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IMPACT OF HUMAN RIGHTS ON SCIENCE & TECHNOLOGY

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PROGRESSIVE EDUCATION SOCIETY'S MODERN LAW

COLLEGE, PUNE

Abstract

There is a close relationship between science and human rights. Although it has been recognized for decades by international law, the right to enjoy the benefits of scientific progress and its applicability has only recently received minimal recognition as a human right by intergovernmental organizations. Human rights are at the center of the international community's efforts to address pressing global issues when science, technology, and development are approached from a human rights perspective. In order to provide a comprehensive analysis, the paper first addresses the pertinent international human rights instruments, such as laws, rules, declarations, and conventions.

Human rights approaches are presented in the paper's doctrinal and qualitative analysis in order to shed light on the moral implications of emerging technologies and look into how policy can keep up with the rapid advancement of science. The report also suggests that in order to prevent conflicts between science and human rights, the international community should support regulatory procedures.¹

Keyword: International law, digitalization, ICT, science, and human rights

Introduction

The relationships between humans and their surroundings changed and underwent significant upheavals with the development of science and technology. Technology and science have both

¹ <https://www.annualreviews.org/doi/10.1146/annurev-lawsocsci-060220-081955>

constructive and destructive effects. The realization that there are not enough resources to support the needs of the world's rapidly expanding population led to the initial push for scientific development. The needs were not met by the outdated, traditional methods, and issues like famines, droughts, and food shortages grew worse. The Malthusian theory of population suggests that "the power of population is so superior to the power of the earth to produce subsistence for man," and it seems to be quite relevant in this context. Man had no choice but to turn to science as a remedy because of this and technology for its demise. As time went on and science and technology made astounding advancements, grave concerns were raised about the application of these newfound advances, particularly in relation to human rights. Since technology has taken over every aspect of life, it has become apparent that its unchecked power gives those in positions of authority tremendous influence over others. Wide-ranging, uncontrollable, and unthinkable consequences were realized. Very fundamental human rights issues have arisen as a result of the rapid spread of extremely sophisticated technology. Human rights concerns had previously centered on the fundamental concerns of freedom of speech and thought, the right to inherit, and the manipulation and abuse of those rights by the police and other authorities. However, as technology advanced, new issues emerged, which were believed to leave the lasting imprints on human body, mind, environment and the human society.²

Meaning and concept: Interplay between Science, Technology and Human Rights

Firstly, let us examine the definition of science and technology before going into further detail about the impact. "Knowledge obtained through study or practice covering general truths of the operation of general laws, especially as obtained and tested through scientific method and concerned with the physical world," is how Webster's New Collegiate Dictionary defines "science." Conversely, the word "technology" refers to the methodical approach to an artistic, formal, or skillful endeavor, or to a way of carrying out a task, particularly when employing technical procedures, techniques, or expertise. Though they may seem like simple ideas after reading the definition, they are actually extremely potent forces that have the ability to either challenge or change the course of human history.

Understanding the interactions between science, technology, and human rights is therefore even

²<https://humanrights.gov.au/our-work/technology-and-human-rights>

more crucial. According to C.G. Weeramantry's article, it took until recently for people to realize that, like all other aspects of power, scientific and technological power needed to be governed by the law. And it had already put them well behind in the race by the time attorneys or the law addressed it. He explains the antiquated nature of legal concepts with a brief example. According to him, the definition of trespass, which was previously only understood in the physical sense, has changed somewhat in the technological age because it is now possible for someone to alter someone's integrity, image, and personal information without actually entering their home.. Since science and technology have advanced at an exponential rate, new solutions are outdated before they are even implemented.³

Need to research the Effects

As was previously mentioned, the new technologies presented enormous challenges, which were made worse by the expansion of the large corporate entities that were the technology's owners. These corporate entities combined wealth and technology to control national finances, producing results that exceeded individual expectations. The fact that these houses were solely focused on turning a profit and spent enormous sums of money developing new technologies, totally disregarding human values, added another layer to the issue.

The development of advanced military technologies opened the door for partnerships between technology developers and consumers. Technology has impacted nearly every aspect of life, including food, health, the environment, and reproduction. These interactions have had more negative than positive effects. There are numerous human rights issues as a result of the legal system's incapacity to address the issues brought about by technological advancement.⁴

The original notion of using Science and Technology to advance Social and Human Welfare, or the Scientific Temper

Technology development was initially seen as a blessing as we advanced the accomplishments of human resource development. The human rights instruments addressed, from a positive perspective, the issues surrounding human rights, human dignity, and integrity that have been raised by scientific and technological advancements.

³ <https://archive.unu.edu/unupress/unupbooks/uu08ie/uu08ie01.htm>

⁴ <https://www.openglobalrights.org/technology/>

The Universal Declaration of Human Rights, Article 27(1), recognizes that everyone "has the right to share in scientific development and its benefits." Similar language was used in the International Covenant on Economic, Social, and Cultural Rights' Art. 15(b), which emphasized the full realization of this right to development and freedom both of which are essential for scientific research while confirming the right to benefit from scientific advancement and its applications. Developing a scientific temper, humanism, and a spirit of inquiry and reform are stressed even in Article 51A (h) of the Indian Constitution.⁵

Discussions about "Development": Materialism vs. Quality of Life

It is evident that during the early stages of the development of human rights, the necessity for increasing amounts of technology and science was unquestionably stated, but the potential risks of scientific advancements were either not stated or not considered. However, the idea of the right to development eventually served as a spur for the achievement of human rights. In the United Nations Millennium Development Goals (2001), the United Nations Declaration on Social Progress and Development (1969), and the United Nations Declaration on the Right to Development (1986), development was portrayed as a process that realizes all human rights, including civil, political, economic, social, and cultural rights.

It was decided that "development" was a broad term that included social, cultural, political, and economic processes. Its goal was to continuously improve everyone's well-being by allowing everyone to actively, freely, and meaningfully participate in development and in the equitable distribution of the benefits that resulted from it. At the Vienna Conference in 1993, it was decided to recognize the right to development as a human right. The word "development" was given a proper definition that encompassed a concept that goes beyond the expansion of the nation's and its citizens' material well-being or economic growth.

It was believed to encompass the rights to food, health, education, and other necessities. Academic debates about development quality of life versus materialism opened the door to the idea that unrestricted, uncontrolled technological advancement will not be permitted at the expense of fundamental human rights in the name of progress. In the sake of development, there was a sense that technological advancement needed to be restrained and controlled.

⁵ <https://www.ohchr.org/en/instruments-mechanisms/instruments/declaration-use-scientific-and-technological-progress-interests>

The concept of Human Rights is acknowledged in the field of Science and Technology.

There were significant issues arising from the rapid and uncontrolled advancement of technology, both nationally and globally. While domestic legislation could be implemented, states appeared hesitant to submit to international regulations and norms, so while the problems were the same, their severity was greater. Two areas can be used to examine how the concept of human rights is recognized in the fields of science and technology:

Worldwide Instruments

It took some time for international law to adapt because it was not prepared to handle the new problems brought about by scientific and technological advancements. Additionally, the states had a stake in the specific technology, which would have impeded their interests if it had come under international regulation. It is significant to remember that the 1968 International Conference on Human Rights in Tehran, Iran, took the initiative to bring the issue of how scientific and technological advancements affect human rights before the UN for the first time.

As per the suggestions made during the conference, the United Nations General Assembly passed a resolution requesting the Secretary-General to carry out "ongoing and multidisciplinary research, both domestically and globally, that could provide a foundation for formulating suitable guidelines to safeguard fundamental liberties and human rights." Advanced science and technology advancements were to receive particular attention concerning:

- regard for people's right to privacy as well as the integrity and sovereignty of nations in light of advancements in recording and other technologies;
- safeguarding the integrity of the human psyche, body, and mind in light of developments in biology, medicine, and biochemistry;
- the uses of electronics that could violate someone's rights and the restrictions that ought to be placed on them in a democracy; and, more broadly,
- the proper balance to be struck between the advancement of science and technology and humankind's intellectual, spiritual, cultural, and moral development.

This resolution emphasized the risks that advances in technology posed to fundamental freedoms

and human rights. In this context, the Proclamation of Tehran takes on significance as it established, for the first time, that technological and scientific advancements may jeopardize people's rights and freedoms and necessitate ongoing oversight. A study of the issues pertaining to human rights that result from advancements in science and technology should be conducted, the Conference recommended in resolution XI, for the various UN organizations. Resolution of the General Assembly: The UN General Assembly invited the Secretary General to conduct a study of the issues pertaining to human rights resulting from developments on December 19, 1968, through Resolution 2450 (XXII).

Based on the suggestions, the Secretary General created an additional report that resembled a draft program and presented it to the Human Rights Commission during its 26th session in 1970. The result was Resolution 10(XXVII) dated March 18, 1971, in which the Commission linked the issue to the requirements of the Second UN Development Decade. The same Declaration urged all states to work together to help developing nations establish, grow, and advance their scientific and technological capacities in order to hasten the realization of their citizens' social and economic rights.⁶

Technology has had a variety of effects, from the peaceful influx of beneficial technologies to what Dr. Egziabher has called the "violent entry" of technologies that cause destruction. This has had a profound and widespread impact on lifestyles that have been maintained for centuries, if not millennia. As a result, the General Assembly of the United Nations adopted the Declaration on the Use of Scientific and Technological Progress in the Interests of Peace for the Benefit of Mankind (resolution 3384 (X X X) of November 10, 1975) in 1975 in response to growing awareness of the issues at the intersection of the expanding fields of technology and human rights. This Declaration urged all states to take the necessary steps to stop the use of scientific and technological advancements to restrict or obstruct an individual's ability to exercise their fundamental freedoms and human rights, as guaranteed by the International Covenants on Human Rights, the Universal Declaration of Human Rights, and other pertinent international agreements. Ten years later, the Commission on Human Rights addressed the application of scientific and technological advancements for the defense and advancement of fundamental freedoms and human rights in Resolution 1988. It invited the UNU to investigate the advantages and disadvantages of scientific and technological advancements for human rights and fundamental

⁶ <https://archive.unu.edu/unupress/unupbooks/uu06he/uu06he0c.htm>

freedoms, working with other interested academic and research institutions.⁷

Internal Tools

The "Poona Indictment," which was adopted at a meeting of the World Order Models Projects held in Pune in July 1978, was made possible by the developing countries' profound concern. The statement "Technology and Science Perversion: An Indictment" It mentioned, among other things, drug testing among the underprivileged and the employment of 50% of research scientists in the field of military R&D. The Indian Constitution, specifically Article 51A (h), emphasizes the importance of fostering a scientific temperament, humanism, and a spirit of inquiry and reform.

Despite this, India has struggled to keep up with technological advancement. Nevertheless, it has legislation in relevant areas, such as the Prenatal Diagnostic Techniques Act of 1994, the National Organ Transplant Act of 1984, the Environmental Protection Act of 1986, and the Human Ethics Committee at the Rajiv Gandhi Centre for Biotechnology, which operates within the framework prescribed by the Indian Constitution. The Indian Council of Medical Research and the Department of Biotechnology, Government of India, have also established guidelines for research on human subjects, and the Information Technology Act has been enacted at a rapid enough pace to keep up with technological advancements.⁸

Science and technology's effects

According to C.G. Weeramantry's book, the problems have become more urgent due to the remarkable advancements in science and technology that have persisted unabatedly. He goes on to say that the problem's scientific and practical aspects are both growing more pressing, and when these two elements come together, the problem's urgency and scope exponentially increase. According to him, the issue cannot be ignored any longer in the interest of improving humankind since scientific and technological advancements have increased their ability to have a positive or negative impact on human society. This power will grow with each year that goes by, and it will become increasingly urgent to use it for the sake of human rights. He goes on to explain that as science and technology continue to advance, the issues we are trying to solve will get worse. He

⁷ <https://digitalcommons.schulichlaw.dal.ca/cgi/viewcontent.cgi?article=1258&context=dlj>

⁸ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7762914/>

gives the following example to demonstrate his point: the issues we face in the early 1990s are far more serious than they were in the early 1980s, he claims, since everyone has the legal right to food and a clean environment. Examining the function of science and technology and how it affects human rights thus becomes crucial. There is no longer a smug belief that science and technology are interchangeable.

As a result, people no longer view the choices made in connection with their adoption as impartial and value-free. Instead, they elicit strong support or opposition, elicit strong feelings, and, in fact, turn into significant political issues. The debates surrounding these choices bring up important questions about whether society should and can control science and technology, or if these fields determine how they develop on their own. Solutions that work for one society might not work for another. Choosing the right scientific and technological models for a particular society has a direct impact on human rights issues.⁹

Constructive Role

"Productive patterns of interaction among all members of the international community" can be produced with unparalleled ease thanks to science and technology. A crucial area of focus in the effort to better the human condition is human rights. Persistent peace requires such an improvement, as the Secretary-General notes. Unquestionably, scientific and technological advancements have strengthened the human rights movement in that they have made it possible for basic human rights like the right to food, health, and education to be realized. These rights were made possible by these developments.

The greatest medical and therapeutic methods are available to humans; the green and white revolutions, which increased food production through the use of pesticide-resistant manures, irrigation systems, and high-yielding varieties of seeds, respectively, and increased milk productivity through the use of cow germ line engineering after the 1960s, helped India address issues such as food scarcity, which was the main post-independence problem. Without a doubt, science and technology have brought about a number of material comforts that have improved people's quality of life. These include better medical facilities that have improved life and alleviated some of the worst human suffering, improved accessibility in terms of transportation facilities, and information availability (a large amount of data can be generated through the

⁹https://www.gettextbooks.com/author/C_G_Weeramantry

internet).¹⁰

Adverse Role

Human rights are being denied in a desperate and unstable way in the face of advances in science and technology. Unprecedented advances in science and technology have made it impossible to postpone any longer without endangering the future of the human race. Some of the major issues that impact human rights are the concept of dual use of technologies, the impact of unrestrained use of natural resources, the development of weapons and methods of warfare, new techniques for torturing people, and methods of deprivation. These issues strike at the core of what has been recognized as basic human rights: human dignity, integrity, and well-being. The detrimental effects of these technical developments have been addressed under particular and relevant human rights concerns.¹¹

Principal Concerns/Ethical and Legal Issues

One must be selective in addressing a problem as big and serious as the interplay between science, technology, and human rights. Because of this, this assignment addresses the effects of science and technology in a few subheads that are particularly pertinent and immediately relevant to large segments of the world's population. Regarding the effect of technology on human rights, the heads covered provide insightful information.¹²

Advances in Biotechnology

The development of biotechnology has made it possible to experiment on humans, on fetuses, sell and hire human organs, use of untested drugs, torture techniques, psychosurgery, personality tests, genetic engineering, selective breeding, and pre-selection of sex. Important moral and human rights concerns are brought up by sperm and egg banks, in vitro fertilization, embryo transplantation, and foetus farms.¹³

- **Human Cloning**

The process of cloning indicates the taking of a cutting, and also includes nuclear transfer, of

¹⁰ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3190088/>

¹¹ <https://www.ohchr.org/en/instruments-mechanisms/instruments/declaration-use-scientific-and-technological-progress-interests>

¹² <https://pubmed.ncbi.nlm.nih.gov/21766721/>

¹³ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3178936/>

genetically identical animals. Nuclear transfer involves removing the chromosomes from an unfertilized egg and replacing them with nucleus from the donor cell. As it is the transfer of nucleus that determines almost all of the characteristics of the resulting offspring, a clone will resemble its parents, i.e. the animal from which the donor cell was taken. 16 no doubt there is positive consequences such as coding for genetically inherited diseases and unresolved diseases for eg. Early detection of cancer. But it raises number of ethical and human rights issues. Should the alteration of germ cells which results in a permanent genetic change for whole organism and subsequent generations be allowed?

Is it permissible for humans to reproduce clone organisms from individual genes, as has been successfully done with mice and sheep? How can the production of "humonioids" (human-species hybrids) be stopped? These inquiries strike at the very core of what it means to be human, including one's integrity and sense of dignity. It also brings up issues like "biopiracy," or the export of novel genes outside of the nation, which is problematic for developing nations with abundant biological diversity because it can stop them from using them for personal gain.¹⁴

• **Innovative Reproductive Methods**

Women who are unable to have children through the conventional biological process have benefited greatly from technological advancements. They can now have test tube babies that grow inside the surrogate mother's womb. The fundamental question it poses is: Who is the mother, and can a child ever claim property owned by a surrogate mother? Even though they are more legally significant, they also raise important questions about fundamental human rights. The idea of surrogacy completely eliminates the social heir phenomenon, in which a couple unable to have a child would adopt, but because of advances in technology, which render women incapable of bearing children, the wealthy and fitter ones might choose to become rental mothers in order to protect themselves from pre and post natal discomfort.

Artificial insemination is another aspect of technological advancements in reproductive techniques. It allows women to become pregnant without a legal male partner acting as their husband by using sperm banks as the marriage instrument. The question of who should be the true heir the genetic or natural heir becomes extremely complicated. Doesn't it go against a child's right to live in a family where both of his parents love him? What can be done, furthermore, if a man chooses to hire a rental mother instead of getting a child from his wife? Artificial

¹⁴ <https://www.genome.gov/about-genomics/fact-sheets/Cloning-Fact-Sheet>

reproductive techniques can be used to undermine the fundamental social fabric and strike at the heart of human rights, namely dignity.¹⁵

- **Drugs that Enhance Human Performance**

Drugs and technologies that enhance human performance, such as hormone replacement therapy, steroids for athletes, and viagra, present certain concerns. The makeup of these medications is incomprehensible to even the most knowledgeable person. The large pharmaceutical companies fail to disclose the negative effects of these medications, which include impulsive behavior, depression, and hormone imbalances. Prolonged use of these medications also leads to addiction and the degradation of one's health, which is a fundamental human right.¹⁶

- **Euthanasia and Life Sustaining Technologies**

While improving life was the primary goal of medical advancement in the past, the same technology is currently being used to administer death. It is believed that many people in comas or living on machines can end their life with the assistance of a doctor by injecting a lethal dose of medication. Friends and family want to free these people from their obligations because they consider them a burden. These days, euthanasia is a hot topic of conversation. While some think physician assisted suicide is a waste of money because the patient won't recover, human rights activists stress the value of protecting life and oppose it. Euthanasia raises questions about whether the right to life is inalienable or if we treat doctors like gods with the power to decide on a patient's fate.¹⁷

- **All-New Technologies for Torture**

Human rights activists are gravely concerned about new technologies used in torture, such as electric shocks, drugs that cause trauma, and psychotropic drugs. Up until recently, there was a lot of misuse associated with brain mapping, psychosurgery, and narcotic analysis tests. Drugs that cause specific psychological reactions like terror, fear, or disorientation, as well as carefully calibrated electrical shock, are some of the new tools of torture. Pharmacological torture is another option; this may result in momentary paralysis.¹⁹ The presumption of innocence until proven guilty is the fundamental legal tenet upon which the criminal justice system is built, but

¹⁵<https://www.ncbi.nlm.nih.gov/books/NBK576409/>

¹⁶ <https://pubmed.ncbi.nlm.nih.gov/22868973/>

¹⁷ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1121705/>

these tactics have called into question this very foundation.

Under the 1984 Convention on the Protection of All Persons from Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment, Article 5 of the UDHR, Article 7 of the ICCPR, and other legal instruments forbid degrading and inhuman torture.¹⁸

- **The Human Society: Concerned Issues Life, Knowledge, Peace, and Well-Being**

Every aspect of human existence has been impacted by technological advancement. The interest of society has been compromised because the new area of information exchange requires the proper information to be disseminated. Since inadequate information can endanger human life, the right to information determines other rights as well, such as the right to health.¹⁹

- **Information Access, Regulated Thought and Expression**

The global dissemination of information has been strengthened by new information technologies. It has improved communication and uplinked every corner of the globe. All libraries are accessible, which has benefited scholars everywhere. However, it has also led to issues like the right to privacy. These days, it's actually not necessary to physically invade someone to interfere with their life online and negatively impact the person whose rights have been violated. Copyright violations and piracy are among the issues. The internet is also used to spread pornography and to encourage other hate crimes like terrorism, xenophobia, and racism. A commission on the ethics of scientific knowledge and technologies was suggested during the 1997 Monaco International Congress on Ethical, Legal, and Societal Aspects of Digital Information.²⁰

- **Foods Made With Genetic Modifications**

Food production, storage, and security have all improved thanks to science and technology. The issue of food scarcity was brought to light by the Universal Declaration on the Eradication of Hunger and Malnutrition in 1974 and the UN Millennium Development Goals in 2001, which paved the way for the introduction of biotechnology in agriculture. The implications of genetically modified food have given rise to discussions like the BT brinjal. BT cotton was widely used up until recently, when it was found to be the cause of the extinction of monarch butterflies in the United States. Since many scientists argue that genetically modified food shouldn't be

¹⁸ <https://pubmed.ncbi.nlm.nih.gov/35950441/>

¹⁹ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5282611/>

²⁰ <https://rti.gov.in/webactrti.htm>

permitted because the consequences are still being studied, genetically modified food involves the fundamental human right to life.²¹

- **Ways and Means of Fighting**

Weapons of mass destruction like biological and nuclear weapons have the potential to wipe out the human race. Human existence itself is in danger, let alone issues of integrity and dignity. The war is still raging in spite of the 1975 UN Declaration on the Use of Scientific and Technological Progress in the Interest of Peace and for the Benefit of Mankind. Despite the fact that nuclear warfare has consequences and has been demonstrated by the bombings of Hiroshima and Nagasaki, nations continue to spend billions of dollars developing ever-more-advanced weaponry.²²

- **The surroundings of humans**

The topic of environmental degradation is very broad. Actually, the environment has suffered the most from technological advancement. Unrestricted scientific and technological progress has resulted in issues like ozone depletion, deforestation, acid rain, desertification, water, air, and land pollution, and the extinction of diverse flora and fauna. The release of radioactive and toxic wastes violates the most fundamental human right to life. According to estimates from the World Health Organization, environmental factors cause between 75 and 85 percent of cancer cases. The Rio World Summit on Environment and Sustainable Development, 1992 documents, including the Agenda 21 Convention on Biodiversity and the Stockholm Declaration on Environment and Development, 1972, have highlighted the seriousness of the issue and offered pertinent solutions so that humanity can survive on this earth.²³

From an Indian perspective, science and technology in relation to human rights

We are living in a time of myth-making about technology fixes. The use of technology to replace human labor is strongly supported by corruption, inefficiency, and "leakages." In an environment where technology is widely used but relatively few comprehend its implications, applications, or

²¹ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3791249/>

²² <https://guide-humanitarian-law.org/content/article/3/methods-and-means-of-warfare>

²³ <https://www.ignfa.gov.in/document/environment-and-human-rights-8521.pdf>

value, technology is readily viewed as impersonal and detached from the human, social condition and its imperfections.

The depths to which public morality has descended inspire desperation, which looks for solutions elsewhere, namely outside of the human person, where the problem currently resides. In the land of hopeless optimism, technology and machines can appear largely uncorruptible. Technology's potential intrusiveness is mitigated by the degree to which its temptations have subverted concepts of fraud, privacy, confidentiality, and personal security. It appears that this has set the stage for a technological remedy.

This paper focuses on just three areas among the many science and technology-related topics that are covered. These are-

A. Clinical trials conducted in India

B. UIDAI's effectiveness in India

C. Biotechnology's Effect on the Environment²⁴

A. Clinical trials conducted in India

India is now known to be a desirable location for clinical trials. However, the nation's history in the field of clinical research is lengthy. Ayurveda is a traditional medicine with a long history in India. The old books offer thorough advice on treatments as well as in-depth observations on illnesses. These descriptions most likely stem from firsthand observations made by the traditional Ayurvedic practitioners. Nevertheless, no clinical experimentation is known to have occurred, according to the old manuscripts. As a result, one must rely on India's recent history of medical research.²⁵

An Overview of History

The Indian Council of Medical Research's significant historical accomplishments are indicative of the nation's medical research landscape's expansion and evolution over the past 80 years. The Indian Research Fund Association (IRFA) Governing Body met for the first time on November 15, 1911, at the Plague Laboratory in Bombay. Sir Harcourt Butler served as the meeting's

²⁴ <https://www.legalservicesindia.com/article/1508/Science-and-Technology-in-human-rights:-An-Indian-perspective>

²⁵ https://en.wikipedia.org/wiki/Clinical_trials_in_India

chairman. Establishing a journal for Indian medical research was decided upon historically at the Governing Body's second meeting in 1912. Numerous initiatives on kala azar, beriberi, malaria, and indigenous drugs were started between 1918 and 1920. 1945 saw the establishment of the Clinical Research Unit, the first IRFA research unit connected to a hospital-The Indian Cancer Research Centre in Bombay is where it was founded. The Indian Council of Medical Research replaced IRFA as the organization's name in 1949. During the course of the following 60 years, the ICMR established numerous national research centers in the areas of traditional medicine, genetics, AIDS, toxicology, cancer, tuberculosis, leprosy, viral diseases, cholera, enteric diseases, nutrition, and reproductive disorders.

On September 10, 1996, the Central Ethical Committee of ICMR on Human Research, which was established and is chaired by Hon'ble Justice (Retired) M.N. Venkatachaliah, convened for the first time. A number of subcommittees were established to address ethical concerns in particular fields, such as human genetics, organ transplantation, clinical evaluation of products to be used on humans, epidemiological research, etc. In 2000, the committee published Ethical Guidelines for Biomedical Research on Human Subjects, and again in 2006.

The regulatory guidelines for clinical trial (CT) permission were established by the Drugs and Cosmetics Act's Schedule Y, which went into effect in 1988. The schedule did compel the pharmaceutical industry to carry out Phase III clinical trials in order to register a new medication and encouraged the expansion of India's generic pharmaceutical market. This schedule, however, only allowed clinical trials at a level below its current global status. India's integration into international clinical development was hampered by this phase lag.

The revision of Schedule Y in January 2005 was the next significant step. The revised Schedule Y 2005 offered practical definitions for Phase I through IV of clinical trials, in contrast to the narrow and constrictive definitions found in Schedule Y 1988. Clinical trial phases have well-defined and logical guidelines and definitions. Schedule Y of 1988's previous limitations on the number of patients and centers in the initial stages were lifted, giving the sponsor company more leeway to determine how these related to protocol requirements. Phase lag requirements were abandoned in favor of concurrent Phase II–III clinical trials conducted worldwide. Indian GCP guidelines of 2001 were also made legal by Schedule Y 2005. It outlined the GCP obligations of the sponsor, investigator, and ethics committee (EC) as well as the recommended

formats for important records like reports, consent forms, and EC approval forms and reports of serious adverse events. These Schedule Y changes have been a significant advancement toward GCP-compliant trials and have given GCP guidelines the much-needed regulatory support. Although the World Medical Association's Declaration of Helsinki provides the fundamental ethical standards for conducting clinical trials. However, the Indian Council of Medical Research (ICMR) has established guidelines, and those conducting trials are not required by law to follow them. The International Conference on Harmonization's 1996 Good Clinical Practice guidelines must also be followed during trials.

However, it was felt that we needed to create our own Indian Guidelines in order to guarantee the same caliber of clinical research across the nation and to produce the necessary data for new drug registration prior to use in the Indian population. This has been developed by an Expert Committee that the Central Drugs Standard Control Organization (CDSCO) established after consulting with clinical experts.²⁶

The Procedure for Trials

The drugs go through multiple stages of development before being tested on humans. The trials are approved and governed by government agencies, and they are carried out only after it has been demonstrated beyond a reasonable doubt that animal experiments are safe. "Drug development is a long, complex, and expensive process; on average, it takes around 12 to 15 years to develop a new medicine for human use," said Dr. Bhatt of the ISCR. Only drugs that pass laboratory safety and efficacy testing are subjected to clinical testing. Out of the 10,000 compounds that have been identified as potential drugs, only about ten are tested on humans, and only one of these could make it to market.

In short, when a new drug is discovered, clinical trials can be conducted in India with permission from the regulatory body, the office of the Drugs Controller General of India (DCGI). The approval of an ethics panel is given. (An independent or institutional body made up of professionals like sociologists, pharmacologists, and lawyers that has at least seven members. This body is responsible for safeguarding the rights, welfare, and security of a trial subject. Informed consent forms, trial design, and insurance coverage should all be checked.) The Clinical

²⁶ <https://www.ncbi.nlm.nih.gov/books/NBK546595/#:~:text=Drug%20trials%20in%20human%20subjects>

Trial Registry of India (CTRI) has it listed as a medication that is being tested in India. Trial management is the responsibility of the investigating agencies, which could be CROs or nonprofits. trial location following which marketing licenses are issued.

At present, there is no explicit provision in the Drugs and Cosmetics Rules concerning payment of compensation in case of harm or death resulting from a clinical trial. In accordance with the Good Clinical Practice (GCP) Guidelines for Clinical Trials of India, a research subject who suffers physical harm as a consequence of taking part in clinical trials is entitled to financial or other assistance to fairly compensate him for any impairment or disability, whether temporary or permanent, subject to confirmation from the Ethics Committee. In the event that the subject passes away, their dependents are entitled to payment.²⁷

B. UIDAI's effectiveness in India

In 2006, the government and other social groups felt strongly that it was necessary to identify those who fell into the BPL category. Finally, on January 28, 2009, an executive order issued by the Planning Commission established the Unique Identification Authority of India (UIDAI).

The project, formerly known as the UID Authority of India and later renamed AADHAAR, intends to build a database containing a distinct identity number for each citizen of the nation, verified through iris and fingerprint scans. Proponents, headed by UIDAI chairman Nandan Nilekani, assert that it will help the impoverished and homeless connect with the government, as well as improve government programs' inclusivity and efficiency.

Every Indian citizen will receive a unique 12-digit number called "Aadhaar" as part of the UID project, a national initiative of the Indian government. This number is generated at random and is connected to a person's biometric and demographic data. The project's proponents think that this will close the corrupting loops that have developed over time, as well as the numerous bureaucratic layers that the nation's citizens especially the impoverished in rural areas must deal with. They also think that this will remove the numerous documents that these citizens must produce in order to obtain their rightful entitlements.²⁸

²⁷ https://en.wikipedia.org/wiki/Clinical_trials_in_India#:~:text=10%20External%20links-,Government

²⁸ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7133485/>

Although it appeared to be a very good project at first, it has also included a fair share of fallacies, which have been actively promoted by Ms. Usha Ranganathan, a socio-legal activist. That is the major topic of this essay.

She used the terms "unique," "ubiquitous," and "universal," which all represent the objectives of the Unique Identification Authority of India (UIDAI). She gave an example of how their original goals and assertions had been significantly changed in numerous

- According to the UIDAI, enrollment is inclusive because it is voluntary rather than required. However, Nandan Nilekani has always insisted that it might be required by other organizations. UID is becoming widely used and is required to access many different welfare programs and services, including PDS, MGNREGS, banks, public health, and so forth. Thus, it is evident that individuals without a number or whose biometrics are inoperable may be excluded by this. Consequently, this calls into question the project's inclusiveness.
- According to the UIDAI, inclusive growth would be made possible by the UID. Approximately 2.5 to 5% of Indians would not be able to obtain a UID number or be included in the current authentication process because they lack valid biometric data. This would be the opposite of encouraging inclusion. People with physical or visual impairments that prevent them from providing valid fingerprints or iris scans include corneal blindness, corneal scars, malnourishment-induced cataracts, and "low-quality" fingerprints from a lifetime of hard work. Because a sizable portion of the population depends on manual labor, biometric failure is predicted to reach 15%.
- A third party would determine each person's identity. The manner in which an Adivaasi is introduced by a third body, like the UID, determines his existence and how the state perceives him. Although we have our own identities now, the world will recognize us in the future as being projected by a third body that is unknown, alien, and distant a UID.²⁹

A registrar receives the ID number of every individual. The registrar is free to gather any extra data they so choose. The registrar is free to choose what kind of data should be

²⁹ <https://www.moneylife.in/article/aadhaar-who-owns-the-uid-database-part-ii/32440.html>

gathered. As a result, this information is shared among numerous people and will be remembered by numerous others.

- The National Identification Authority India Bill, 2010 forbids data sharing unless the resident agrees, a court order is issued, or for defense of the country. Nevertheless, UID data is being fed directly into the National Intelligence Grid (NATGRID), which will then supply eleven security agencies—including the RAW and IB, over which there is no supervision or oversight—with information about individuals contained in 21 databases. She talked about how unlikely it is that someone's privacy will be violated because there aren't enough rules in place to shield people from illegal invasion. Furthermore, there are no procedures in place at the UIDAI to notify a person in the event of a data breach.

Finally, Ms. Ramanathan spoke about the global experience with universal identity systems. Their universal system of identification has been called both "an assault on personal liberties" and "intrusive bullying" in the United Kingdom. Both the United States and the United Kingdom gave up on a universal identity system because it was risky, unworkable, and unreasonable. According to the Parliamentary Standing Committee on Finance in India, the UID project is "conceptualized with no clarity" and "directionless."³⁰

C. Environment and Biotechnology

In its most basic form, biotechnology is the process by which humans use living systems, or organisms, to produce goods. To create tools and products, it draws on a wide range of scientific disciplines, including biology, chemistry, physics, engineering, computer science, and information technology. In essence, it modifies an organism's genes to suit a particular need. The term "genetically modified food," or "GM food," has gained a lot of attention recently. The word "genetically modified organisms," or "GM foods," describes crop plants that have been developed using the most recent molecular biology techniques for both human and animal consumption. Using this method, the plants have been altered in the lab to increase their nutritional value and herbicide resistance. These foods have the capacity to address numerous In addition to aiding in increased production, transgenic plants and animals also transfer vital amino acids, vitamins, and photochemicals. For example, the introduction of golden rice addressed vitamin A deficiency,

³⁰ <https://ainowinstitute.org/wp-content/uploads/2023/09/regulatingbiometrics-ranganathan.pdf>

and the green and white revolutions in India helped the country become self-sufficient in the same way.³¹

Medicine is one area where biotech is frequently used.

1. A recent advancement known as gene therapy explores human genetic material.
2. A substance used to preserve health or fend off illness is called a therapeutic.
3. Biopharmaceuticals, also known as designer drugs, are pharmaceuticals or vaccines created using biotechnology.
4. Biopharming, which combines the pharmaceutical and agricultural industries, is the process of producing pharmaceuticals in cultured organisms.

Forestry and Agriculture

a. Plant biotechnology

1. Make plants and the goods derived from them better.
2. Plants resistant to disease and insects.
3. Plants designed to possess specific traits.
4. Lysine, an amino acid, is produced in large quantities by corn plants.

b. Animal biotechnology

1. Enhance animals or the goods they generate.
2. Products that support human health may be made using animals.
3. Boost lifespan or productivity.
4. Pigs designed to generate hemoglobin from humans.
5. A recent advancement called gene therapy explores the human genetic code.

c. Food and drink preparation

1. Production and processing of goods using technology
2. Some biotech concepts, such as the use of yeast in bread baking, have been around for hundreds of years.
3. Genetically modified crops, such as milk made with BGH.

³¹ <https://pubmed.ncbi.nlm.nih.gov/31396652/>

Surroundings

It's the process of using biotechnology to solve environmental issues. It's required to: get rid of the dangerous waste that our other technologies produce.

-Recognize similar species and make sure that no species is in danger of going extinct.

-Provide substitute energy sources, such as biofuel.

It is currently employed in a number of domains:

1. Molecular Ecology

using biological methods to gain a deeper understanding of certain aspects of nature, such as DNA fingerprinting. In order to make sure that various populations—like polar bears and cheetahs, for example—do not face extinction, this is done to examine their biodiversity. It can be used to better map the evolutionary development of various animal families (currently, whales and horses) and determine whether a new species has emerged. Examples include exaggerating the use of biofuels and reading DNA fingerprints.

2. Restoration by Bioremediation

The process of bioremediation involves cleaning up hazardous environmental wastes with bacteria or fungus. The hazardous waste products are essentially transformed into less hazardous, easily disposed of waste by the bacteria. Additionally, in certain regions, plants are being tested to perform this function (sunflowers at Chernobyl removed Strontium and Cesium). Current science allows for the "engineering" of bacteria to break down hazardous waste on-site, saving transportation and storage costs. This technology has also been used to clean up after oil spills.

3. Biosensors

A biosensor either uses chemicals to monitor the levels of specific biological entities (like pathogens) or uses a biological entity (like bacteria) to monitor the levels of specific chemicals. Currently, biosensors are employed in:

-figuring out how toxic an ecosystem is

-Finding pathogens in the air (like anthrax)

-keeping an eye on blood sugar levels

4. Biofuels

Because they all emit less carbon dioxide into the atmosphere than existing fuel sources, biofuels

made from plants are thought to be more environmentally friendly than other fuels. For example, many gasoline varieties in North America contain corn-based ethanol.

-Cooking oil waste is used to make biodiesel.

-Biogas is produced from the gases emitted by landfills or compost.

-Several biofuel scientists are currently working on a project dubbed "A Journey to Forever," which aims to create a self-sustaining biofuel cell that emits no greenhouse gases. Under anaerobic conditions, a wide variety of bacterial strains can produce large amounts of hydrogen. The only waste product from this hydrogen, which can be used as fuel, is oxidized hydrogen, or water. Even so, this technology is far from flawless.

Some have referred to biotechnology as "Janus-faced." There are two sides, according to this. First, methods for manipulating DNA enable the transfer of genes between different organisms. However, it involves relatively new technologies, the effects of which have not yet been thoroughly investigated and should be handled carefully. Traditional biotechnologies like the fermentation of microorganisms to make cheese, wine, and beer are widely accepted and do not raise any ethical concerns. However, there has been a great deal of public interest and scrutiny surrounding genetic engineering, a potent new technology that involves the artificial transfer of genes across species lines. Genetic engineering has drawn criticism from some quarters despite its many advantages. Fearing that dangerous, uncontrollable bacteria could be unintentionally created, some people are against genetic engineering.³²

Conclusion

Every area of science and technology advancement presents a unique set of challenges. They represent serious risks that jeopardize not just human rights but also civilization as a whole. In spite of this, they offer some of the best opportunities for any generation to actively contribute to the future of humanity. According to C.G. Weeramnatry's book, this is a historical moment when powerful forces that seem to be at odds with one another are coming together. The ideological strength of the human rights concept and the power of science and technology are two of the most potent. Neither of these has ever had the same level of power as it does now.

The first has the power to weaken or even destroy the second. When combined, they can form a

³² <https://www.farmers.gov/blog/agriculture-and-forestry-5-ways-agroforestry-can-work-you-and-your-land>

force greater than anything seen in human history for the advancement of humanity. One of the most important things we can focus on right now is studying how they can be brought into mutual cooperation instead of confrontations. The answer is to direct technological advancement along a path made clear by human rights, not to downplay the advantages of science and technology or to ignore its dangers. a real sustainable development, from which future generations can benefit.

