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LAW, SCIENCE AND TECHNOLOGY: AN INTERFACE

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Introduction

This article focuses on interface of law, science, and technology. Since inception of human civilization, change is one of the important aspects that remained constant. From stone age to digital age, change can be perceived as constant aspect. When we talk about change it consists of both the sides of a coin. While observing the journey of human civilisation till date since inception, the importance and contribution of science and technology is notable.

With the development and change in society, law has been changed and developed accordingly. For the development of human society, the contribution of science and technology can never be overlooked. Since inception of human civilisation till date, whatever changes, and development we may observe is due to contribution of science and technology. As stated, each coin has both sides. On one hand our development is indebted to science and technology but on the other hand we have faced and facing various issues and challenges while using science and technology.

Law as an instrument is indispensable irrespective of age, time, and society. Existence of law in society has been witnessed since inception of human civilisation. The term law is dynamic and cannot be confined to any definition. Conflict of interest has been a common phenomenon of human civilisation till date. However, the form and manner of conflict of interest has been varied. Presently the science and technology has resulted into various issues and challenges before us. For instance, a legal question will arise to fix liability when an auto pilot car met with an accident. Such situation talks about convergence of law, science and technology while fixing liability, especially criminal liability as we cannot attract vicarious liability. Another example, while searching name of captain of Indian Cricket Team, one will get names of male captains of cricket team till date. Here, ethical issue regarding gender biasness of technology will come to effect. Use of science and technology has resulted into such kind of issues. The

present study is dealing with balancing of conflicting interests as one of the hypotheses. Use of Artificial Intelligence has posed various challenges one of them is balancing of conflicting interest.

In 21st century we may witness many technical developments and issues and challenges pertaining thereto. One notable development is Artificial Intelligence. With the inception of Artificial Intelligence, our life has changed drastically. Artificial Intelligence like other technology has its own issues and challenges. For effective functioning, Artificial Intelligence has led to various ethical and legal issues such as bias, discrimination, privacy, etc. Only effective law can help us to overcome issues and challenges pertaining to use of Artificial Intelligence.

In this article, the Researcher shall deal with the meaning and function of law, interface of law, science and technology.

Law: Meaning and Nature

Meaning of Law

The term 'law' has been explained differently with reference to time, place, and society. It is normally construed a mechanism involving uniformity and consistency in behaviour and happenings of course of events. Law in India has primarily evolved from customs and religious prescription to the current constitutional and legal system we have today, thereby traversing through secular legal systems and the common law. India has a recorded legal history starting from the Vedic ages. It is believed that ancient India had some sort of legal system in place even during the Bronze Age and the Indus Valley civilization. Law as a matter of religious prescriptions and philosophical discourse has an illustrious history in India. Emanating from the Vedas, the Upanishads, and other religious texts, it was a fertile field enriched by practitioners from different Hindu philosophical schools and later by the Jains and Buddhists. Law is a set of norms applicable equally to all subjects under similar circumstances For instance, one who earns beyond certain limits, has to pay income tax. According to Salmond, the term 'law' in its widest sense, "includes any rule of action, that is to say, any standard or pattern to which actions (whether the acts of rational agents or operations of nature) are or ought to be conformed."¹ According to Balckstone, "Law in its most general and

¹ M.J Sethna; Jurisprudence; 89, Lakhani Book Depot; Third Revised Edition, 1973

comprehensive sense, signifies a rule of action whether animate or inanimate, rational or irrational.”² Austin calls the uniformities of nature, and laws of consistency in the animate and inanimate world, ‘laws by metaphor’.³ Austin defined law as “a rule laid for guidance of intelligent beings by an intelligent being having power over him.”⁴ According to Rosco Pound “the real function of law is balancing of conflicting interests by satisfying maximum wants with minimum friction.”⁵ Current research is very dealing with balancing of conflicting interests as one of the hypothesis. Use of Artificial Intelligence has posed various challenges one of them is balancing of conflicting interest.

Function of Law

Since time immemorial till date as a human society we have witnessed various challenges. Law as one of the most important instruments has contributed to overcome such challenges. One cannot imagine any society without law. Law brings consistency and uniformity in the behaviour of the society. Law being flexible in nature helps to tackle various challenges over the time. Law has been looked from different perspective with reference to time and society especially with reference to its functions. One of the most important functions of law is to prevent and resolve conflict of interest. With the advancement of science and technology there has been emergence of various issues and challenges in this regard. In this context, we can say the function of law is to overcome new challenges as well. Law is dynamic in nature, it changes with time, place and circumstances. Development of science and technology pose various challenges and issues before human society and through instrumentality of law, we are minimising those challenges and try to get solutions of issues. One had never thought of the day that we have some new forms of legal wrongs like cybercrimes, cybersquatting, phishing, etc. Such challenges can only be overcome with the help of relevant legal framework.

Science and Technology: Nature and Meaning

Science: Meaning

The word science first came into English in the 14th century and its present usage appeared even later, in 1867, soon after the Age of Revolution.⁶ The term Science comes from Latin

² ibid

³ ibid

⁴ Dr. N.V. Paranjape; Studies in Jurisprudence and Legal Theory; 32; Central Law Agency; Ninth Edition, 2019

⁵ Ibid, 105

⁶ https://faculty.ksu.edu.sa/sites/default/files/about_science_1_basics_knowledge_science_and_scimat.pdf (last visited on 01/05/2022)

word 'scientia', meaning "knowledge" or "the pursuit of knowledge", and especially "established theories" when it first appears.⁷ Basically science is a breach of knowledge based on truths under similar circumstances derived through experiments and observations. According to Merriam- Webster Dictionary the term science means, "knowledge or a system of knowledge covering general truths, or the operation of general laws especially as obtained and tested through scientific method."⁸ This means science is a branch of knowledge which is tested and proven by reliable methods. According to Cambridge Dictionary science means, knowledge from the careful study of the structure and behaviour of the physical world, especially by watching, measuring, and doing experiments, and the development of theories to describe the results of these activities."⁹ Science has various attributes which help up to draw a specific conclusion based on the facts and circumstances of the case. According to Britannica Dictionary science means, "knowledge about or study of the natural world based on facts learned through experiments and observation."¹⁰ These meaning lays emphasis on knowledge obtained via experiments and observation. Taking into consideration all the these meaning we may sum up by stating that science is a knowledge which is gained through largely by experiments and careful observations. Whether they are principles of Newton or inventions by various Scientists, we may find experiments and careful observations as the key components of science. A science is ordinarily defined as a body of organized, systematized knowledge relative to any particular field of human thought; while science in general is regarded as the total of such organized knowledge as a whole.¹¹ Science, when used as a suffix talks about particular branch of knowledge. Such as Social Science, Community Science, Computer Science, Natural Science, etc.

Science has helped us to understand the cause-and-effect relationship quite effectively and contributed tremendously to the development of human society. The present study is associated with a particular branch of modern science, Artificial Intelligence.

Technology: Meaning

Science is the base for development of technology. As discussed earlier, science is a branch of knowledge based on experiments and observations. Having presumption of rationale and

⁷ ibid

⁸ <https://www.merriam-webster.com/dictionary/science> (last visited on 05/05/2022)

⁹ <https://dictionary.cambridge.org/dictionary/english/science> (last visited on 05/05/2022)

¹⁰ <https://www.britannica.com/dictionary/science> (last visited on 05/05/2022)

¹¹ W. P. Meroney, The Meaning and Method of Science, Vol. 6, No. 2 (September 1925), Willey, pp 83-111

scientific temper, one can say it is a set of norms or principles acceptable irrespective of time and place. Technology is something which helps us to perform our tasks easier based on scientific knowledge or principles. For example, if we compress any object, it may either break or change its shape. Applying same principle, we have developed various machines which help us to get designated shape by compressing the object. Etymologically the word technology comes from two Greek words, 'techne' and 'logos.' Techne means art, skill, craft, or the way, manner, or means by which a thing is gained. Logos means word, the utterance by which inward thought is expressed, a saying, or an expression.¹² According to Cambridge Dictionary the term technology means the study and knowledge of the practical especially industrial use of scientific discoveries.¹³ Technology thus is the practical use of scientific discoveries. According to Merriam Webster Dictionary technology is the practical application of knowledge especially in a particular area.¹⁴ While science is concerned with principles, technology is concerned with application of those principles. According to Britannica, **technology is**, the application of scientific knowledge to the practical aims of human life or, as it is sometimes phrased, to the change and manipulation of the human environment.¹⁵ All these dictionary meanings laid emphasis on application of scientific knowledge.

Science and technology always correlated with each other. It is the development of scientific principles, which has paved the way for development of technology. Technological inventions have immensely touched each segment of human society. If we look at the history of human civilisation, especially after industrial revolutions in England, one can easily establish importance of technology to all around development of human society. Technological inventions and development is a continuous process. AI as technology is one such invention. With the help of numerous data, the algorithm is designed which ultimately helps to get resultant output. For example, one may command Siri or Alexa to set an alarm, or to dial call to specific person. In the next chapter that is chapter 2.4, researcher is going to discuss an interface among law, science and technology.

¹²<https://web.engr.oregonstate.edu/~funkk/Technology/technology.html#:~:text=Etymology,a%20saying%2C%20or%20an%20expression.> (last visited on 08/05/2022)

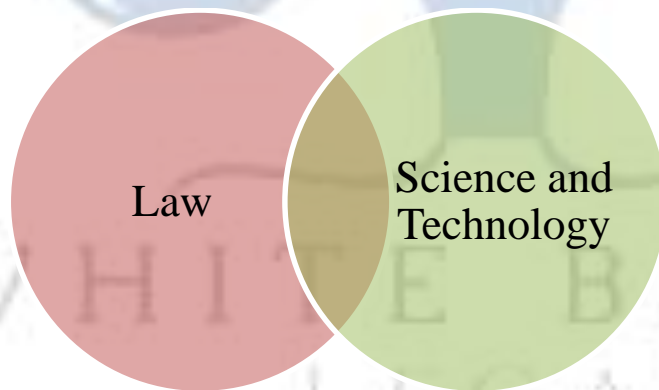
¹³ <https://dictionary.cambridge.org/dictionary/english/technology> (last visited on 08/05/2022)

¹⁴ <https://www.merriam-webster.com/dictionary/technology> (last visited on 08/05/2022)

¹⁵ <https://www.britannica.com/technology/technology> (last visited on 08/05/2022)

Law, Science and Technology: An Interface

Development of society has been a constant thing. For the development of society, the contribution of science and technology is inevitable. Science and technology have contributed immensely to the society to overcome various challenges over the period of time. However, it has its own issues and challenges. History is evident about various incidences of unregulated, unethical, and immoral use. The course of history since the last quarter of the nineteenth century has been a story of increasing acceptance and incorporation of the scientific knowledge and scientists into practical institutions of society, including both business and government. Science has become involved in our domestic politics, international relations and virtually every institution which vitally affects men in the mid- twentieth century.¹⁶ Being part of society science and technology should be governed properly. There has always been an interface between law, science, and technology. Law has always been an instrument to check issues and challenges which have been emerged due to use of science and technology in society. Initially, there has been a belief that law and science and technology have no correlation and they can be represented by two separate circles. Gradually, people started to experience an interface between law on one hand and science and technology on the other. It can be explained with the help of Venn diagram as follows:



[Figure 1: An Interface between Law and Science and Technology]

The use of computers, internet are part and parcel of our life. The term Artificial Intelligence (AI) does not require any introduction. Although the term has not been defined precisely. It has been expected that AI will have applicability at all walks of life. It will help to overcome various challenges viz, traffic management, weather forecasting, understanding of buying pattern, education, health, and medicine. Along with the advantages which AI is having, it has potential issues and challenges before society.

¹⁶ P.M. Bakshi, Science, Technology and Law, Institute's Journal, July-September 1995

Due to emergence of AI and its use, it has been felt necessary to regulate the same. As the technology is in its primitive phase, we are not able predict potential issues and challenges. There has been a common concern to regulate AI throughout the world. There has always been an expectation irrespective of time and place, so far as existence of effective of legal framework to tackle scientific and technological development is concerned. It is a herculean task to keep a proper balance between benefits guaranteed by science and technology on one hand and the issues and challenges those are outcome of their use on the other.

Biotechnology and Law

The rapid progress of modern biotechnology has given rise to new legislative needs, in order to safeguard human health and the environment while at the same time taking advantage of the opportunities offered by biotechnology. Recent years have seen important new legislation being adopted, and older law amended to respond to the new challenges.

The growth of science and technology has actually helped us in improving our standard of living. With technological advancements we may able to stand hard against various challenges. Technology like law is an instrument to bring a change in society. The growth of bio technology too has touched our life to many aspects. It has helped us any many ways and at the same time the same has paused various concerns and challenges.

Biotechnology: Meaning

The term biotechnology is a combination of two words 'bio' and 'technology'. Biology means the scientific knowledge that uses life or living entities.¹⁷ According to Encyclopaedia Britannica, "biotechnology means the use of biology to solve problems and make useful products."¹⁸ For example the technology of making cheese, wine, beer, in vitro fertilizations, Genetically Modified (GMO) crops. Biotechnology refers to use of biological principles and properties to make useful products. In simple terms one can say that it is a technology based on biology.¹⁹

Biotechnology has contributed immensely and has resulted into social change in human society across the globe. Whether it is DNA technology, hybridoma technology, tissue culture,

¹⁷ Sreenivasulu N. S. and Raju C. B., Biotechnology and Patent Law, 1st edition, manupatra pg. 1

¹⁸ <https://www.britannica.com/technology/biotechnology> (last visited on 15/07/2022)

¹⁹ <https://www.bio.org/what-biotechnology> (last visited on 15/07/2022)

chemical synthesis of protein and DNA, in vitro fertilization, biotechnology has contributed notably to overcome various challenges. Now we may have hybrid species of milch animals which can yield more milk in comparison with natural species. With the advancement of Genetically Modified crops the yielding capacity has been increased and this in another manner helped to provide food security which is one of the challenges of developing countries.

Contribution of Biotechnology

The word biotechnology was coined by Karl Erkey. Initially biotechnology was an art involved in production of beer, wine, cheese etc. Later on, it involves microbiology, protein engineering, process engineering and genetic engineering. Whether it is use of yeast, baking, fermentation use of biotechnology can be witnessed since long. During eighteenth century, the invention of small pox vaccine has widened the area of operations so far as use of biotechnology is concerned.²⁰ Biotechnology has contributed to various segments of human society. Such as agriculture, medicine, flora and fauna, environment and human health and welfare.²¹

Biotechnology and Agriculture

Right to food has been recognised as basic human right. Indian Constitution has included it as a fundamental right which is very important to guarantee right to life in its true sense. Looking at the current sustainable developmental goals zero hunger is one of them. On one hand agricultural resources are limited and on the other hand the demand is on higher side and increasing day by day due to population explosion. In order to guarantee food to each and every one we need to produce on large scale. To be very precise we have to increase our yielding capacity. In order to increase yielding capacity, we have to take help of science and technology. Use of GMO Crops has contributed in many ways specially to increase yielding capacity. Use of biotechnology in agriculture sector has helped by reducing loss after harvesting of crops, additional nutrients value can be inserted as per the need while modifying, high yielding capacity, less use of minerals, lessen the use of insecticides, pesticides and fertilizers. Taking into account India's population which currently the second largest, use of such technology is a welcome inclusion in agriculture sector.

²⁰ Supra 1, pg 2

²¹ <https://byjus.com/biology/why-is-biotechnology-important-to-humans/> (last visited on 16/07/2022)

Biotechnology and Medicine

Right to health too like right to food has recognised as human right and Indian Constitution guarantees the same as fundamental right under the auspices of right to life. Use of biology and technology has helped to fight and overcome with various medical challenges and thus guaranteeing right to life in its spirit. One may trace back to Alexander Flemming who invented penicillin to fight the diseases caused by bacteria. One may recall of various pandemic situations caused by virus such as H1N1, SARS, Covid 19. Inventions of vaccines has helped us to fight against such deadliest virus. The benefits of biotechnology in medicine are not limited to production of vaccines, antibiotics and hormones. Biotechnology can be used as a tool to diagnose. early diagnosis and knowledge of pathophysiology are essential for an effective cure. This can be achieved with the help of techniques such as Recombinant DNA Technology, Polymerase Chain Reaction (PCR) and Enzyme-Linked Immunosorbent Assay (ELISA), etc.²² There are other such segments as well where biotechnology can be used for medicinal purpose.

Thus, one may realise and understand the importance and use of biotechnology in various sectors. However, use of biotechnology has paused many concerns and challenges.

Regulatory Framework in India

Department of Biotechnology (DBT) constituted under the Ministry of Science and Technology is the nodal agency for policy, promotion of research and development, international cooperation, and manufacturing activities. Together with DBT, Genetic Engineering and Approval Committee (GEAC) constituted under Ministry of Environment and Forests (MoEF) is the leading regulatory body in the area of Biotechnology in India. Several committees have also been constituted under the said ministries to regulate the activities involving handling, manufacture, storage, testing, and release of genetic modified materials in India. These committees have statutory authority. Most of the committee members are from the scientific community and staff of DBT and MoEF. DBT appoints the members to the committees. The GEAC is supposed to be assisted by the State Biotechnology Coordination Committees (SBCC) and District Level Committees (DLC).²³

²² <https://byjus.com/biology/application-biotechnology-medicine/> (last visited on 16/07/2022)

²³ Rajkumar Dubey, Biotechnology Laws in India, 17 May 2004, <http://www.cifilejournal.com/>
<https://www.mondaq.com/india/healthcare/26049/biotechnology-laws-in-india>

The most important committees are:

- The Institutional Biosafety Committees (IBSC), responsible for the local implementation of guidelines,
- Review Committee on Genetic Manipulations (RCGM) responsible for issuing permits.
- GEAC responsible for monitoring the large scale and commercial use of transgenic materials.

Ethical Concerns: Use of Biotechnology

Use of biotechnology has not only resulted into legal or regulatory concerns, but it has resulted into various ethical concerns as well. While going through any clinical trial an utmost care should be observed to protect the subjects. Another concern is with reference to affordability of the medicine. It may happen due to patenting and other formalities; at times the products are available at high price. In such a case one can rely on state to take certain measures to make available such medicines at competitive price. Another ethical concern is with reference to maintaining privacy of the subjects. Recently the Supreme Court of India has recognised right to privacy as fundamental right. This shows how important privacy of the concerned subjects is inevitable to be maintained. We cannot avoid use of biotechnology but while using the same the legal and other concerns shall be taken into consideration.

Summing up

From the discussion made so far one may draw an opinion that use of science and technology is inevitable to overcome challenges faced by human society. Use of biotechnology has helped human society to greater extent. At the same time use of the same has paused several concerns as well. It is challenging task to maintain a balance between benefits and challenges attached with biotechnology.

Technology always contributes to overcome various challenges and problems faced by human society irrespective of time and place. Technology along with its benefits brings challenges of its own. Biotechnology too have benefits as well as challenges. By making a concentrated effort, we may mitigate the challenges to greater extent.

Criminal Justice and Law-Administration of justice

Administration of justice is one of the criterion to determine the nature of the state. Many ancient civilisations were famous for their administration of justice. Administration of justice broadly includes civil and criminal justice as its kinds. The categorisation of civil and criminal wrongs is based on the jurisprudence of wrong against state or person. The way justice is being administered has varied with reference to time and place.

Administration of justice has been considered to be one of the most important mechanisms for any society. Administration of the criminal justice has been considered as a special branch with reference to punishing the criminals by observing set of norms. There has been a common consensus among the societies irrespective of time and place that whoever commits a crime ought to be punished. But before we decide to punish the offender we need to establish crime committed by an accused. Proof of the crime beyond reasonable doubt has been accepted as basic principle to establish criminal liability of an offender.

Application of Technology: Administration of Criminal Justice

As discussed earlier proof of the crime beyond reasonable doubt is a condition precedent to punish an offender. In order to be so sure or conclusive we need to investigate in correct manner. It is essential to established with full precision that certain crime has been committed by certain person before required punishment has been ordered.

In order to prove the commission of crime by a certain person in a certain manner we need to have techniques and principles to help us. Use of science and technology can be very much helpful to prove the commission of crime and the manner in which crime is committed. For example, with the help of breath analyser one can easily identify that whether the person is drunken or not while driving. Similarly, there are various technologies which are used in criminal investigation. To name few finger-print analysis, blood stain analysis, gunshot analysis, narco-analysis, brain finger mapping, ballistic report. Use of technology has helped us to draw a conclusion with precision before the commission of crime has been proved.

On one hand use of technology has helped us to prove commission of crime and the manner in which and by whom a crime has been committed. But on the other hand, it has paused several concerns.

Constitutional Provisions

No person accused of any offence shall be compelled to be a witness against himself.²⁴ With the advancement of science and technology Article 20 (3) has to be guaranteed in true manner. Technology like brain mapping, narco-analysis, polygraph has interfaced with fundamental rights. In *M. P. Sharma v. Satish Chandra*²⁵ to limit the oral evidence of a person standing trial for an offence is “to confine the content of the constitutional guarantee to its barely literal import”.²⁶ In *Smt. Selvi & Ors Vs State of Karnataka*²⁷ the Supreme Court has laid down guidelines with reference to use of Deception Detection Test (DDT). The Court has laid emphasis on Article 20 (3), 21. The Court noted that the purpose of the right against self-incrimination was to ensure that testimony considered during trial was reliable, since involuntary statements were more likely to be inaccurate, while also violating the dignity and integrity of the person.²⁸ After *Puttaswamy* judgement right to privacy has been recognised as fundamental right to be covered under the auspices of Article 21. Article 21 not only mandates procedure established by law but also mandates that the procedure has to be just, fair and reasonable. With the arrival of AI, the scope of use of technology has widened. The same has resulted in to concerns. Article 14 of the Constitution of India guarantees equality before law and Article 15 protects against discrimination, in this connection, use of AI shall not be biased towards particular accused based on race, religion, sex, caste, place of birth, etc.

Issues: Use of technology in Administration of Criminal Justice

Use of technology in administration of criminal justice has helped to a great extent so far as investigation is concerned. Use of technology has even extended to interrogation of accused. Along with various positives, use of technology has raised certain issues or concerns.

Indian Constitution guarantees to its citizens right against self- incrimination and this becomes very relevant while technologies are being used during criminal investigation. The Supreme Court of India has taken a cognizance in selvi’s case and mandated certain guidelines to be observed fir the use some technologies by police or other agenises while investigating. The Court in this case distinguished between ‘efficient investigation’ and ‘preservation of

²⁴ Article 20 (3) of Indian Constitution.

²⁵ AIR 1954 SC 300

²⁶ Jain M. P.; Indian Constitutional Law; LexisNexis, seventh edition, 2014, pg- 1099

²⁷ AIR 2010 SC 1974, (2010) 7 SCC 263

²⁸ <https://privacylibrary.ccgnlud.org/case/selvi-vs-state-of-karnataka> (last visited on 19/05/2022)

individual liberty'. It has been expressly mentioned as one of the guidelines to obtain the consent of the accused first before any Lie Detector Tests is being administered on him. Whether the consent has been obtained or not or if obtained whether it is free or not is difficult question to answer. Once accused is willing to go for Lie Detector Test he should be explained so far as implications of the test is concerned. these implications may be physical, legal and mental in nature. With regard to this guideline the question arises whether accused has been explained properly or not. There has been a requirement of recording of the Lie Detector Test and the same shall be done by an independent agency.

Moreover, with the emergence of AI, the same has been used in administration of justice. In order to be more precise and correct AI need to be backed by large number of data popularly known as Big Data. Many countries are using AI in their administration of Justice, US is one such nation. According to one group of scholars, experts in the area of technology and law, AI shall be included in criminal justice after checking all probable limitations of the system. Currently there has been a belief that the AI is bias towards black accused. The AI shows that black accused having more probability to commit crimes in future in comparison with other. So like humans, machine can be biased, at the end of the day the machine works as per the command, data which are being stored. Use of specialised chat bots by the judiciary has been a ground of debate at present. The debate has begun that in future, whether judges are replaced by AI.

Benefits vis-à-vis Challenges

There has been a debate regarding use of AI in criminal justice. There has been difference of opinions among scholars, jurists, lawyers, and other experts in this area. AI has helped and contributed a lot so far as administration of criminal justice is concerned. Use of criminalising algorithm, risk assessment tools such as domestic violence risk, juvenile justice risk, pretrial risk, etc.²⁹ AI technology also has the potential to provide law enforcement with situational awareness and context, thus aiding in police well-being due to better informed responses to possibly dangerous situations.³⁰ Use of robots and drones is quite normal these days to keep a surveillance or investigation. Use of technologies has contributed notably especially in criminal investigation as well as prevention. Today one may witness use of drones by law enforcement,

²⁹ <https://epic.org/issues/ai/ai-in-the-criminal-justice-system/> (last visited on 07/05/2022)

³⁰ <https://www.ojp.gov/pdffiles1/nij/252038.pdf> (last visited on 07/05/22)

gunshot detection systems, automatic licence plate recognition system, GPS tracking darts, etc.³¹ Although the technology has manifold benefits or advantages it has its own potential challenges where it interfaces with law. Use of technology in criminal has paused several concerns such as privacy, discrimination by algorithms. Irrespective of such concerns use of technology will not be put out with regard to its importance in criminal investigation. There has been an observation regarding discrimination or bias towards particular class of offenders by the technology. The Correctional Offender Management Profiling for Alternative Sections (COMPAS) has been criticised by many experts in the field of AI on the ground of the system being bias or unfair towards black defendants. At the same time other group of experts support the use of technology as the same will help us to eliminate the probability of bias which may arise on account of human involvement.³²

Along with the benefits of AI it has resulted into various challenges and apprehensions. AI is dependent on how the same has been designed or developed. So far as the designing and developing of algorithm is concerned, it depends on the human element who designs the same. There are various challenges or potential apprehensions which one can perceive due to involvement of humans who develops AI. There has been a constant buzz across the world of AI being bias or discriminating while the same in being used in administration of criminal justice. This happens due to various factors such as lack of sufficient data, biasness in the mind of developer or flaw in designing.

It is very clear that with the advancement of time, the use of AI in criminal justice will going to be increased. The important question is, to what extent we can depend or rely upon AI, in criminal justice administration. If we are thinking of using machines to eliminate biasness due to involvement of humans, how would it be justified if the machines too proved to be bias.

The Criminal Procedure (Identification) Bill 2022

The Bill has been passed by Lok Sabha and Rajya Sabha on 4th April 2022 and 6th April 2022 respectively. Use of technology has definitely contributed to a great extent especially with reference to administration of criminal justice. However, it has paused its own issues and

³¹ <https://wjta.com/2019/03/04/catch-me-if-you-can-the-evolution-of-technology-in-the-context-of-criminal-investigation/> (last visited on 12/06/2022)

³² <https://massivesci.com/articles/machine-learning-compas-racism-policing-fairness/> (last visited on 18/06/2022)

concerns. The said Bill too has been debated because of certain provisions in the Bill. It has been argued that the Bill may violate right to privacy as well as right to equality which are fundamental rights guaranteed under Articles 21 and 14 respectively. This Bill permits the collection and storage of personal data for the period of seventy-five years. Not only this who may collect the data and which kind of data may be collected too has raised concerns. Although collection and storage of data going to contribute tremendously so far as criminal investigation is concerned.³³ But at the Same time a proper balance is required to be maintained between pros and challenges of use of technology in criminal investigation.

Summing Up

From the discussion made so far one may realise that use of technology in administration of criminal justice has come stay. Use of technology has actually helped criminal investigation agencies to a great extent. One may prove beyond reasonable doubt regarding various aspects of investigation. Whether it is murder or natural death, actual cause of death, how the victim has died, which is the weapon used to commit crime, and many more. While interrogating hardened criminals such as terrorists, rapists, use of Lie Detector Tests is a great help. Although a balance between use of such technology and right against self-incrimination need to be maintained. However, use of technology has posed several issues such as administration of Lie Detector Test without obtaining consent of the accused or forcibly obtaining the consent. On many occasions the accused were not correctly explained the impact of such tests physical, emotional and legal. Use of AI has been questioned on the ground of biasness or discrimination. There has been a great responsibility on the state and its agencies while involving itself in investigation. In addition to this, state shall try take effective measures so that rights of accused shall be protected during inquiry and investigation. Technology has slowly entered in judiciary as well. While using technology by the judiciary a care shall be taken with reference to its effectiveness as well as non-discrimination.

AI and Media

Development of science and technology has always contributed to all spheres of human society. Media is no exception to the same. Science and technology have contributed drastically and effectively the way media has developed over the years. Over the years there has been a constant change in the way media is being used. Whether it is print, electronic, or social media.

³³ <https://prsindia.org/billtrack/the-criminal-procedure-identification-bill-2022> (last visited on 14/06/2022)

With the emergence of AI, the social media has been affected drastically the way the same has been being used.

Social Media and AI

Whether it is Facebook (now Metaverse), Twitter, Instagram, or any other social media, all have been influenced by AI. Social media marketing has heled to increase the profits of the sellers. Political opinions too are greatly influenced by social media. Currently we cannot think of social media by eliminating use of AI. It has been clearly perceived that AI will now remain with us, whatever benefits, apprehension or challenges it may have. Taking an example of Amazon, we can easily realise that how AI as a technology has helped the sellers to gain profits in large volume in comparison with customary sale of products. Looking from the perspective of political parties AI based social media has helped them to understand the mind set of voters with reference to race, religion, caste, sex, etc. We may take example of US election, how the same was influenced by the technology. AI as a technology has helped in many ways so far as social media is concerned. AI has helped with reference to maintenance of data privacy, restricting specific users, verifying authenticity of information shared on social platforms. In this manner, AI is must for any social media.

Along with benefits of AI with respect to social media, it has various challenges too. Because any AI driven system ultimately depend on how effectively the same has been designed. Due lack of sufficient proper data, the system might not yield desirable results. Due to biasness in the mind of developer or designer, the AI will always give biased output which is harmful for any society.

Bulli Bai Case³⁴: Times of India (January 21, 2022)

In this case, the Mumbai cybercrime police arrested accused for developing the application titled Bulli Bai. This application targeted Muslim women. This application was consisting of images of Muslim women, available by online auction. Currently this application is removed form the online repository. Such incidence warns us how AI may put life and dignity at stake if data privacy has not been protected in rightful manner.

³⁴ Vishal Jha v. State

Data Privacy and Law

While talking about AI, it becomes inevitable to discuss about data, and its privacy. Data has been considered as fuel. In order to make an effective AI, one must need variety of data. The more we have variety of data, the more effective AI as a technology will be. AI is dependent on big data for its success. Every now and then we are providing our data to various platforms, government departments, etc. Such data is being used to develop sound AI.

Here comes the question, which data can be used, which cannot be used, which can be used only after obtaining permission in writing? At times our sensitive data have been used without our knowledge, or the data which is shared do not have any relevance as on date. The issue of data privacy is one of the common international challenge these days. As the world in which we are living, one can say privacy is a myth. If you believe there is a privacy, you can feel privacy. Actually speaking there is no privacy specially with reference to use of data.

Many countries in the world have realised this concern. European Union has taken an initiative by formulating General Data Protection Regulations (GDPR). The Supreme Court of India has made its point very clear in Aadhar Case³⁵ by declaring right to privacy as fundamental right under Article 21 of the Indian Constitution. Since then Government of India has taken an initiative to introduce an effective data protection legal framework. A Committee was constituted under the leadership of Justice Sri Krishna. The Committee has submitted draft in this regard. The Data Protection Bill 2021 is now ready to get a nod from the Parliament. Data will be used on continuous basis and there will be a challenge to its protection.

Human Cloning, Genetic Privacy and Law

With the ever-growing development in the field of science and technology, there are various areas of research which require immediate legal attention. One such aspect which remains unexplored, deals with the cloning of humans, animals and other living organisms. With an ongoing argument about human cloning The United Nations has in its declaration on Human Genome and Human Rights in Art. 11 stated that practices detrimental to human integrity, such as cloning of human beings, shall not be allowed, however, a global policy regarding human cloning does not exist. India had voted against the adoption of this UN declaration as it prohibited the practice of therapeutic cloning which is allowed in India.

³⁵*Justice Puttaswamy (Retd.) and Anr. v Union of India and Ors (2019) SCC 1*

Human Cloning

Human cloning may be referred to as ‘therapeutic cloning,’ in particular the cloning of embryonic cells for transplantation or the treatment of wounded nerve cells and other health purposes. Human cloning is more commonly stated to as “reproductive cloning,” the usage of somatic cell nuclear transfer (SCNT) to obtain eggs that might develop into adult individuals. Human cloning has also been proposed as a means to boost the genetic endowment of humanity, by cloning persons of considerable accomplishment, for example, in athletics, music, art, education, literature, politics and the like, or of recognized virtue. Such ideas were obviously never taken seriously.

Concepts of genetic privacy

The genetic information of an individual is different from other types of personal information. Therefore, special care should be paid to it so that no one can breach one’s privacy. As genetic science is developing, now the genetic tests can be conducted through the small tissues of the human body. In some cases, the test can be performed with a root of single hair or saliva left on a glass from which a person drank water. And obviously, these kinds of tests are done against the will of the person which is against his privacy. So, this should be ensured that a person’s privacy is secured.

Legal Issues concerned

Infringement of right to privacy and genetic uniqueness

Dignity is a concept connected to human “uniqueness”.³⁶ Each individual has their own dignity which has a distinct value and separates them from the rest. This uniqueness is also present in an individual’s DNA and genetic information. As privacy is a fundamental right covered under Article 21, to copy the human genetic identity goes beyond something inherent in human dignity and eccentricity.³⁷ In essence, genetic identity is directly linked with the concept of human dignity.³⁸ By creating a genetic copy of a pre-existing human it will compromise the sanctity of one’s uniqueness and will violate the dignity and privacy of an individual. The DNA of the clone will be similar but not exactly the same. This is because mitochondrial DNA of

³⁶ T. Wright, Second Thoughts: How Human Cloning Can Promote Human Dignity, Valparaiso Uni. L.R. 1–35 (2000).

³⁷ Bruce D., A View from Edinburgh. In: Cole-Turner R., editor. In Human Cloning: Religious Responses (Louisville: Westminster John Know Press, 1997).

³⁸ Timothy Caulfield, Human cloning laws, human dignity and the poverty of the policy making dialogue, BMC Medical Ethics <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC183855/#B18>.

the egg that will also come into picture. However, it can still lead to serious privacy issues.

Danger of commodification and human trafficking

Creation of a human clone can lead to immoral and unethical practices of human trafficking. Due to lack of any prescribed punishment or penalty for creating a human clone, the process can be abused. It can further lead to commodification of the cloned humans where they will be merely used as body doubles to medically treat diseases of their pre-existing human counterparts. Clones, although created through an artificial process, will still be humans and there is a huge chance that if human cloning is done, it will give rise to infringing basic human rights of the clones.

Issues regarding parentage

In sexual reproduction, each parent contributes half of their genes, while during cloning, which is a form of asexual reproduction, only one person passes on all of his or her genes.³⁹ Therefore, in theory, neither the female who carries the embryo in her uterus nor the person who provides the clone with its genetic information is its parent. It therefore creates a confusing situation regarding the parentage of the human clone.

Guidelines in India Regarding Human Cloning

India does not have specific law regarding regulation of cloning, but the Indian Council of Medical Research has laid down certain guidelines prohibiting research related to germ line genetic engineering and cloning. These guidelines discuss about the status of both therapeutic cloning and reproductive cloning.

The National Ethical Guidelines for Biomedical and Health Research involving human participants was brought in the year 2017. It has categorized stem cell research into permissible, restricted and prohibited. The research involving therapeutic cloning is categorized as “restricted” and reproductive cloning is categorised as “prohibited”⁴⁰ In India, only permissible and restricted areas of research are permitted with appropriate approvals. It is necessary to ensure that donors are not exploited and commodified.⁴¹

³⁹ Henry T. Greely, *The end of Sex & the future of human reproduction* 28-44 (Harvard University Press, 2016)

⁴⁰ § 7.9, National Ethical Guidelines for Biomedical and Health Research involving Human Participants, 2017.

⁴¹ § 7.9, National Ethical Guidelines for Biomedical and Health Research involving Human Participants, 2017.

However, these guideline by themselves are not binding in nature. The National Ethical Guidelines for Biomedical and Health Research became enforceable through the New Drugs and Clinical Trial Rules, 2019 stemming from the Drugs and Cosmetics Act, 1940. The New Drugs and Clinical Trial Rules, 2019 establishes a mandatory requirement for the Ethics Committee to approve, review and oversee the research in National Ethical Guidelines for Biomedical and Health Research Involving Human Participants.⁴² Human cloning can take place in multiple forms out of which only through reproductive cloning can an entire human being be created. Scientists have been successful in cloning animals like sheep, horse, etc. and now creation of a human clone is also a possibility. Human reproductive cloning can lead to serious legal implications as discussed in the article and for countering the same, India presently has no specific legal framework which punishes or penalizes such activity.

Artificial Intelligence and Law

AI is known to us. It has been associated with various segments of human society. Such as weather forecasting, education, healthcare, retail, manufacturing, Banking. We cannot though of our present and future devoid of AI. AI is and will be there. Whenever any new technology arrives, it comes with its own benefits and challenges. It has been observed that we do not have legal framework in pace with technological development. Currently we are facing various challenges to tackle various issues related to AI.

There has been a constant buzz regarding liability of AI, whether AI may be given a status of person, whether AI driven humanoids may be given citizenship? Most countries in the world are still finding difficulties to answer to these questions. We do not have any specific legal framework which deals with issues and challenges pertaining to AI. Law always fixes rights and duties on persons. Each right comes with its remedy or remedies in case the same is violated. What can be the situation if any of our rights are violated by AI. For example, if AI driven pilotless car met with an accident, who can be held responsible? If the AI has proven to be biased, who can be held responsible? Whether robots may be given citizenship the way in which Saudi Arabia has given?

⁴² Rule 15, New Drugs and Clinical Trials Rules, 2018.

Law, Science and Technology: Legal, Moral and Ethical Concerns

From the points discussed above we may conclude an interface among law, science and technology. Such interface results into various legal, moral and ethical concerns. In this chapter researcher shall deal with such concerns in general.

Human civilisation is evident of development over the years. Application of science and technology is one of the important factors responsible for development. Use of science and technology in day to day life is inevitable. Therefore it is obvious that we have to face certain legal, moral and ethical concerns. For example, use of automobiles has definitely helped us a lot so far as transportation is concerned at the same time it has posed an important challenge with regard to environmental pollution. As a result of the same we may witness development of environmental jurisprudence across the nations. Scientific inventions have helped us to resolve various problems at the same time it has its own challenges. For example, science has helped childless couple to have children by surrogacy, IVF, etc. organ transplantation has helped to save many lives. All such scientific methods and use of relevant technology has no doubt helped us to resolve many challenges. At the same time it has posed various concerns of its own. We have legal framework pertaining to deal with various issues with regard to surrogacy, IVF, organ transplantation. Various animals are being used for experiments of drug or cosmetic before the same can be made available for clinical trials on humans. We must be thankful to Indian Judiciary who has banned the experiments on animals to develop a new cosmetic. But still for inventing a new drug, animals are still the soft target. Taking into consideration various moral, ethical and legal aspects of the same there has been various guidelines which have to be followed with reference to experiments on animals. There have been various procedural and other legal norms pertaining to clinical trials on humans in various phases.

Article 21⁴³ of the Indian Constitution guarantees right to life. Taking into consideration scientific and technological development, there has been a group of people who are advocating permitting not only passive but also the active euthanasia. The Supreme Court of India as on date has permitted only passive euthanasia and that too under specific circumstances and following mentioned protocols. The judiciary has its own reasons not to permit active

⁴³ No person shall be deprived of his life or personal liberty except according to procedure established by law. <https://indiankanoon.org/doc/1199182/> (last visited on 07/05/2022)

euthanasia. The reasons may be moral, legal or ethical.

The World Commission on the Ethics of Scientific Knowledge and Technology is mandated to formulate ethical principles that could provide decision-makers with criteria that extend beyond purely economic considerations.⁴⁴ Observing the composition of the members of the Commission, it is comprised of various fields such as law, philosophy, science, cultural and political. The composition itself is quite evident that science and technology not only governed by legal norms but also by ethical, cultural, moral, religious norms.

Legal norms play a vital role to maintain a balance between benefits of science and technology on one hand and the issues and challenges on the other. With regard to above discussion one may conclude that we cannot live without science and technology. Because of the same we should have certain norms which shall be effective to mitigate legal, ethical and moral concerns.

Emergence of AI too has resulted into various legal and ethical concerns. Following chapter shall discuss the ethical and legal concerns relating to AI in particular.

⁴⁴ <https://en.unesco.org/themes/ethics-science-and-technology/comest> (last visited on 07/05/2022)