoo Case***[12] was one of the most controversial cases in India due to the manner in which it was handled. The Additional Sessions Judge, G.P. Thareja gave the following statement, *"Though I know he is the man who committed the crime, I acquit him, giving him the benefit of doubt."* The accused was an influential person and the son of a former Senior IPS officer who took advantage of the power and influence to be acquitted in the case where he had allegedly raped and murdered a 25-year-old law student, Priyadarshini Matoo. The investigation of the case was carried out by the CBI. When the documentary and circumstantial was produced before the Trial Court, it acquitted the accused stating that the evidence produced by the prosecution was incorrect, fabricated and inadmissible under **Section 45** of the Indian Evidence Act, 1872.

The case was appealed before the High Court where the verdict of the Trial Court was overturned. The High Court held that, *"the DNA finger printing report conclusively establishes the guilt of the accused."* It noted that, *"there were no lacunae in the DNA testing and that the combination of the forensic and circumstantial evidence was clinching."* The verdict was based on strong circumstantial evidence that had been provided by the CBI. The Supreme Court upheld the decision of the High Court and answered the questions raised over the validity of the DNA report in negative.

Forensic Science played a key role in this decision where even the son of an influential person could not work his way around the scientific methods of criminal investigation. The accuracy of the evidence collected using Forensic Science and the application of scientific principles make it a key cog in any criminal investigation carried out in India. The role of the same was also appreciated by the Indian Judiciary in the *Priyadarshini Mattoo case.*

4.4. Solving of a Gruesome Murder Case

The ***Tandoor Murder Case***[13] is one of the most horrific murder cases in Indian history. In this case, a husband murdered his wife using a gun and attempted to burn her body inside a tandoor. The revolver used for shooting and blood-stained clothes were sent to a Forensic Laboratory. A blood sample of the family of the deceased was also sent to identify the body of the deceased for a DNA Test. The DNA report stated, *"The tests prove beyond any reasonable doubt that the charred body is that of Naina Sahni who is the biological offspring of Mr. Harbhajan Singh and Jaswant Kaur."* The fingerprints on the revolver also matched those of the accused. These evidences proved the guilt of the accused beyond reasonable doubt and resulted in his conviction.

A key role was played by Forensic Science in this investigation as well, since the accused had made efforts to destroy the evidence of the crime but was caught by the authorities. It would have been difficult to clearly establish the guilt of the accused without the aid of Forensic Science.

4.5. Admissibility of DNA Evidence

In the case of ***Mukesh and Another* v. *State (NCT of Delhi) and Others***,[14] the Supreme Court noted that India has been increasingly relying on DNA evidence. The importance of the same was emphasised through reference to the Sections 53 A and 164 A of Code of Criminal Procedure, 1973. These sections deal with the examination of a person accused of rape and a victim of rape. It held that DNA profiling is a part of the statutory scheme. It referred to a number of precedents and held that, *"a DNA report deserves to be accepted unless it is absolutely dented. In case the DNA report is rejected, it must be established that there had been no quality control or quality assurance. A DNA report should be accepted if there is no error in sampling and no indication of tampering of samples."*

In the case of ***Anil* v. *State of Maharashtra***,[15] the Court held that, *"When the DNA profile of a sample found at the scene of crime matches with the DNA profile of the suspect, it can generally be concluded that both the samples have the same biological origin."*

These decisions show the support of the Supreme Court for the application of Forensic Science in Criminal Investigation and the significant role it plays in the solving of cases. The Courts have also acknowledged the utility of the application of scientific methods in the field of Criminal Investigation. They have considered Forensic Evidence as the major determining factor for Conviction or Acquittal in a number of cases. This shows that the field of Forensic Science is judicially accepted and has a lot of scope for growth in the coming times.

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[12] *Santosh Kumar Singh* v. *State through CBI* (2010) 9 SCC 747.

[13] *Sushil Sharma* v. State of Delhi (2014) 4, SCC, 317.

[14] *Mukesh and Another* v. *State (NCT of Delhi) and Others* (2017) 6 SCC 1.

[15] *Anil* v. *State of Maharashtra,* (2014) 4 SCC 69.

V. FORENSIC SCIENCE IN INDIAN LEGAL SYSTEM: THE WAY FORWARD

The application of Forensic Science has proven to be greatly beneficial to the investigators in Criminal Cases. It can often be a determining factor between the acquittal or conviction of the accused during the trial before the Court of Law. It involves methods that are highly accurate and make the interrogation proceedings all the more effective. Criminal Investigation involves a detailed study of facts, evidence and the series of events which led to the crime. There are cases where a number of victims, suspects and accused are involved in the investigation process. This can often make the procedure very complicated and difficult for the agencies. In such situations Forensic Science can often come to the aid of the agencies by providing scientific methods of evidence collection, DNA mapping, interrogation, substance determination and more. There is a lot of scope for the application of Forensic Science in the Indian Legal System as highlighted by the Malimath Committee Report in 2003 and the PIL filed before the Supreme Court in January, 2022 which sought enforcement of the direction provided in the Malimath Committee Report.

5.1. Malimath Committee Report, 2003

Forensic Science is already a pivotal part of modern-day criminal investigations and its role is bound to grow further with technological advancements. However, as noted by the Malimath Committee Report in the year 2003, Forensic Science has not been sufficiently developed in India to assist in the investigation process to its full ability. It was of the view that, *"the application of forensic science to crime investigation must commence from the stage of the very first visit by the IO to the crime scene so that all relevant physical clues, including trace evidence, which would eventually afford forensic science examination, are appropriately identified and collected."*

It also noted the lamented the lack of Forensic Laboratories in India by stating that, *"There are only 23 Central Forensic Science Laboratories /Forensic Science Laboratories and about 17 Regional Laboratories in the country. On the other hand, USA has about 320 Forensic Science Laboratories (including private sector Laboratories). It would, thus, appear that the number of Forensic Science Laboratories in the country is grossly inadequate and certainly not commensurate with our requirements."* It expressed the need for development of the development of facilities related to Forensic Science in India.

5.2. PIL filed in the Supreme Court

A PIL[16] was also recently filed in the Supreme Court where the petitioner has sought directions from the Supreme Court to the Union of India to improve investigation methods through the use of Forensic Science and Scientific Techniques. It aims to strengthen the role of Forensic Science in crime scene investigations. It sought to enforce the suggestions of Malimath Committee's in 2003 so that the investigation in criminal cases could be efficient through the application of Forensic Science and Advanced Technologies. It also seeks directions from the Apex Court to direct States and Union Territories to make rules and regulations related to forensic science for tracing of evidence and analysis of crime scenes with the help of Forensic Experts. It further sought directions for increasing the courses related to Forensic Science in every college where the faculty had expertise in the domain. It further asked for independence of the Forensic Labs and facilities in India. It highlighted the lack of manpower in the domain of Forensic Science and the need to increase the same.

VI. FUTURE OF FORENSIC SCIENCE

The importance of Forensic Science in criminal investigation has been well-established. The increasing levels of innovation and path-breaking developments in the field of science and technology are only going to further the advancement of Forensic Science. There is a possibility of the development of more advanced tools such a simulator system that could be considered to be an *"Integrative Reconstruction and Prediction Simulator."* This kind of platform would allow for the scientific reconstruction of an event to simulate different possible scenarios and outcomes of a crime. When combined with other methods like DNA sampling, substance testing, fingerprints collection and more, it will be able to provide probabilities of different scenarios that could have potentially occurred during the crime scene. It can also be useful in development of Crime Prevention Tools.

There are several similar future developments that can potentially take place in Forensic Science. India, off late, has been able to build up a Start Up culture where the best brains of the country have combined to develop some great products and platforms for solving problems faced in daily life and increasing the quality of life. A technology firm **Mibiz Cyber Forensics,** started a Cyber Forensic Laboratory for the **Kerala Start-up Mission (KSUM).** The objectives of the Cyber Forensic lab were to, *"create awareness among the public about cybercrimes, ramp up facilities that ensure safety in cyberworld, offer solutions for*

[16] *Shrikant Prasad & Ors* v. *Union of India & Ors.*

cyber victims and trace fraudsters with the aid of modern technology."[17] Such innovations are a proof that the future of development of Forensic Science in India is bright. However, as noted previously, the implementation of the technology at the ground level remains lackadaisical and contributes to inefficiency in solving crimes and wrong verdicts being delivered by the Courts. Therefore, it is up to the State and Central Governments to work in conjunction with the law enforcement and investigating agencies to ensure that Forensic Science is optimally used in the Indian Criminal Justice System and its growing potential can translate into legal provisions for greater transparency and accountability.

6.1. Suggestions for Further Development in Forensic Science in the Criminal Justice System

- The development of critical infrastructure related to Forensic Science should be developed expediently. India trails behind from the developed countries in the facilities and labs related to Forensic Science. Therefore, it is essential that the efforts are stepped up to ensure greater utilization of scientific methods in Criminal Investigations.
- There should a regular academic audit of Forensic Institutions conducted in order to improve the quality of the Forensic Science education. There can be introduction of applied courses which specifically deal with Criminal Justice and Investigation using the methods of Forensic Sciences.
- There can be an introduction of an All India Forensic Services Examination similar to IFS (Indian Foreign Services), IAS (Indian Administrative Services), IPS (Indian Police Services) and more. This will help in appointment of special officers for the purpose of Forensic Science which will fulfil the lacunae of insufficient staff for the discipline. Moreover, it will result in creation of more job opportunities in the field of Forensic Science which will drive people towards the discipline.
- Innovation and development in the field of Forensic Science should be encouraged. The Government should promote Start-ups and companies willing to research on advancement in Forensic Science methods.
- A faceless system for examination of Forensic Evidence can be developed similar to the one developed for Income Tax Assessment. This will ensure neutrality in the examination process and allow for fairness in investigation. It will help in imparting impartiality during Criminal Investigations. The lessened human interference will also increase the pace of the investigation and provide a sense of Fairness in the Criminal Justice System.
- The Supreme Court of India and the Delhi High Court conducted a survey which showed that DNA evidence has been used only in about 5% of murder cases and 3% rape cases. This shows that scientific investigation has not been sufficiently used in Criminal Investigation in India. Conscious efforts must be made to increase the use of Forensic Science in Criminal Investigations.
- The judges should be given training to understand the impact of Forensic Evidence on Criminal Investigations and be regularly educated about the developments in the field so that they can take it into consideration before giving their decisions.

[17] PTI, "KSUM-Backed Startup's Cyber Forensic Lab, E-Service Platform to Be Launched on Dec 2 - et Telecom" (*ETTelecom.com*December 2, 2021) <https://telecom.economictimes.indiatimes.com/news/ksum-backed-startups-cyber-forensic-lab-e-service-platform-to-be-launched-on-dec-2/88041367> accessed January 30, 2022.