75 YEARS – 25 DIMENSIONS

An overview of themes of NSD

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Contribution of India to Science & Technology - In the Journey of its 75 Years of Independence

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MESSAGE

Message by the Commissioner, Collegiate Education, Andhra Pradesh.

I am pleased to introduce this insightful overview of the themes of the National Science Day celebration, marking the 75th anniversary of India's independence. As we commemorate this historic milestone, it is important to make a note of the contribution of Science & technology which helped the nation to flourish. This book provides a comprehensive analysis of the 25 themes of the NSD and their significance in the shaping of India.

I congratulate Government Degree College Avanigadda for their efforts in compiling this document and for their commitment to promoting a deeper understanding and appreciation of the NSD.As an academic institution, Government Degree College Avanigadda has always been committed to promoting excellence in education and fostering a spirit of innovation and creativity among its students. By compiling this document, once again it has demonstrated its dedication to the pursuit of knowledge and the advancement of our nation. I am honoured to commend the Physics club of Avanigadda GDC, PAGE, for their contribution to this insightful document; I would also like to extend my congratulations to the Faculty of Physics of this college for their role in editing and compiling these articles. Their expertise and guidance have undoubtedly contributed to the high quality of this book.

Finally, I would like to acknowledge the contribution of our Principal, who serves as the advisor of the Physics club of Avanigadda GDC. His commitment to the academic and personal development of our students is truly inspiring, and I am grateful for his leadership and support. I also congratulate the faculty and staff of Government Degree College Avanigadda for their hard work and dedication in publishing this book. Your contributions to the academic community are truly commendable, and I am proud to support your efforts. I believe that this book will serve as a source of inspiration and knowledge for students and may mould them in researchers, and policymakers, and I am proud to support the efforts of Government Degree College Avanigadda in promoting academic excellence and scientific inquiry.

With Best wishes,

Dr POLA BHASKAR IAS

Accredited by NAAC with “B” Grade

Govt. Degree College

Avanigadda

Dr. D. Uma Rani
Principal
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From Principal’s Desk

This book, first of its kind to be released from any government degree college in India, aims mainly at two things. Firstly, it tries to unleash the potential of rural students who are prone to inertia and are blind to their own talents. Secondly it wants to focus on the firm steps with which India is striding forward towards excellence through education.

The roots of the book grew from Physics Club established in GDC, Avanigadda with an aim to keep the minds of the students ignited and owes its growth to the constant efforts of Dr.P.B.Sandhya Sri , Lecturer in Physics and of course to the entire academic family of GDC Avanigadda.

It is hoped that the readers will go through the book diligently and gives their valuable feedback so that the students may be encouraged to proceed further with their learning exercises.

Thank you

Dr. D. Uma Rani

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Developments of Science & Technology in India

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Abstract - India has a rich inheritance of science and technology. Scientific development in India is old age practice. From the ancient Indus Valley Civilization to the present day, scientific and technological progress in India has flourished. If appraise progress in ancient time, it is documented in studies that in ancient period, India had close contiguity in religion and science. There were several developments in the different branches of science in the ancient period. In ancient time, India had made great progress in astronomy. The movement of planets came to be emphasized and closely observed. Jyotishvedanga texts established systematic categories in astronomy but the more basic problem was dealt by Aryabhatta (499 AD). He gave separate sections on astronomical definitions, methods of determining the true position of the planets, description of the movement of the sun and the moon and the calculation of the eclipses. He gave good explanation for eclipse that the earth was a sphere and rotated on its axis and when the shadow of the earth fell on the moon, it caused Lunar eclipse and when the shadow of the moon fell on the earth, it caused Solar eclipse. Aryabhatta's theories exhibited a distinct departure from astrology which stressed more on beliefs than scientific investigations.

Keywords: India

I. CONTEXT

Scientific and technological developments in medieval India - During the medieval period that was in eleventh to eighteenth century, science and technology in India advanced in two ways. One concerned with the already charted course of earlier traditions and the other with the new influences which came up as a result of Islamic and European influence. Some important subjects like arithmetic, mensuration, geometry, astronomy, accountancy, public administration and agriculture were included in the course of studies for primary education. In this period, the form of agricultural practices was almost the same as that in early ancient India. Some important changes, however, were brought about by the foreigners such as the introduction of new crops, trees and horticultural plants. The principal crops were wheat, rice, barley, millets, pulses, oilseeds, cotton, sugarcane and indigo.

Advancement of science and technology in modern time - Significant achievements have been made in India in the areas of nuclear and space science, electronics and defence. The government is committed to make science and technology an integral part of the socio-economic development of the country. In the context of India, science and Technology (S & T) have always been an integral part of Indian culture. Natural philosophy ancient times, was chased energetically at institutions of higher learning. The Indian Resurgence, which accorded with our independence struggle, at the beginning of 1900s observed great steps made by Indian scientists, who have left ineffaceable traces at global level. The Government confidently believed that science and Technology would be the major tool that will assist to bring social equality and economic progress. These advancements also enable India to come in the mainstream of world community. This principle was reflected in the Scientific Policy Resolution (SPR) of 1958. In this period numerous scientific department were established. The Department of Atomic Energy (DAE), the Department of Science and Technology (DST) and the Department of Space (DOS) were among the first S & T departments in the country. The Department of Science and Technology was established in May, 1971. The aim of DST was to promote new areas of science and technology and to be the nodal department for coordinating those areas of science and technology in which a number of institutions and departments have interest and capabilities. Thus, the DST has imperative role in promoting basic research and technology development in the country. The DST also assists in formulation of policy statements and guidelines on S & T.

Atomic energy - India has good position in world and considered as one of the most progressive countries in the arena of nuclear technology including production of source materials. The country is self-reliant and has become proficient at the expertise covering the complete nuclear cycle from exploration and mining to power generation and waste management. Accelerators and research and power reactors are now designed and built indigenously. The sophisticated variable energy cyclotron at Kolkata and a medium-energy heavy ion accelerator 'pelletron' set up recently at Mumbai are national research facilities in the frontier areas of science. As part of its programme of passive uses of atomic energy, India has also boarded on a programme of nuclear power generation. India has enormous demand of power supply and by 2020 the existing demand is likely to double. Per Capita electricity consumption seems to grow manifold and India had to search for other energy sources for generation of electricity. Nuclear technology came to its rescue. India has knowledge of fast reactors and Thorium fuel cycle which will take it to one of the leaders' positions in nuclear technology. India's aim is to utilise nuclear energy for peaceful purposes.

Space research - The Indian space programme is focussed on the goal of self-reliance in the use of space technology for national development. Over the years, the space programme has established itself with a series of achievements. They include the launching of the first Indian space satellite Aryabhatta in 1975 and then Bhaskara I and Bhaskara II from the Soviet Union, the Rohini satellite on India's own SLV-3 rocket and the Apple satellite on the European Arianne rocket. A far reaching experiment in education through satellite, SITE, was conducted in India in 1975. Subsequently, INSAT I-IB, launched in 1983, provided radio, television, telecommunication and meteorological services. A perspective of major space mission planned for the decade 1985-95 aims at using space technology for nationwide application in communication, survey and management of natural resources and meteorology. The Indian Space Research Organisation (ISRO), under the Department of Space (DOS), is the organization that involve in extensive research, development and operationalization of space systems in the areas of satellite communications, remote sensing for resource survey, environmental monitoring, and meteorological services. Department of Space is also the nodal agency for the Physical Research Laboratory, which conducts research in the areas of space science, and the National Remote Sensing Agency, which deploys modern remote-sensing methods for natural resource surveys and provides operational services to user agencies.

Telecom - In new millennium, there are unprecedented transformation and up gradation in the area of telecom. In Indian context, it is observed that country is engaged in speedy growth of its telecommunications infrastructure. Numerous reports indicated that the Indian Telecom Sector has arisen as one of the critical components of economic growth required for overall socio-economic development of the country as there is a positive correlation between the penetration of mobile services and internet on the growth of GDP of a country. To accelerate telecom development, the government has licensed one private Basic Services Operator (BSO) in each state, to set up an independent telecom network in the state. The inter-state network and international links will be operated by the government-owned monopoly operator (DoT) for the time being. The DoT, of course, is previously an operator in all the states, and is expanding its subscriber base every year. The telecom network has been built along conventional lines, similar to networks in developed countries. The long-haul support network is mostly digital network and employs optical fibre, microwave and satellite links.

E- governance - The role of E-government is to organize public management in order to upsurge efficiency, transparency, accessibility and responsiveness to inhabitants through the intensive and strategic use of information and communication technologies in the inner management of the public sector (intra and inter-governmental relations) as well as in its daily relations with peoples and users of public services. In simple term, E-governance is an ICT-enabled tool to realize good governance. E-Governance offers novel solutions, helping improve government processes, connect citizens, and build interactions with and within civil society. Some e – governance initiatives in India especially in Andhra Pradesh are are e-Seva, CARD, VOICE, MPHS, FAST, e-Cops, AP online-One-stop-shop on the Internet, Saukaryam, Online transaction processing, APSWAN (Andhra Pradesh State Wide Area Network), Gram Dootha

Electronics - The Department of Electronics has imperative and positive role for the expansion and use of electronics for socio-economic development. Many initiatives have been taken for a balanced growth of the electronics industry. After independence, India has developed the capability to produce array of electronic goods such as radio and television sets, communication systems, broadcasting equipment, radars, nuclear reactors, power control systems and underwater systems. A very large part of the components required for these are produced indigenously. The basic push has been towards a general rationalization of the licensing policy with an emphasis on promotion instead of regulation, besides achieving economy of scale with up- to-date technology. A multi-pronged approach has been evolved for result-oriented R & D with special emphasis on microelectronics, telematics, and high- performance computing and software development. Main R & D initiatives in electronics has been in the development of Linac tubes, automateion & Intelligent Transportation Systems technology, setting up of Nano electronics centres & generic Nanometrology facilities.

Biotechnology

India has been the foreshadowing among the developing nations in encouraging multidisciplinary activities in this area, recognizing the practically unlimited possibility of their applications in increasing agricultural and industrial production, and in improving human and animal life. The centre of research in this area is the National Biotechnology Board, constituted in 1982. Some of the initiatives taken include developing techniques for gene mapping, conservation of biodiversity and bio-indicators research, special biotechnology programmes for the benefit of the scheduled castes and scheduled tribes and activities in the area of plantation crops. The areas which have been receiving attention are cattle herd improvement through embryo transfer technology, in vitro propagation of disease resistant plant varieties for obtaining higher yields, and development of vaccines for various diseases.

Information Technology - India's software industry is more vigorous than its hardware industry, at least in certain areas. While selling packaged software to consumer (and most business) markets require economies of scale and scope, as well as marketing and customer support muscle, project oriented components of software development do not do so, to quite the same degree. The software development and use life cycle includes analysis and specification of requirements, design, coding, testing, installation, maintenance and support. Many of these activities, particularly coding and testing, involve relatively routine IT skills that India's workforce has in large absolute numbers (though small relative to the total population). The existence of the Indian Institutes of Technology (IITs), the ubiquity of Unix in academic environments, and the comparatively low infrastructure demands of learning to use and create software all worked in India's favor on the supply side. IT-enabled services are not essentially related to the production of software or IT in general, but use IT to make the provision of services possible. Customer call centers are one example, where Indians have been training to speak with American accents, in order to deal with customer queries from the US.

Health and medicine

In the field of medicine, India has progressed well and there have been many achievements. It is witnessed that in health care, science and technology are entrenched in much broader social and institutional structures. Major developments have been made to prevent and treat various diseases. Small pox has been eradicated. Treatment of diseases like tuberculosis, malaria, filaria, goitre, and cancer has been considerably improved. Research is done to control communicable diseases. Research based activities have already augmented life expectancy appreciably and death rate has declined, while schemes such as the immunisation programme have reduced infant mortality considerably. Improved medical facilities in the form of government-run hospitals and dispensaries, research councils, and primary health centres for rural areas are also being provided. New technologies in the healthcare management systems consist of electronic data storage, data maintenance and exchange. Such process when implemented will make the healthcare management process effective. Example of such type of healthcare management system is Electronic Medical Records (EMR).

II. CONCLUSIONS

The developments in science & technology in our country is discussed in detailed in field like bio technology, space, health & medicine etc in comparison with ancient and medieval periods.

REFERENCES

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Science, Technology and Innovation for Sustainable Development

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Abstract - Science, technology and innovation are essential drivers of sustainable and inclusive development. It is therefore crucial that science, technology and innovation initiatives address all aspects of sustainable development economic, social and environmental and their interrelationships, since technological choices can have negative impacts on the social and environmental dimensions of sustainable development. It is equally important that knowledge systems be constructed broadly to include the cultural, social and institutional dimensions in which.

Keywords: Science; Technology; Sustainable Development; Innovation.

I. INTRODUCTION

Science, technology and innovation play a critical role in achieving sustainable development goals, including with respect to enhancing productivity and inducing a dynamic transformation of the economy, increasing growth rates and the number of decent jobs while reducing fossil-based energy consumption, developing essential drugs and improving health/medical care, achieving food security through sustainable agricultural methods and raising agricultural productivity, reducing the drudgery and improving the safety of housework, and increasing the safety of reproduction. Advancing a nation's capacity in science, technology and innovation and its effective application in economic activities are essential factors for expanding peoples' capabilities and achieving sustainable development. At the same time, science, technology and innovation form part of global and national capabilities to address the economic, social and environmental dimensions of development and their interactions.

In this regard, the contributions of science, technology and innovation to a new sustainable development paradigm require a deep understanding of the relation among the three pillars of sustainable development, acknowledging that environmental degradation harms economic development and human well-being, especially for the poor and vulnerable groups in society. Social and economic sciences must contribute as much as natural and technical sciences to an approach where improved quality of life and sustainable patterns of consumption and production can be reconciled with reduced environmental degradation, poverty and inequalities, and the promotion of peace and security.

Similarly, it is imperative to understand that there are technological choices that can have negative impacts (externalities) on the social and environmental dimensions of sustainable development. They also have important distributional consequences besides generating "winners" and "losers" owing to the introduction of new production processes and labour-saving technologies. Important distributional implications emerge particularly owing to decisions about which types of knowledge and innovations are promoted and developed and which types are neglected and forgotten. Thus, it remains important to be clear about the fact that the choices we face are societal choices, not scientific or technical ones. Understanding this approach, science, technology and innovation for sustainable development offers immense opportunities to connect science with society, culture and traditional knowledge.

II. SCIENCE, TECHNOLOGY AND INNOVATION

a) **Science, technology and innovation: meeting basic human needs and environmental challenges:** The science, technology and innovation capabilities of a nation are basic, yet crucial, factors not only for sustained economic growth, but also for a nation's ability to provide its citizens with quality education, good health care and safe food and to mitigate the negative impacts of climate change and natural disasters.

   Since the adoption of the Millennium Development Goals in 2000, there have been renewed efforts to use science, technology and innovation, nationally and globally, for the development of vaccines and improved medical treatments for tropical diseases and other diseases that plague the developing world, as well as for global pandemics such as HIV/AIDS1. Technological innovation has played an equally critical role in the management of safe freshwater resources and in addressing concerns about water scarcity in agricultural production by small farmers.

b) **Science, technology and innovation as global public goods:** The above-mentioned considerations reinforce the need to view certain technologies, particularly those that contribute to meeting basic human needs and environmental challenges, as global public goods that deserve to be supported by a system of incentives to make them accessible to all. The development and dissemination of these technologies should be a global priority. However, both confront major obstacles.

III. BUILDING SCIENCE, TECHNOLOGY AND INNOVATION CAPABILITIES FOR SUSTAINED GROWTH: THE ROLE OF GOVERNMENT

Development is, in essence, a process of capacity-building. Developing countries confront many obstacles in building a robust and entrepreneurially dynamic private sector; however, they also have some advantages. They can draw on the knowledge accumulated elsewhere, obviating the need to devote significant resources to research and development. Developing countries use a given technology only after it becomes an industrial standard, which also implies that they can adapt these existing mature technologies. This is known as the "latecomer effect"4. However, latecomers also need to acquire new or emerging technologies, which are often associated with dynamic markets. Emerging technological paradigms can serve as a window of opportunity for latecomers because they are not necessarily locked into the "old" or "mature" technological paradigm and thus are able to make best use of new opportunities in the emerging or new industries.

However, developing countries often go through technological learning and capability development before reaching the stage where they can fully benefit from the latecomer effects. Public and/or private entities need to build a stock of knowledge in the form of human and physical capital, identify the technologies and industries in which the country or firm has the larger growth potential and channel the resources into them, while acknowledging the risks of failing to plan.

IV. IMPORTANCE OF POLICY SPACE FOR SCIENCE, TECHNOLOGY AND INNOVATION

A pertinent question is whether the current international trade and investment regimes guarantee enough policy space for the Governments of developing countries to promote national science, technology and innovation capabilities. Among the relevant multilateral, regional and bilateral agreements, the TRIPS and TRIMs Agreements should both be mentioned. The TRIPS Agreement establishes minimum standards for domestic intellectual property protection with which signatory countries (excluding least developed countries) are required to comply. This has significant implications for permissible science, technology and innovation policies at the national level. In this regard, certain measures that developed countries used in the course of their industrialization, namely, discrimination against foreign patent application, or exclusion of such industries as chemicals and pharmaceuticals, are no longer available. However, the TRIPS Agreement contains several "flexibilities" that can be used by developing countries in designing their own intellectual property rights system. Meanwhile, the TRIMs Agreement prohibits practices such as local content requirements manufacturing requirements, export performance, trade balancing in developing countries. Beyond this issue, there is the question of whether the TRIPS rules are the right intellectual property rights model for developing countries and what implications they bring in terms of access to knowledge and technology.

V. CONCLUSION

TRIPS establishes minimum standards for the availability, scope, and use of seven forms of intellectual property: copyrights, trademarks, geographical indications, industrial designs, patents, layout designs for integrated circuits, and undisclosed information (trade secrets). This article might be concluded by stating that, despite the importance of the TRIPS Agreement, the developing countries have highlighted a number of concerns and flaws in the treaty. Despite these issues, the TRIPS Agreement is often regarded as the most comprehensive mechanism for protecting intellectual property rights. It enhances and manifests the previous IPR conventions, the most important of which were first drafted at the end of the nineteenth century.

REFERENCES

[1]. https://www.wto.org/english/thewto_e/whatis_e/tif_e/agrm7_e.htm
[2]. https://www.wto.org/english/tratop_e/trips_e/intel2_e.htm
[3]. https://www.e-ir.info/2013/12/23/the-arguments-for-and-against-the-trips-agreement/


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Education in India – The Role of Technology

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Abstract - There is an emerging broad consensus around the world about the benefits that can be brought to education system through the appropriate use of evolving information and communication technologies. The range of possible benefits pervaded practically all areas of activity in which knowledge and communication play a vital role. It is involved from improved teaching and learning processes to better student outcome, increased student engagement and seamless communication with teachers and parents. Today there is a significant gap between knowledge and skills students learn in school and the knowledge and skills that workers need in workplaces and communities. Employers report that they need students who are professional, having good moral and work ethics, can collaboratively work in team, have critical thinking and problem-solving ability, can lead a group of people and are skilled in verbal and written communication. This paper is to study role of Education Technology in India.

Keywords: e-Learning, Education Technology in India

I. INTRODUCTION

Education technology means the use of all kind of modern media and materials for maximising the learning experiences. Education technology is suggested by expert as one of the potential means of impairing education effectively and efficiently. Previously, teachers used to teach in rigid, formal and stereo-typed ways. Education was then conceived as the process of transmitting knowledge and ideas. Student used to get by heart whatever was given by the teacher or textbook. They often could not understand what was taught and were expected to reproduce at the time of examination. Pupils were silent audience and could not make any logical queries or independent thinking of their own. Today, the student is not considered as an empty vessel to be filled in by facts and figures. They are now expected to use so many media and materials and to get learning experience from all sides. Education is regarded as a process of interaction and interpersonal communication. The modern teacher has to help, to guide and facilitate the learner's development. The teacher has to inspire and motivate the young leaners and assist the adult learners in their quest for knowledge and skills.

II. CONTEXT

History of Use of Technology in Education Educational technology could be traced back to the emergence of very early tools, e.g., paintings on cave walls. But usually its history starts with the introduction of educational films (1900s) or Sidney Presser's mechanical teaching machines in the 1920s. The first large scale usage of new technologies can be traced to US WWII training of soldiers through training films and other mediated materials. Today, presentation-based technology, based on the idea that people can learn through aural and visual reception, exists in many forms, e.g., streaming audio and video, or PowerPoint presentations In the 1990s, there are a variety of schools that have Computer-based learning (CBL) system. They are frequently based on constructivist and cognitivist learning theories, these environments focused on teaching both abstract and domain-specific problem-solving learning. The 2000s emergence of multiple media and ubiquitous technologies which gave a new impulse to situated learning theories favouring learning-in-context scenarios. Students are now growing up in a digital age where they have constant exposure to a variety of media.

Technology as tools of Teaching - There are various types of technologies currently used in classrooms. Among these are:

- Computer in the classroom: Having a computer in the classroom is an asset to any teacher. With a computer in the classroom, teachers are able to demonstrate a new lesson, present new material, illustrate how to use new programs, and show new information on websites.
- Class blogs and Wikipedia: There are a variety of Web 2.0 tools that are currently being implemented in the classroom. Blogs allow for students to maintain a running dialogue, such as a journal, thoughts, ideas, and assignments that also provide for student comment and reflection. Wikipedia, an online encyclopaedia, are more group focused to allow multiple members of the group to edit a single document and create a truly collaborative and carefully edited finished product.
- Wireless classroom microphones: Noisy classrooms are a daily occurrence, and with the help of microphones, students are able to hear their teachers more clearly. Students learn better when they hear the teacher clearly.
- Mobile devices: Mobile devices such as tablet or smart phone can be used to enhance the experience in the classroom by providing the possibility for professors to get feedback.
- Interactive Whiteboards: An interactive whiteboard that provides touch control of computer applications. These enhance the experience in the classroom by showing anything that can be on a computer screen. This not only aids in visual learning, but it is interactive so the students can draw, write, or manipulate images on the interactive whiteboard.

Education Technology Project in India - The Government of India in the Ministry of Education and Social Welfare realized the importance of Education Technology for Qualitative improvement of education and included the Education Technology Project in its Fifth Five Year Plan in 1971. This project had four sub-schemes as follows:
Setting up an Education Technology Unit in the Ministry of Education and Social Welfare.

- Establishing a Centre for Education Technology (CET) in the NCERT.
- Assisting States for setting up Education Technology Cells and their programmes on 100% basis.
- Strengthening a few education institutions for undertaking Education Technology Programmes.

Accordingly, unit was started in the Ministry since 1971 and a CET in the NCERT was set-up during 1973. Education Technology Cells come into being different states from 1972-73 onwards. The Unit in the Ministry made all planning, policy-making and providing funds for implementation of the educational project and the CET in the NCERT started functioning in the following areas:
Systems designing and implementation.

- Prototype production of suitable hardware and software.
- Training in different areas of Education Technology.
- Research and Evaluation
- Collection and dissemination of information, data and consultancy services.

Recently, Information and Communication Technology (ICT) for education, initiative by UNESCO, conducted an extensive consultation to identify the competencies that teachers should develop to use technology effectively in the classroom. It is basically an umbrella term that encompasses all communication technologies such as internet, wireless networks, cell-phones, satellite communications, digital television computer and network hardware and software; as well as the equipment and services associated with these technologies, such as videoconferencing, e-mail and blogs etc. that provide access to information.

Challenges of use of Education Technology in India - Despite early implementation of technologies in Education system, India still faces teething problem for the new technologies in education. Some of them are:

- Not enough or limited access to computer hardware & computer software in education institutes
- Lack of time in school schedule for projects involving use of technologies
- Lack of adequate technical support for education institutes
- Not enough teacher training opportunities are there
- Lack of knowledge about ways to integrate technologies to enhance curriculum
- Education technologies integration is not a priority
- Students and Teachers do not have access to the necessary technology at home

There are also a negative facets of new technologies used in education. Many ethical questions and issues arise with this use of the latest technologies in education.

The Copy and paste syndrome – Schools and universities have more and more problems with students who prepare essays/ project/ presentation by using material from websites or blogs. Often, students just copy pieces of information that look relevant and paste them together, without sometimes even understanding them, let alone citing them.

Distortion of reality – When students are looking for some information on the website, they usually employ a search engine. This will give them a ranked list of often incredibly many search results. There is the real danger that their view of reality is distorted by the website, by the fact that someone with enough money can influence what is written or ranked.

Too much trust in the information found – When searching for some information on the website students tend to accept what they have found as true information, often without looking at other sources and hence having no justification to accept the information at face value.

Loss of privacy and profiling – When students use services offered over the websites it is clear to us that they are making often information about us known to the service providers. The situation gets much more complicated if a company has a set of services so that combining all the information that potentially can be extracted gives a very detailed profile. There can be no doubt that some companies are collecting information or profiles on users, and on economic relevant developments. This may be done through stealth as described or from open social networks where many persons give away information that may well be harmful to them at some later stage.

III. CONCLUSION

Technology can reduce the tremendous effort given by students to gather number of printed book and journals for acquiring knowledge and increase students' focus on more important knowledge gathering process. Equally important, technology can represent education in ways that help students understand latest concepts and ideas. The Education Technology also enables teachers to integrate project-based learning. With guidance from effective teachers, students at different levels can use these tools to construct knowledge and develop skills required in modern society such as presentation skills and analytical skills.

REFERENCES

[1]. Durham University News, 2012, ur.ac.uk/news/newsitem/?itemno=15991
[2]. Research Report of NCERT, 2009

[3]. The National Policy on Education (NPE,)2009, www.ncert.nic.in/oth_anoun/npe86.pdf

 

P.Hima Komali & D. Nishi

Science and Technology for Specially Abled Person's - An overview on Contribution of India

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Abstract - There are three main factors which cause individuals with disabilities to be under-represented in science, engineering, and mathematics fields: preparation of students with disabilities; access to facilities, programs, and equipment; and acceptance by educators, employers and co-workers. Technology can have a positive affect on all of these factors and help to open doors to new areas of study and employment. This paper explores the role of information technology, describes a campus program designed to positively influence each of the factors, and makes a series of recommendations for action.

Keywords: Technology for the Specially Abled , Science and Technology

I. INTRODUCTION

For most people, technology makes things easier.
For people with disabilities, technology makes things possible.
—Mary Pat Radabaugh

National Science Day of 2017, celebrated to commemorate the discovery of Dr. C V Raman's 'Raman Effect', is themed around 'Science and Technology for Specially Abled Persons'. One billion people, or 15% of the world's population, experience some form of disability today, and the prevalence of disability is highest in developing countries like India. A report by World Bank estimates that about 110-190 million of them experience significant disabilities. 'Persons with disabilities' or PwDs include those who have long-term physical, mental, intellectual or sensory impairments which may hinder their full and effective participation in the society. For an individual with a disability to experience life to the fullest, it's not sympathy that is needed, but the ability to live independently with dignity. Children with disabilities are among the most stigmatized and excluded group around the world. These children are likely to have poorer health, lesser education at school and lesser economic opportunities when they grow up. They are more likely to live in poverty and deal with greater inequalities than their well-abled peers.

For an individual with a disability to experience life to the fullest, independent-living and self-advocacy skills must be developed. As the end of high school approaches, so does the termination of a structured environment and pre-college support systems. Adolescents with disabilities who wish to attend college are often faced with responsibilities that they are unprepared to meet because they are conditioned to depend on others. Once enrolled, students with disabilities often hesitate to request the specific accommodations they need. The levels and types of resources available to students with disabilities in pre-college programs, on post-secondary campuses, and in employment situations are different and programs to help bridge the gaps between these critical stages are rare.

Students with disabilities are rarely encouraged to prepare for science, engineering and mathematics fields. Since they do not consider a career in science, engineering, or mathematics an achievable goal, they do not take the courses necessary to prepare for post-secondary studies in these areas. High school and college students with disabilities, counsellors, social service agency staff, and special education teachers often lack an understanding of the content and requirements of science, engineering, and mathematics programs in higher education and of the technology and other resources that make it possible for students with disabilities to pursue these fields.

Students with disabilities lack access to role models with similar disabilities who are successful in careers that they might otherwise have thought impossible for themselves. Potential role models are often separated by great distances, leaving individuals with disabilities isolated from those facing similar obstacles in school and work (Brown & Foster, 1990; Moore & Nye, 1986).

To prepare for science, engineering, and mathematics studies, students need to be able to use the powerful tools of the trade at an early age. Although network technology can reduce social isolation and allow independent access to information resources, these tools are not often readily available to pre-college students with disabilities.

II. CONTEXT

Technology for the Specially Abled - Assistive technology (AT) is any item, piece of equipment, software program, or product system that is used to increase, maintain, or improve the functional capabilities of persons with disabilities. A person who has difficulty in moving could use a walking stick, crutch, walking frame, wheelchair or tricycle; a person with visual impairments could take advantage of eyeglasses, magnifier, magnifying software or a screen reader on a computer, a white cane, GPS-based navigation device, read and write with Braille script, etc. all in an attempt to make life better. While there is no dearth of assistive technologies available in India, they tend to be expensive and unaffordable to most.

With the government's 'Accessible India Campaign (Sugamya Bharat Abhiyan)', a nation-wide campaign for achieving universal accessibility, there is a push to integrate PwDs in the society. Easing commute between work and home, providing convenience in day-to-day activities and ensuring safety for people with disabilities can go a long way in making them independent and more productive. Kannur, a small district in Kerala, became the first disabled-friendly district in the country setting an example to others. Under the 'Barrier-Free Kannur' project, former District Collector Bala Kiran ensured ramps, lifts and signage in all the 1839 public buildings to help people with disability. This is an example of how small steps can go a long way.

Specially Abled in Science and Technology - It is often perceived that children with disabilities settle down with a career outside of STEM (Science, Technology, Engineering and Mathematics). "The percentage of visually impaired taking up careers in commerce or arts is more when compared to science", says Mr. Muthu Raj, Assistive Technology Expert at Cheshire Homes India. Can mainstream careers in STEM be a really viable option for these children? "A student with disability who is interested in pursuing a career in STEM should be able to use his/her hands, to think abstract and have verbal and non-verbal communication skills", says Mrs. Rukmini Krishnaswamy, Director, Spastics Society of Karnataka. Trained in India and the US, she is a pioneer in the field of special education for over five decades. "Individuals with disabilities are underrepresented in STEM today because they lack sufficient preparation, have minimal access to facilities, programs, and equipment and are often unaccepted by educators, employers and co-workers", she says.

Mrs. Krishnaswamy created the first facility for children with cerebral palsy. She has organized, trained and mentored innumerable teachers and therapists in all fields of special education. "In order to create a positive environment for learning and working, efforts should be taken to increase awareness of college educators regarding the potential contributions and accessibility need of the specially abled", she points out. What does a specially abled student need to pursue a career of her choice in STEM? "They must begin to use computing and networking tools at a young age which can help them to communicate with others", says Mrs. Krishnaswamy. "If such students are aided with assistive technology to overcome their impediment, they can work in areas of their interest. For example, a good number of visually impaired students have been trained as network engineers after completing their course in the Cisco Academy for the Vision Impaired (CAVI), a leading technology school for the blind around the world", echoes Mr. Muthu Raj.

There are numerous examples of scientists who have had a successful and fulfilling career despite coping with a disability. Today, some of them are working on exciting projects in a wide range of fields, including those that create assistive technology. Dr Satendra Singh, an acclaimed doctor and founder of Infinite Ability, a medical humanities group on disability, contracted polio when he was just nine months old. Today, he is also a prominent disability activist and works extensively to make public places more accessible to persons with disabilities.

With full access to learning opportunities and solid academic preparation, students with disabilities are poised to succeed. But one final piece of the puzzle is acceptance. Negative attitudes have been identified as the single greatest barrier faced by individuals with disabilities who are pursuing a career in STEM fields. Educators, fellow students, employers, and co-workers, who embrace diversity, often find themselves working with gifted people whose abilities far outweigh their disabilities. It is important to maintain commitments to inclusiveness, training, and mentoring that can help ensure that differently abled researchers participate fully and enhance professional capability at all levels of the workforce.

III. CONCLUSIONS

In all of these efforts successful individuals with disabilities should be given opportunities to share the specialized expertise they have developed through their own personal experiences. Individuals with disabilities can be empowered with opportunities to apply their skills in efforts to promote the participation of other individuals with disabilities in science, engineering, and mathematics academic programs and careers.

We must continue to increase the understanding of factors affecting the under-representation of individuals with disabilities, implement creative programs to address problems, and share successful practices. Many small steps taken locally can, together, create a substantial impact and move us closer to a shared vision where people with disabilities have equal access to opportunities in science, engineering, and mathematics.

REFERENCES

[1]. Alquraini, T., and Gut, D. 2012. Critical components of successful inclusion of students with severe disabilities: Literature review. International Journal of Special Education, 27(1), 42-59.

[2]. Burgstahler, S. 2003. The role of technology in preparing youth with disabilities for postsecondary education and employment. Journal of Special Education Technology, 18, 719.

[3]. Collins, A., and Halverson, R. 2009. Rethinking education in the age of technology: The digital revolution and the schools. New York, NY: Teachers College Press. Retrieved from http://ocw.mit.edu/courses/mediaarts- and-sciences/ mas-714j-technologies-for-creative-learning-fall2009/ readings/MITMAS_714JF09_read03_coll.pdf

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Waste to Wealth Mission in India – An Overview

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Abstract - The objectives of writing this paper is to study the current practices related to the various waste management initiatives taken in India for human wellbeing. The other purpose is to provide some suggestions and recommendations to improve the waste management practices in Indian towns. This paper is based on secondary research. Existing reports related to waste management and recommendations of planners/NGOs/consultants/government accountability agencies/key industry experts/ for improving the system are studied. It offers deep knowledge about the various waste management initiatives in India and find out the scope for improvement in the management of waste for the welfare of the society. The paper attempts to understand the important role played by the formal sector engaged in waste management in our country. This work is original and could be further extended.

Keywords: Waste to Wealth, User Charges, Municipal Solid Waste.

I. INTRODUCTION

The Waste to Wealth Mission is one of the nine scientific missions of the Prime Minister's Science, Technology, and Innovation Advisory Council (PMSTIAC). The mission is spearheaded by the office of the Principal Scientific Adviser (PSA), Government of India. The mission aims to identify, develop, and deploy technologies to treat waste to generate energy, recycle materials, and extract resources of value.

The vision of waste to wealth is to:

- The mission will also work to identify and support the development of modern technologies that promise to create a clean and green environment.
- The mission will assist and augment the Swachh Bharat and Smart Cities projects by leveraging science, technology, and innovation to create circular economic models that are financially viable for waste management to streamline waste handling in the country.
- To create ready reckoners that are financially viable for waste management.
- To streamline waste handling in India.

Circular Economy Action Plans for 10 waste categories have been finalized, and are under implementation:

1. Lithium-ion batteries
2. E-waste
3. Toxic and hazardous industrial waste
4. Scrap metal (ferrous and non-ferrous)
5. Tyre and Rubber
6. End-of-Life Vehicles
7. Gypsum
8. Used Oil
9. Solar Panels
10. Municipal Solid Waste

Respective Nodal Ministries are coordinating the progress of the implementation of these action plans.

- Ministry of Environment, Forest and Climate Change is the Nodal Ministry for Circular Economy Action Plan for Tyre and Rubber and stakeholder ministry in other CE Action Plans.

Regulations on the market-based Extended Producer Responsibility (EPR) principle have been notified for four categories of wastes i.e., plastic packaging waste, battery waste, e-waste, and waste tire.

- In EPR for Plastic Packaging, targets for minimum recycling, minimum use of recycled content, and use of rigid plastic packaging in identified sizes have been mandated.
- In rules incorporating the EPR principle that have been notified/amended this year, different targets of minimum recycling, minimum recovery percentage, and minimum use of recycled content have been given lead times to start with.
- The optimum level will be reached over some time. This has been done to provide time to the industry as well as recyclers for the development of systems and recycling infrastructure.
- Regulations to bring in EPR for end-of-life vehicles are under development.

II. SIGNIFICANCE OF WASTE TO WEALTH

The 'Waste-to-Energy' and Waste Management market in India is set to be a $14bn opportunity by the year 2025. The population of 1.3 billion in India currently generates 62 million tonnes of municipal solid waste per year.

And by 2027, India is set to become the world's most populous country as per projections of the United Nations with 7 new megacities.

- At this exponential population and urban growth rate, landfills almost 90% of the size of Bengaluru would be required for dumping if the waste remains untreated.
- Though rapid urbanization presents a humungous challenge, with the right policy framework and action, this challenge can be turned into a golden opportunity.

The benefits of effective waste management are immense.

- India presents an opportunity in numerous subsectors of waste management including municipal solid waste, electronic waste, bio-medical waste, agricultural waste, and others.
- It is predicted that India has the potential to generate 3GW of electricity from waste by 2050

The Waste-to-Wealth Mission/ Mission Circular Economy is bound to create new business models as well as new employment opportunities.

- This will also result in the integration of the informal sector. Participation in the industry is of critical importance to make the Waste-to-Wealth Mission a success.
- This will result in moving away from mindless consumption to mindful utilization and will help achieve the vision of
- Mission LiFE – Lifestyle for Environment.

Various other Indian cities were identified for the best practices of waste management.

- Alappuzha (Kerala) and Panaji (Goa) for reducing operating costs through source segregation.
- Mysuru (Karnataka) is applying scientific techniques to turn biodegradable garbage into compost.
- Paradeep (Odisha) has adopted a decentralized and community-driven model with micro-composing centers and material recovery facilities.

III. DISCUSSION

If the garbage is not controlled, it eventually finds its way to the land, where it may be dispersed, dumped in landfills, or polluted by it.

Waste may both be a resource and a problem for the environment. Ineffective waste management causes substantial material loss and may be harmful to the environment and public health. This means that we must try to generate as little non-hazardous waste as possible. Where it is environmentally appropriate, material recycling should take precedence over energy recycling for rubbish that still gets created. The emphasis should be on source segregation, especially by using taxation policy to make fresh plastic and other trash creation more expensive than recycling.

- To establish waste-to-energy units, innovative concepts and new firms need to receive financial backing.
- Landfills should be provided by all local governments in proportion to the waste they generate after recycling.
- A new tax could be implemented to charge producers according to the amount of rubbish they produce.
- This will assist in raising the necessary funding for the infrastructure of solid and liquid waste management.
- The major responsibility for treating and selling treated water for agricultural and industrial use should be placed on the producer and the private sector.
- The complexities and relationships both inside and outside of government must be taken into account in waste management governance.

IV. CONCLUSION

The initiatives taken by government of India is presented briefly in this paper and few suggestions were given.

REFERENCES

[1]. SAR (2013), Sectoral Assessment and Situation Analysis Report, unpublished report by Directorate of Urban Development, Himachal Pradesh.

[2]. DPR for Conservation and Management Plan of Nainital Lake, Master Plan of Nainital the Town and Country Planning Division Office (Kumaon)


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Achievements of India in Science & Technology in 2022

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I. INTRODUCTION

Several scientific and technological developments have touched the lives of common people in the last seven decades. In the past seven decades, India has built satellites and sent probes to the moon and Mars, established nuclear power stations, acquired nuclear weapon capability and demonstrated firepower in the form of a range of missiles. Undoubtedly these are all fabulous achievements of Indian scientists and technologists. At the same time, scientific research – combined with favourable public policies - has made India self-sufficient in production of food, milk, fruits and vegetables, drugs and vaccines. All this has had great social and economic impacts and directly and indirectly touched the lives of ordinary Indians. Developments in communications and information technology have enabled timely forecast of weather and early warning of cyclones, saving thousands of lives.

II. CONTEXT

2.1. India's Ranking in Global S&T Indices Continues to Rise - India is now placed at 40th position among the top innovative economies globally as per Global Innovation Index (GII) 2022. The country remains among the top 3 countries in scientific publication as per NSF database and also in terms of no of Ph.Ds, in size of Higher Education System; as well as in terms of number of patents and Start-ups.

2.2. Creating a Robust Start-Up and Innovation Ecosystem - DST has been initiated in establishing a network of Technology Business Incubators (TBI) and Science & Technology Entrepreneur's Parks (STEP) across the country under the National Initiative for Developing and Harnessing Innovations (NIDHI) program. This had a major impact through all aspects of innovation ecosystem for scouting and mentoring of start-ups for commercialization including significant widening the base of innovation pyramid, enhanced support to frugal and grassroots innovations. NIDHI has the entire innovation value chain and built largely around Technology Business Incubators with several components.

2.3. India Achieving New Heights in Supercomputing Capacity - New installations of high-performance computers at five institutes (IIT Kharagpur, NIT Trichy, IIT Gandhinagar, IIT Guwahati, IIT Mandi). The figures of human resource trained under the mission reached 17,500.

2.4. Boosting Technology Development in Cyber Physical Domains Like AI, Robotics, IoT through Research and Innovation Hubs - The Union Cabinet approved the National Mission on Interdisciplinary Cyber Physical Systems (NM-ICPS) in December, 2018 at a total outlay of Rs.3660 Crores for a period of five years, to be implemented by the Department of Science and Technology (DST). The Mission is being implemented through 25 Technology Innovation Hubs (TIHs) created at reputed academic institutes across the country.

2.5. Strengthening India's Position on International S&T Engagement - India assumes the G20 Presidency on the 1st of December 2022 and will convene the G20 Leaders' Summit for the first time in the country in 2023. As part of the same DST takes the responsibility of coordinating the activities of Science-20 (S20) and Research Innovation Initiative Gathering (RIIG) Engagement Groups during India's G20 Presidency in 2023. India joins hand with Finland to establish Virtual Network Centre in Quantum Computing to jointly develop 20 qubits superconducting based Quantum Computer in 1st phase and further scale it up to 54 qubits in second phase.

2.6. Geospatial Data, Infrastructure and Technology Leading to Improved Citizen Services -

- The Second United Nations World Geospatial Information Congress (UNWGIC) on the theme "Geo-Enabling the Global Village: No one should be left behind" was held successfully in Hyderabad from 10-14 October 2022.
- India was awarded to chair the new working group constituted for the Integrated Geospatial Information Framework (IGIF) during the Eleventh Plenary Meeting at Hyderabad organized by the Regional Committee of UN-GGIM for Asia and the Pacific (UN-GGIM-AP).
- Six Regional Centres for Geodesy have been established under the National Geospatial Programme at IIT Bombay, IIST Trivandrum, IRS Anna University, IIT (ISM) Dhanbad, MNNIT Allahabad and MANIT Bhopal with the aim to assist in spreading Geodesy Education and R&D in the country towards strengthening the Geodetic Infrastructure.
- Survey of India (SoI) the National Survey and Mapping Organization of the country has successfully carried out drone survey of rural abadi areas of 2,00,000+ villages as part of the SVAMITVA (Survey of villages and mapping with improvised technology in village areas) for distribution of Property Cards in Abadi Areas and providing 'Record of Rights' to village household owners.
- Continuously Operating Reference Stations (CORS) is one of its kind geodetic infrastructure
- Online maps portal launched on 17th August, 2021 provides various digital geospatial products to the users
- High resolution mapping for major river basins is also being carried out to provide the high resolution GIS and Digital Elevation Model (DEM) for improved flood hazard mapping and other planning purposes.
- Standardised Geographical Place Names (Toponymy): SOI has prepared National toponymic database in 23 languages.

2.7. New Feathers to Technology Commercialization - This year took well by witnessing the swarming of 1000 indigenized drones in the sky at the eve of beating the Retreat ceremony on January 29, 2022. M/s Sapigen Biologix Pvt Ltd., Hyderabad has prepared a Covid-19 **intra nasal vaccine.** M/s Orange Koi Private Limited, Visakhapatnam aims at implementing the Metal Injection Molding (MIM) process for the manufacturing of medical surgical instruments and device components. Their work is so eccentric that it gathered attention of **Hon'ble PM** and were named in **90th Mann ki Baat.** In tune with Honb'le Prime Minister's vision of National Hydrogen Mission (NHM), many companies have come up with plan to manufacturing of Hydrogen sensors indigenously.

2.8. Accessible Scientific Infrastructure for All Stakeholders -Four new Universities under '**Promotion of University Research and Scientific Excellence (PURSE**)' and 65 Departments in various academic organizations and universities under '**Fund for Improvement of S&T Infrastructure (FIST)'** were supported under FIST for strengthening the research infrastructure

2.9. Technology-Led Solutions for Energy and Environment Challenges - The Department has been supporting mission mode technology development programmes in different areas of clean energy, water and environment areas. A first-of-its-kind Distributor System Operator (DSO) report has been prepared that can help in transforming the operational and financial state of the Indian power sector and boost private sector's confidence attracting much-needed investment and innovation in the industry. A real time pollution monitoring photonic system, Air Unique Quality Monitoring System (AUM) has been developed

2.10. Climate Change Research Expanding to Newer Areas - The Department has been implementing two National missions on Climate Change. Four new State Climate Change Cells (SCCCs) have been established in the States of Goa, UT of Chandigarh and Jharkhand and Uttar Pradesh.

2.11. Promoting Career Opportunities for Women Scientists - DST is encouraging meritorious girls to pursue higher education and career in underrepresented STEM areas, through its major initiative 'Vigyan Jyoti'. **Research Support to Women Scientists was extended to** around 370 women **scientists** under Women Scientists Scheme-A (WOS-A) to pursue research after break in career in 5 subject areas of Basic and Applied Sciences. **Training in Intellectual Property Rights (IPRs) was provided to** 99 women scientists. **Research Infrastructure Support,** CURIE (Consolidation of University Research for Innovation and Excellence) Programme extended to 25 Women PG Colleges. The 'SERB-POWER mobility grant' was introduced to provide opportunity to women scientists to visit leading institutions/universities across the globe for a period of 01-03 months

2.12. Attracting the Best Talent Pools to Pursue their Career in Science - The Scholarship for Higher Education (SHE) was supported to 10833 students, selected on competitive basis, for pursuing under-graduation and post-graduation in basic and natural sciences.

2.13. Conserving the Heritages through Digital Technologies - Under the Science and Heritage Research Initiative (SHRI) programme of DST, the sound proofing qualities of Pattamadai mat, a mat made by weaving or interlacing korai grass with the cotton threads, has been explored for use in noise guarding classrooms as well as recording studios against external noise disturbances.

2.14. Augmenting Research Capabilities in State Universities and Colleges - The growth of existing research capabilities in state universities and colleges is imperative to ensure horizontal diffusion of research excellence reaching all research students hoping to contribute to the national R&D ecosystem and promoting the enhancement of quality. A dedicated scheme, State University Research Excellence (SERB-SURE) has been launched by Science and Engineering Research Board (SERB) to create a robust R&D ecosystem in state universities and colleges including the private ones.

III. CONCLUSIONS

The achievements of India in S & T is discussed along the with the opportunities extended by the government for research especially special provisions for women.

Wealth from Agricultural Waste

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Abstract - India is an agricultural based country. Farmers are the back bones of our nation. In early days farmers were using locally available natural materials like after harvest trashes, weeds, cow dung etc. as manure. Later on they started using chemical fertilizers in view of fast growth and good yield. Though they got good results in early days, after 10-15 years of continuous use agricultural land becomes barren, crops become less resistant to environmental conditions. To dispose the agriculture waste, they started burning it and digest anaerobically in the land itself, which leads to air pollution, release of obnoxious and greenhouse gases. Use of chemicals as fertilizer is not only expensive but also goes on accumulating in soil, crops, undergoes bio-magnification which leads to health disorders. Chemical fertilizer is not feasible from economical, health, environmental point of view and for these Indian farmers are committing suicide, instead they could use indigenous technology and improve agricultural land. In view of this a was study- conducted on agricultural waste management through vermicomposting. Representative samples were collected from a typical agricultural farm and allowed to decompose aerobically for about 22days and then transferred to vermi pits. Chemical analysis of samples shows significant decrease in carbon content and good N, P, K in the final compost. Pre aerobic decomposition outside the vermi pit cut off the leachate and odour problem in vermi pit and also reduces the overall time required for composting. Present study gives bio-remedial recycling technology for agricultural waste which meets a part of agricultural input and also conserves the environment

Key Words:

I. INTRODUCTION

Agriculture is the back bone of our country. Gross fixed capital formation in agriculture is recorded as 16.5% of Gross Value Added (GVA) in 2019-20. Right from the Kashmir to the coast of Kanya Kumari and from North eastern states to the desserts of Rajasthan the country is involved in a number of agricultural activities. The most commonly followed cropping system in the country is rice – wheat based but horticulture, fisheries and animal husbandry also plays very important role in the country's economy. We have been witnessing that, while agriculture is contributing towards the food & nutritional security of our people, and economic growth of the country, improper management of agricultural waste generated in the process has been contributing towards mounting air, soil and water pollution. India generates about 350 million tonnes of agricultural waste every year. As per the estimates given by the ministry of new and renewable energy, this waste can generate more than 18,000 MW of power every year apart from generating green fertilizer for use in agriculture. Globally about 1.3 billion tonnes of food products for human consumption gets wasted or lost every year and about one-third of biodegradable municipal solid waste mainly comprise of domestic kitchen waste generated from households. This intern generates obnoxious gases and GHGs besides foul odour, around the landfill sites. Taking a single crop of potato for example, a total world potato waste is estimated to be 12 million tonnes per annum out of which 2 million tonnes of potato waste is generated in India alone.

Waste is any material that cannot be used, it is not needed by the producer or owner because it has lost its value. If we do not utilize waste and thrown it around, causes various pollutions which is harmful to the environment as well as the health of human beings. Waste also posses a serious threat to our life.

Agriculture waste is defined as, "the collective term used for a non-economical substance which is produced by agricultural operations such as roots, crop residues, and livestock waste". Agricultural waste is waste produced through various agricultural operations like bagasse, straw, peels, etc. It includes manure and other farm waste, poultry house waste, fish waste, and slaughterhouse waste too. When there is high agriculture production, it results in high agricultural wastes, so it is very necessary to convert unutilized waste into a useful form. Wastes obtained through rural and urban areas are different.

II. CONTEXT

Waste from a rural area – Maximum agricultural waste is obtained from the rural area such as cattle urine and dung, waste of food materials of animals and their excreta i.e. Poultry waste, Agro-industrial waste i.e. sugarcane molasses, peels of potato, peels of orange and another agriculture crop. Rural areas mainly produce natural or organic agricultural wastes.

Waste from urban area– In an urban area, mixed waste is found. A waste product that is Being isolated from normal waste is diapers, sanitary pads, bandages, syringes, and other medical waste. Polythene, glass, and waste from machinery i.e. tires and batteries, plastics i.e. moulds plastics, and hard plastic are included. Whereas normal waste in the urban area includes kitchen waste and excreta etc. In nature, nothing is considered a waste. Everything is food for something else. Everything is meant for another thing through its modification. It is the rule of nature. At present time, the population is increasing day by day and simultaneously resulting in a decrease or scarcity of food. Due to the arrival of such critical conditions, people started relying on the use of more complex nutrients i.e. chemical fertilizers to produce a higher yield or sufficient food to cater to the need of people and fulfilled the need of the increasing population. Due to continuous and non-judicious use of chemicals, the land becomes infertile and barren. People also burnt agricultural waste which create air pollution, damage other crops or create an unhealthy environment.

Physical characteristics of the waste

Table 1. Physical Characteristics of Agricultural waste (% by Wet Weight)

Parameter	% by weight	Parameter	% by weight
Dry leaves	9.8	Weeds	5.9
Vegetable waste	15.6	Fresh grass	10.2
Sugarcane trash	10.7	Eucalyptus	2.2
Banana waste	12.5	Coconut waste	4.3
Flowers	3.6	Parthenium	1.1
Ashes	3	Others	13.8
Fruits waste	7.2		

Managing Agricultural Waste - The management of agriculture waste through composting and vermicomposting etc. –

- **Composting** –Composting is the process of recycling various organic materials which are earlier regarded as waste material and produce a soil conditioner. Compost is a result of the decomposition of material into organic matter full of humus and nutritive value.
- **Method of recycling of organic wastes-** NADEP compost method, heap method, pit method, Indore method, and Bangalore method.
- **Efficient composting techniques-** vermicomposting and microbial enriched composting.
- **Vermicomposting** – Vermicomposting is the product of composting using different species of worms, to create a mixture of decomposing vegetable or food waste, bedding material, and vermicast. Vermicast is the end product of the breakdown of organic matter by earthworms. It is the eco-friendliest recycling process that not only converts organic debris into compost but also makes the availability of nutrients to plants. The basic requirement for composting to start is organic waste. As earthworms feed on waste, they begin to excrete a dark-colored nutrient-rich organic matter called vermicast, when the worm container gets filled with compost, it can be used as manure for gardening or farming purposes.

Wealth from agricultural waste – With the management of agricultural wastes, we utilize it to obtain a lot of money. Many examples of agricultural waste to wealth are as follows:

i). Production of biogas from waste to be utilized for various purposes.
ii). Use of agriculture waste in mushroom production.
iii). Use of briquette. Making of bio-fertilizer
iv). Production of biofuel such as ethanol.
v). Use of wood chips, straw in mulching.
vi). Used for alcohol production
vii). Medicinal uses
viii). Use of stubbles and roots for plywood making and craft paper making.
ix). In organic farming, oilcake to be decomposed, and the product obtained is used as insecticide material

Mushroom production – A mushroom farming business can be means of big profit in just a few weeks with considerably low start-up capital investment to start a business. Mushroom is cultivated on a large number of agro-waste. For this, we can use paddy straw, wheat and ragi straw or leaves of maize, millets and cotton wastes, dried grasses, used tea leaf waste. Waste material that remains after mushroom production is used as a raw material for composting or vermicomposting.

Medicinal and value-added products developed from farm wastes – which may increase the income of farmers. Many medicinal uses of plants or crops are not being used due to lack of knowledge such as cucurbits sp. known as kacharia in local language is considers as waste material but it possesses a medicinal value which is beneficial for health.

If the farmers or people aware of the beneficial effect of kacharia, they may enhance their income by selling it to the pharmaceutical industries. They make dried products or pickles of kacharia and sell them at a valuable cost in the market. Here farmers get money from the waste material i.e. Kacharia, which is grown unnecessarily in the field. And this also produces many value-added products which benefit the health and Increase income as well. Like the above examples, there are several forests produces which can be used for many other medicinal and other uses.

III. CONCLUSION

Agricultural waste is no doubt organic waste and is purely biodegradable. Hence it can be used for composting. Cow dung is easily available seeding material in rural area. If it is added with the waste microbial activity increases and oxidation of organic matter takes place in faster rate and stabilized within shorter period. Also, cow dung adds nutrient to the compost. Thus increases the quality of final compost. Composting is the best method in which agricultural solid waste can be recycled. Recycling is truly an eco-friendly technology through which we can convert all organic waste into a product which is rich in nutrient content and can replace chemical fertilizer. Limiting factors in suggesting composting as a solid waste treatment methods are odour problem, leachate, and unsanitary condition in the compost yard. Moisture content, temperature and aeration are the three main parameters to be controlled to overcome these limiting factors. As the waste is shifted to vermi pits after preliminary decomposition(21days) and as there is no leachate production after preliminary decomposition. Quantity of worms increase about the three times by the time of completion of compost process which can be used on large quantity of waste or it is of better salable value. Long term use of chemical fertilizer can be disastrous for soil. But organic manure enriches the agricultural field soil, if it is used constantly. It can be used as an additional manure in early days and after 5-8 years of continues use soil gets enriched, then organic manure can be used as substitute for chemical fertilizer, which not only saves the cost of chemical fertilizer but also after harvest materials gets recycled in an eco-friendly way. Contamination of agricultural products by chemicals also gets reduced.

REFERENCES

[1]. Nedgwa P.M. and Thompson, S.A. 2001. Integrated composting and vermicomposting in the treatment and bioconversion of bio solids, J. Bioresource Technology. 76:107-112.

[2]. Radha, D. Kale, 2000. Methods of Vermicomposting and its applications, Teach. on vermiculture and Vermicomposting, org. TNAU and ICAR

[3]. Srikanth K. 1997. Enrichment of compost and its effect on soil properties and crop growth.Ph.D.hesis.SubmittedtoGKVK,Bangalore


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Food Waste in India – Government Initiatives

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Abstract - In order to make progress toward reducing food loss and waste in India, it is vital to understand the existing knowledge, practice, and policy on the issue. This article contains review of the literature on food loss and waste in India to provide insights into its extent (how much, where, and why); the social, economic, and ecological impacts; and available solutions.

I. INTRODUCTION

Indians waste as much food as the whole of United Kingdom consumes – food wastage is an alarming issue in India. Our streets and garbage bins, landfills have enough proof to prove it. Weddings, restaurants, hotels, social and family functions, households spew out so much food. According to the United Nations Development Programme (UNDP), up to 40% of the food in India is wasted. About 21 million tons of wheat is wasted in India and 50% of all food across the world meets the same fate and never reaches the needy. In fact, according to the agriculture ministry, Rs. 50,000 crore worth of food produced is wasted every year in the country. India ranks 103 among 119 countries in Global Hunger Index 2018. Wastage of food is not indicative of only hunger or pollution, but also many economic problems in the country, such as inflation. Only government policies are not responsible for the problems we are facing today, but our culture and traditions are also playing a lead role in this drama. In India, the bigger the wedding, the larger the party and the more colossal the waste.

Keywords: Ripening Chamber**,** Food Wastage in India.

II. CONTEXT

Food Wastage - A Problem

- 25% of fresh water used to produce food is ultimately wasted, even as millions of people still don't have access to clean drinking water.
- Even though the world produces enough food to feed twice the world's present population, food wastage is ironically behind the billions of people who are malnourished. The number of hungry people in India has increased by 65 million more than the population of France.
- Acres of land are deforested to grow food. Approximately 45% of India's land is degraded primarily due to deforestation, unsustainable agricultural practices, and excessive groundwater extraction to meet the food demand.
- 300 million barrels of oil are used to produce food that is ultimately wasted.

Government Initiatives

- The Ministry of Food Processing Industries is concerned with formulation and implementation of the policies for the food processing industries within the overall national priorities and objectives. If the surplus production of cereals, fruits, vegetables, milk, fish, meat and poultry, etc., are processed and marketed both inside and outside the country, there will be greater opportunities for adding to the income of farmers and employment.
- Several policy initiatives have been taken from time to time to promote growth of the food processing sector in the country. Some of these are:
- Exempting all the processed food items from the purview of licensing under the Industries (Development and Regulation) Act, 1951.
- Automatic approval for foreign equity upto 100% for most of the processed food items excepting alcohol and beer subject to certain conditions.
- 100% Foreign Direct Investment (FDI), under government approval route, for trading, including through e-commerce, in respect of food products manufactured or produced in India.
- Lower Goods and Service Tax (GST) for raw and processed product; nearby 80% food products are covered in lower tax slab of 0%, 5% and 12%.
- Provision of profit linked tax holiday under section 80 IB and investment linked deduction under section 35 AD of Income Tax Act, 1961.
- Classifying loan to food & agro based processing units and cold chain under agriculture activities for Priority Sector Lending.
- Cold chain and food parks covered under Harmonized Master List of Infrastructure Sub-sector.
- Incentivizing creation of infrastructure, expansion of processing capacity and developing technology to convert raw prouce into value added products.
- Setting up of a special fund of Rs. 2000 crore in National Bank for Agriculture and Rural Development (NABARD) to provide affordable credit for designated food parks and agro-processing units.

- Government agencies such as the Agricultural and Processed Food Products Export Development Authority (APEDA), National Horticulture Board (NHB) were set up to help provide financial assistance and drive exports developing cold chain sector. The establishment of the National Centre for Cold Chain Development (NCCD) in 2012 gives a much needed impetus to the sector by focusing on promotion and development of an integrated cold chain for perishable products.
- Equally important is cold storage at the transport stage of the supply chain. The union agriculture ministry is working in coordination with fresh and healthy enterprises, a fully owned subsidiary of the government-owned Container Corporation of India, to launch a special purpose vehicle (SPV), a body to fund projects. In its initial phase, the SPV will provide complete cooling logistics for fruits such as kinnows, oranges, bananas, and mangoes.
- Similarly, government has proposed schemes for creating backward and forward linkages to plug the loopholes of food wastages in the entire production chain.
- "Operation Greens" was announced on the line of "Operation Flood", with an outlay of Rs.500 crores to promote Farmer Producers Organizations (FPOs), agri-logistics, processing facilities and professional management. Accordingly, the Ministry has formulated a scheme for integrated development of Tomato, Onion and Potato (TOP) value chain.

Analysing Food Wastage in India - Food wastage is fast assuming serious dimensions. According to the Food and Agriculture Organisation (FAO), a staggering 1.3 billion tonnes of food is being wasted annually. The FAO report further states that one-third of the total global food production is wasted, costing the world economy about $750 billion or Rs. 47 lakh crore.

Food wastage is an issue that has a global scale. According to a report by the National Resources Defence Council (NRDC), 40 per cent of the food goes uneaten in the US, whereas in Asia, India and China cause a loss 1.3 billion tonnes of food wastage every year. In terms of overall food waste — agricultural produce, poultry and milk — India ranks seventh, with the Russian Federation at the top of the list.

India's lower ranking is because most of the countries ranking above it utilise much of their land in raising poultry, while a major chunk of land in India is under agriculture and this explains the highest wastage of cereals, pulses, fruits and vegetables that occurs in India. A recent study conducted by Indian Institute of Management, Kolkata, revealed that only 10 per cent of foods get cold storage facility in India, this factor, accompanied by inappropriate supply chain management, has resulted in India becoming a significant contributor towards food wastage both at pre and post-harvest waste in cereals, pulses, fruits and vegetables.

The government has made many efforts to rein in food wastage but clearly, the depth of the problem is such that the impact of these efforts is hardly up to the mark. India should also take a cue from global practices that are both unorthodox and innovative in order to tackle food wastage problem. For instance, France has passed unanimous legislation requiring supermarkets to either give unsold food to charity or send it to farmers for use as feed and fertiliser.

Similarly, institutions in Canada are recovering unused and unspoiled food from retailers, manufacturers, restaurants and caterers and sending them to charities, in the process delivering ingredients for over 22,000 meals daily. These powerful initiatives have made a big difference in how these countries have approached a vexing issue.

India can effectively use technology to script a new chapter in prevention of food wastage. The government can speed up research in Nano technology with the help of which eco-friendly and healthy food preservation applications can be invented that are helpful in preserving food for longer duration and keeping farm produce fresh.

In addition to these efforts, the government must make it mandatory for the food retailers across the country to adopt technology standards that allow incentives for the customer to purchase perishable products that are approaching their expiration dates. This will help reduce food wastage, maximises grocery retailer revenue, and effectively reduces the global carbon footprint.

The Technological Solutions - The adoption of proven technology solutions can help bring down operating costs, improve quality of produce and help the environment with wastage mitigations. Multiple and innovative solutions are emerging in India to help meet these goals.

- **Multi-commodity Cold Storages and Multipurpose cold storage facilities:** These are designed to store a range of commodities such as fruit, vegetables, dry fruits, spices, pulses and milk throughout the year.
- **Ripening Chamber:** Fruit such as mangoes, bananas and papayas are often harvested in a mature but unripe condition, and are subsequently allowed to ripen off the tree. In natural conditions they ripen slowly, leading to high fruit weight loss, desiccation and uneven ripening. A ripening chamber helps in maintaining precise conditions specific to the product's requirement. The ripening is more uniform and the fruit has a firmer pulp texture and a better flavor. Farmers can also choose to pause or hasten the ripening process based on market demand. This usually results in less food wastage and higher price realization.
- **Distributed Refrigeration Architecture:** A centralized refrigeration system consists of one or more large capacity refrigeration racks, housed in a mechanical room, located in the back of a supermarket. It is specifically designed for the store's entire refrigeration needs. Distributed systems, on the other hand, are one of the newer commercially adopted refrigeration technologies. A distributed system consists of several miniature parallel compressor racks, distributed throughout the store, located next to, or in close proximity to, their display case or walk-in cooler refrigeration loads.
- **Increased Usage of Electronic Controllers:** In conventional cold storages, the temperature adjustment and storage method depends upon the experience of the operator. This requires the operator to be physically present at the cold storages to adjust the temperature and manage the system by periodic measurement. However, negligence and inaccuracy due to human

intervention can result in product spoilage. The use of electronic management systems and controllers assist by controlling the storage environment automatically, with the preset values which help in precise control, food safety and compliance. Electronic sensors help maintain precise conditions. A remote monitoring capability provides the user with the ability to control the system from any place, instead of remaining at the site all the time, while also maintaining a log of data for easy analysis.

III. CONCLUSION

The reasons for food waste are explained and the government initiative also explained

REFERENCES

[1]. WORKING PAPER | August 2021 | 31 Abraham, M. 2020. "Direct-Selling Helps Indian Farmers Swerve Food Waste under Lockdown." Deutsche Welle, May 27.

[2]. Agrawal, V.S., and A. Nag. 2013. "Sustainable Food Waste Prevention Strategies to Achieve Food Security in India." International Journal of Agriculture and Food Science Technology 4 (3): 189–94.

[3]. Ahmad, M.S., and M.W. Siddiqui. 2015. "Factors A□ecting Postharvest Quality of Fresh Fruits." In Postharvest Quality Assurance of Fruits, 7–32

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Government Initiatives by Government of India in Promoting ICT in Education

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Abstract- In this digital age, it is difficult to think of any event in our daily life that is not using information and communication technology. UNESCO has defined ICT as forms of technology that are used to transmit, process, store, create, display, share or exchange information by electronic means. It includes not only conventional technologies such as radio and television, but also modern technologies such as cell phones, Internet and Intranet, hardware and software, satellite systems, expert systems, teleconferences, etc., as well as the various services and associated applications. Within education, ICT have begun to have a presence, but the impact has not been as extensive as in other fields. Education is a very socially oriented activity and quality education has traditionally been associated with strong teachers who have a high degree of personal contact with students. The use of ICT in education lends itself to more student-centred learning environments, and this often creates some tensions for some teachers and students. But as the world moves rapidly towards information and digital media, the role of ICT in education is increasingly important and this importance will continue to grow and develop in the 21st century. This document highlights the various impacts of ICT in contemporary higher education and explores possible future developments. The document argues the role of ICT in the transformation of teaching and learning and seeks to explore how this pact will be offered and delivered in the universities and colleges of the future.

I. INTRODUCTION

For meeting the needs of quality education, higher education has grown exponentially in the last five decades. Due to swift advancements in Information and Communication Technology (ICT), it has further gained momentum. Demand for skilled and proficient labor is ever increasing in the upto date globalised society. For achieving economic growth and development, there has been need to access the quality in higher education. In order to reach the remotest part of the country, there have been provisions of distance learning and open learning all across the country. It is a lifelong learning process and that too at affordable cost. From last two decades, there has been tremendous increase in ICT in higher education. Even then there is a challenge to develop a higher education system that is supple and self-motivated so as to holistically integrate the technology in the management and delivery of learning programmers is daunting. In first section the evolution of ICT has been discussed followed by the initiatives in the use of ICT. Role of ICTs in formal education and the areas in which they can be incorporated to play prominent role are discussed in the second section. For achieving development in the field of higher education, various challenges faced in the use of ICT have also been discussed in the last section.

The Information and Communication Technology (ICT) is an umbrella term that comprises of any communication tool or application, encompassing: radio, television, smart phones, computer, and network hardware and software, satellite systems, Expert systems and so on, as well as the various services and applications associated with them, such as videoconferencing and distance learning. ICT can be considered as a subfield of Educational Technology, as such technologies are used for enlightening purposes, namely to support and improve the learning of students and to develop learning environments. ICTs in higher education are being used for developing course material; delivering content and sharing content; communication between learners, teachers and the outside world; creation and delivery of presentation and lectures; academic research; administrative support, student enrolment etc.

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II. CONTEXT

Today ICTs – including laptops wirelessly linked to the Internet, personal digital assistants, low-cost video cameras, and cell phones have become reasonable priced, available and integrated in large sections of the society all through the world. It can reorganize organizations, promote alliance, increase democratic involvement of citizens, improve the lucidity and responsiveness of governmental agencies, make education and health care more extensively available, foster cultural creativity, and augment the development in social integration. It is only through education and the incorporation of ICT in education that one teaches students to be participants in the growth process in this era of rapid change. ICT also help in the creation of digital resources like digital libraries where students, teachers and professionals can access research material and course material from any place at any time. Such facilities permit the networking of academics and researchers and hence sharing of scholarly material. This avoids photocopying of work.

In sight of ICT, education can be classified in three main categories:

- E-learning
- Blended Learning, and
- Distance Learning

E – Learning - E-learning allows higher participation and greater communication. It challenges the concept that face-to-face conventional education is superior to it. The core ICTs are web and Internet which spread knowledge through e-learning. The components comprise e-portfolios, cyber infrastructures, digital libraries and online learning object repositories. All the above components create a digital personality of the student and unite all the stakeholders in the education. Some of the advantages of e-learning are:

- To diminish the geographical barriers and eliminate time consumption among the teachers and learners.
- Enhanced group association made possible via ICT.
- New approaches in education are widely seen.
- It can provide speedy diffusion of education to target deprived groups.
- It offers the blend of education while balancing family and work life.
- It enhances the international aspect of educational services.

Initiatives of Usage of ICT in Education - India is making utilize of honourable incorporation of ICTs such as open-source software, satellite technology, regional language interfaces, simple to use human-computer interfaces, digital libraries etc. with a long-term plan to attain the farthest of the villages. Community service centres have been started to promote e-learning across the country. Prominent initiatives of use of ICT in education in India include: Indira Gandhi National Open University (IGNOU) utilizes radio, television and internet technologies. National Programme on Technology Enhanced Learning: a concept related to the open courseware initiative of MIT. It includes internet and television technologies. Eklavya initiative: Uses internet and television to encourage distance learning. IIT-Kanpur has urban 'Brihaspati', an open-source e-learning platform (Virtual Class Room). Premier institutions like Calcutta have entered into a deliberate alliance with NIIT for given that programmes through implicit Classrooms. Jadavpur University has been using mobile-learning centre. IIT-Bombay has initiated the program of CDEEP (Centre for Distance Engineering Education Program) as emulated classroom interface through the use of real time interactive satellite technology. The UGC initiated scheme called "ICT for teaching and learning process" for achieving quality and distinction in higher education. Network facilities with the help of ERNET, Ministry of Information and Technology, Government of India were installed at UGC office to promote a healthy work culture. By the side of with this UGC launched a mega programme namely, 'UGC INFONET', a network of Indian Universities and Colleges, by integrating Information and Communication Technology (ICT) in the process of training, learning and learning management. The network is managed by ERNET India and many universities are its members. Information for Library Network (INFLIBNET), a self-sufficient Inter University Centre of UGC is the nodal agency for harmonization and facilitation of the association between ERNET and Universities. Instruction programmers for the manpower were conducted to administer the ERNET facilities and other aspects of systems including electronic subscriptions. In addition,. UGC is persuade formation of e content / learning material for teaching learning process and supervision of learning in colleges and universities.

Challenges of ICT in Higher Education - First is the high cost of acquiring, installing, operating, maintaining and replacing ICT. Although potentially of great importance, the integration of ICT in education is still in its infancy. The introduction of ICT systems for education in developing countries has a particularly high opportunity cost because installing them is usually more expensive in absolute terms than in industrialized countries, while, in contrast, alternative investments are relatively less expensive. The use of unlicensed software can be very problematic, not only legally but also in maintenance costs, especially if the pirated software varies in standard formats. Although students can greatly benefit from well-produced learning resources, online teaching has its own unique challenges since not all faculties have ICT skills and can teach the use of ICT tools. The four most common errors in the introduction of ICT in education are:

- Install learning technology without reviewing student needs and content availability;
- Implant technology systems from the top down without involving teachers and students;
- Use inappropriate content from other regions of the world without appropriately customizing it; and
- Produce low quality content that has a poor instructional design and does not adapt to the technology in use.

The other challenge he faces is that in many developing countries the basic requirement of electricity and telephone networks is not available. In addition, many collages do not have adequate rooms or buildings to adapt to technology. Another challenge is that teachers need to develop their own capacity to make efficient use of different ICTs in different situations. They should not fear that ICTs replace teachers. English is the dominant language. The majority of the online content is in English. This causes problems, since in many nations people are neither familiar with English nor comfortable. Skill development is another important area in which ICT could be used effectively. Attempts are being made to strengthen the ICT framework for technical and vocational education (TVET).

III. CONCLUSION

There has been tremendous increase in the quality of education, due to rapid use of ICT tools day by day. Learning methods which were earlier conventional or traditional are now online and practical. With the assimilation of ICT in the education system, there have been great changes occurring in the education system in our country. In the education process, it has not only improvised classroom teaching learning process, but also the students are well equipped with the knowledge of ICT tools and e-learning process. ICT has also improved distance learning. The Extension worker or the teaching community is now able to reach every doorstep through e-learning process and learners are able to gain knowledge without visiting school or learning center. Teachers or trainers should be made to take on technology in their teaching styles to provide academic and educational gains to the learners. Teachers should be more involved in encouraging students towards the use of ICT rather than equipping themselves with different ICT tools. Democracy in education can be achieved through the use of ICT enabled education.

REFERENCES

[1]. Neeru S. ICT in Indian Universities and Colleges: Opportunities and Challenges, Management and Change, 2009; 13(2):231-244.

[2]. UGC. Annual Report 2009 – 10, New Delhi, UGC, 2011.

[3]. UNESCO. Open and Distance Learning Trends, Policy and Strategy Considerations, UNESCO, 2002

Applications of Chemistry in Daily life

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Abstract - Everything has chemistry tied to it, from the exchange of gases in the human body to the destruction of life through atomic bombs. The importance and scope of chemistry are huge. In this article, we will look at some basic concepts of Chemistry and its practical applications. Chemicals play an important part in our life and we come across umpteen of them in our day-to-day activities. We are quite unaware of chemical uses and in this blog you will see examples of chemicals that keep our life going smooth. These chemicals are used either in combined form or as some reagents. This paper contains the applications of chemistry in daily life in brief.

I. INTRODUCTION

The study of molecules, or the building blocks of matter, is referred to as Chemistry. It is fundamental to our life, and it guides our research into the human body, the Earth, food, materials, energy, and everything in between. Much of our economic success is based on the chemical industry, which is supported by chemistry research. As a result, chemistry not only studies the qualities of matter but also how and why it changes. Chemicals used in industry have a direct impact on our daily life, including what we eat, wear, travel, technology, how we treat illnesses, how we receive electricity, and many more.

Many future concerns, such as sustainable energy and food production, environmental management, supplying safe drinking water, and improving human and environmental health, will be solved with chemistry. There are several times in our daily life where chemistry, its applications, and its principles are involved. Let's take a look at each one separately.

II. CONTEXT

The applications of chemistry in various industries

2.1 Food Industry - Chemicals can play a significant role in the manufacturing and preservation of food. Food additives, for example, can extend the shelf life of foods; others- such as colours, can enhance the appeal of foods. Flavourings are used to improve the taste of food. As a source of nourishment, food supplements are employed.

1. Esters, which are flavouring agents, are chemical molecules created when alcohol and carboxylic acid combine chemically.
2. Alcohol is a hydrocarbon derivative that is organic in nature.
3. Ethyl Butanoate gives pineapple its flavour.
4. Vinegar is largely made up of acetic acid.
5. By combining different alcohols with different acids, new or diverse flavours can be created.

2.2 Agriculture - Chemical analysis- analyses the ratios of soil components and the degree of availability of these components for planting or cropping, aids agriculture by assisting in the selection of suitable soil for planting a specific crop. Chemistry has provided the world with essential fertilisers, herbicides, insecticides, and fungicides to aid in the production of healthy and nutritious crops, fruits, and vegetables. Urea, calcium superphosphates, ammonium sulphate, and sodium nitrate are all significant fertilisers. Farms must be highly systematic in determining which strategies to use to make the most optimal use of their resources. To feed the globe, modern farming techniques rely on a wide range of chemical agents.

2.3 Soaps and Cleaners - Soaps are created from natural animal fats and vegetable oils that have undergone a saponification process. Soaps are one sort of cleaner, but there are many more that employ different substances and procedures to remove filth from various uses.

Body gels, fabric softeners, laundry detergents, bathroom tile solutions, and all-purpose cleaning solutions would not exist without the chemistry involved in making specialized soaps and cleansers. Synthetic sulphates have made it possible for us to use a new generation of gentler cleaning products for our bodies and homes. Green chemistry has enabled us to generate numerous discoveries in developing healthier, ecologically friendly solutions.

2.4 Colourants - Minerals or petroleum are used to make the most common colours and pigments used in industry. Colourants enable us to make items such as clothing more vibrant. Laser dyes, inkjet printing, photodynamic therapy, and surgery are a few of the various uses for dyes and pigments. Each of these applications uses dyes or pigments created specifically for the purpose.

2.5 Medicines - Medicines are chemical compounds with healing properties that can be extracted from natural sources or prepared in laboratories. Chemistry is important in both medicine and pharmacy because it helps to understand the nature of hormone and enzyme functions as well as the role of medicine in the human body.

Let's have a look at some of the most important medications in chemistry-

1. Analgesics are pain relievers that are used to treat a variety of ailments.
2. Tranquilisers are medications that are used to treat mental illnesses. Take, for instance, tension.
3. Antiseptics are used to destroy or prevent the growth of microorganisms on the skin, wounds, and cuts.
4. Disinfectants are chemicals that kill microorganisms but are not suitable for human consumption.
5. Antibiotics are chemical molecules produced by some microorganisms that can be employed to kill infection-causing microorganisms.
6. Antacids are substances used to eliminate excess acid from the stomach and increase the pH to a healthy level.

2.6 Textiles - Textiles may undergo a variety of chemical and non-chemical treatments during the manufacturing process, including preparation and pre-treatment, dyeing, printing, and fabric refining.
Textiles and clothing contain a wide range of chemicals. Some are used to provide a product with a specific effect, such as biocides to prevent mould from forming on shoes, dyes to give clothing their distinct colours, and water repellents to make outdoor wear more practical. Special chemicals are sometimes used to keep the clothes from becoming wrinkled or mildewy during long periods of transit. To fight foul odour, some clothing and shoes include bacteria-killing chemicals. Oils and greases, starch, sulphonated oils, waxes, and certain surfactants can all be found in textiles.

2.7 Cosmetics - For the production of cosmetics, a variety of chemical combinations are used. The texture and feel of these beauty products are determined by the chemicals incorporated. Cosmetics are made up of a variety of industrial chemicals. Synthetic chemicals and naturally occurring processed chemicals are both examples of industrial chemicals.

2.8 Fuels - Any chemical with stored energy is referred to as a fuel. Photosynthesis and respiration are two processes that store this energy in chemical bonds in the molecules. During oxidation, energy is released. The most prevalent type of oxidation is the combustion, which is the direct reaction of a fuel with oxygen.
Wood, gasoline, coal, and a variety of other fuels have energy-rich chemical bonds that are formed using the Sun's energy and released when the fuel is burned (i.e., the release of chemical energy). Chemical fuels, often known as fossil fuels, are a valuable source of energy and are thus widely employed to meet the needs of an energy-dependent civilization.

2.9 Wars - TNT, RDX, HMX, Gun-powders used in bullets, and other explosives used in wars are all chemical compounds. It was the chemistry that allowed these chemicals to be used during the war. Nuclear weapons, which have become more well-known in recent years, are also chemical compounds.
Biochemistry Application - Biochemistry is the study of the chemical reactions that occur in living organisms. Biochemistry is the study of all live organisms and living processes. Here is the list of a few applications in Biochemistry:

2.10 Biochemistry Application in Agriculture

- Disease Control
- Increases Growth
- Biochemical Tests
- Helps in Animal Husbandry
- Soil Condition

2.11 Biochemistry Application in Medical Test

- Blood Test
- Kidney Function Test
- Pregnancy Test
- Liver Function Tests
- Serum Cholesterol Test
- Breast Cancer Screening
- ESR Test
- Ames Test

III. FUTURE SCOPE OF CHEMISTRY

We can utilize nano chemistry to discover and manufacture some chemicals with amazing qualities that can be used to improve a variety of fields such as engineering, communications, medicine, the environment, transportation, and to meet a variety of human needs.

REFERENCES

[1]. https://www.pure-chemical.com/blog/list-of-chemicals-in-daily-life/
[2]. https://www.studocu.com/in/document/mahatma-gandhi-university/bsc-chemistry/scope-and-applications-of-analytical-chemistry-in-daily-life/28274765

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Science and Technology for Sustainable Growth

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I. INTRODUCTION

Science, technology and innovation play a critical role in achieving sustainable development goals, including with respect to enhancing productivity and inducing a dynamic transformation of the economy, increasing growth rates and the number of decent jobs while reducing fossil-based energy consumption, developing essential drugs and improving health/medical care, achieving food security through sustainable agricultural methods and raising agricultural productivity, reducing the drudgery and improving the safety of housework, and increasing the safety of reproduction. Advancing a nation's capacity in science, technology and innovation and its effective application in economic activities are essential factors for expanding peoples' capabilities and achieving sustainable development. At the same time, science, technology and innovation form part of global and national capabilities to address the economic, social and environmental dimensions of development and their interactions.

While science, technology and innovation are essential in finding answers to the sustainability crisis that the world is currently facing, there is a need to look at the broader context and take into account both the cultural and historical dimensions in which science, technology and innovation operate. Under this framework, it is crucial to recognize that although the world is confronting common crises, there are differences within and between countries; hence, knowledge systems should be constructed broadly to include the diverse historical, cultural, social and institutional features of countries.

In this regard, the contributions of science, technology and innovation to a new sustainable development paradigm require a deep understanding of the relation among the three pillars of sustainable development, acknowledging that environmental degradation harms economic development and human well-being, especially for the poor and vulnerable groups in society. Social and economic sciences must contribute as much as natural and technical sciences to an approach where improved quality of life and sustainable patterns of consumption and production can be reconciled with reduced environmental degradation, poverty and inequalities, and the promotion of peace and security.

II. CONTEXT

2.1 Science, technology and innovation: meeting basic human needs and environmental challenges - The science, technology and innovation capabilities of a nation are basic, yet crucial, factors not only for sustained economic growth, but also for a nation's ability to provide its citizens with quality education, good health care and safe food and to mitigate the negative impacts of climate change and natural disasters.

A major challenge for science, technology and innovation in climate change is to support mitigation and adaptation. While much attention has been paid to mitigation, particularly because greenhouse gas emissions are largely generated in the more technologically advanced countries, little or no attention has been paid to the promotion and development of science, technology and innovation for adaptation. Most of the adaptation technologies currently available reflect informal or spontaneous processes, such as indigenous or traditional knowledge-based technologies used to cope with flooding and irrigation systems developed and updated to make more efficient use of scarce water. Adaptation measures are likely to be more amenable to small-scale interventions and thus more adaptable to local conditions and institutions. However, adaptation measures are likely to be more accessible to richer countries, communities and individuals, which are not necessarily the most vulnerable.

2.2 Building science, technology and innovation capabilities for sustained growth: the role of Government - Development is, in essence, a process of capacity-building. Developing countries confront many obstacles in building a robust and entrepreneurially dynamic private sector; however, they also have some advantages. They can draw on the knowledge accumulated elsewhere, obviating the need to devote significant resources to research and development. Developing countries use a given technology only after it becomes an industrial standard, which also implies that they can adapt these existing mature technologies. This is known as the "latecomer effect". However, latecomers also need to acquire new or emerging technologies, which are often associated with dynamic markets. Emerging technological paradigms can serve as a window of opportunity for latecomers because they are not necessarily locked into the "old" or "mature" technological paradigm and thus are able to make best use of new opportunities in the emerging or new industries.

However, developing countries often go through technological learning and capability development before reaching the stage where they can fully benefit from the latecomer effects. Public and/or private entities need to build a stock of knowledge in the form of human and physical capital, identify the technologies and industries in which the country or firm has the larger growth potential and channel the resources into them, while acknowledging the risks of failing to plan.

Governments thus have a fundamental role to play in building science, technology and innovation capabilities, including in stimulating the development of systems that foster the acquisition and dissemination of knowledge, as well as in designing and implementing industrial policies. Evidence suggests that the level of expenditure on research and development is key to building up innovation capacities. Meanwhile, a country's institutions, educational system and quality of education are significant factors in achieving the transition from the low-income to the middle-income level. In this regard, it should be noted that tertiary education and retraining and facilitating the mobility of researchers are necessary to enhance the transfer of technology among different sectors of the economy and the application of such technology in business activities.

Moreover, building technological capacities requires Government support. When private capacity is non-existent or weak, the public sector as a whole need to lead the design and implementation of a new industry or a new technology, with a combination of horizontal interventions at the macroeconomic level. As the capacity of the private sector advances, the direct involvement of the national Government may become less prominent, its policies are likely to be more targeted to specific industries or technologies, and the nature of public and private cooperation takes the form of partnership. Ultimately, the private sector may become fairly independent from the public sector in technological development, with the latter providing the former with economic incentives, including exclusive property rights for a certain period, to encourage its efforts. Nonetheless, it should be recognized that even in developed countries, Governments continue to conduct and sponsor a significant amount of research and technological development, and not only in defence-related matters.

2.3 Importance of policy space for science, technology and innovation - Among the relevant multilateral, regional and bilateral agreements, the TRIPS and TRIMs Agreements should both be mentioned. The TRIPS Agreement establishes minimum standards for domestic intellectual property protection with which signatory countries (excluding least developed countries) are required to comply. This has significant implications for permissible science, technology and innovation policies at the national level. In this regard, certain measures that developed countries used in the course of their industrialization, namely, discrimination against foreign patent application, or exclusion of such industries as chemicals and pharmaceuticals, are no longer available. However, the TRIPS Agreement contains several “flexibilities” that can be used by developing countries in designing their own intellectual property rights system. Meanwhile, the TRIMs Agreement prohibits practices such as local content requirements manufacturing requirements, export performance, trade balancing requirements and technology transfer requirements. Simply put, these measures significantly limit policy space for Governments in developing countries. Beyond this issue, there is the question of whether the TRIPS rules are the right intellectual property rights model for developing countries and what implications they bring in terms of access to knowledge and technology.

III. CONCLUSIONS

There is a need for a global dialogue on the reform of international trade and investment regimes. In particular, intellectual property right systems need to evolve from a focus on protection to one that fosters dissemination. Stringent protection of intellectual property rights, particularly patents, can be a serious deterrent in countries’ efforts to achieve sustainable development in general and to pursue appropriate industrial policies to that effect. In this regard, the international community should also consider several policy issues, including a broad research exemption for experimental users and judicial power to require non-exclusive licensing in the spirit of public interest. Moreover, there is a need to install a minimum safeguard of public interests by ensuring transparency in licensing and allowing wider use of non-exclusive licensing, particularly in the patenting of results of publicly funded research.

Contribution of India in Space Technologies

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Abstract - In the past 50 years, Indian Space has seen many successful milestones – demonstrating excelling Indian technology and widespread utilization of space services in different areas of national economy. Present capabilities and capacities of Indian Space are mainly in the unitary capabilities of the national space agency – this has enabled the nation to significantly achieve about 10-12 high-quality missions every year.

Keywords: Space Technology, India, Satellite.

I. INTRODUCTION

India is on a path of tremendous progress and growth. With annual GDP of around 7.5% in past few years, it is set to become the third largest economy in the world by 2030- powered largely by domestic demand and the transformation to a highly industrialized and technologically advanced economy. With such a level of economy, developmental activities in India demand a new paradigm and Governance regimes will need considerable change – moving from the traditional allocation systems to determining equitable systems.

In such a scenario, Indian Space cannot remain in a different mould. In the past 50 years, Indian Space has seen many successful milestones – demonstrating excelling Indian technology and widespread utilization of space services in different areas of national economy.

Present capabilities and capacities of Indian Space are mainly in the unitary capabilities of the national space agency – this has enabled the nation to significantly achieve about 10-12 high-quality missions every year. Meeting future domestic needs AND benefitting by access to large global market of space will require a quantum jump in capabilities and capacities to be served.

II. CONTEXT

India's space program – Upto the Present - Dr. Vikram Sarabhai - "……to be second to none in the application of advanced technologies to the real problems of man and society". This extraordinary vision founded the ISRO - first led by Prof Satish Dhawan way back in 1970s. Some of the major achievements of Indian Space include

First Unmanned Satellite - India celebrates a unique day on April 19 because it was on this date in 1975 that the country launched Aryabhata, its first unmanned Earth satellite. With this accomplishment, India became the world's 11th country to orbit a satellite. The goal of the mission was to identify and investigate X-ray emissions from space as well as solar neutron and gamma-ray emissions as well as aeronomy, including the ionosphere. The 360-kilogram satellite, Aryabhatta, was launched atop a Soviet rocket, Kosmos-3M, from the Volgograd Spaceport at Kapustin-Yar.

Astronaut to Space - India sent its first astronaut to space in 1984 in a joint mission with the Soviet Union. Rakesh Sharma made history on April 2, 1984, when he became the first and only Indian to enter space aboard a Soviet rocket. In September 1982, Sharma, a former IAF pilot, was chosen to participate in a collaborative space programme between ISRO and the Soviet Intercosmos space programme. When he went aboard the Soviet rocket Soyuz T-11 that was launched from the Baikonur Cosmodrome in the Kazakh Soviet Socialist Republic in 1984, he became the first Indian to enter space.

Moon Mission - The ISRO is unquestionably one of the most cutting-edge space agencies in the world. The space agency has shown that cutting-edge technology may help you accomplish the same goals as NASA. Chandrayaan mission of ISRO is one such example. India's first lunar mission was launched in October 2008. Chandrayaan 1's launch signalled the beginning of India's first-ever lunar programme.

Chandrayaan-1 - On October 22, 2008, Chandrayaan-1 was launched from Sriharikota's Satish Dhawan Space Centre. It utilised a rocket called the Polar Satellite Launch Vehicle (PSLV-XL) that was domestically created. The Indian meteorological satellite Kalpansat served as the inspiration for Chandrayaan-1.

On November 8, 2008, the spacecraft successfully entered lunar orbit; six days later, it released its Moon Impact Probe. On the same day, the Moon Impact Probe crashed close to the Shackleton crater. The Impact Probe crashed in a way that allowed for an analysis of the lunar soil's subsurface for signs of ice. Chandrayaan-1 captured multiple high-resolution photographs of the geography of the Moon while hovering only 100 km above its surface. Additionally, it carried out mineralogical mapping and searched the surface for radioactive substances. The discovery of many water molecules in the soil of the Moon was one of the mission's greatest successes. The mission only cost $56 million and provided us with vital data regarding the Moon's surface.

Chandrayaan-2 - In comparison to ISRO's earlier missions, which combined an orbiter, lander, and rover to study the south pole of the Moon, Chandrayaan-2 is a very complicated mission that represents a substantial technological advance. This mission is special because it combines the exosphere, the moon's surface, and its subsurface to investigate the entire moon, not just one particular region.

On July 22, 2019, a spacecraft was launched on its mission to the Moon from the second launch pad at the Satish Dhawan Space Centre in Andhra Pradesh by a GSLV Mark III-M1. On August 20, 2019, the spacecraft entered the Moon's orbit and started orbital positioning manoeuvres in preparation for the landing of the Vikram lander. On September 6, 2019, the lander and rover were supposed to touch down on the near side of the Moon in the south polar area at a latitude of roughly 70° south and perform scientific research for one lunar day, which is equivalent to nearly two Earth weeks. India would have become the fourth nation to do so, joining Surveyor 1 (US), Chang'e 3 (China), and Luna 9 (Soviet Union) in doing so. But on September 6, 2019, the lander crashed after it veered off course while attempting to land. A failure analysis report provided to ISRO states that a software error was to blame for the disaster. With Chandrayaan-3, ISRO will try a landing once more in August 2022.

Mars Mission - The Mars Orbiter Mission, MOM, also known as Mangalyaan, has been orbiting Mars since September 24, 2014. It was launched by the Indian Space Research Organisation on November 5, 2013. It is India's first interplanetary mission and, following NASA, Roscosmos, and the European Space Agency, it became the fourth space agency to reach Mars orbit. On a first-ever attempt, India became the first country in the world to enter Martian orbit. The PSLV rocket C25 was used to launch the Mars Orbiter Mission probe from the First Launch Pad at Satish Dhawan Space Centre (Sriharikota Range SHAR), Andhra Pradesh. The launch window began on October 28, 2013, and lasted roughly 20 days. The MOM mission spent roughly a month in Earth orbit, performing a sequence of seven orbital manoeuvres to raise its apogee before injecting itself into Mars on November 30, 2013. On September 24, 2014, it was sent into Mars orbit following a 298-day transit to Mars.

Many in one - By successfully launching the most satellites on a single rocket on February 15, 2017, ISRO broke Russia's previous record of 37 satellites aboard the Dnepr rocket in a single mission in 2014. However, Elon Musk's Space X outperformed it four years later by launching 143 satellites at once, setting a world record that the business still maintains today. 104 satellites were launched by ISRO from the Satish Dhawan Space Centre in Sriharikota. Cartosat-2, INS-1, and INS-2 were among the aforementioned spacecraft from India; the remaining 101 co-passenger satellites came from the USA (96), the Netherlands (1), Switzerland (1), Israel (1), Kazakhstan (1), and the United Arab Emirates (1).

Heaviest rocket - GSAT-11, India's newest high-throughput communication satellite, was successfully launched by an Ariane-5 VA-246 on December 5, 2018, from Kourou Launch Base in French Guiana. GSAT-11 is the heaviest satellite produced by ISRO, weighing around 5854 kg. The first in a line of cutting-edge communication satellites, GSAT-11 has multi-spot beam antenna coverage over the mainland and islands of India. To provide broadband services all across the nation, GSAT-11 will be essential. It will serve as a platform for the presentation of newer generation applications. GSAT-11 was launched into a Geosynchronous Transfer Orbit before being handed over to ISRO's Master Control Facility at Hassan, which used the satellite's Liquid Apogee Motor to undertake the initial orbit-raising procedures to place it in a circular Geostationary Orbit.

III. OTHER ACHIEVEMENTS

Development of an atomic clock - The Indian Space Research Organization has made a big advancement by creating an atomic clock that will be used in navigation satellites to assess exact location data. For its navigation satellites, the space agency now imports atomic clocks from the European aerospace company Astrium.

Saraswati - A group of Indian astronomers has identified a massive supercluster of galaxies that is as enormous as 20 million billion suns and has been called Saraswati. With a distance of 4,000 million light-years from Earth and an estimated age of more than 10 billion years, this is one of the biggest structures in the vicinity of the cosmos that is currently known. It is claimed that its bulk spans a distance of 600 million light years.

Scramjet Rocket Engine - An air-breathing propulsion system that employs hydrogen as fuel and oxygen from the air as the oxidizer is the goal of the Indian Space Research Organisation's maiden experimental mission. The design and development of the supersonic combustor, the hypersonic engine air intake, correct thermal management, and engine ground testing are some of the technological issues that ISRO scientists had to deal with during the development of the scramjet engine.

INSAT - The Indian National Satellite System, often known as INSAT, is a collection of geostationary satellites with several uses that ISRO deployed to support telecommunications, broadcasting, meteorology, and search and rescue activities. The largest domestic communication system in the Indo-Pacific region was launched in 1983 with INSAT. The Department of Space, the Department of Telecommunications, the India Meteorological Department, All India Radio, and Doordarshan collaborated on the project. The Secretary-level INSAT Coordination Committee is responsible for the overall coordination and management of the INSAT system.

100th Satellite - ISRO launched its 100th satellite along with 30 others in a single mission on January 12, 2018, from Sriharikota Spaceport in Andhra Pradesh. Thirty-one spacecraft, including the weather observation satellites and Cartosat-2 series satellites, were launched by PSLV-C40. Out of the 31, 28 satellites are foreign, while three are from India.

IV. CONCLUSIONS

India's ambitions for space activities and its emerging needs for next few decades for services and infrastructure development present an unprecedented opportunity. Yet, there is a foreseeable way in which the government can pursue such diverse and growing space programme needs – it has to outline a long-term National Space Policy; involve a risk-sharing industry for space assets manufacturing/ownership; challenging national space agency-ISRO for advanced space technology development/planetary missions/human space flight missions and invigorating research and academia for front-ranking research in space.

REFERENCES

[1]. http://eprints.nias.res.in/887/.
[2]. https://iafastro.directory/iac/paper/id/20955/ext/appendix/IAC-14,E3,2,7,x20955.pdf
[3]. https://www.news9live.com/knowledge/independence-day-2022-top-achievements-of-india-in-space-188193.

 

P. Pavan Sai & T.Praneeth Ganesh

Nuclear Oncology in India – Present Scenario

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Abstract - Cancer is one of the leading causes of morbidity and mortality worldwide. The GLOBOCAN 2018 has reported an estimated 18.1 million new cases and 9.6 million cancer-related deaths worldwide. Cancer trends in India closely reflect the global landscape. As per the National Cancer Registry Programme (NCRP) Report 2020, India has a cancer burden of over 1.39 million cases. This number is likely to increase to 1.57 million by 2025 — a 12% increase from the current estimated cases. One in 9 Indians will develop cancer during their lifetime. While lung and oral or mouth are the most prevalent cancer types among males, breast and cervix cancers are the most common among females. This Paper presents a brief review of scenario in India.

I. INTRODUCTION

The reasons for the rapid growth in the incidence are complex; however, it can be empirically attributed to aging and population growth. Importantly, increasing adoption of risk behaviors such as unhealthy diets, physical inactivity and harmful use of alcohol and tobacco further add to the rise in the number of cases. According to the World Health Organization (WHO), approximately 70% of deaths from cancer occur in low- and middle-income countries the availability and access to essential services from screening, diagnostics to treatment are likely to have a direct and indirect impact on patient outcomes in the long- and short-term.

In India, non-communicable diseases (NCDs) are responsible for more than half of the deaths and cancer is one of the leading contributors. Late-stage presentation, poor access to optimal diagnosis and treatment, and affordability further adds to the escalating burden of cancer-related morbidity and mortality in the country. The recent COVID-19 pandemic has further widened the gaps in cancer care. Changes in health-seeking behaviors and the availability and access to essential services from screening, diagnostics to treatment are likely to have a direct and indirect impact on patient outcomes in the long- and short-term.

Against this backdrop, the roundtable Discussion on Oncology, part of the Sweden-India Health Talks 2020, aimed at addressing some of the critical roadblocks in optimum cancer care in India. Experts from both public and private sector in India and Sweden share their best practices and potential policy interventions focusing on strengthening the current healthcare system to drive efficient outcomes in prevention, diagnosis and management of cancer.

II. ANALYSIS

Current Challenges in the Cancer Care Pathway - Delivering equitable and affordable care has been one of the greatest public health challenges in India. Differing cancer profiles, marked socioeconomic diversity, variable access to care, gaps in knowledge, behaviour and attitude of the public combined with resource and infrastructure constraints, complicate timely and efficient delivery of cancer care in the country. A series of gaps and weaknesses in the current cancer care pathway have been identified throughout this discussion.

Limited Awareness - The importance of awareness with respect to prevention cannot be underestimated, particularly in the resource-limited conditions of the country. Among patients, lower recognition of warning signs and suspicious symptoms of cancer is associated with delays in seeking medical help. In addition, emotional barriers such as fear, worry and stigma strongly influence the help-seeking behaviour. Evidence suggests that the awareness on the availability of screening is poor among the Indian population

Treatment direction and long-term prognosis largely depend on the stage at diagnosis. Cancers are usually detected or at least suspected within primary care settings. General Physicians (GPs) act as 'gatekeepers' whereby they can assess pre-symptomatic risk, identify early presentations, gather family history and vital patient information and finally decide on investigations or referrals. However, there is a paucity of training and resources for GPs to enable them to detect cancers at early stages or for synthesizing information from a patient's presentation. This lack of awareness among the public and the primary care providers could explain the advanced stage of disease at diagnosis, commonly observed among cancer patients in India.

Gaps in Reporting - As observed during the ongoing COVID-19 pandemic, mandatory disease reporting plays a critical role in preventing and controlling the spread of disease in populations. Despite the alarming current and projected burden of NCDs such as cancer, their inclusion as a notifiable disease has remained elusive. Compulsory notification of cancer cases facilitates collection of data for population-based cancer registries (PBCRs). Since cancer is not a notifiable disease, registries in India face several challenges in data collection. As per the 2020 report of the NCRP, PBCRs included in the study covered just 10% of the population in India. Another challenge is incomplete and inaccurate certification of cause of death that contributes to the gaps in cancer-related mortality registrations [2]. These limitations in the reach of quality registries hamper systematic collection, analysis and use of epidemiologic data to define sustainable frameworks for cancer control in the community.

Unequal access - Healthcare pushes an estimated 32 to 39 million people to poverty every year. Cancer ranks the highest on hospitalisation spending and out-of-pocket expenditure in the country with a proportional catastrophic financial impact

India is predominately rural in terms of its population concentration. However, there exists a significant inconsistency between demand and supply in rural healthcare in India. Most district hospitals and even regional cancer centers lack necessary facilities to provide quality cancer care. Vast majority of inflicted patients thus travel long distances to the few major cancer centers, predominantly located in big cities. For the patient, this migration significantly adds to their financial burden, and for the cancer centers, this means disproportionate patient load hampering efficient care delivery.

Compared with the developed world, the ratio of incidence to mortality in India is high. Lesser than 30% of patients with cancer survive 5 years or longer after diagnosis [8]. The inadequacies in on-time and affordable diagnosis, high treatment costs and the urban-rural divide are some of the critical factors responsible for the poor access to cancer care in the country.

Shortages in health resources — manpower and infrastructure, is the Achilles heel of the cancer care pathway in India. Overall, the density and distribution of skilled primary and secondary healthcare workforce is a significant barrier. There exists an astounding inequality in the distribution of density of doctors in the country, where there are 4 times more doctors in the urban compared with the rural areas [9]. Given their late stage of diagnosis, cancer patients in India often require seeing a medical oncologist for palliative care. Estimates suggest fewer than 350 medical oncologists see an enormous case load of 3000 new cases per year, predominantly in private settings [10]. Besides the human resource limitations, the physical infrastructure required to complement optimal cancer care too remains inadequate in the country.

III. RECOMMENDATIONS ON PRAGMATIC CANCER CARE IN INDIA

The Round table discussion on Oncology has identified specific recommendations to address the challenges and barriers to efficient cancer care in India. In many respects they are interconnected and ideally should be considered holistically.

Create targeted initiatives towards cancer prevention - Prevention offers the most cost-effective and long-term strategy for the control of cancer. Modifying or avoiding risk factors and implementation of evidence-based prevention strategies can reduce up to half of cancer deaths. Appropriate cancer care requires improved awareness and understanding of the disease through effective communication, education and training. To effect positive change in the general population, implement programmes on cancer awareness at the community and individual level. Education on risk factors, recognition of symptoms and eliminating stigma associated with the disease may help earlier detection and improve survival. In addition to the traditional channels such as mass media, utilize digital such as social media to drive outreach. Careful selection of the target groups such as at-risk and vulnerable population and crafting context-specific communications are the critical determinants to their success. Tobacco consumption is responsible for almost one in 5 cancer deaths and ironically is the single largest preventable cause of cancer deaths. In India, tobacco in various forms, is responsible for 30% to 60% of total cancers among males and 10% to 30% among females. Thus, strict tobacco control measures including policy changes are critical in the prevention of cancer in India.

Promote strategies to early detection as part of comprehensive cancer control - Early detection is cardinal to earlier stage diagnosis, survival and improvement in the quality of life of patients. Existing infrastructure in the public and private sector needs to better enable early detection approaches. Considering the resource limitations, geographic spread and population density in the country, high-risk and endemic regions can be strategically prioritized for timely and routine screening, for instance, the North East for tobacco related cancers. In fact, proven screening mechanisms exist for 3 of the most prevalent cancers in the country – mouth or oral, cervix and breast. Efficient utilization of existing screening programmes can be utilized for cancer control. For example, medical social workers such as accredited social health activist (ASHA) can be trained to teach women breast self-examination and conduct PAP smear which can be sent to the district hospitals for investigations.

Artificial intelligence (AI)-based risk assessment models can help identify patients who are at elevated risk and should be enrolled in screening programmes for disease prevention and early detection. As a long-term strategy, tap into the potential of AI and machine learning for early detection research. Another important consideration is linking primary to tertiary health centres with the objective of facilitating earlier diagnosis. Application of rational models such as connecting the health and wellness centres under the Ayushman Bharat initiative to the regional cancer centre (RCC) in a hub-and-spoke, could potentially strengthen the rural connectivity and fasten the time to diagnosis and delivery of efficient care.

Make cancer a notifiable disease - Clinically led quality registries in cancer are indispensable to improve treatment outcome, gather real-world evidence, and enable new research. Cancer registries under the NCRP have consistently provided valuable estimation of cancer occurrence in the country, the foundation for the national cancer control programmed. In the short-term, initiation of new and expansion of the existing PBCRs is recommended to include the remotest of the areas in the country. Quality control measures are necessary to maintain the accuracy and completeness of information, including information on diagnostic and treatment modalities as well as mortality. Over the longer term, with the objective of improving surveillance and outcome, create a unified national registry integrating with Ayushman Bharat, hospital information systems and mortality databases.

Science Education in India – A brief Review & Initiatives Taken by Government

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Abstract - Science is the constitutive feature of modern society. It has not only changed the world but has also changed the way we understand the social and natural world. Apart from alleviating us from the traps of ignorance, illiteracy and penury, it has challenged the centrality and dominance of meta-physical beliefs in society. The attributes of science like rationality, and open-mindedness, and scientific worldviews are universal values, essential for the growth of an individual as well as the society. In post-independent India, our Constitution adopted the goals of establishing a society based on scientific temperament, humanism and spirit of inquiry. Science education is central to our modernity project and the idea of society predicated on scientific rationality, democratic values and open-mindedness. Introducing the idea of science as a process at curriculum level, exposing students to the nature of science are some of the important components of pedagogical content knowledge that can be leveraged in today's science education programme to make science education enjoyable, productive and intrinsic to the learning process.

Keywords: Post Independent India, Science Education, Society

I. INTRODUCTION

Science education was seen as necessary “to develop in the child well defined abilities and values such as the spirit of inquiry, creativity, objectivity, the courage to question, and an aesthetic sensibility.” Science education programmes to enable the learner to acquire problem solving and decision making skills and to discover the relationship of science with health, agriculture, industry and other aspects of daily life were to be designed. Every effort was to be made “to extend science education to the vast numbers who have remained outside the pale of formal education. Science education was seen as necessary “to develop in the child well defined abilities and values such as the spirit of inquiry, creativity, objectivity, the courage to question, and an aesthetic sensibility.” Science education programmes to enable the learner to acquire problem solving and decision making skills and to discover the relationship of science with health, agriculture, industry and other aspects of daily life were to be designed. Every effort was to be made “to extend science education to the vast numbers who have remained outside the pale of formal education.

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The constitutional amendment of 1976 placed education including science and technology education in the concurrent list which implies the joint responsibility of the central and the state governments. The Ministry of Human Resource Development functions as an administrative ministry and the UGC and the All India Council for Technical Education were established to superintend the functioning of higher education in science and technology respectively

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II. ANALYSIS

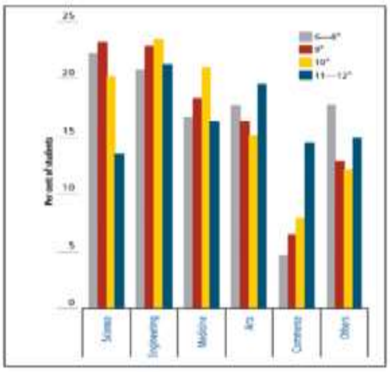
Because of too many reasons, students are not continuing their studies in science at higher level, even though they are truly interested in sciences. Some of the reasons are presented below.

- The interest in all types of science education does not decline much — 60% of the students at the class six to eight level said they wanted to pursue some science education (pure science, engineering or medicine) at a higher level as compared to 57% students in classes 11 and 12.
- Over 40% of the students, whether in classes six to eight or 11 and 12, wanted to become either an engineer or a doctor.

- While close to two–thirds of students in classes six to eight are satisfied with the quality of science teaching, this falls to just 40% in classes 11 and 12.
- About 60–70% students are satisfied with the quality of teaching of most of the subjects except computer science where just 15% of the students in government schools are satisfied with the teaching as compared to 23% in private schools.
- Not too many students are keeping away from science deeming it a costly not having taken up science at the plus–2 level, 45% state they are not pursuing science because they have no interest in science
- Parents and teachers play an important role in the selection of courses as well as in deciding career choices.
- The three most preferred professions for students turn out to be teacher, doc-tor and engineer.
- There is no decline in interest in the proportion of students who wish to study science. A third of the students said they did not study science as they did not feel motivated enough and another 40% said the number of students in a class were too many for them to understand what was being taught.

Subjects	Level of education				
	6–8th	9th	10th	11–12th	Total
Physics	2.0	1.8	3.1	10.1	6.3
Chemistry	1.0	2.1	1.3	7.1	4.3
Mathematics	32.6	31.8	34.8	21.1	27.2
Biology	7.2	6.3	8.4	12.3	10.0
Humanities and Social Science	17.8	16.8	13.9	17.1	16.4
Computer Science	0.5	0.4	0.6	1.0	0.8
Other subjects	29.3	28.4	26.0	28.1	27.8
None	9.5	12.4	12.1	3.2	7.3
Total	100.0	100.0	100.0	100.0	100.0

Favourite subjects by level of education(% of Students)



Preferred subjects for higher education by level of students

Reasons	% of science students (Class 11 & 12)
Interested in science subjects	66.6
Better job opportunities	20.4
Parents' desire	3.3
Interested in doing research in science	1.8
Influenced by the work of scientists	1.3
Quality of science teachers is very good	0.8
Influence of peer group	0.7
Intend to go abroad	0.2
Others	4.8

Reasons	% of non-science students (Class 11 & 12)
Not interested in science subjects	44.5
Difficult subject	20.4
Higher studies are costly	9.9
Interested in commerce	5.4
Like arts subjects	4.8
No future opportunities	2.1
No science college nearby	2.0
Difficult to get through competitive examination	1.1
Poor quality of teaching at school	1.1
Others	8.9

Reasons for taking admission and not taking admission in science

III. HIGHER EDUCATION

"The most common pattern prevalent all over the country for post-school (10+2) teaching programmes in basic sciences requires the students to go through a 3-year B.Sc. course followed by a 2-year M.Sc. course before they can join a Ph.D. programme. The B.Sc. programmes offered in different central/state/private universities have several variations. Most of them follow the annual system, although a few have switched over to the semester pattern. The B.Sc. (pass) degree typically involves study of a pre-defined combination of three subjects in all the years, although in some cases during the third year of B.Sc., only two subjects, out of the three studied earlier, are taught. Several universities offer Honours at B.Sc.: in this case, the student studies a pre-defined set of three subjects in the first two years and only one subject in the third year for Honours (or Major) in that subject. In some universities, the Honours subject is defined in the first year of B.Sc. itself such that the student studies three subjects all through the three-year course but with greater emphasis on the subject chosen for Honours.

In yet another variation, some B.Sc. degrees involve study of only one subject all through the three years. In most of the universities, the three-subject combination at B.Sc. is compartmentalized among three major science streams, viz., the 'Bio' (or 'Medical') group, the 'Maths' or 'Physics' (or 'non-Medical' or 'pure science') group, or the 'Geo' group, with little freedom for the students to learn across these groups. For example, those opting for 'Mathematics' or 'pure Science' stream, study Physics, Chemistry and Mathematics or Statistics or Computer Science but nothing of Biology while those opting for the 'Biology' stream cannot study Physics, Mathematics, Statistics or Computer Science etc. On completion of the B.Sc. degree, the student seeks admission to the 2-year M.Sc. (annual or semester) often with a specialization in the final year. A majority of the M.Sc. courses are also confined to one subject only, with the possibility of a student opting for a particular branch within the subject as 'special paper' or 'major elective'. Barring a few cases, there is hardly any avenue available for students to learn something outside the subject in which they

qualify for the M.Sc. degree. In most cases, there is only a little component of research in the M.Sc. curricula. Some institutions have also started integrated M.Sc. – Ph.D. programme for B.Sc. degree holders, with a provision for graduation with M.Sc. degree after successful completion of the course work".
In 2004, about a quarter (22.3%) of the 39.2 million graduates had a background of science education; about a fifth (19.4%) of the 9.3 million postgraduates and a third of the 0.3 million doctorates were from the science stream. Of the total 'professional, technical and related jobs', 29% are educated in science. Of the total graduates who are unemployed, 22.3% have studied science. In the total unemployed postgraduates, 62.8% are with science background.

IV. POLICY RECOMMENDED RESOURCES/OPPORTUNITIES

Improvement of Science Education in Schools: A centrally sponsored scheme to improve the quality of science education and to promote scientific temper, became operational in 1987-88. Under the scheme 100% assistance is provided to the States/UTs for provision of science kits to upper primary schools, up gradation of science laboratories and library facilities in senior/secondary schools and training of science teachers. The scheme also provides for assistance to voluntary organizations for undertaking innovative projects in the field of science education. The following are some of the schemes introduced by Government of India.
Kishore Vaigyanik Protsahan Yojana (KVPY)
Learning Enhancement Programme
Computer literacy and studies in schools (CLASS)
Computer Aided Learning (CAL)
ICT @ Schools
INSPIRE
Scheme for Providing Quality Education in Madrassas (SPQEM)

V. CONCLUSIONS

The initiatives taken by Government of India is mainly discussed and mentioned various schemes introduced by the Government to encourage students to prefer science as their subject at higher level.

REFERENCES

[1]. Agarwal, P. 2006. Higher education in India: The need for change. Working Paper No. 180. New Delhi: Indian Council for Research on International Economic Relations.
[2]. Chunawala, S. 2006. Science Education. In Sixth Survey of Educational Research 1993-2000, Volume 1, p 77-92. New Delhi: National Council of Educational Research and Training.
[3]. Heitzman, J. & Worden, R.L. 1995. India: A country study. Washington D.C: Library of Congress.
[4]. Indian National Science Academy. 2001. Pursuit and promotion of science: The Indian experience. New Delhi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Applications of Radio Isotopes in Agriculture

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Abstract - Radioisotopes decay by emission of radiation and energy they possess, can be utilized in wide range of agricultural applications. Nuclear scientists and technologist are unlocking the secrets of many agricultural problems, which could not have been possible with conventional methods. Radioisotopes were used for producing high yielding crop seeds to increase the agricultural yield. Radioisotopes were also used for determining the function of fertilizers in different plants. Radiations from certain radioisotopes were also used for killing insects which damage the food grains. Cereals, fruits, vegetables and canned food can be stored for longer periods by gently exposing them to radiations. Applications of Radioisotopes and radiations are helping us to find the solution of problems in much shorter time. The production of radioisotopes by nuclear reactors and other atomic installations have increased the use of radioisotopes in the field of agriculture. India is a leading producer of radioisotopes in the world and our nuclear scientists are engaged in developing various technologies for the beneficial uses of radioisotopes. This article briefly describes the role of radioisotopes and their radiation in the field of agriculture.

Keywords: Radioisotopes; Radiations; Nutrients; Preservation.

I. INTRODUCTION

Nuclear science and technology offer techniques that are being used to improve productivity while conserving valuable resources needed for day to day life (Rao 1999). Radioisotopes are used as a research tool to develop new strains of agricultural crops that are drought and disease resistant, are of higher quality, have shorter growing time and produce a higher yield. Radioactive elements emit a variety of radiations and energy particles during decay which are used in health care, agriculture and physical sciences for basic research and in wide range of applications.

II. CONTEXT

2.1 Agriculture -It is sobering to realize that here at the beginning of the 21st century, some one billion of our fellow citizens on planet Earth (approximately one out of every five) go to bed hungry every night. Tens of thousands die every day from hunger and hunger-related diseases. Hence, there is an enormous need to find new ways to increase food production and deliver it to an increasing population of hungry mouths with only minimum spoilage. The following paragraphs provide a glimpse of the enormous contributions radiation makes in our constant quest for enhanced supplies of quality food.

2.2 Higher Crop Production - It is well known that the yield from any crop is directly dependent upon the proper amounts of nutrients and water. The demand for fertilizer, which is essential in modern agriculture practices to maximize crop yields, will continue to mount in order to provide food for the rapidly increasing world population. Radioisotopes can be used to "label" different fertilizers. By attaching radioactive tracers to known quantities and varieties of fertilizers, it is possible to directly determine the associated nutrient efficiencies as the labelled products are absorbed at critical locations in the plant. This technique can be used to substantially reduce the amount of fertilizer required to produce robust yields, thereby reducing costs to the farmer and minimizing environmental damage.

Water is a critically important factor for crop production and it is becoming quite scarce in many areas of the world. Neutron moisture gauges, which measure the spectrum shift resulting from the impingent of energetic neutrons upon protons, can measure the hydrogen component of water in both the plant and the surrounding soil. As such, they are ideal instruments to help farmers make the best use of limited water supplies. Another effective way to improve crop production is the development of new species-- varieties that can better withstand heat or storm damage, exhibit enhanced maturing times attain increased disease and draught resistance, provide better growth and yield patterns, deliver improved nutritional value, allow improved processing quality, and provide enhanced customer acceptance. For centuries, selective breeding and natural evolution resulting from spontaneous mutation has winnowed out weak plant species, allowing only the hardiest to survive. But specialized radiation techniques (either directly bombarding seeds to alter DNA structures or irradiating crops to induce variations in the resulting seeds) can greatly accelerate this process to produce superior species

Subjecting plants and seeds to carefully tailored ionizing radiation to create new combinations in their genetic makeup has resulted in improved strains of numerous crops. Many of these superior species now constitute a key part of modern agricultural commerce around the world. In fact, over 30 nations have developed more than 2250 new crop varieties in the past 70 years— with radiation being the key element in the development of 89% of this enormous new stock

Indeed, the application of radiation techniques to the development of new crop varieties has likely provided the highest global economic value of any form of harnessing radiation. Mutant varieties that have made major contributions to the global economy include grains such as rice, barley, wheat, beans, lentils, and peas. Other crops include new varieties of cotton, soybeans, sunflowers, and peppermint. New fruit varieties include apples, cherries, oranges, peaches, bananas, apricots, pomegranates, pears, and grapefruit. There is even one cultivar for raspberries and grapes. Of the 2250 new crop varieties noted above, 75% are crops of the type just mentioned. The other 25% are ornamental flowers, such as chrysanthemums, roses, dahlias, bougainvillea, begonias, carnations, alstroemerias, achimenes, streptocarpus, and azaleas. All of this technology started as far back as 1928 with the discovery of mutagenesis—an important tool for locating genes on chromosomes. Plant breeders and geneticists soon became interested in radiation as a fast and effective way to alter plant traits. Gamma rays are used in the majority of cases to change plant characteristics (64% usage) and x-rays are employed in another 22% of the cases. The bulk of the remaining 14% is done via fast and thermal neutrons. To date, China has benefited the most from the utilization of radiation to improve crop species. As of 2002, nearly 27% of the crops grown in China were developed using radiation techniques. China is followed by India (11.5%), USSR/Russia (9.3%), The Netherlands (7.8%), USA (5.7%), and Japan (5.3%).

2.3 Food Processing and Preservation - Demand for instant food which is wholesome and which has a long shelf life is growing in both the developed and the developing countries. 25-30% of the world's food produce are lost due to spoilage by microbes and pest and these losses are more in developing countries. This loss of food can be avoided by employing efficient food preservation methods. Radiation can be used to destroy microbes in food and control insect and parasite infestation in harvested food to prevent various kinds of wastage and spoilage. Extension of shelf life of certain foods of a few days by irradiation is enough to save them from spoiling. Irradiation of food has potential to produce safe foods with long shelf life. Certain seeds and canned food can be stored for longer periods by gently exposing them to radiations. Food irradiation is energy-conserving when compared with conventional methods of preserving food to obtain a similar shelf-life. It can alleviate the world's food shortage by reducing post-harvest losses. Food irradiation can replace or drastically reduce the use of food additives and fumigants which are hazardous for consumers as well as workers in food processing industries. Irradiation does not heat the food material so food keeps its freshness in its physical state. The agents which cause spoilage (microbes, insects, etc.) are eliminated by irradiation from packaged food and packaging materials are impermeable to bacteria and insects so recontamination does not take place. Irradiation of food kills insects and parasites, inactivate bacterial spores and moulds, prevent reproduction of microbes and insects, inhibit the sprouting of root crops, delays ripening of fruits and improve technological properties of food.

FDA has approved irradiation as a method to inhibit sprouting and to delay ripening in many fresh fruits and vegetables. Several steps were taken by the FAO and IAEA division in close cooperation with the World Health Organization (WHO) to promote international acceptance of irradiated food (WHO, 1988). The Joint FAO/IAEA/WHO Expert Committees on the Wholesomeness of Irradiated Food (1980) have evaluated the safety of irradiated foods for human consumption and concluded that the irradiation of any food up to an average dose of 10 kGy causes no toxicological hazard. Irradiation of food is controversial in many parts of the world. World-wide introduction of food irradiation is necessary to enhance confidence among trading nations that foods irradiated in one country and offered for sale in another, have been subjected to commonly acceptable standards of wholesomeness, hygienic practice, and irradiation treatment control. Efforts and support from international organizations, governments, and the food industry will be needed for the introduction of food irradiation on a truly commercial scale. Some organizations and industries do not recognize this cheap and efficient food preservation method. In the last 30 years of testing of irradiated foods, no harmful effects to animals or humans have been found so now attitude of relevant organizations is changing and some irradiated foods are being released for general consumption. Many countries have accorded clearance for gamma irradiation of food items. The National Monitoring Agency (NMA) of Government of India has cleared radiation processing of onions, spices and frozen sea foods. In India two demonstration plants one at Vashi, Navi Mumbai and another at Lasalgaon, Nashik are providing irradiation service for processing of spices, onions and fruits.

III. CONCLUSION

In conclusion, we can confidently state that President Eisenhower's challenge to use the atom for a plethora of humanitarian applications has been ably met. The positive impacts that have been achieved in the past 50 years are nothing short of astonishing! But perhaps the biggest impacts are yet to come. Successful endorsement of food irradiation alone could easily double the impacts achieved to date. Such non-power applications remain a challenging and rewarding field for the best and brightest of our next generation of radiation scientists and engineers.

REFERENCES

[1]. Nuclear News, "Irradiated food, good; food borne pathogens, bad." American Nuclear Society, July 2003, p. 62.
[2]. Yanagisawa, Kazauki, et al., "An Economic Index Regarding Market Creation of Products Obtained from Utilization of Radiation and Nuclear Energy (IV)", Journal of Nuclear Science and Technology, Vol. 39, No. 10, p. 1120-1124, October 2002.

 

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National Action Plan on Climate Change - India's Initiative for protecting the poor and vulnerable sections of society through sustainable development strategies

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Abstract - India is a Party to the United Nations Framework Convention on Climate Change (UNFCCC) and the Government of India attaches great importance to climate change issues. The Convention aims at stabilizing the greenhouse gas concentrations in the atmosphere at safer levels that would prevent dangerous anthropogenic interference with the climate system. Eradication of poverty, avoiding risks to food production, and sustainable development are three integrated principles deeply embedded in the Convention. This paper provides the information about the necessity behind the formation of NAPCC, ant its missions according to the guidelines stipulated for parties

Keywords: NMEEE, NAPCC.

I. INTRODUCTION

India faces challenges in economic development, which have to be met with the limited resources available, with minimal externalities and in the presence of large uncertainties with respect to climate. One of the growing and accepted approaches to overcome this development paradox is adoption of a sustainable development paradigm, which entails development that meets the needs of the present without compromising the ability of the future generations to meet their own needs

The relationship between climate change and sustainable development was recognized in "Delhi Declaration" during Conference of Parties (COP)-8 in 2002. In fact, it has been argued that exclusive climate centric vision shall prove very expensive and might create large mitigation and adaptation "burden", whereas the sustainable development pathway results in lower mitigation cost besides creating opportunities to realize co-benefits without having to sacrifice the original objective of enhancing economic and social development.

On 30th June 2008, India announced and launched its National Action Plan on Climate Change (NAPCC). The NAPCC, guided by the principles of sustainable development, aligns the environmental and economic objectives. Broadly, the NAPCC is based on the following principles: protecting the poor and vulnerable sections of society through sustainable development strategies that are sensitive to climate change; achieving national growth targets through means that enhance ecological sustainability; devising an efficient and cost-effective strategy for demand-side management; deploying appropriate mitigation and adaptation technologies extensively and at an accelerated pace; promoting sustainable development through innovative and new forms of market and regulatory and voluntary mechanisms; effecting implementation through unique linkages with civil society, local governments, and public–private partnerships (PPPs); and finally, welcoming international cooperation for research, development, sharing, and transfer of technologies driven by external funding and facilitating global intellectual property rights (IPR) regime for such a technology transfer under the UNFCCC.

The NAPCC identifies measures that promote our development objectives while also resulting in co-benefits in terms of addressing climate change. There are eight National Missions, which form the core of the NAPCC, representing a "multi-pronged, long-term, and integrated strategies for achieving key goals in the context of climate change". This underscores the fact that several of the programmes enumerated under the NAPCC are already being undertaken under various schemes/programmes of the Government of India, but in the present context, it would require a change in "direction, enhancement of scope, and accelerated implementation". It is understood that the implementation of the NAPCC would require appropriate institutional mechanisms and the focus would, therefore, be on the formation and evolution of such arrangements. Broadly, the Plan envisages promoting the understanding of climate change with emphasis on issues related to adaptation and mitigation, energy efficiency, and natural resource conservation.

II. CONTEXT

Missions of the Action Plan - National Solar Mission (renamed as Jawaharlal Nehru National Solar Mission): Under the brand name "Solar India", this Mission was launched to significantly increase the share of solar energy in the total energy mix. This Mission would promote the use of solar energy for power generation and other applications. The objective of the Mission is to establish India as a global leader in solar energy by creating enabling policies for its quick diffusion across the country. The immediate aim of the Mission is to set up a conducive environment for solar technology penetration in the country, both at the centralized and decentralized levels. The first phase (till 2013) will capture all the options in solar thermal and vigorously promote off grid decentralized options and at the same time ensure modest capacity additions in the grid-based systems. In the second phase

(2013–2022 and after gaining substantial experience), solar energy capacity is planned to be aggressively ramped up. The ultimate objective of the Mission is to develop a solar capacity in India that is capable of delivering solar energy competitively against fossil options in the next 20–25 years. Through this Mission, the Government of India has aggressively pursued a policy that makes a distinct shift towards clean energy options and at the same time enhances the energy security position of the country. This is a strong policy choice towards making the energy profile of the country ecologically sustainable.

National Mission for Enhanced Energy Efficiency (NMEEE) **-** This Mission focuses on enhancing energy efficiency measures in the country [in addition to the already existing programmes pursued by Ministry of Power (MoP) and Bureau of Energy Efficiency (BEE)] through four new initiatives. These initiatives are: a market-based mechanism to enhance cost-effectiveness of energy efficiency improvements in energy-intensive large industries through the certification of energy savings that could be traded (perform, achieve, and trade), accelerating the shift towards energy efficient appliances in identified sectors (market transformation), creating a financing mechanism for facilitating demand side management (DSM) programmes (energy efficiency financing platform), and developing fiscal instruments that promote energy efficiency (framework for energy efficiency economic development). The Mission seeks to enhance efforts to unlock the energy efficiency market on a purchasing power parity basis to result in a total avoided capacity addition of 19,598 MW by 2017

National Mission on Sustainable Habitat - This Mission has been launched with three main components: promoting energy efficiency in the residential and commercial sector, managing municipal solid waste, and promoting urban public transport. The main objectives of the Mission are to exploit the potential for mitigation of climate change through reduction in energy demand from the residential and commercial sectors through measures focusing on energy efficiency improvements and resource conservation and to adopt a comprehensive approach in the management of water, municipal solid waste, and waste water so as to realize their potential in terms of energy generation, recycling, reuse, and composting, mitigating climate change by taking appropriate measures in the transport sector (evolving integrated land use and transportation plans, effecting modal shift from private to public transport, encouraging greater use of non-motorized transport, improving fuel efficiency, and using alternative fuels). It is estimated, on an average, that the implementation of energy efficiency measures would help in achieving about 30% of energy savings in new residential buildings and 40% in new commercial buildings. In the case of existing buildings, these estimates are about 20% and 30%, respectively. Among the various plans for the implementation of this Mission, it is identified that the Bachat Lamp Yojana (BLY) model is an effective mechanism to promote energy efficiency through promoting replacement of incandescent bulbs in households by compact fluorescent lamps (CFLs). It is also identified that a comprehensive implementation of this plan could translate into a demand reduction of 10,000 MW. As a broader strategy, it is envisaged to promote various energy service companies (ESCOs) as vehicles to deliver energy efficiency targets.

National Water Mission - The main objective of the Mission is "conservation of water, minimizing wastage and ensuring its more equitable distribution both across and within States through integrated water resources development and management". The main identified goals of the Mission are: development of a water database in the public domain, particularly regarding the assessment of the impact of climate change on water resources; promoting water conservation, augmentation, and preservation; focusing attention on over-exploited areas from water use perspective, increasing water use efficiency by 20%; and promoting basin level integrated water resource management. The Mission has identified certain key strategies to achieve the above-mentioned goals, such as: reviewing the National Water Policy, promoting and facilitating research on all aspects of the impact of climate change on water, fast-tracking implementation of various new and old water resource projects, promoting traditional systems of water conservation, an intensive programme of groundwater recharge in over-exploited areas, incentivizing recycling of water, including waste water, promoting planning on the principles of integrated water resources development and management, ensuring convergence among the various water resource programmes, intensive stakeholder capacity building and awareness through measures such as sensitizing elected representatives regarding over-exploited areas; and reorienting public investment under various government programmes towards water conservation.

National Mission on Green India - The Mission aims at addressing climate change by enhancing carbon sinks in sustainably managed forests and ecosystems, enhancing the resilience and ability of vulnerable species/ ecosystems to adapt to the changing climate and enabling adaptation of forest dependent local communities in the face of climatic variability. There are three main objectives of the Mission: doubling the area under afforestation/Eco restoration in India in the next 10 years (total area to be afforested/eco-restored to 20 million ha), increasing the GHG removal by India's forests to 6.35% of India's annual total GHG emissions by the year 2020, and enhancing the resilience of forests/ecosystems under the Mission.

National Mission for Sustaining the Himalayan Ecosystem - This Mission identifies the importance of continuity and enhancement in the monitoring of the Himalayan ecosystem, in particular, the state of glaciers and the impact of changes in the glacial mass and its subsequent impact on river flows. It envisages an appropriate form of scientific collaboration and exchange of information among South Asian region so as to enhance the understanding of ecosystem changes and their effects. It is also identified, under the Mission, to empower local communities through Panchayati Raj institutions (PRIs), so as to assume greater responsibility for the management of natural resources. These measures are over and above the specifi c measures/strategies identified in the National Environmental Policy (2006).

National Mission for Sustainable Agriculture (NMSA) - The Mission seeks to transform Indian agriculture into a climate resilient production system through suitable adaptation and mitigation measures in the domain of crops and animal husbandry. These interventions would be embedded in research and development activities, absorption of improved technology and best practices, creation of physical and financial infrastructure and institutional framework, facilitating access to information and promoting capacity building. While promotion of dryland agriculture would receive prime importance by way of developing suitable drought and pest-resistant crop varieties and ensuring adequacy of institutional support, NMSA would also expand its coverage to rain-fed areas for integrating farming systems with management of livestock and fisheries, so that agricultural production continues to grow in a sustainable manner.

National Mission on Strategic Knowledge for Climate Change - This Mission envisions a broad-based approach, to include the following: conducting research in the key domains of climate science, improving the global and regional climate models for the specificity and quality of climate change projections over the Indian sub-continent, strengthening of observational networks and data gathering and assimilation, and creating an essential research infrastructure. The Indian Network for Climate Change Assessment (INCCA) was launched on 14 October 2009 and is a step in the direction of implementing the objectives of the Mission.

III. CONCLUSIONS

NAPCC if implemented in full driven force will surely lead to India with abundant power to regulate the environmental challenges and changes. Through NAPCC the country can aim to adapt to such heights that yield benefits and mitigation.

REFRENCES

[1]. InternationalEnergyAgency.2010.http://www.iea.org/textbase/pm/?mode=cc&id=4161&action=detail
[2]. Prime Minister's Office (PMO). 2008. Government of India, http://pmindia.nic.in/
[3]. Ministry of New & Renewable Energy. 2010. Jawahar Lal Nehru National Solar Mission- Towards
[4]. Buidling Solar India, Government of India, www.mnre.gov.in/pdf/mission-document-JNNSM.pdf



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A Brief Analysis on Gender Gaps and Biases in Science

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Abstract - The position on the S&T qualified women in science in India is reviewed in this paper And the glimpse of how S & T qualified women are placed across S & T disciplines. Analysis of gender gaps and biases, implementation of effective actions based on identified gaps and stepping up support to gender equality are discussed. Government of India initiatives and policies to empower women and bring them back to mainstream science are elaborated along with achievements.

Keywords: Gender gaps, Science & technology

I. INTRODUCTION

Society has to understand that women as an important human resource have made important contributions in many areas like medicine, pure science, biotechnology and are venturing into new fields like information technology, engineering and space technology. The 2030 Agenda for Sustainable Development includes 17 Sustainable Development Goals (SDGs) including SDG 4 on education and SDG 5 on gender equality.

Status of women in higher education in science and technology in India - According to UNESCO Institute for Statistics (UIS) fact sheet 2017 on Women in Science, women account for 28.8% of the world's researchers. In other words, less than 30% of the world's researchers are women. UIS fact sheet for 2018 reconfirms the same scenario. In India, as on 1 April 2015, there were (13.9%) women out of 2.82 lakh R&D personnel directly engaged in R&D activities. According to the latest Research and Development Statistics at a Glance 2017–18 brought out by the Department of Science and Technology (DST), Government of India, women participation in extramural R&D projects supported by various central S&T agencies has been 29% in 2014–15. In absolute terms, 1301 women principal investigators (PIs) during 2014–15 availed extramural R&D support as against 232 in 2000–01. Data on women enrolment in higher education institutions can be one of the parameters to assess the growth of S&T qualified women in the country. There has been remarkable increase in the number of women enrolled in the institutions of higher education from 13.67 lakh in 1989–90 to 27.42 lakh in 1999–2000. In 2016–17, women enrolment shot up to 141.56 lakh in higher education institutions.

Table 1 shows that their percentage share in total enrolment has gone up from 32.3% in 1989–90 to 47.9% in 2016–17. We hope that in coming years, women enrolment may reach 50%, that is half of the total students enrolled in higher education institutions may be women. In absolute terms, the number of women in S&T faculties has increased from 3.4 lakh in 1989–90 to 46.34 lakh in 2016–17. Among the women enrolled in S&T faculties, 53.3% belonged to pure science, 15.5% to medicine, 29.4% to engineering and technology and 1.5% to agriculture during 2016–17.

Table 1. Growth of women enrolment in higher education by various faculties (thousands)

	1989–1990		1999–2000		2009–2010		2016–2017	
Faculty	(000)	%	(000)	%	(000)	%	(000)	%
Science	275	6.5	520	6.7	1215	8.3	2474	8.4
Engineering and technology	16	0.4	63	0.8	468	3.2	1364	4.6
Medicine	45	1.1	91	1.2	235	1.6	717	2.4
Agriculture	3	0.1	16	0.2	16	0.1	68	0.2
Veterinary sciences	1	0.02	3	0.04	4	0.03	11	0.03
Total women enrolment in S&T faculties	340	8.1	693	8.94	1938	13.23	4634	15.63
Others	1027	24.2	2049	26.5	4142	28.3	9522	32.3
Total women enrolment	1367	32.3	2742	35.44	6080	41.53	14156	47.93
Total enrolment	4247	100.0	7733	100.0	14625	100.0	29427	100.0

Source: Research and Development Statistics, DST and UGC Annual Report.
Note: 1. Percentage has been worked out on total enrolment in respective years. 2. Science means pure or natural science

Table 2 indicates that women enrolment in science and technology disciplines in higher education sector is increasing. However, rate of this growth is not as it should be for a densely populated country like India. Doctorate degree holders are highly qualified personnel of the higher education system. Analysis of data of Ph D degree recipients during 2015–16 reveals that in S&T faculties, out of total doctorate degrees awarded, 38.8% were women. Out of total doctorates awarded in pure science, 44.2% were women, followed by medicine with 42.8% and agriculture with 36.5%. In engineering and technology, women took 32% of the total doctorates awarded.

Table 2. Enrolment of women in higher education in various science and technology disciplines (thousands)

Year	Science	Engineering	Medicine	Agriculture	Veterinary science	Total percentage share
2001–02	699.4 (19.9)	131.8 (3.8)	123.0 (3.5)	9.1 (0.3)	3.2 (0.1)	966.5 (27.6)
2002–03	736.9 (19.9)	154.0 (4.2)	134.4 (3.6)	9.3 (0.3)	3.0 (0.1)	1037.6 (28.1)
2003–04	809.0 (20.2)	165.3 (4.1)	145.3 (3.6)	9.9 (0.2)	3.0 (0.1)	1132.5 (28.2)
2004–05	850.2 (20.1)	175.7 (4.1)	153.7 (3.6)	10.6 (0.3)	3.4 (0.1)	1193.6 (28.2)
2005–06	901.3 (20.2)	185.8 (4.2)	162.6 (3.6)	10.7 (0.2)	3.6 (0.1)	1264.0 (28.3)
2006–07	901.3 (19.1)	185.8 (3.9)	162.6 (3.5)	10.7 (0.2)	3.6 (0.1)	1264.0 (26.8)
2007–08	1014.0 (20.2)	209.5 (4.2)	183.4 (3.6)	12.1 (0.2)	4.0 (0.1)	1423.0 (28.3)
2008–09	1129.3 (20.2)	276.8 (4.9)	202.8 (3.6)	15.3 (0.3)	4.5 (0.1)	1628.7 (29.1)
2009–10	1214.9 (20.0)	467.6 (7.7)	234.7 (3.9)	16.4 (0.3)	4.3 (0.1)	1937.9 (32.0)
2010–11	1349.2 (19.1)	800.7 (11.4)	330.0 (4.7)	25.2 (0.4)	6.9 (0.1)	2512.0 (35.7)
2011–12	1662.1 (19.2)	959.1 (11.1)	350.3 (4.0)	24.8 (0.3)	7.0 (0.1)	3003.3 (34.7)
2012–13	1175.3 (13.5)	982.3 (11.3)	391.1 (4.5)	27.8 (0.3)	8.1 (0.1)	2584.6 (29.7)
2013–14	1911.1 (18.1)	992.8 (9.4)	364.6 (4.4)	30.4 (0.3)	9.4 (0.1)	3408.3 (32.3)
2014–15	2320.9 (18.6)	1232.0 (9.9)	637.0 (5.1)	55.4 (0.4)	10.0 (0.1)	4255.3 (34.1)
2015–16*	2685.4 (19.9)	1360.0 (10.1)	676.2 (5.0)	65.6 (0.5)	9.9 (0.1)	4797.1 (35.6)

Source: Science and Technology indicators tables 2017–18, NSTMIS, DST[5].
Note: Figures in bracket indicate discipline-wise percentage share of women enrolment. *Provisional.

Table 3. Faculty-wise number of doctorate degree awarded, 2015–16

	Number of Ph D awarded		
Faculty	Total	Women	% Share of women Ph Ds
Science	7,636	3,377	44.2
Engineering and technology	4,772	1,528	32.0
Medicine	1,021	437	42.8
Agriculture	1,350	493	36.5
Veterinary science	283	65	23.0
Computer science/computer application	698	220	31.5
Total	15,760	6,120	38.8

Source: UGC Annual Report, 2016–17.

II. ANALYSIS

Gender gap in science - The above data shows that enrolment of women in science and technology disciplines has grown with time. While the number of women earning doctorate degrees in different fields of science and technology is growing every year, number of women scientists entering the workforce is not growing at a similar pace. It is important to understand and analyse the reasons for their fallout from entering the science and technology areas.

Analysis - Family support plays an important role in any woman's career and its growth. Achieving heights in a career generally begins with a successful personal life and good family support. Women fall out of science, technology, engineering and mathematics (STEM) areas because of variety of reasons, some known to society while others remain hidden but play an important role from beneath. Global map in Figure 1 shows the gender gap in science in terms of share of women in the total number of researchers by country. Women fall out of STEM pipeline and majority of them do so because of societal and cultural reasons. Some of these are given below.

Education is a family decision - Educational decisions in our country are generally family decisions and not individual choices, as education involves investment of collective family resources with collective impacts. Decisions are primarily based on projected impact on the collective family welfare. For parents, daughter's education involves family resources, status, marriage considerations and these become too important to leave choices in the hands of individual students. Family and social consequences become more significant in case of a girl child rather than her interest and will.

Economic factors - These play a major role in academic decisions and are major constraints for women in pursuing science. Even for families with greater resources, economic considerations affect the pursuit of science degree as a science or engineering degree is generally a more expensive option than an arts or a commerce degree.

Gender stereotypes and gender roles - Gendered family responsibilities and emphasis on homely traits for daughters makes the situation less favourable to study science. Widespread Indian cultural model of a family is patriarchal in which gender roles are differentiated and all household responsibilities lie with female members of a family. Individual women's goals and interests get merged for collective family welfare and smooth functioning of household activities.

Conformity to social expectations - Families expect daughters to marry and assume obligations to their husband's family. Many families think that a daughter's education would primarily benefit her in-laws rather than her natal family. Such families traditionally view boys' education differently from girls'.

Male-dominated environment - Women in STEM are highly visible minorities. Male dominated social context of science and engineering is a major constraint on women's participation. Girls feel uncomfortable in a male-dominated environment while pursuing science but more and more women are catching up now.

Lack of role models - It is much easier for girls to pursue science and imagine a career there when they see more successful women examples. Lack of role models continue to hinder career choices of girls away from STEM subjects.

III. CONCLUSIONS

There has been a change in women's attitudes towards scientific careers and personal life over the generations. India has come a long way as a society, but still has a long way to go before both women and men are granted equal opportunities from various fronts to become successful STEM professionals. Together we should find solutions that give both men and women proper access and necessary support to pursue a career in STEM.

REFERENCES

[1]. UNESCO Open Access Repository. Cracking the Code: Girls' and Women's Education in Science, Technology, Engineering and Mathematics (STEM), UNESCO, 2017, ISBN-978-92-3-100233- http://unesdoc.unesco.org/images/0025/002534/253479e.pdf

[2]. UNESCO Institute for Statistics Fact Sheet No. 43, Women in Science, FS/2017/SCI/43, March 2017.


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Initiatives Taken by Government of India in Renewable Energy Sector

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Abstract - The Government has been promoting private investment in setting up of projects for power generation from renewable energy sources through an attractive mix of fiscal and financial incentives, in addition to the preferential tariffs being provided at the State level. These include capital/interest subsidy, accelerated depreciation and nil/concessional excise and customs duties. In addition, generation-based incentives have also been introduced recently for wind power to attract private investment by Independent Power Producers not availing Accelerated Depreciation benefit and feed-in tariff for solar power.

Keywords: CNG, HEI

I. INTRODUCTION

India intends to provide a reliable energy supply through a diverse and sustainable fuel-mix that addresses major national drivers. These include energy security concerns, commercial exploitation of renewable power potential, eradication of energy poverty, ensuring availability and affordability of energy supply and preparing the nation for imminent energy transition. Accordingly, renewable energy has been an important component of India's energy planning process. The country has an estimated renewable energy potential of around 85,000 MW from commercially exploitable sources of wind, small hydro and biomass. In addition, India has the potential to generate around 50 MW per square km using solar photovoltaic and solar thermal energy. The potential is under reassessment and is likely to increase substantially. In addition, there is an estimated potential for around 140 million square metre solar thermal collector area and also 12 million household biogas plants. By March 2011, renewable power; excluding hydro above 25 MW, installed capacity has reached over 20 GW, contributing around 11% of the country's electric installed capacity. This has grown from 3% in 2003 at a time when the growth of conventional power has also been the fastest. At present, the share of renewable power in the electricity mix is around 6% and the National Action Plan on Climate Change mandates increasing share of renewable power in the electricity mix to 15% by the year 2020. The wind power programme constitutes around 70% of the total renewable power capacity and is the fastest growing programme with the investment almost entirely coming from the private sector. The Ministry has ambitious plans to have an installed capacity of about 72 GW, including 20 GW for solar by 2022.

The Government has been promoting private investment in setting up of projects for power generation from renewable energy sources through an attractive mix of fiscal and financial incentives, in addition to the preferential tariffs being provided at the State level. These include capital/interest subsidy, accelerated depreciation and nil/concessional excise and customs duties. In addition, generation-based incentives have also been introduced recently for wind power to attract private investment by Independent Power Producers not availing Accelerated Depreciation benefit and feed-in tariff for solar power.

II. CONTEXT

Decentralized and standalone renewable electricity systems: Amongst the major priorities of the Indian renewable energy programme are off-grid and distributed solutions including providing energy access to large rural populations including those in inaccessible areas and meeting unmet demands in many other areas. These also replace/reduce fossil fuel consumption. For instance, solar rural lighting replaces kerosene, a biogas plant or solar cooking systems replace cooking gas, solar PV replaces diesel or furnace oil in various areas. Renewable energy competitively meets the process heat as well as power requirements of large number of small and medium enterprises as well as some other areas, which use a lot of diesel for power generation. A new policy framework has been put into place for rapid up-scaling of off-grid programmes in an inclusive mode. The programmes are now being implemented through multiple channel partners including renewable energy service providing companies, financial institutions including microfinance institutions, financial integrators, system integrators, and industry and programme administrators. In order to sustain satisfactory performance and generation of output in the envisaged energy forms, a flexible funding approach has been adopted with a bouquet of instruments including support in the form of capital subsidy, interest subsidy, viability gap funding etc. This apart, the ministry provides full financial support for undertaking pilot and demonstration projects through manufacturers and other organizations for demonstrating new and innovative applications of renewable energy systems. An extension of off-grid relates to rural electrification. Over 40% of the country's population currently do not have energy access. Over 8000 remote and inaccessible villages and hamlets have been provided with basic electricity services through distributed renewable power systems. These include about 150 villages covered through mini grid by rice husk based gasification systems in Bihar. In addition, over 570 MW capacity distributed off-grid in the capacity range of 5-100 kW are in use for small-scale industrial applications and electrification purposes. Further, over 1.6 million solar home lighting systems, including lanterns and streetlights have been set up in different parts of the country. To meet unmet demands, the Ministry aims to cover about 10,000 villages with biomass-based systems and over 1000 villages with solar power by 2022.

The greatest potential area of off-grid relates to solar technologies. These include solar water heating systems, home lighting systems which include solar lanterns, solar cooking systems, and process heat using solar concentrators, biomass gasification for thermal application, solar pumps and small power generating systems. Under the National Solar Mission, it has been proposed to cover 2000 MW equivalent by 2022 which includes all the above, except solar water heating systems for which there is a separate target of 20 million sqm. Within the off-grid component, there is a separate target of covering 20 million rural households with solar lights. This includes coverage under the Remote Village Electrification Programme where largely solar lighting is provided to villages where grid is unlikely to go and which is almost entirely funded by Central grants. In addition, in other areas where grid is available but power supply is of erratic nature, solar lighting is financed through loans given through rural banks. There are areas where solar power is somewhat competitive with some government support. These include solar-powering of telecom towers, large scale use by industrial establishments in the manufacturing sector where diesel generating sets have been installed for partly mitigating daytime use of diesel, increased coverage in areas like Ladakh where diesel is the prime source of energy generation, solarisation of diesel run electric pump sets etc. It is estimated that installation of 1000 domestic solar water heaters, can result in peak load saving of 1 MW. Mandatory provisions, therefore, are being made to make solar water heating mandatory in buildings and sectors where hot water demand is met by electricity or other sources. Large-scale deployment of this nature of renewable energy technology thus not only allows avoided utility cost but would also result in substantial saving of electricity and fossil fuels. Use of solar thermal systems has started gaining momentum, with a solar collector area of 4.8 million sqm already installed to meet these needs. However, regulations by municipal authorities have so far been sporadic and adoption by industry is less than desirable.

Heat energy for cooking purposes: Since the 1970s, around 4.8 million family-type biogas plants have been set up to provide a clean cooking energy option in rural areas. The present deployment is about 0.15 million plants annually. The aim is to reach an additional 2 million households by 2022. The biogas programme has had a favourable impact on the environment through supply of clean gaseous fuel. In addition to savings on fuel, the biogas technology has multiple benefits including provision of energy in a clean and unpolluted form; making available enriched organic fertilizer as a by-product for supplementing and optimizing the use of chemical fertilizers. Rural women walking for miles to collect fuel wood and sweating it out in smoky kitchens is a thing of the past in a large number of rural households in India. The concept has gradually caught up and it is no longer just the family type biogas plants that are promoted. Toilet-linked biogas plants are also coming up. Medium size and large size biogas plants are being installed for power generation from urban and industrial wastes and animal manure. Technology demonstration projects are also promoted to produce CNG-like gas for its use where CNG is being used.

As far as cook-stove is concerned, the biggest problem relates to inefficient combustion of biomass and the inability of large number of people to spend money on processed fuels for improved cook-stoves because traditionally available biomass is used free of cost. A large number of community size cook-stoves currently use substantial amount of firewood. A pilot project has been launched to test the efficiency and marketability of improved community size cook-stoves, so that the consumption of firewood is reduced. This project covers governmental institutions like 'Anganwadi Centres', schools for mid-day meals and tribal hostels apart from private dhabas (roadside eateries). Simultaneously a pilot project is being contemplated to test sustainable delivery models for household improved cook-stoves. The Ministry has also started the process of upgrading biomass cook-stove test centres as well as developing modified standards for various improved cook-stoves. The world's largest system for cooking in community kitchens has been installed at Shirdi in Maharashtra to cook food for 20,000 people per day and is saving around 60,000 kg of LPG every year. All institutions including large institutions with hostels, hospitals/medical colleges, military/ para-military establishments, industrial organizations, academies; wherever large number of meals is cooked, are the targets.

Policy Framework: India has been pursuing a three-fold strategy for the promotion of renewable energy:

- Providing budgetary support for research, development and demonstration of technologies
- Facilitating institutional finance from various financial institutions
- Promoting private investment through fiscal incentives, tax holidays, depreciation allowance and remunerative returns for power fed into the grid India's renewable energy programme is primarily private sector driven and offers significant investment and business opportunities.

A domestic manufacturing base has been established in the country for renewable energy systems and products. The annual turnover of the renewable energy industry, including the power generating technologies for wind and other sources, has reached a level of over USD 10 billion. Companies investing in these technologies are eligible for fiscal incentives, tax holidays, depreciation allowance and remunerative returns for power fed into the grid. Further, the Government is encouraging foreign investors to set up renewable power projects on a 'build-own and operate' basis with 100% foreign direct investment.

There continue to be barriers for speedy deployment of renewable energy in the country. These include creation of transmission infrastructure for evacuation of renewable power from remote locations, availability of low cost funds particularly for off-grid applications, sustainable business models for decentralised renewable energy projects and also absence of rural entrepreneurship and distributed service companies.

Possibilities for Cooperation: India's experience in dissemination of renewable energy could be of much use to other developing countries, particularly in Asia and Africa. The cooperation activities could be:

- Exchange of officials/technologists for participation in the training programmes, on different aspects of renewable energy.
- Company-to-company cooperation through joint ventures.
- Technology transfer

III. CONCLUSIONS

The pilot projects introduced by government of India is limited only few sectors. Hence, this may be made as compulsory to all sectors and more and more awareness programmes may be arranged. HEIs should play a significant role to support the initiatives taken by government.

REFERENCES

[1]. Özkale, C., Celik, C., Turkmen, A. and Cakmaz, E. (2017). Decision analysis application intended for selection of a power plant running on renewable energy sources. Renewable and Sustainable Energy Reviews, 70, pp.1011-1021.
[2]. Wood, Allen J., and Bruce F. Wollenberg. Power generation, operation, and control. John Wiley & Sons, 2012.
[3]. Aydin, G. (2014). Modeling of energy consumption based on economic and demographic factors: The case of Turkey with projections. Renewable and Sustainable Energy Reviews, 35, pp.382-389


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Applications of Radio Isotopes in Medicine

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Abstract - The majority of our citizens are aware of the contributions of nuclear technology to the production of electricity via commercial nuclear power plants. But most are unaware that the impact of this technology is even greater for non-power applications. The world of medicine, agriculture, and modern industry has been substantially improved by the harnessing of radioisotopes, and new applications continue to make major humanitarian contributions to our quality of life.

I. INTRODUCTION

In his 1953 United Nations Atoms for Peace address, President Eisenhower specifically challenged scientists and engineers to harness the atom for humanitarian applications in medicine, agriculture, and other non-power aspects of direct benefit. Hence, a key part of the Lawrence Livermore National Laboratory Center for Global Security "Atoms for Peace" workshop series held during 2003 was to consider how well his challenge has been addressed, and what the future may hold for such non-power applications.

II. CONTEXT

2.1 Diagnostic Techniques - A crucial part of successful medical practice is to diagnose ailments. There are countless examples in every corner of the globe where an early and exact diagnosis could have prevented tragic results. It is this element of medicine where radiation techniques have made their most significant contribution to enhanced health care. The earliest use of radiation in the medical field was employing portable x-rays sources in World War I, where such devices helped field surgeons save many lives. Dental x-rays, chest x-rays, mammograms, and a plethora of other tests are in routine use today in the medical/dental professions. But x-rays, useful as they are, provide only a snapshot of a particular piece of the anatomy. The imaging properties of radioisotopes allow modern nuclear medical specialists to measure the activity of some specific physiological or biochemical function in the body as a function of time. This has enormous implications, all the way from determining nutritional deficiencies to locating and identifying various types of cancer. Two of the most common approaches used in modern diagnostic nuclear medicine are single photon emission computed tomography (SPECT) and positron emission tomography (PET).

SPECT is widely used for routine clinical work because it is relatively inexpensive and utilizes radioisotopes available from nuclear reactors. Technetium-99m, a very popular 140 keV gamma emitter with a 6-hour half-life, is the most popular radioisotope used in this device. It is derived from a common nuclear reactor fission product (Molybdenum-99). Mo-99 has a 66 hour half-life and it decays to Tc-99m. The "generator" consists of a lead pot enclosing a glass tube that contains Mo-99. When an order for Tc-99m is placed, it is washed out of the lead pot by a saline solution and prepared for injection into the patient. After about two weeks of use, the generator is returned for a new batch of Mo-99. The SPECT system works by placing a solution containing a short-lived radioisotope such as Tc-99m into the patient. The patient stays in a fixed position and cameras (detector systems) rotate around the patient, picking up the gamma rays emitted by the Tc-99m circulating in the patient's body. By the clever use of microprocessors, the data collected by the cameras can be sorted out and the location of the Tc-99m radioisotope can be followed as a function of time. If bone cancer exists, the chemical carrier to which the Tc-99m is attached will tend to collect at the sites of the tumors, and the "tell-tale" sharp images at those sites clearly reveal the problem. If the physician is looking for other types of abnormalities, a different chemical carrier is used. This procedure is now employed so frequently that one of every three patients that enter a U.S. medical center today directly benefits from nuclear medicine. Whereas Tc-99m is by far the most popular radioisotope used for such purposes, some SPECT systems have been equipped with Flourine-18 embedded in 18F-deoxyglucose (18FDG). F-18 has a substantially more energetic gamma ray (511keV), thus requiring a different detector system. Other radioisotopes, generally produced by nuclear reactors for such use, are I-131, Ga-67, and Tl-210. PET devices are based on the detection of a pair of photons emitted from positron annihilation. Very shortly after a positron is emitted from a radioactive substance such as flourine-18, it collides with an electron and the two particles are literally annihilated. The mass of the two particles is translated into pure energy and two gamma rays of at least 511 keV each move apart at light speed in precisely opposite directions. By surrounding the patient into which the radioisotope was injected with special detectors, the location of the radioisotope can be pinpointed by determining counts recorded at exactly the same time (coincidence counting) at opposite sides of the patient.

PET systems tend to be more expensive than SPECT systems, partly because of the sophistication of the counting system and partly because the radioisotopes that emit positrons typically have a very short half-life (minutes). Hence, they must be produced on-site by accelerators (usually cyclotrons) and administered to the patient with the proper chemical carrier very quickly. But PET machines are becoming increasingly popular because they are capable of more precision than most SPECT devices. Three-dimensional PET systems are particularly impressive and can provide the diagnostician excellent images. Radioisotopes often used in such devices, in addition to F-18, include carbon-11, nitrogen-13, and oxygen-15. Nuclear diagnostics are now routinely employed throughout the developed world to determine anomalies in the heart, brain, kidneys, lungs, liver, breasts, and thyroid glands. Bone and joint disorders, along with spinal disorders, also benefit directly from this routine use of radioisotopes. In addition to the accuracy in determining medical abnormalities that nuclear diagnostics provides to the physician, a great advantage to the patient is that there is no discomfort during the test and after a short time there is no trace that the test was ever done. The radioisotopes simply decay and disappear completely. The non-invasive nature of this technology, together with the ability to observe an organ functioning from outside the body, makes nuclear diagnostics a very powerful tool.

2.2 Therapeutic Approaches - Until recently, the use of radiation to actually cure diseases has been rather limited. One of the first therapeutic uses of radioisotopes was employing Iodine-131 to cure thyroid cancer. Since the thyroid gland has a special affinity for iodine, it is a relatively simple and straightforward matter to have a patient drink a carefully determined amount of I-131 in a chemically palatable form of solution. The I-131 then preferentially lodges in the thyroid gland and the beta emitting properties of this radioisotope subsequently target and destroy the thyroid malignancy. Since I-131 has a half-life of 8 days, it does its job and then effectively disappears within a few weeks. Another widespread use of radiation is in the treatment of other cancers. Surgery, chemotherapy, and radiation (often used in combination) constitute the principal venues of cancer treatment today. Most of the current procedures utilizing radiation to kill cancer in humans are based on delivering the radiation to the patient externally. This is called teletherapy. Accelerators are used to deliver either protons to the target (such as the system used for external beam prostate treatment at the Loma Linda facility in California) or beta particles, which are normally directed onto a target that secondarily produces x-rays. Whereas substantial benefits can be obtained by such treatment, it is essentially impossible to keep the radiation from killing or impairing healthy tissue in the immediate vicinity—especially if the beam must pass through healthy tissue to reach the malignancy. The two principal approaches underway to prevent radiation therapy from injuring healthy cells are

1) creating radioisotopes at the site of the malignancy,
2) developing a method to deliver appropriate radioisotopes directly to the cancerous tissue.

An example of the first approach is called boron-neutron capture therapy (BNCT).

Boron is placed into the patient as part of a special chemical carrier such that it preferentially concentrates at the tumour site. A neutron beam is then focused on the boron, producing alpha particles that destroy the malignant cells only in the immediate vicinity of the concentrated boron. Since alpha particles are stopped at a very short distance from their point of origin (typically about one human cell), the intense radiation damage is very localized. Some damage may be done to healthy cells through which the neutrons must pass to reach the malignancy, but special "beam tailoring" can be done to minimize this concern. An example of the second approach is celldirected radiation therapy. In order to attain the localized damage desired, either beta or alpha emitters are needed. For solid tumors, one method of getting the radioisotope to the target is direct injection, assuming the tumour is accessible. An example of this approach is Brachytherapy. One well-founded application of this technique is treating prostate cancer. This is accomplished by encapsulating a small amount of a radionuclide such as I-125 or Pd-103 within a titanium capsule about the size of a grain of rice. These "seeds" are then placed directly into the prostate gland where they remain for life. Another approach to cell-directed radiation therapy is to find a chemical that has a special affinity for the malignancy, and then attach the radioisotope to this special carrier. This is called the monoclonal antibody approach. It is also sometimes called targeted alpha therapy (TAT), since much of this research is focused on the use of alpha particles. Such an approach is particularly suited for treating malignancies that are not confined to a particular spot.

Leukemia and Non-Hodgkin's diseases are examples. Recent work employing the "smart bullet" approach has revealed some very impressive results. End stage Hodgkin's disease has been treated with Yttrium-90 (a beta emitter), with a positive response rate of over 80% (for patients who have failed all other known treatments). Patients with advanced stages of B cell lymphomas treated with Iodine-131 have a demonstrated survival rate of over 90%. Recent trials using an alpha emitter (Bismuth-213) have shown remarkable results in treating leukemia. Several specialized areas of treating specific abnormalities are developing on almost a constant basis. Most people are aware of the procedure called angioplasty (that of inserting a "balloon" into a clogged artery and passing it through in a "roto-rooter" manner to unclog it). Whereas this procedure has a high success rate, and has prevented a plethora of heart attacks, there are several cases where the arteries slowly become re-blocked. Several years ago, it was discovered that lining the "balloon" with rehenium-86 made a huge impact in preventing re-closure of the arteries. Another example of a specialty area is the treatment of arterio-venous malformation (AVM). This condition is a malformation of blood vessels characterized by a mass of unwanted arteries in the brain. A special mixture containing a radioactive powder is injected into the artery, causing an arterial occlusion, thereby stopping the blood flow into the unwanted vessels. This is but one example of numerous applications of radioactivity to somewhat unique conditions. Although many of the above results are still in relatively early trial stages, the potential for success is enormous. Given that cancer remains a major concern in most areas of the world, and that it is the most prevalent childhood disease in the Western World, the incentive for further harnessing radiation in the field of medicine remains huge.

III. CONCLUSION

In conclusion, we can confidently state that President Eisenhower's challenge to use the atom for a plethora of humanitarian applications has been ably met. The positive impacts that have been achieved in the past 50 years are nothing short of astonishing! But perhaps the biggest impacts are yet to come. Successful endorsement of food irradiation alone could easily double the impacts achieved to date. Such non-power applications remain a challenging and rewarding field for the best and brightest of our next generation of radiation scientists and engineers.

REFERENCES

[1]. Nuclear News, "Irradiated food, good; food borne pathogens, bad." American Nuclear Society, July 2003, p. 62.

[2]. Yanagisawa, Kazauki, et al., "An Economic Index Regarding Market Creation of Products Obtained from Utilization of Radiation and Nuclear Energy (IV)", Journal of Nuclear Science and Technology, Vol. 39, No. 10, p. 1120-1124, October 2002.


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Political Activities of People Science Movements

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Abstract - The people science movement aims at a critical understanding of science. It informs the common people on what science is being done, how and why, i.e., analysing policies, educating people and mobilising public opinion on issues. It further works towards constructing a rational society by explaining natural phenomena using science and countering irrational beliefs ad superstitions. By initiating programmes such as training teachers to use innovative teaching methods, training village women to use health information, training farmers to experiment and use science to improve the soil, etc., mobilising the poorest and putting into practise the promise of science — improving living conditions.

Keywords: PSM, KSSP

I. INTRODUCTION

After independence in 1947, India emerged as underdeveloped in relation to the west and sought to eliminate poverty and unemployment with large-scale industrialisation. Nehru (1985: 31) believed that without 'catching up' with the scientific and technological advances made in the west, India would remain weak and vulnerable to foreign domination. He felt that Indians must learn to think and behave scientifically to overcome traditional, mystical, supernatural, uncritical, and inward-looking way of life so they can adapt to the modem age. The Communist Party of India (CPI) supported nationalists as representing the interests of national bourgeoisie and sought peaceful transition to socialism through participation in elections. It viewed feudal relations of production as hindering capitalist development. With the victory of CPI in elections in Kerala in 1957, it supported the Congress Party and its policies. Western scholars, working within structural functionalism, positivism and anti-communism traditions, also proposed modernisation of third world countries like India. Modernisation was seen in terms of the acquisition of western S and T, industrialisation along western lines, urbanisation, literacy, spread of technical roles, social mobility, and cultural secularisation.

II. CONTEXT

The origin of PSM in India may be traced to the early 1950s when a number of organisations got engaged in activities aimed to create scientific awareness among the general public. The Kerala Sastra Sahitya Parishad (KSSP), the Marathi Vigyan Parishad, the Assam Science Society and the Banga Vigyan Parishad are the more prominent among them. They began dissemination of information about science and technology by publishing literature in various Indian languages. Of these, the KSSP in the 1960s and 1970s grew into a mass organisation. A Convention of PSM was held for the first time in India in November 1978 in Trivandrum under the auspices of Kerala Sahitya Sastra Parishad (KSSP). Since then, there has been an intensification of the interest in initiating a PSM in several parts of the country. The need was then felt for a second convention of PSM, which was hosted by KSSP in Kerala. The concern of the convention was focused on the need to define a PSM, which should form the basis of an all-India perspective so that programmes and activities initiated would have a clear-cut direction and purpose.

KSSP, which was formed in Kerala in the early 1960s, initially accepted the basic premise of modernisation of India. They emphasised changing people's outlook from 'traditional' to 'scientific'. Their understanding of scientific thinking was rather conventional. It meant relying on facts, accepting nothing on blind faith, changing old beliefs in the light of new evidence, drawing conclusions on the basis of independent evidence, being critical, keeping an open mind, and challenging the forces of supernaturalism and superstition. They realised that science was one among many knowledge systems, yet stressed its supremacy in the study of society.

However, as KSSP experienced obstacles in communicating their scientific goals to people, the lack of scientific temper as the root cause of India's problems was criticised inside the movement. For one thing it amounted to blaming people for their misfortune. It was argued that the scientific temper like any other behavioural attribute could not be made a universal requirement for modernisation. The Dependency School identified underdevelopment or poverty of the third world as the basis of development or wealth of the west. They rejected the possibility of self-sufficient capitalist development in the periphery without breaking its historical linkages with the core. Indian scholars such as Amiya Kumar Bagchi, Nirmal Chandra, Sanjaya Lall, Deepak Nayyar, Ashok Rudra and Ranjit Sau showed that the main cause of the backwardness of India was due to the reproduction of economic and political structures in accordance with the interests of the metropolitan powers and the dominant classes. Against the emphasis on internal behavioural factors, critics emphasised external political economic factors for modernisation or development of the third world. The so-called 'traditional', 'unscientific' or 'backward' behaviour was perceived as a product of economic and political circumstances prevalent in the country. As a result, the scientific temper formed smaller components of PSM in the late 1970s and early 1980s and the focus has since shifted to education, health, alternative S and T, and a number of related areas.

KSSP has been using the slogan "Science for Social Revolution". They believe that science can find solutions to social problems and thus empower the vast majority of the poor. Unlike earlier positivism, however, they no longer prioritise scientific knowledge over traditions and culture. Further, they have been popularising science differently. For instance, KSSP has set up medical camps to carry out mass education programmes on AIDS and maternal health. Similarly, Sahayog has been working on reproductive health education, delivery services, the context of AIDS, and local practices that make the population potentially vulnerable to the spread of HIV. The All India People's Science Network has been forging linkages that affect the transfer of scientific knowledge between the scientific community and the people. The Medico Friends Circle has been campaigning against global corporations marketing nonessential and dangerous drugs in India. The same group exposed cover-up of the health effects on the gas victims when MIC leaked from the Union Carbide plant in Bhopal in 1984, killing over 2,500 and affecting 2,00,000 people. Many groups have initiated experimental science teaching programmes based on the discovery or inquiry method as opposed to rote learning in rural areas. Generally, these groups no longer aim to teach atheism or confront religion even when they experience opposition from those representing religious orthodoxy. They believe that the issue of religion and tradition can be addressed successfully only after significant economic and political changes have occurred.

Most of these groups feel that scientific knowledge and technology should not be concentrated in the west and in the hands of Indian elite, and it should be distributed fairly. As pointed out earlier, India has been trying to revitalise its economy by introducing S and T, which has been developed in the west. However, India has been unable to acquire modern S and T at the right price under the right terms and conditions mostly because the carriers of S and T are global corporations. There are proprietary rights in technology in the forms of patents, trademarks, and brand names; the basic designs, blue prints and knowhow remain in the private possession of global corporations. Furthermore, those in authority in India have been making a disproportionately large allocation of the available S and T for the benefit of the Indian upper classes. Thus, many PSM groups are working to overcome these barriers to make S and T work for the benefit of the common people and India.

In its attempt to incorporate western S and T, India has acquired 'technological dualism' or 'technological polarisation', that is, the use of different production functions in the advanced and traditional sectors. The reality of India is that the huge investment in the modern sector coexists with extremely poor human conditions. Over all, gains from the growth of the modern sector has been increasing, rather than decreasing the problems of development by deepening dualism between the limited modern industrial sector and the vast rural hinterland. Modernisation and related development programmes have not met the needs of the neediest. PSM realised that they could not perform a catalysing role in empowering people with science, when it has been increasingly becoming an oppressive instrument in the policies of modernisation and development. This led to redefining the role of science in PSM to the "mobilisation and participation of the people for their own development - as distinguished from the kind of 'development' handed out to them". PSM rejected the idea that they can solve people's problems from outside; instead proposed to learn from the people.

People in India have been getting organised to oppose destruction of their livelihood in the name of scientific progress and national development. With deforestation, rural women have to traverse greater distances to collect fuel, fodder, and other basic necessities, which has cut time available for wage labour and stretched the normal working day up to 14-15 hours. These women waged the world famous Chipko Movement by clinging to trees to save them from being felled. The National Fish Workers Forum is fighting off the threat of mass displacement and damage to the ecosystems by the industrial fishing practices of gigantic factory ships. Bhopal Gas Affected Working Women's Union and the Medico Friends Circle have been working for medical and economic relief of gas victims due to a poisonous gas leak in the Union Carbide plant. Azadi Bachao Andolan has been campaigning against the entry of global corporations in India. MIND, a newly formed group, has been demonstrating against the policy of nuclear weaponisation in the region and providing the scientific and intellectual resistance to some of the myths perpetrated by the Indian government.

One of the most influential movements is against dams, which have been displacing many local inhabitants. In 1979, the government of India approved the Sardar Sarovar Project to build 30 large, 135 medium and 3,000 small dams, stretching over 1,300 km of the Narmada river across three states of Madhya Pradesh, Maharashtra and Gujarat. It has been submerging the homes, villages, cultivable lands, and forests along with disrupting environmental quality. Officially, it has displaced over 2,00,000 people and is likely to reach the displacement of over one million people. The government is unable to provide the dam-displaced people with equivalent land. It has spawned vehement opposition to industrial development in the region by the Narmada Bachao Andolan. In 1993, the movement compelled the World Bank to withdraw from the project. Similar withdrawal by three global corporations took place in 1998 and 1999. Now the movement is fighting the US power utility Ogden Energy Group, which has decided to invest into the hydroelectric project. In response to the case filed by the movement against Sardar Sarovar Project in 1994, on October 18, 2000 the Supreme Court ordered the dam to be completed as 'expeditiously' as possible.

In 1993, several groups that opposed the prevailing model of industrial development came together to form the National Alliance of People's Movements. They redefined development in terms of equality, peace, happiness, and self-reliance. They want people to be involved in the decision-making, and have control over the natural resources in their vicinity. They advocate self-reliance of both urban and rural communities for their basic needs, with limited dependence on expanded markets. For them, industrial production should be labour-intensive, decentralised, and based on renewable energy. They propose sustainable use and conservation of soil, water, forests, and other resources. They believe that such actions would develop creative mass energies towards self-reliant and participatory development. They held a third convention in March 2000 in which individuals, organisations, movements, and parties from all over India participated.

Mahatma Gandhi had earlier proposed cottage and small-scale industries to ease the problems of poverty and unemployment; but Nehru's government saw them as a temporary solution until India became fully industrialised. In 1971, mostly because of PSM activities, the ministry of industry also opened a cell for appropriate technology. Since then it has been supporting research into local technologies in leading institutes. It has led to up scaling technologies such as the heat-efficient and smoke-reducing stoves, solar ricecookers, water control devices, sanitation, alternatives to chemicals in agriculture, indigenous seed conservation, and bio-gas production forenergy. Governmental agencies working in the areas of alternative technology, however, are not a part of PSM; instead, they have taken PSM's theme of learning from people into the production of technologies that are appropriate in rural areas. PSM have their own projects to disseminate technologies appropriate to the socio-economic environment.

Some PSM groups like PPST have been defending the traditional Indian system itself to propose it as an alternative. Their work has been to reassess modern science that has grown within the context of colonialism and imperialism, to evoke a debate on western versus Indian science, and to popularise that heritage of the Indian system that was destroyed during the British rule. They argue that the claims of truth in modern science are no more universal than claims of truth in Indian science. They think that the Indian society has its version of truth and thus interpret knowledge accordingly. They affirm the epistemological right of Indian people to understand the world from their own cultural and metaphysical assumptions.

The theme of appropriate development or alternative society is not without criticism. The implementation of appropriate S and T or a return to the golden past is seen as a panacea formany problems facing India. Yet, there are no plans on how to implement goals of appropriate development or alternative society on a wider scale.

III. CONCLUSION

Political Scientists today employ survey methods, graphs, charts and other scientific tools to arrive at their research conclusions. Political Science is thus a science, though not like the physical sciences. It is a social science.

REFERENCES

[1]. Alvares, Claude (1990): Science, Development, and Violence: The Revolt against Modernity Oxford University Press, Delhi.

[2]. Amin, Samir (1976): Unequal Development: An Essay on the Social Transformations of Peripheral Capitalism, Monthly Review Press, New York



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Science & Technology for Nation Building

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Abstract - Science and technology have been central to the progress and development of virtually all the nations of the world. It contributes immensely to various sectors of the economy. Science and technology are intimately connected with development because and share a symbiotic relationship. It leads to healthier, longer, wealthier and more productive lives and alleviation of poverty becomes possible. The many ways in which science and technology impact poverty alleviation across various sectors and economic growth merit attention.

Keywords: Science, Technology, economy, development

I. INTRODUCTION

For any successful economy, particularly in today's quest for knowledge based economies, science, technology and engineering are the basic requisites. If nations do not implement science and technology, then the chances of getting themselves developed becomes minimal and thus could be even rated as an undeveloped nation. Science and Technology is associated in all means with modernity and it is an essential tool for rapid development.

It was the vision of Pandit Nehru, the first prime minister of independent India, and the need of India at that time that led to the foundation of the Indian Institute of Technology in 1950 after only three years of independence. These institutes, with assistance from international institutes, promoted research in India. Nehru aimed to inculcate the scientific temper among the Indians. He also aimed "to convert India's economy into that of a modern state, and to fit her into the nuclear age and do it quickly". The Department of scientific research and natural resources was also set up by him.

II. CONTEXT

The Linkage among Science, Technology and Development - Development of science and technology is sequential and systematic starting with mathematics expanded and enhanced by the rise of advancement in mathematical sciences and engineering fields such as operational research, system engineering, electrical computing, information theory, numerical analysis, and theoretical computer science Physics the "fundamental science" pull strings for the natural sciences because these aspects of sciences study the laws of physics. These are energy, physical laws of matter, and the forces of nature handle the interactions among particles Chemistry referred to as the fundamental science which links the fundamental laws of physics to engineering and other natural sciences such as astronomy, - biology, earth science and materials science. It tackles experiences related to the structure and composition of matter and the transformations it goes through. The life sciences compose of the area of science that relates to the study of a living organisms such as animals, plants and human beings. Consequently, on its part biology is the focal point of the life sciences; technological transformations in molecular biology and biotechnology drastically open a flood of scholarly studies and specialisations, often interdisciplinary areas

Fundamentally, technologies on the other hand, greatly influence human as well as other animal species' capacity to regulate and conform to their natural. The human species' utilisation of technology started with the conversion of natural resources into simple apparatus. The pre-historical uncovering of the ability to regulate fire expanded the available sources of food. The design of the wheel greatly assisted in travelling long distance with ease and in human controlling their environment. Contemporary technological innovations, including the internet, the printing press the telephone and have reduced physical hurdles to communication and allow unhindered interactions on the global level. Moreover, not all technologies have been used for nonviolent means; the discovery of weapons of ever-increasing calamitous power has progressed throughout history, from clubs to nuclear weapons.

Technology has troubled human communities in multiple ways. In a number of communities, technology has bolstered the development of economies. It has encouraged the growth of a leisure class. A number of technological processes harvest unwanted by products. Technology produces pollution and depletes natural resources which affect the earth and its environment.

Scientific innovations turn science from a spotlight on knowing nature to a focus on manipulating nature. The scientific manipulation of nature makes possible to manipulate people. A human concerted human effort to study makes it possible to understand better, the history of the natural world and how the natural world works, with observable physical evidence as the basis of that understanding. It is done through observation of natural phenomena, and through experimentation that tries to simulate natural processes under controlled conditions.

Geologists examine the distribution of fossils in an outcrop; ecologist observes territorial behaviours of birds, astrophysics photograph distant galaxies, climatologist sifts data from whether balloons are all scientist studying nature. Experiments scientist like chemist observe rates of chemical reactions to different types of temperatures and a nuclear physicist record the result of the assault. Importantly, all these professionals are commonly making and recording observations on nature and simulations of nature, in order to learn more about how nature, in a real world works.

Generally speaking, scientists work to improve the world condition as a whole and people's lives in particular. Geneticists study how defined conditions are transferred from generation to generation. Biologists trace how diseases are transmitted and to make life less disease infected. Earth scientists developed models for the prediction of weather or for determining the occurrence of earthquakes, landslides, and volcanic eruptions. Scientist seek knowledge to help distance the world from the hardships that have plagued humanity for centuries. Governments ensure that the welfare of the people is secured.

Scientists also work towards economic transformation. A number of earth scientists dedicate their research to the discovery of better and effective approaches to exploring natural resources including petroleum and ores. Plant scientists exploring species of fruiting plants for crops help improve the agricultural output of countries provide better- nutritional output and simply enriches the people. Chemists discover improved chemical substances with potential technological applications. Physicists developed improved phenomena such as superconductivity are also encouraging a knowledge based society that spurs economic growth. The present world is increasingly becoming competitive in economic spheres, therefore encouraging the development of scientific exploits is an investment in the economic endeavour.

Science control potentially detrimental wastes and toxins that pass through our air, soil and water. Scientific research is also conducted to find out how changes in the atmosphere and oceans may transform the global climate which also controls the sources of food and water. In a sense, such science seeks to develop the owner's manual that human beings will need as they increase if unwittingly, take control of the global ecosystem and a host of local ecosystems.

Scientists are continually making discoveries by developing new concepts and theories. Scientific breakthrough produced ensures that there is constant global change. Such transformations are progressed toward a better understanding of nature. It is realized by constantly questioning whether our current ideas are empirical. Challenging existing ideas better and improve evidence are discovered. However, an attempt to look at history forces researchers to realize that the future is likely to provide new evidence that will lead to different interpretations. However, most scientists discover that celebrated theories are presumably the future's archaic knowledge, and the best is that the theories will survive with some fine-tuning by the coming generations of a scientist.

Technology is an enterprise that forms or transforms culture. The rise in communication technology has curtailed barriers to human interaction. Improved communications aid spawns transform subcultures. It swiftly encourages the rise of cyber culture as a result of the development of the internet and the computer technology. Technology as a cultural activity predates both science and engineering. Both science and technology formalize some aspects of the technological venture. Engineering can be seen as a resourceful endeavour of designing and making tools and systems to exploit natural phenomena for practical human means, often using results and techniques from science. The development of technology may draw upon many areas of knowledge, including scientific, engineering, mathematical, linguistics and historical knowledge, to achieve some practical result. Technology is often a consequence of science and engineering although technology as a human activity precedes the two areas.

The 18th century the industrial revolution commencing in the United Kingdom is an era of considerable technological innovations. Primarily inventions are encouraged in the field of agriculture, manufacturing, mining, metallurgy and transport powered by the development of steam power. Technology growth considerably improved with the exploitation of electricity to develop modern innovations including an electric motor, light bulb and countless others. Scientific improvement and the discovery of novel concepts allowed for power flight, and improvements in chemistry, engineering, medicine and physics. The advancement in technology brought about the construction of skyscrapers and the construction of modern cities whose people rely on automobile or other powered transit for transportation. Communication was also immensely enhanced with the development of the telegraph, telephone, radio and television. The late 19th and early 20th centuries saw a revolution in the transportation system with the discovery of the steam-powered, ship, train, aeroplane and automobile.

The late 20th century also came along with many discoveries. Discoveries in physics discover nuclear fission which brought about the development of nuclear weapons and nuclear power. Computers were developed and which was progressively miniaturised exploiting transistors and integrated circuits. The technology advancement came with improved information technology. Improvement in information technologies afterwards led to the establishment of the internet which brought about the present information age. The human race has explored space with satellites for telecommunication and in manned missions going all the way to the moon. Growth in innovations in the medical sciences brought about developments including open-heart surgery and of recent stem cell therapy along with new medications and treatments. Complex manufacturing and construction techniques and organisations are needed to construct and maintain these new technologies. Furthermore, these technologies have become so complex that entire fields have been developed to support them, including engineering, medicine and computer science and other areas have been made more complex, such as construction, transportation and architecture.

Technological advancement has seemingly been accelerating. Some technologies discovered include but not limited to the clock, the engine, electric motor, the telescope, the microscope, the electric generator and radio, nuclear power and weapons, television, computer. Technological innovations advanced swiftly sustained by the huge amount of resources. The most celebrated discoveries in the technology of recent are related to computers, entertainment, nanotechnology, materials science, renewable energy, space travel, and medicine. Currently, abundant discoveries in mobile media and technology are, creating a new world of possibilities.

III. CONCLUSION AND RECOMMENDATIONS

Science and Technology Policy has to be designed to resolve practically the long term disconnect between socio - political and economic planning and science and technology in tandem with the objectives of development plans. The policy is to evolve a new world that will build a large, strong, diversified, sustainable and competitive economy that guarantees a high standard of living and quality of life to its people. Specifically, it should be designed to provide a strong platform for science, technology and innovation commitment with the economic transformation that is people centred.

REFERENCES

[1]. https://directresearchpublisher.org/drjsses/files/2016/12/Anaeto-et-al1.pdf

[2]. https://www.researchgate.net/publication/319456206_The_Role_of_Science_and_Technology_in_Development


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Celebrating Physics - WYP & IYL

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Abstract - To highlight the important role of science in society and the need to engage the wider public in debates on emerging and important contemporary issues relevant to science, UNESCO declared 2005 as The World Year of Physics (WYP) & 2015 as International Year of Light(IYL) related to science especially Physics. This paper presents the brief background t of the two occasion.

Keywords: Science, Physics, WYP, IYL

I. INTRODUCTION

Science has led us to finding out things that give us what we have today. In fact without science we would not have electricity which would mean no mobiles, internet, Facebook we would not have fridges to keep food fresh, television to entertain or even cars to travel in. A world without science would mean that we would still be living in a very different way to that of what we live today. Science is based on curiosity and how to's. In fact, we are natural Scientists watch children and you will see that young children play like Scientists work, with investigation. Today science influences so many different things that trying to list them all would mean this page could go on forever. Science has influenced the medical industry that today reduces thousands of deaths every day. Science is about a whole lot more than that and to sum it up we believe that science is a way of helping the brain grow in finding new knowledge and helps us defeat our curiosity of how the world develops and works today. Science is important because it has helped form the world that we live in today.

One of the oldest academic disciplines, physics is a natural science whose goal is to understand how everything works at its most fundamental level. Physicists study nature on scales as small as an atomic nucleus to as large as the observable universe. Physics is the cornerstone of the other natural sciences and is essential to understanding our modern technological society. At the heart of physics is a combination of experiment, observation and the analysis of phenomena using mathematical and computational tools. UNESCO recognised this fact and declared two 2005 as The World Year of Physics (WYP) & 2015 as International Year of Light(IYL) related to science especially Physics.

II. CONTEXT

2.1 The World Year of Physics(WYP) - The General Assembly of United Nations recognised the year 2005 as WYP for

- Recognizing that physics provides a significant basis for the development of the understanding of nature,
- Noting that physics and its applications are the basis of many of today's technological advances,
- Being aware that the year 2005 is the centenary of seminal scientific discoveries by Albert Einstein which are the basis of modern physics,

The World Year of Physics is a worldwide celebration of physics and its importance in our everyday lives. Physics not only plays an important role in the development of science and technology but also has a tremendous impact on our society. WYP aims to raise the worldwide awareness of physics and physical science.

The United Nations has declared 2005 to be the International Year of Physics. This declaration coincides with the 100th anniversary of physicist Albert Einstein's "miraculous year." In 1905, Einstein wrote three of his most famous scientific papers. These legendary articles provided the basis of three fundamental fields in physics: the theory of relativity, quantum theory and the theory of Brownian motion.

The World Year of Physics (WYP 2005) is a worldwide celebration of physics and its importance in our everyday lives. Physics not only plays an important role in the development of science and technology but also has a tremendous impact on our society. WYP aims to raise the worldwide awareness of physics and physical science. 2005, the International Year of Physics, marks the centenary of Albert Einstein's "Miracle Year" and the fiftieth anniversary of his death.

It was in 1905 that Einstein published four articles in the German monthly Annalen der Physik, which not only revolutionized physics and our understanding of the universe, but also changed our world. On a Heuristic Viewpoint Concerning the Production and Transformation of Light postulated the hypothesis of light quanta. On the Motion of Small Particles Suspended in a Stationary Liquid According to the Molecular Kinetic Theory of Induction explained Brownian motion. On the Electrodynamics of Moving Bodies is regarded as the seminal text of the theory of relativity. Does the Inertia of the Body Depend Upon Its Energy Content? looked at the consequences of the theory of relativity and introduced the most celebrated equation in physics: E = mc2. In April of the same year Albert Einstein finished writing his thesis A New Determination of Molecular Dimensions and defended it successfully in July.

The Miracle Year came in the middle of the period – from 1902 to 1909 – in which Einstein, possessing an undistinguished educational record and unable to obtain a teaching job in a university, was working as a technical assistant at the Swiss Federal Patent Office in Bern. Examining patent applications clearly did not absorb all Einstein's energies, as in the course of those seven years Einstein had some two dozen articles on theoretical physics published in the Annalen. Some commentators have even suggested a connection between his work on relativity and the problem of synchronizing clocks, a thorny one at the time, which accounted for a large number of Swiss patent applications. Later, Einstein was to write: "A profession with practical purposes is a delight for a man such as I; an academic career requires young researchers to produce science, and it takes a strong character to resist the temptation of superficial research.

Einstein the Inventor - Einstein's outstanding contribution to science needs no further words from WIPO Magazine. Less well known is that Einstein was himself an inventor with many patents to his name. Among other inventions, he and his pupil, Leó Szilárd, motivated by the death of a family from toxic fumes from their gas refrigerator, patented new types of refrigerators. The patent rights sold to companies such as Electrolux in Sweden provided Einstein and Szilárd with a livelihood for a few years. Einstein's refrigerator was never commercialized, however, largely because of the Depression and the invention of chlorofluorocarbons. But recently there has been renewed interest in the system, as certain features could potentially suit it to use in remote locations or developing countries: it cannot wear out as it has no compressor nor moving parts; it can operate without electricity, requiring only a source of heat; and the cost of manufacture would be relatively low. Time will tell whether Einstein's and Szilárd's invention ever sees commercial exploitation. It stands today as an intriguing example of a little gem preserved by the patent information system, providing an insight into the practical side of one of the greatest minds of the modern age.

2.2 International Year of Light (IYL) - Light plays a central role in human activities. On the most fundamental level through photosynthesis, light is necessary to the existence of life itself, and the many applications of light have revolutionized society through medicine, communications, entertainment and culture. Industries based on light are major economic drivers, and light-based technologies directly respond to the needs of humankind by providing access to information, promoting sustainable development, and increasing societal health and well-being. As light becomes the key cross-cutting discipline of science and engineering in the 21st century, it is essential that the brightest young minds continue to be attracted into careers in this field.

All fields of science are based on the theories of light and its interaction with matter, and light is one of the main messengers in our understanding of the Universe and the subatomic world. The history of the study of light spans centuries, and has involved virtually all the major figures of science. And it was the 20th century that saw the birth of the modern theory of light, the invention and application of lasers, the widespread deployment of photonic devices to improve society, and the full appreciation of the fundamental place that light occupies in the fabric of space and time. The spectrum of light from X-rays to infrared lasers provides technologies that underpin our lives, optical technologies have revolutionized medical diagnostics and treatment, and light and photonics are poised to become the key enabling technologies of the future.Light is the means by which human beings see themselves, each other, and their place in the Universe. Light is an essential part of culture and art and is a unifying symbol for the world. An International Year of Light is the ideal instrument to ensure the necessary increased worldwide awareness of the central role of light in the present and in the future of us all.

An International Year of Light will coordinate international and national activities in order to achieve the following goals.

- Improve the public understanding of how light and light-based technologies touch the daily lives of everybody, and are central to the future development of the global society.
- Build worldwide educational capacity through activities targeted on science for young people, addressing issues of gender balance, and focusing especially on developing countries and emerging economies.
- Enhance international cooperation by acting as a central information resource for activities coordinated by learned societies, educational establishments and industry.
- Focus on particular discoveries in the nineteenth and twentieth centuries that have shown the fundamental centrality of light in science.
- Highlight the importance of research both into the fundamental science of light and its applications, and promote careers in science in these fields.
- Promote the importance of lighting technology in sustainable development, and for improving quality of life in the developing world.
- Highlight and explain the intimate link between light and art and culture, enhancing the role of optical technology to preserve cultural heritage.
- Maintain these goals and achievements in the future beyond the International Year of Light.

An International Year of Light will contribute significantly to fulfilling the missions of UNESCO to the building of peace, the alleviation of poverty, to sustainable development and intercultural dialogue through education, science, culture, and communication.

III. CONCLUSION

The initiatives taken by UNESCO for creating awareness among public by announcing WYP and IYL are discussed in detail in this paper.

REFERENCES

[1]. https://cdn.ymaws.com/www.eps.org/resource/resmgr/events/EPS_IYL2015prospectus.pdf
[2]. https://www.aps.org/publications/apsnews/200408/wyp.cfm


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People’s Science Movements & Wars in India

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Abstract - People's science movements in India have been viewed in terms of two opposite cultures: taking the scientist's science and technology to the people and opposing the scientist's science and technology for the people. This article provides a critique of science epistemologies behind those two cultures that has led to the so-called science wars among scholars. The article shows up the myth of science wars in India by identifying a common platform for both sides.

Keywords: PSM

I. INTRODUCTION

Several grass roots groups coming from a mixture of ideological traditions are part of what has been called the People's Science Movements (PSM) in India. PSM defy definition because they are diverse in size, strategy, focus, and history. The group size varies from a band of few individuals in one area to over 30,000 in other areas. While some are recent, others go back to over 40 years. Some groups focus on a single issue, while others cover a vast range. Some work on reducing disparity in scientific knowledge, while others promote an alternative development model, based on local Indian science and technology (S and T). The core set which brings various groups under the umbrella of PSM is working on the issue of S and T in society and is not a direct division of Indian government. All these groups have given PSM a voice in the media and political arena. Since the 1990s, some PSM groups have been invited to make presentations at the annual sessions of the Indian National Science Congress, which has been a platform for projecting national goals for the application of science. Some groups which represent PSM are: All India Anti-Imperialist Forum, All India People's Science Network, Azadi Bachao Andolan, Bharat Jan Andolan, Bhopal Gas Affected Working Women's Union, Chilka Bachao Andolan, Chipko Move ment, Eklavya, Friends of Rural Society, Ganga Mukti Andolan, Himalaya Bachao Andolan, Jan Vikas Andolan, Kerala Sastra Sahitya Parishad (KSSP), Kishore Bharati, Manav Vahini, Medico Friends Circle, Mines Minerals and People, Movement in India for Nuclear Disarmament (MIND), National Alliance of People's Movement, Narmada Bachao Andolan, National Fish Workers Forum, Patriotic People for Science and Technology (PPST), Sahayog, Samajwadi Jan Parishad, and Vigyan Siksha Kendra, among others. These groups are committed to different notions of S and T in society and thus encapsulate a diversity of activities. Yet, their activities have been framed in terms of two cultures that have led to what some have called the 'science wars' in India.

One school has been viewed as seeking to disseminate the worldview of modem science among traditional people to generate what the late prime minister Nehru called the 'scientific temper'. In sharp contrast, the other school has been viewed as opposing development based on modern S and T that is impoverishing the majority to keep what has been called the 'humanistic temper'. This article argues that there is a myth about science wars in India because the two cultures problem suggests that versions of reality should be on on either side in serious conflict, whereas the PSM works on a common platform. Without two sides that are dramatically opposite of each other that cannot be reconciled, there cannot be science wars. First, the article identifies PSM as a new type of social movement, so objectives, modes of action, and compositions of activists are differentiated from movements associated with the Left. The article then discusses various political activities of PSM to show diversity on issues related to S and T in society and how their actions are making a difference. Finally, the article addresses the science wars, which have occupied much scholarly attention since the mid-1990s.

PSM as New Social Movement - Like peace, environmentalism, feminism, human rights, and gay rights, PSM in India fall in the category of 'new' social movements. Social movements need redefinition because the conflicts of the 1980s have revealed new contradictions. New social movements can be defined as "a form of collective action (a) based on solidarity, (b) carrying on a conflict, (c) breaking the limits of the system in which action occurs."

Other researchers defined new social movements as "an agent of conflict for the social control of the main cultural patterns." In some significant respects, PSM constitutes those new social movements because they differ in their objectives, modes of operation, and composition of activists from movements historically associated with the Left such as the Tebhaga struggle in 1946, the Telengana peasant uprising in 1948, the Naxalbari upheavals in 1967, and the railway workers revolts in 1974. First, PSM does not work towards the central goal of destroying existing political structure nor are new ones built after the victory in which economic exploitation of one class by another class is done away with. Instead, PSM work on diverse issues such as: the development of S and T for people, protection of natural environment and forests, opposition to mega projects of global corporations and the World Bank, improvement in the conditions of life and health, building cultural identity, promotion of scientific knowledge among the common people, research related to people's health, innovation in scientific communication, and rediscovering Indian heritage. It seeks to identify a set of focused objectives within PSM because they consist of many voluntary groups throughout India.

The only common thread uniting these groups is that they fall on the interface of S and T in society and are not a direct division of government. Second, the agenda of PSM is not to target the state by forming trade unions or political parties of the socialist or communist type to win state power by elections or underground activities. Instead, PSM focuses on grass roots activities by forming

loose associations. Their organisational structure is rather decentralised, lacking regulation, differentiation, control, and power. Their officials and members consist of voluntary workers who rely on nominal donation. They publicise their causes by speaking publicly and demonstrating against governmental policies. Many groups use art, songs, poems, dances, puppet shows, and plays to wage their struggles.
Third, activists in PSM do not view themselves in terms of a class, that is, a group defined by a socio-economic condition or in relation to the means of production such as the working class or the feudal landlords. Most activists come primarily from the educated middle classes, and hold employment as scientists, engineers, technologists, policy analysts, journalists, or teachers. Many are students of science or engineering. However, their middle-class background does not determine the stakes of their action. They speak on behalf of people of India who are poor, small peasants, agricultural labourers, rural artisans, craftsmen, tribal people, and urban workers. Their demands are class-unspecific. This, however, does not mean that PSM have no connection with the Left politics. In fact, KSSP, one of the largest groups in PSM, had early linkages with the Communist Party of India (Marxist).
Similarly, many PSM activists have Marxist or Maoist orientations. The very term 'people' in PSM is a Marxist categorisation of disempowered workers and peasants. A movement, which consists of many groups working on diverse issues related to the use of S and T in society, is bound to be shaped by a wide range of thinkers including Marx, Lenin and Mao. However, PSM view class structure as an important but not sufficient to analyse the Indian society. PSM are rooted in the middle classes and their goals are class-unspecific and diverse. Their modes of action are based on grass roots activities that are informal, spontaneous, and legal. Mahatma Gandhi's philosophy of non-violence, tolerance, spirtiualisation of politics, and self-reliance influence many PSM activists. Even though PSM go along with the status quo, they advocate for changes in structured inequality and empower people to stand for themselves.
Science Wars - Much of the science practised throughout the world draws on the basic principles, formulae, and concepts that were elaborated, among others, by Copernicus, Galileo, Newton, Harvey, Boyle, Bacon, and Descartes in Europe between 1500 and 1700. The knowledge of the scientific revolution replaced ancient teachings of Ptolemy, Aristotle, and Galen. Today, modern science is understood as the application of mathematical hypotheses to nature, the combination of mathematics with experiment, the distinction between primary and secondary qualities, the geometrisation of space, and the acceptance of the mechanical model of reality. Modern scientific methods mean systematic reasoning, critical observation, logical thinking, proof/verification, objectivity, and honesty in recording observations and experimental results. Philosophy of science, which dominated until the 1970s, accepted the basic premise of modern science and suggested that it is the autonomous pursuit of knowledge. Generally, science is understood as neutral, independent of social, cultural, and political factors, which is produced according to rational or cognitive factors. If social or cultural factors enter in the scientific discourse, they are viewed as creating bias. Against such ideology, scholars in science studies have proposed that scientific knowledge is influenced by social and cultural factors and thus deviates from the traditional ethos of science. They believe that decisions on scientific methods are shaped by disciplinary cultures, availability of funds, networking politics, and so forth. Instead of the institution of science, they focus on the conduct of science such as facts, theories, methods, technical designs, and experiments to show how social context is essential in the scientific activities.
Some science studies scholars have also challenged the Enlightenment's faith in universal knowledge. They go beyond social factors shaping scientific activities and propose that science itself is social. They believe that all claims about nature, world, and physical reality are social and cultural constructs, and the world beyond one's observations does not exist. They view modern science as ethno-science of the west, which far from being neutral and objective, reflects the dominant ideologies and power relations of western cultures. Instead of modern science, they believe in 'standpoint epistemologies' or 'subjugated knowledges'. a physicist, published an article supporting cultural critiques of science in Social Text only to reveal that his article was a parody. His affair was carried on the front page of The New York Times, followed by many other publications and by the news radio in the US and around the world Unlike science studies, social and cultural factors do not influence the core of science or the truth of scientific propositions. They find modern science as objective, neutral, value free, and progressive. They think that science corresponds to truth about nature because of facts, logical reasoning, scientific methods, experimental validity, disinterestedness, and impersonal standards. They believe that there is a world out there, existing independently of the knower, which is accessible through science. Nanda (1998) goes one step further and proposes 'modern science without apologies' for India. She argues that the cultural position that prescribes non-western science for India as the worst form of colonial condescension. There are serious problems in the furore over science studies. First, defenders of science talk about the principles of scientific investigation yet do not apply the same principles to dismiss science studies. Instead of empirical investigations or case studies, they dismiss science studies with caricature, condescension, and parody. They portray critics of science as 'the bible of North American science', 'doctrinaire', 'eco-apocalyptic rhetoric', 'goddess worshipping', 'hotbed of postmodern irrationalism', 'hostile', 'ideological', 'left's disenchantment with science', 'muddleheaded', 'nonsensical thesis', 'radicals', 'sloppy thinking', 'too marginalised to change the world', 'refugee from an unsatisfactory scientific career', and so forth. They do not acquire detailed knowledge of science studies but proceed to judge it anyway. They fail to address how science studies have established themselves in the last 30 years and why they have a large following in universities both in the US and around the world. They do not provide a 'scientific proof' why scientific epistemologies are necessarily better than alternative ones; instead, they keep reiterating their ideological convictions. Second, even though defenders of science do not find a theoretical core among the critics of science, they still refer to them as constituting 'the academic

left'. Marxists, postmodernists, environmentalists, feminists, multiculturalists, social constructivists, post colonialists, Afro-centrists, AIDS activists, and poststructuralists - all are lumped together as belonging to the Left.
The minimum requirement of being a part of left-wing politics is to believe in the class analysis of a society. The Left views S and T only as one important factor affecting social change, and not the factor. Most of the groups listed by defenders of science concentrate only on the issues at hand and seldom function within the broader class analysis. Instead of class, there is mostly gender and race mantra in science studies. Further, a majority of those singled out by defenders of science rarely count themselves as a part of left politics.
Third, science studies are more than just promoting cultural relativism. A field, which has evolved in the last 30 years with extensive theory and research, is bound to have some scholars who believe that sciences are epistemologically relative to each and every culture's beliefs. But this is certainly not true for all scholars in science studies. has shown that most science studies scholars are like natural scientists in that both assume a real, material world beyond their observations. Many scholars in science studies believe that observations are shaped by social factors or structured by cultural categories, but they are, at the same time, shaped and structured by an external reality. Instead of assuming the supremacy of modern science, however, they argue that other knowledge claims deserve the same respect. Such investigation is likely to offer a basis for deciding which claims one should believe in and why. Finally, it is important to point out that science has become an integral part of modern society and the goals of science studies is to provide a forum for discussion on the social and ethical dimensions of scientific activities. Because of such role science studies are not always popular. Yet, science studies have acquired prominence and established themselves by showing the role of society, culture, race, gender, and class in scientific activities, which defenders of science are refuting. If modern science was not limited in its scope and had developed its own scientific methods to remove value, it would not be open to interpretations by science studies. Nonetheless, the critique of science is a matter of science practice. It appears that too much has been made of two little of the science wars.

REFERENCES

[1]. Bone 1996, Claudio 1996, Kimball 1996, National Public Radio 1996, Scott 1996, http://weber.u.washington.edu/-jwalsh/ sokal.


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Our Changing Earth

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Abstract - Earth is a very unique planet. It is currently the only planet in our solar system capable of sustaining life. It has liquid water, plate tectonics responsible for the movement of our continents, and an atmosphere that protects Earth's inhabitants from the harsh rays of the sun. However, Earth was not spontaneously created this way. Over a course of millions of years Earth has changed and, oddly enough, the life that it hosts has had a huge impact in its development. This article contains the changes occur on earth and steps to be followed to protect biodiversity.

I. INTRODUCTION

Although we do not know much about Earth, science continues to prevail and it continues to make breakthroughs. These breakthroughs allow us to catch a glimpse of what Earth used to be like before humans inhabited it, even afterwards. As the years go on our methods improve and we are able to not only eliminate many theories and narrow it down but organize the events that happened. Once we know the order we get closer to uncovering the secrets that muddle Earth's past.

Studying the Earth's history and how past human populations interacted with it gives us valuable insight into contemporary environmental changes. By studying key areas such as; landscape evolution, geochronology, geological influences on past climate, palaeoclimates, palaeoecology and palaeontology, our experts can identify trends in the data that may pave the way to action that could mitigate climate change.

II. CONTEXT

2.1 Climate Change - Climate is sometimes mistaken for weather. But climate is different from weather because it is measured over a long period of time, whereas weather can change from day to day, or from year to year. The climate of an area includes seasonal temperature and rainfall averages, and wind patterns. Different places have different climates. A desert, for example, is referred to as an arid climate because little water falls, as rain or snow, during the year. Other types of climate include tropical climates, which are hot and humid, and temperate climates, which have warm summers and cooler winters.

Climate change is the long-term alteration of temperature and typical weather patterns in a place. Climate change could refer to a particular location or the planet as a whole. Climate change may cause weather patterns to be less predictable. These unexpected weather patterns can make it difficult to maintain and grow crops in regions that rely on farming because expected temperature and rainfall levels can no longer be relied on. Climate change has also been connected with other damaging weather events such as more frequent and more intense hurricanes, floods, downpours, and winter storms.

In polar regions, the warming global temperatures associated with climate change have meant ice sheets and glaciers are melting at an accelerated rate from season to season. This contributes to sea levels rising in different regions of the planet. Together with expanding ocean waters due to rising temperatures, the resulting rise in sea level has begun to damage coastlines as a result of increased flooding and erosion.

The cause of current climate change is largely human activity, like burning fossil fuels, like natural gas, oil, and coal. Burning these materials releases what are called greenhouse gases into Earth's atmosphere. There, these gases trap heat from the sun's rays inside the atmosphere causing Earth's average temperature to rise. This rise in the planet's temperature is called global warming. The warming of the planet impacts local and regional climates. Throughout Earth's history, climate has continually changed. When occurring naturally, this is a slow process that has taken place over hundreds and thousands of years. The human influenced climate change that is happening now is occurring at a much faster rate.

Earth's biodiversity is its most valuable and most necessary resource. Biodiversity is the primary source of Earth's biosphere – the life web that produces everything humans need most: food, water, many modern medicines, and air. While other planets are likely rich in minerals of high monetary value here on Earth, no other planet that we know of have the conditions necessary for human civilization.

2.2 Earth's biodiversity is the very basis for our own survival - This is demonstrated repeatedly, across the planet, at the macro and microscopic scale. Without plants, there would be no oxygen. Without bees, many of our crops would vanish. Other benefits of biodiversity are even more fundamental. The hardwood trees in the rainforests that are our most effective above-ground carbon sinks are also the product of the relationship between seeds and the fruit-eating animals that eat them. Trees are up to 500x more likely to germinate when the seeds have first passed through the digestion system of a bat, monkey, or elephant.

Microscopic biodiversity in our soils creates the chemical conditions necessary for healthy, abundant, and sustainable crops. Many new medicines are found in nature, including cancer fighting fungi and pain killing tree resins.

The current projection for biodiversity is grim. In a recent report by the United Nations, an international coalition of scientists concluded that within the next 80 years, we are on track to lose over one million known species. That is one species in eight. In addition, the populations of individuals species have plunged. Tigers have lost 97% of their populations, migratory birds are estimated to have lost approximately 70% of their populations. In the span of only a few decades, the biomass of humans and our livestock has come to total 24x more than that of all other wild mammals!

The single biggest threat to biodiversity is habitat loss, linked to food production on land and in the sea. Biodiversity needs space to survive. Every animal needs a home. That home is wilderness. When we remove wildlands and convert them into industrial production spaces, we simultaneously subtract the landscapes needed for life production. The landscapes we depend on are for our own survival.

When we lose biodiversity, we reduce our ability to fight climate change, grow sustainable and healthy crops, have access to clean and abundant water, prevent pandemics, and plan for a future for our children and grandchildren.

Steps to be Taken to Protect Biodiversity - Humans need wild nature in order to survive. The best solution for fighting climate change and ending the extinction crisis is to set aside enough space for nature to support healthy biodiversity. That means protecting at least half the planet's land and and seas. Scientists conclude that if we do so by 2030 we can successfully avert the worst of the climate and extinction emergencies

Protecting the planet at that scale may seem like a huge task, but in fact, this is a historic opportunity for us to transform the way we live with nature. Because we must protect half the entire planet, that means every region, every community, every individual is on the frontlines of conservation. You are on the frontlines of conservation, and you can make a difference.

The challenge is that while we need biodiversity and biodiversity needs us, most people around the world still don't know about the critical importance of wildlands and the biodiversity they support. You can help change that and spark new hope for the future. When you share with your friends, families, and networks about biodiversity, you expand the possibility for a healthy and wild future, and give new reason to hope.

2.3 Extreme Events - Extreme events are defined as unusual and rare events. They are so intense or out of place that they get special mention. Heatwaves, extreme rainfalls, floods, thunderstorms, typhoons, hurricanes, tornadoes, tropical cyclones, hailstorms, storm surges, droughts, and wildfires are all extreme events. Many weather and climate extremes happen naturally, but climate does change where and how often some extreme events take place, and how strong those events are. Some extreme events are already happening more often, are more intense, and will continue to worsen.

Climate change is increasing the frequency, severity, and impacts of some extreme events. The world has already warmed an average of 1.1°C since the late 1800s. Because of Earth's changing climate, we can expect hotter heatwaves, drier droughts, stronger storms, and more extreme rainfall.

A warmer and wetter atmosphere can hold more water—about 7% more water for every degree of warming. The extra heat and water in the atmosphere mean that there is more energy for storms that generate intense rainfall. As a result, we expect more intense rainfall in the future, with increased floods and damage to structures like buildings and roads. Climate change also increases the risk of coastal flooding due to higher sea levels and more storms.

Some extreme events have already been affected by climate change. Wildfires are now more dangerous and fire seasons have lengthened. Climate change has also already increased how often heatwaves happen. If we want to protect ourselves and our planet from a future full of many more extreme events, governments around the world must plan to rapidly stop deforestation and the burning of coal, oil, and gas. These activities have been driving climate change over the past century and contributing to the increased risk of extreme events. The world must pull together to create a future in which extreme events, and the damage they cause, remain relatively rare.

III. CONCLUSION

We, as humans are impacting the earth in multiple ways and it is our responsibility to be aware of this impact and mitigate its damage. Our researchers look at the physical, biological, and chemical processes that drive this impact, including; pollution, environmental tipping points and thresholds, ecosystem service quantification/valuation, environmental restoration and management.

REFERENCES

[1]. https://www.meri.manchester.ac.uk/research/themes/our-changing-earth-system/

[2]. https://kids.frontiersin.org/articles/10.3389/frym.2022.682759

[3]. https://wild.org/biodiversity/?utm_source=google_cpc&utm_medium=ad_grant&utm_campaign=awareness_india&utm_term=biodiversity%20definition&gclid=Cj0KCQiA0oagBhDHARIsAI-BbgdiMnqsbps2RN0r-XLZajXADRLEjczt-ng26_YO2_pLPKgcmzwW-0waAhE-EALw_wcB

Indian Health Innovation System - An Overview

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Abstract - Biomedical innovation requires scientists, engineers, and managers with the right mix of skills; publicly supported research with strong links to industry; financing for product development; access to technology; rigorous but supportive regulation; functioning infrastructure; and, of course, markets for products. These elements are in place in India to varying degrees, but important gaps remain. Although India has quite a strong tradition of public-sector scientific research, links to industry are weak, with the result that relatively few technologies developed by public-sector researchers are successfully commercialized. This paper contains an overview of innovation system in health in our country

I. INTRODUCTION

For their part, the private Indian pharmaceutical and biotech industries are thriving, but they have, at least until recently, focused mostly on production of generic drugs or versions of existing vaccines and diagnostics rather than on innovation. R&D financing is another important constraint, as there is still little private equity or venture capital investment in early-stage biomedical projects in India. New government programs providing grants and soft loans to industry have helped fill this gap and are particularly important for neglected disease projects, which have little commercial potential. International funding has been important for late-stage clinical trials of several vaccines.

One barrier to R&D often cited by industry executives is a regulatory system that is poorly equipped to oversee the development and approval of new products. Regulatory obstacles are particularly severe for products based on genetic engineering and biotechnology, which require review by several different agencies. According to firms, regulators often lack familiarity with the relevant science. The pull of public-sector markets as an incentive for product development has been limited by low prices; slow adoption of new products, especially vaccines; and lack of clear signals on new technology priorities for future procurement.

The Indian government has launched a range of initiatives to address these weaknesses in the biomedical innovation system, but in most cases it is too early to assess their impact.

II. CONTEXT

Vaccines - India's vaccine R&D capacity is growing and it is now in a position to make important contributions to the development of needed new vaccines. The Indian vaccine industry began as a network of state-owned manufacturers supplying basic childhood vaccines to the national immunization program. In recent decades, a number of privately owned firms have grown rapidly, developed the capacity to produce more sophisticated vaccines, and become important suppliers to other low- and middle-income countries, in particular through UNICEF and the Pan American Health Organization. Total revenues of India's vaccine companies have reached about $500 million and are projected to grow at more than 10 percent per year. Both the Indian market and Indian vaccine companies remain small in comparison to U.S. and European markets and to the largest multinational firms—the largest international vaccine manufacturer, Glaxo SmithKline, alone earned more than $6 billion from its vaccines business in 2010.

Exports account for more than 40 percent of the Indian vaccine industry's sales. Unlike Indian drug firms, however, the nation's vaccine companies have not yet gained access to the U.S. and European markets and remain largely focused on public-sector and UN markets in low- and middle-income countries.

In R&D, the leading firms have moved from process development and incremental innovation in combinations and formulations to the development of new vaccines and have developed expertise in recombinant technology. Across the industry, a dozen or so new vaccines—against rotavirus, Japanese encephalitis, typhoid fever, malaria, rabies, and influenza—are in clinical development. Many more projects are at earlier stages, including efforts on dengue, chikungunya, and cholera.

Important limitations remain, however. No Indian firm has ever developed a truly new, first-in-class vaccine: the industry's current products, as well as most of the vaccines in its R&D portfolios, are based to varying degrees on licensed vaccines. Indian industry has little experience with the large-scale community-based clinical trials necessary to prove efficacy of new vaccines, and it remains relatively weak in vaccine discovery. And although there are promising vaccine research projects underway at a few public research institutions, ties between public sector researchers and the vaccine industry remain weak, and companies have, in most cases, relied on technology acquired from abroad. A notable exception is the rotavirus vaccine developed at the All India Institute of Medical Sciences and now in advanced clinical trials with Bharat Biotech International.

Continued financial and technical support from international partners, as well as further financial support from the Indian government, will be important to achieving these goals. These partnerships can help overcome remaining capacity constraints and facilitate access to technology, as well as make development of vaccines with small or modest markets commercially viable. Although Indian firms are willing to pursue products with markets that would be too small to interest the big multinationals, they cannot afford to develop vaccines for the most neglected diseases—chikungunya or typhoid fever, for example—without substantial subsidy. The prospect of donor-subsidized sales through GAVI is a powerful inducement for these firms, but only a subset of needed vaccines are included in GAVI's portfolio. Some up-front subsidy is also necessary for vaccines such as rotavirus, despite the GAVI market, as most Indian firms do not have access to the capital to finance the needed large clinical trials. This report includes an in depth-look at rotavirus vaccine development in India.

Drugs - Unlike the vaccine companies, Indian drug firms show little interest in developing new drugs against neglected diseases, although they remain crucial suppliers of affordable medicines to India and to other low- and middle-income countries.

The Indian drug industry is considered a success story for Indian industrial policy. Sheltered by India's decision in the 1970's not to award product patents on drugs and to restrict foreign participation in the industry, Indian companies developed expertise in drug process development and low-cost production, laying the groundwork for a thriving generic drug industry that has continued to expand since the implementation of product patents in 2005. Several Indian firms have won approval for their drugs in the United States and Europe, and India is now the world's fourth-largest supplier of generic drugs. The pharmaceutical industry brings in about $20 billion a year, with more than $8 billion coming from exports.

A widely shared expectation that the Indian drug industry would shift toward a more R&D-based model after India changed its patent laws in 2001 has not been fully met, however. Although the leading firms have increased R&D spending in the past decade, levels of investment remain relatively low, averaging 8 percent of sales compared with 10 to 20 percent of much larger sales for the big multinationals. Moreover, most firms have drawn back from new drug development, focusing instead on R&D related to their thriving generic businesses. At the same time, a contract research industry focused primarily on process and analytical chemistry and on clinical trials had grown rapidly in recent years.

Lucrative international markets for generic drugs promise quick returns for shareholders, and there is little incentive for Indian firms, most of which are publicly traded, to refocus their efforts on neglected diseases. In addition, their skills in drug discovery are limited, and the R&D efforts of both the large generic producers and the contract research organizations are focused primarily on products with global markets. There are some notable exceptions—for example, Ranbaxy Laboratories recently launched a new malaria drug initially developed in collaboration with the Medicines for Malaria Venture.

Although it seems unlikely that Indian drug firms will develop new drugs for neglected diseases on a commercial basis, even with Indian government or international subsidy, these firms are well-placed to develop needed new formulations and combinations of existing drugs. For example, Indian firms are continuing to take the lead in developing new fixed dose combinations of HIV drugs. Moreover, Indian firms can contribute to international R&D initiatives on a fee-for-service basis in aspects of R&D where they have expertise and enjoy cost advantages, for example in chemical synthesis. In fact, an Indian contract research organization was recently named a preferred provider to a consortium of global health product development partnerships.

Public-sector institutes, in particular the Central Drug Research Institute, are pursuing a range of drug R&D projects for both infectious and noncommunicable diseases. Some projects for neglected diseases are now being conducted on open-source basis, but it is not yet clear what form partnerships with industry will take for these projects or whether this will yield new products.

Diagnostics - There is considerable potential for India to contribute quickly to the development of new locally adapted diagnostics for both infectious and noncommunicable diseases.

India's in vitro diagnostic industry comprises a set of established firms with broad portfolios of tests based on established technologies, including serological tests for a range of infectious diseases, as well as a handful of more innovative small companies. Although the R&D capacity of India's test developers, like that of its drug and vaccine industries, still lags well behind international leaders, these firms have the expertise to bring to market tests based on established platforms relatively cheaply when appropriate biomarkers are available. A few Indian firms may also be able, with technical and financial assistance, to develop new diagnostic platforms that could be more affordable and require less infrastructure than existing products. An intriguing case is the new point-of-care nucleic amplification system being developed by Bigtec Labs in collaboration with the Tulip Group.

Diagnostics are a particularly promising area for India firms because the cost and time required to develop a new in vitro test is in general substantially lower than that of bringing a new drug or vaccine to market. This, in turn, lowers financial barriers and makes products for relatively small markets in developing countries commercially viable. Another positive factor for diagnostics development in India is that there appears to be more productive collaboration between the public-sector laboratories and industry. A number of tests initially developed in the public sector have been successfully commercialized, including dengue and hepatitis C tests developed at the International Center for Genetic Engineering and Biotechnology in New Delhi, and many institutes are working on diagnostics for neglected diseases. Lack of clarity about regulatory standards and processes for assessing new diagnostic tests, in India and at the international level, is an important barrier to diagnostic R&D in India.

Although this report focuses on infectious diseases, managing the growing burden of noncommunicable diseases in India and other low- and middle-income countries will also require a range of more affordable new diagnostics, including point-of-care tests requiring little training or infrastructure. Working together and with help from government and international technical partners, India's researchers and diagnostic companies should be in a good position to develop and supply many of these tests. This report also includes a short case study of tuberculosis diagnostics development in India.

III. CONCLUSIONS AND RECOMMENDATIONS

This analysis conveys a mixed picture. On one hand, the capacity of Indian firms—and of the Indian biomedical system as a whole—to create and bring to market new health technologies is still limited in important ways. On the other hand, there are already important areas of strength, and, in general, capacity is growing. Indian firms require subsidy of some kind to work on products with very small markets, such as leishmaniasis or typhoid fever, but there does seem to be a class of useful neglected disease products that these firms see as commercially viable. Crucially, there are big differences across product types and stages of R&D. The greatest opportunities for neglected disease R&D are probably in vaccines and diagnostics. Although firms in these areas are smaller than the leading drug manufacturers, they are investing in R&D and are interested in at least some neglected disease products. The drug firms, in contrast, are primarily focused on building their generic drug businesses and on global markets.

Indian companies are most able to contribute in three ways: by developing more affordable or locally adapted versions of existing products; by bringing to market some new products to which technological barriers are not too high; and by participating in specific aspects of international product development initiatives in areas where they have a cost or other advantage. The Indian government and international partners can help strengthen Indian health R&D capacity and ensure that this capacity is used to meet public health needs in India and other developing countries through action in four areas.

First, both the government and international donors should expand financing for promising neglected disease product development projects, including for late-stage clinical trials and for new, innovation driven firms. Joint financing schemes, such as the existing collaboration between the Department of Biotechnology and the Welcome Trust, are a promising way to channel international funding for R&D. Second, international partnerships that provide technical assistance and access to technology should also be expanded. Although bilateral partnerships like the Program for Appropriate Technology in Health's assistance to Bharat's rotavirus project have been very useful, access to some technologies and relevant know-how could be shared on a more open, multilateral basis. The "technology hub" for influenza vaccines created by the World Health Organization (WHO), which made production know-how available to developing country manufacturers, is one possible model. In addition, shared resources, such as sample banks and intellectual property landscapes in key technology areas, could accelerate product development. Third, both the Indian government and international health donors and procurement agencies could give neglected disease product development a big boost by sending clearer signals about the products they wish to buy, technical standards that will have to be met, and approval and procurement procedures. This is particularly true for diagnostics, where product needs and assessment processes have not been well defined either in India or by relevant international agencies and donors. Greater coordination between the public health and research-funding agencies of the Indian government is also important. Fourth, the Indian system for regulating pharmaceutical and biotechnology R&D needs to be streamlined, and systems and capacity for evaluating new technologies strengthened. Although some arms of government recognize this need, and promising initiatives are underway, progress has been slow so far. At the same time, international systems for assessing and recommending products, especially WHO's prequalification program for diagnostics, need to be expanded so they can handle more products more rapidly.

About PAGE

The PAGE, Physics club of Avanigadda GDC, Standing for Excellence and Striving for Better Pace has been very active since its establishment on 19th November, 2021with 115 members globally. Our club activities are varies and impactful, with a focus on promoting energy conservation, environmental sustainability and STEM education. The PAGE celebrated significant days like National energy Conservation Day, International day for the preservation of Ozone Layer not only for a single day but for one week to bring more awareness among the public with its variety of community awareness activities like e waste collection, hands on programme on energy saving project making, waste thermocol collection and giving it to near by polymer industry for recycling, developing plastic bottle garden, energy production from plants etc. The green audit conducted by the club was commendable as it promoted responsibility sustainable practice.

The national level competitions on the occasion of the National Science Day – 2022 celebrations with financial support of APCOST(Andhra Pradesh State Council of Science an Technology) have helped to showcase the talents and skills of our members on a larger platform.

The government of India started to announce a theme for NSD from 1999 and this year 25th theme. India is celebrating its 75th year of independence as Azadi ka Amrith Mahotsav Keeping these two occasions in mind, the page planned to release a book "75 Years – 25 Dimensions" covering 25 themes of NSD authored by student members of PAGE and it is published by I2OR, International Institute of Organised Research with ISBN number 978-81-961331-0-8. Finally, PAGE will Try to give great credits to GDC, Avanigadda in future and try to keep it as model for other clubs to follow.

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