



Social Science Abstracts

Volume XLIV, 2021

FOCAL THEME

NEW GLOBAL TECHNOLOGICAL SOCIETY



भारतीय समाज विज्ञान अकादमी

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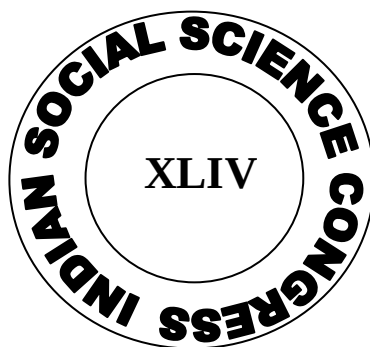
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NEW GLOBAL TECHNOLOGICAL SOCIETY

Edited

BY

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**भारतीय समाज विज्ञान अकादमी
INDIAN SOCIAL SCIENCE ACADEMY**

And

**SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
VIDISHA**



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Views expressed and facts presented in this volume are those of the authours and neither Indian Social Science Academy nor Samrat Ashok Technological Institute are responsible for the same.

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Editors:

D. M. Diwakar
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Date: March 09, 2021
Place: Allahaba

PREFACE

The Indian Social Science Academy (ISSA) resolved to focus deliberations of the 44th Indian Social Science Congress on ‘**New Global Technological Society**’. It set up a National Academic Advisory Committee comprising of Vice-Chancellors, Directors, Eminent Scientists, Philosophers and Social Activists. A note on the focal theme ‘New Global Technological Society’ was prepared and widely circulated. The process of invitation, however, began in late November, 2020 due to Corona Pandemic. Although all Universities, Colleges, Research Institutes, National Laboratories and over 50,000 scientists/teachers from all over India were invited, yet the response is not very encouraging. What is appalling is devastating effect of corona pandemic on education, research and scientists thoughts. Majority of respondents preferred ‘Virtual Mode’ for presentation of their papers and majority of them wanted to participate without papers. However, the Executive Council and the Organizing Committee resolved to limit the deliberations of the 44th Indian Social Science Congress to physical mode of presentation with some exceptions in the case of Plenary speakers beyond 80 years of age.

All papers received till March 08, 2021 have been printed in this Volume. Late papers will be published after the XLIV Indian Social Science Congress is over.

Virtue of Corona Pandemic lies in exposing the dynamics of emerging Global Technological Society. Breakdown of family, community, society accompanied by concentration of wealth in a fewer hands, loss of biodiversity, destruction of economy and increasing global warming and climate change has made survival of 7 billion peoples difficult, on the one hand, and 35% rise in the income of billionares has threatened the very existence of all humans excepting the tiny one percent super rich on the other. Peoples increasing miseries and growing alienation from family, community, society and nature are causing unprecedented strife. Violence, rapes, murders, wanton loot and social chaos are increasing linearly. Rooted in the philosophy of ‘Maximum good of Minimum number’, the Global Technological Society is now revealing its true colour/face. Marketized science has lost its liberating power and has become a tool of political power of oppression. Public health and education system are almost dead. Distinction between real and virtual world is blurred. Scientists seen ignorant of high radiation effects of New Technology on their physical and mental health. Even our scientists, educationists and philosophers are finding ‘Online education and webinar, very charming. Newer forms of New Technology borne mental disease are rising all over the world. Question to ponder is: How do Indian scientists, technologist, educationists, philosophers and social thinkers view ‘New Global Technological Society?’

The present volume provides a glimpse of it. It calls for more serious in-depth enquiry, research and deliberations. It is neither exhaustive nor does it offer any solution. However, it does show that there is now acute need for redefining problems of science and freeing science from politics.

It may be noted that the views expressed and facts presented in this volume are those of the respective authors and that neither the Indian Social Science Academy nor Samrat Ashok Technological Institute are in any way responsible for the same.

Editors:

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WHY SCIENCE IS SOCIAL?

What is science? Science is knowledge, objective knowledge of an object(s)/ a thing(s). Objective means relating to an object or a thing? What is an object or a thing? That which exists independent of human's will is an object or a thing. An object/or a thing can be solid, liquid or gaseous. It can be inanimate/non-living or animate/living. A term matter is used to describe all forms of objects/things. So science is objective knowledge of matter, both, living and non-living.

What is knowledge? Knowledge is answer (s) to questions what? How? And why? of/about a thing/object /matter. All humans ask following questions whenever they come across an object/or a thing:

1. What is it?
2. How is it?
3. Why is it?

Their answers to the three questions constitutes knowledge. Their answers can be correct or incorrect. Correct answers constitute objective knowledge and/incorrect answers define lack of knowledge or ignorance.

Here it is necessary to remember that *knowledge-in-itself*, be it objective or subjective is not the object or *thing-in itself*. That is to say, knowledge is not synonymous to object/thing/or matter. So knowledge is colourless, odourless, weightless, sizeless and shapeless whereas a thing/an object does have colour, weight, size, shape, odour etc. Nevertheless connection between knowledge and object/thing/matter is vital for without it humans cannot build their appropriate relations with it and in the absence of it their survival and growth will become impossible. To be precise science is a mirror of the object/thing to which it is related. Science is concrete as well as abstract.

Science as objective knowledge enables humans to establish their connections with the world in which they live.

Question arises: How do humans acquire objective knowledge of the world in which they live? Answer to it, though looks simple, is actually complex. All humans including non-humans are equipped with sensory-motor mechanism in their bodies (eyes, ears, nose, tongue, skin). Sensory-motor-based knowledge about or of a thing/an object is called 'perception' or 'perceptual knowledge'. Now there is a vast literature on 'perception' or 'perceptual knowledge' in modern psychology. A new branch of science termed 'Cognitive science' is being pursued and propagated in modern science. What the vast literature on 'perception' or 'cognition' shows is that it is less than objective or accurate perhaps because of limited capacity of sensory-motor mechanism. Also, it is susceptible to social influence. This is clear from the literature on 'social perception'. So the humans had to find ways and means to correct the errors and limitations of perception-based knowledge of objects/things. Initially each perception led them to act and in turn each act enabled them to correct their perception. Thus *Perception-Action-Perception-Action* formed the chain for correction in perceptual knowledge. In history of science knowledge is often described as ethno-science. With passage of time humans and their societies grew and in the process ethno-science grew into science. Humans learnt to act in cooperation with each other and share the fruits of their labour together. The collective mental and physical labour led them to discover methods capable of improving their perceptual knowledge. The collective mental and physical labour for understanding the object(s)/thing(s)/matter/produced what is known as science. This can be well understood or well appreciated only through the study of history and philosophy of science since the days of primitive man. But it can also be understood by looking at the modern science which is highly socially organized. Like factory workers thousands of scientists work together in laboratories/research institutes all over the world today.

What is social? An act or result of an act involving two or more than two individuals is called social. Since science is produced by two or more than two individuals, it is social. In other words basic character of science is *social*. What does it mean?

It means that very notion of *science is social*. It means the notions of verifiability, repeatability, reliability, validity, precision, exactness, isomorphism, measurement, methods, hypothesis, inference and theory are social notions. It means there is close connection between society and science and between social conditions and science.

As humans and their societies develop so does science. It also means that proclivity of all humans to social influence and their inability to free themselves wholly from the social and personal prejudices tend to influence objectivity of science. It means science is 'primitive' to some extent and 'precious' to large extent. It is 'primitive' to some extent because it is never cent percent objective. It is, 'precious' to a large extent because there is no other system of better objective knowledge.

What is its implication? It implies that the division of science between science and social science is no longer correct. Today there is no dichotomy between Nature, humans and society or between living matter and non-living matter. Through long and arduous pursuits humans discovered their origin and connections with Nature. Today the term Nature conotes all non-living and living objects including humans and their societies. The 18th century notion of Nature and science or basic science is no longer a valid notion. It might be convenient to fragment science into various subcategories for the sake of study, but it will not serve its social purpose if it is not put together. Science of Nature, therefore, is necessary for modern humans and their societies. Science of Humans and their societies is integral to the science of Nature.

It also means that science is never eternal or static. All objects/things are in constant motion. Since all objects/things keep on changing so does their science. Also, each object is divisible into two because of mutually opposite attributes inherent in it. That is to say, nature of nature, be it non-living or living is dialectical. There is nothing like linearity in Nature. Science, therefore, is dialectical and not linear.

The need for verification and repetition makes science authority free. There is no place for authority in science. Any one and every one enjoys the right to challenge science. Democracy, therefore, is necessary for science. Science grows in democratic conditions and dies in undemocratic or authoritarian conditions.

[Critical comments on this note are most welcome. Those who think science is not social are invited to put their thoughts in writing and send to the General Secretary, Indian Social Science Academy (E-mail-issaald@gmail.com)]

XLIV INDIAN SOCIAL SCIENCE CONGRESS

FOCAL THEME

NEW GLOBAL TECHNOLOGICAL SOCIETY

0100 PREAMBLE

Indian Social Science Academy (ISSA) **in association** with Samrat Ashok Technological Institute (SATI) proposes to focus deliberations of the 44th Indian Social Science Congress on ‘**New Global Technological Society**’ with a view to comprehending its necessity, relevance, validity and potentiality for ensuring sustenance of life on Planet Earth while enabling the people to enjoy higher order of peaceful, material, social, cultural and creative life in harmony with Nature.

0200 CONTEXT

History of origin, evolution of life and the history of development of human, science, technology and society show a very high correlation between Science, Technology and Society. Development of cognitive capacities in homosapiens or humans enabled them first to develop tools, techniques and later science and technology which led to formation of family, community, society, state and nation. Broadly speaking, three forms of revolution following technological and scientific revolution emerged in the process. These are:

- 0201: Agricultural Revolution
- 0202: Industrial Revolution
- 0203: Digital Technology Revolution

Majority of the homosapeins living naked in herds/guilds by hunting-gathering formed family and community during agricultural revolution. Nature of Social formation that began during shifting cultivation transformed to higher forms during settled agricultural revolution which led to the origin of rudimentary forms of society and state.

Further development of science and Technology, which was termed ‘Scientific Revolution’ in 17th century led to industrial revolution which caused radical change in social processes and social structures. Industrial Revolution caused radical change in social character of production and distribution, between society and state, between rural and urban, between owner of industries and workers in the industries. Rural-Urban divide and rich-poor divide went on sharpening along with scientific and Technological Revolution. Social conflicts and wars became endemic. First and Second World Wars were highly devastating.

Post-World War II led (a) liberation of colonial countries, (b) establishment of United Nations Organization and (c) Organization of Science and Technology under the control of State.

Post-1950 development in Science and Technology led to Third Technological Revolution which is called Digital Technology Revolution under the leadership of United States and Russia. Despite initial gains between 1950-1965, India remained far behind and subsequently became a biggest market for imported Digital Technology. However, it gave rise to ‘**New Global Technological Society**’.

This 3rd Technological Revolution caused tremendous change in industry, economy, trade, education, social structure and social process and culture. ‘New World Order’ became the catch phase in 1970-1980s and was defined by another new phrase ‘Liberalization, Privatization and Globalization in 1990s’. ‘Knowledge-society’ was second new catch phrase. Suddenly, the whole world became ‘Global Village’. The old theories of liberalization was replaced by ‘New liberal theory rooted in philosophy of ‘Liberalization, Privatization and Globalization’. Socialist

society in USSR disappeared in 1991 which led to collapse of Berlin Wall and disappearance of Socialism from Europe and Peoples Republic of China. 'Unipolar world' became the new phrase of the new world order. The new society world over is now described as 'New Global Technological Society'. Theoretically, it is without boundary and all encompassing.

Question arises what is this New Global Technological Society? What does global village mean? How has it affected the old social order? What do family and community mean? What are the tenets of New Global Technological Society? Is it real or virtual? What is the connection between real and virtual? What is the nature of new social relations? What is the connection between democracy and New Global Technological Society? Is it equalizer? How has it affected economy, health, education and culture? etc.,etc.?

Indian Social Science Academy and Samrat Ashok Technological Institute, therefore, propose to focus deliberations of the 44th Indian Social Science Congress on '**NEW GLOBAL TECHNOLOGICAL SOCIETY**'. Though the deliberations of the 42nd Indian Social Science Congress were focused on 'Human Future in Digital Era', yet it is considered very important to examine the new social formations within and outside India. It has acquired greater significances because of corona-born national/global crisis. Education, health, agriculture, industry and all social activists have been taken over by the New technology called Digital technology.

0300 OBJECTIVES

- 0301 To comprehend Digital Technology Revolution in conjunction with scientific Revolution
- 0302 To comprehend India's contribution to Digital Technology Revolution and new Indian technology society
- 0303 To assess impact of Digital Technology Revolution on industrial and agriculture production, marketing and management.
- 0304 To investigate the impact of Digital Revolution on emergence of or sprouting of new economic, commercial, educational, political and cultural organizations/ groups/ conglomerations new civil societies, etc.
- 0305 To assess the impact of Digital Technology Revolution on quality of material, social and cultural life of the people.
- 0306 To determine the role or impact of New Technological Revolution in reducing the gap between the rich and the poor, between the village and town and thereby strengthening the democratic principles of equality, freedom, fraternity and peace.
- 0307 To examine the need, relevance and validity of the new digital Technology based education and research.
- 0308 To explore the new Technological Revolution-born economic, political, social, organizational and cultural theories of sustainable, equitable, harmonious, peaceful, poverty-diseases-unemployment-discrimination free global social order.
- 0309 To investigate potentiality of New Technological Revolution for making the world free from the fear of elimination by nuclear, chemical, biological or any form of global war and radiation.
- 0310 To explore the potentiality of New Technological Revolution for making the nature of all humans/Homosapiens truly human by freeing them from their animalist character.
- 0311 To determine the potentiality of new Technological Revolution for making the world healthier, harmonious, happier and pleasant.
- 0312 To explore the impact of corona-born problems on the new technological social system.
- 0313 Any other

0400 ISSUES AND SUB-THEMES

Following tentative issues/themes related to the New Global Technological Social order are stated for discussions:

- 0401 Post-Industrial Development of Science and Technology and formation of New Technological society
- 0402 New Technological Revolution: From Labour intensive to capital intensive.
- 0403 India's and Third World's contribution to New Technological Revolution

- 0404 New Industrial Technology
- 0405 New Agricultural Technology
- 0406 New Social Science and Technology
- 0407 New Biotechnology
- 0408 New Genetic Engineering
- 0409 New Communication Technology
- 0410 New Information Technology Revolution
- 0411 New Biomedical Engineering Technology
- 0412 New Health Science and Theory
- 0413 New Economic Theory and Method
- 0414 New World Trade Organization
- 0415 New Patent Law and Intellectual Property regulations
- 0416 New Environmental and Ecological Science and Technology
- 0417 New Technological Revolution in Social Judicial system
- 0418 Global Village
- 0419 New Education Technology and Radical change in school, college and University Education System
- 0420 Impact of New Technological Revolution on Family, community, society and state
- 0421 Impact of New Technological Revolution on small and medium industries
- 0422 Impact of New Technological Revolution on Rural-Urban and rich-poor divides.
- 0423 Connection between Digital divide and Socio-economic divide
- 0424 New Technological Social Entrepreneurship
- 0425 Impact of New Technology on Conflict, War, Peace and Social Security: Technological Disasters, Nuclear Disaster and Ecological Disasters
- 0426 New or Neoliberal Policies of Democracy and emerging new notion of nation and nationality
- 0427 Impact of New Technological Revolution on Survival and Growth of Peoples Languages
- 0428 Virtual World vs Real World
- 0429 Data Mining and its Social Implications
- 0430 Newer forms of Technological slavery and freedom
- 0431 Impact of New Technological Revolution on Global warming and Global climate
- 0432 Implication of Growing Global e-commerce, super markets and Malls on Small and Medium shops/traders.
- 0433 GST and its implication
- 0434 New Technological Revolution and Future of Mankind
- 0435 Emerging Corona Virus like newer threats to life on Planet Earth
- 0435 Any other

These are tentative themes subject to change and modification by the members and National Academic Advisory Committee.

0500 INTERNATIONAL SYMPOSIA

One or two themes may be chosen for international symposia during the XLIV Indian Social Science Congress. Tentative themes suggested for it are as follows:

- 0501: New and Emerging Technology-Society Configurations
- 0502: Redefining Problems of Science of Nature-Human-Society
- 0503: Post-Corona New Global Technological Society and its sustainability
- 0504: Any other

0600 NATIONAL SYMPOSIA/SEMINARS/WORKSHOPS

Tentative themes suggested for national seminars/symposia/workshops are as follows:

- 0601: Generation and Utilization of Indigenous Science and Technology
- 0602: Building Atma Nirbhar Bharat (Self-Reliant India)
- 0603: Privatization as powerful weapon of liberation
- 0604: Public Health System
- 0605: Public Education System under New Education Policy
- 0606: Impact of Farmers Acts on Farming System
- 0607: Impact of New Labour Laws on labour
- 0608: One Nation One Card
- 0609: Social Violence Theory
- 0610: Indigenous Science and Technology for self-reliant Development
- 0611: State of Art of Indigenous New Digital Technology
- 0612: New Social Entrepreneurship in India
- 0613: New Civil Society Movements for solution of problems of Democratic Republic of India
- 0614: New Technology based solutions for conservation of water, natural resources and biodiversity
- 0615: Post-Corona India and its Peoples
- 0616: Digitalized Space Science and Technology
- 0617: Gender Issues in Science and Technology
- 0618: Sustainable Technology and Gandhian Thoughts
- 0619: Any other

0700 PROPOSAL

There are 28 subject Research committees and 21 Interdisciplinary Thematic Panels as stated below in the Indian Social Science Congress

(a) SUBJECT RESEARCH COMMITTEES

1. Agriculture Science Research Committee
2. Anthropology Research Committee
3. Archaeology, History And Culture Research Committee
4. Biological Or Life Science Research Committee
5. Biotechnology Research Committee
6. Chemical Science Research Committee
7. Commerce Research Committee
8. Communication And Journalism Research Committee
9. Computer Science Research Committee
10. Earth Science (Oceanic Sc, Marine Sc. , Atmospheric Science Etc) And Planetary Science Research Committee
11. Ecological And Environmental Science Research Committee
12. Economics Research Committee
13. Education Research Committee
14. Engineering Science Research Committee
15. Geography Research Committee
16. Home Science Research Committee
17. International Relations Studies & Defense Strategic Studies Research Committee
18. Juridical Science Research Committee
19. Linguistics Research Committee
20. Management Science Research Committee

21. Mathematical And Statistical Science Research Committee
22. Medical And Health Science Research Committee
23. Philosophy Research Committee
24. Physics Science Research Committee
25. Political Science Research Committee
26. Psychology Research Committee
27. Social Work Research Committee
28. Sociology Research Committee

(b) THEMATIC PANELS

1. Conflicts, War, Peace And Social Security
2. Democracy And Human Rights
3. Ecological And Environmental Protection Movements
4. Ethics Of Science And Society
5. Global Warming And Climate Change
6. History And Philosophy of Science
7. Information Technology, Mass Media And Culture
8. Labour In Organized And Unorganized Sectors
9. Nation, States And Emerging Challenges
10. Natural Resources, Bio-Diversity And Geographic Information System
11. Patent Laws And Intellectual Property Rights
12. Peasants, Livelihood And Land-Use
13. People (Dalits, Tribes, Women, Peasants, Etc) Struggles And Movements For Equitable Democratic Society
14. Peoples Health And Quality Of Life
15. Political Economy Of India
16. Population, Poverty And Migration
17. Rural Technology, Social Organizations And Rural Development
18. Science Communication And Science Popularization
19. Science, Technology And Social Development
20. Social Processes, Social Structures And Social Alienation
21. Unity Of Science /Science Of Nature-Humans-Society

Intra, inter and multidisciplinary deliberations on the focal theme will, therefore, be held during the 44th Indian Social Science Congress. Eight Plenaries and 5-7 public lectures and a few international and national symposia/seminars shall be multidisciplinary. Subject Research Committees shall deliberate on related issues of the focal theme as well on **Current Research and Theory** in their domains. A National Academic Advisory Committee set up by the Academy shall help the Executive Council and the Organizing Committee to formulate issues, themes on the focal theme and identify expertise in respective areas.

0800 QUESTIONS

Hosts of questions arise: What is Third Technological Revolution? How is it different from the second Industrial Revolution? What is its impact on agriculture, small and big industries, rural-urban divide, markets, trade and commerce? Will it solve the problems of economic, social, ecological and culture created by the Industrial Revolution? Will it reduce the inequality between the super rich and the poor? Will it resolve the process of conflict and War? Will it make the present world order more democratic, more harmonious and more livable? Will it stop the

extinction of species on Planet Earth? Will it stop desertification of the Planet Earth from deforestation and mining? Will it resolve the ever growing problems of clean potable water? Will it ensure gainful employment to all able bodies? Will it promote belongingness in all by eliminating the process of ever growing social and natural alienation? Will it promote social cohesion and social harmony? Will it make all healthier and happier etc? etc? Will it replace human labour? Will it destroy superstitious? Will it promote scientific temper among all? Will it destroy centralization of economic and political power?

Answer to all these and many more questions in relation to New Technological Society ought to be dispassionately searched in order to find correct answers having relevance to the

New Global Technological Society and making the future of humans better and secure.

Another very important question is can the New Global Technological Society form a bridge or close the rift between human and nature, the rift between family and community and the rift between social classes produced by the Second Technological Revolution called Industrial Revolution? What about new threats from corona like viruses? Above all will the new global technology society be free from borders, inequality, poverty, discrimination and war? Is there now an acute need for redefining problems of science?

0900 APPROACH

Intra, inter and multidisciplinary approach to scientific understanding of 'New Technological Society' shall enable the Indian scientists to develop appropriate scientific theory of philosophy and method of New Global Technological Society. The outcome will be fruitful to research, education, development and policy formulation.



PART I

PLENARY PAPERS

ON

NEW GLOBAL TECHNOLOGICAL SOCIETY

Part I

PLENARY PAPERS

ON

NEW GLOBAL TECHNOLOGICAL SOCIETY

0102001 GUPTA, VIKAS (Department of History, Faculty of Social Sciences, University of Delhi, Delhi 110007). NATIONAL EDUCATION POLICY 2020: CRITICAL ASSESSMENT THROUGH HISTORICAL AND CONTEMPORARY PERSPECTIVES

In order to unmask the intent of National Education Policy (NEP 2020) of the Government of India, we need to first adopt an appropriate methodology. We need to go beyond its deployment of complex rhetorical language and tap exactly on the imperative provisions; raise critical questions by contextualizing its provisions within a careful reading of the history of education policy in India and contemporary education; and treat it as a political rather than neutral document. We should ask whether many of the better sounding things in the NEP 2020 are not already present in earlier policies and twisted/misappropriated now? Why did they fail earlier? Is any concrete, mandatory and time-bound solution to that failure present in the NEP 2020? How does the NEP 2020 preserve the socio-historical pattern of exclusion. For instance, an extremely retarding fact is that 85 percent children in India are unable to complete full-time formal education from Pre-primary Education to class XII and, therefore, less than 15 percent enroll for different kinds of programmes of Higher Education. This has already kept the whole agenda of reservation and social justice only partially materialized. Hence, our question should be that if enacted, can the NEP 2020 provide equitable quality education to all of these 'pushed out' children and youth?

Further, we should see how the NEP 2020 is replete with contradictory elements. For instance, in the NEP 2020, we find that while making illusive claims to respect and promote institutional autonomy and creativity, it actually pushes vigorously for centralization of many crucial aspects of education from Pre-Primary to Higher levels in a federal polity where it is still a subject of Concurrent List. Similarly, although the NEP lays emphasis on the preservation of local languages, knowledges and traditions, all the centralizing structures proposed therein will promote linguistic and epistemological homogenization and social hegemony. The NEP 2020 speaks about 'curbing commercialization of education', however, it simultaneously seeks to promote privatization of education at every level in the name of philanthropy of 'not for profit' organizations without laying any new and effective mechanism for distinguishing between the two: it proposes only the already existing provisions. Of course, the NEP 2020 has sections for equitable quality inclusive education, however, by retaining structural or systemic inequality, and by subjecting vulnerable sections to the exploitation by market forces, it not merely dilutes social justice provisions but also compromises their fundamental right to equality before the state. It advances the agenda of globalization as dictated by the international and domestic corporates while deploying the language of cultural nationalism such as 'vishva guru' and 'knowledge super power' etc. It miss-appropriates the idea of 'School Complexes from the report of Kothari Commission to actually legitimize poor infrastructure of thirty percent schools catering chiefly to disadvantaged children while ignoring Commissions major recommendation for establishing 'Common School System' as accepted by earlier NEPs; and it thus also makes redundant the 'Norms and Standards' as prescribed in the Scheduled annexed with the RTE Act. The NEP underlines need as well as the tradition for respecting teachers and their key importance in the learning process, yet, it is completely silent on all pertinent issues of their service conditions and security.

In order to understand the intent of NEP going beyond these contradictions, we can also look at some of its glaring silences. NEP 2020 nowhere even mentions terms like socialism; secularism; free education for all or any particularly deprived section of society at any level of education; common school system; fundamental right to pre-primary and Secondary levels of education; mother-tongue as mandatory medium of Elementary Education for all schools; reservation in admissions, appointments and promotion; filling up of teacher vacancies with permanent appointments; time-bound promotions and pension etc.

Moreover, these seemingly contradictory elements are not to be treated as some inadvertences for yet another reason and are to be seen as clever maneuvering tactics of the statecraft and governance. For, rather than the more promising parts, the compromising solutions will be found more attractive by our political and bureaucratic classes. I learned rather recently while reading a book “Equality, Quality and Quantity” published in 1975 by J.P. Naik, an eminent educationist and the Secretary to the Kothari Commission that contrary from his advocacy for the principle of ‘Common School System’, how the government bureaucracy and political parties have followed since then less-demanding compromising paths of providing substandard and iniquitous education for majority of our differently disadvantaged population proposed by Naik as interim strategies which have become overarching characteristics of our education system. Since the NEP 2020 also includes all those substandard options, the prevalent situation will continue unchanged. A situation of better-quality education for a few privileged children and substandard educational arrangements for disadvantaged masses will keep the latter ‘wallow in ignorance’ even though they are the actual producer of the entire wealth of the nation as told by Jotirao Phule to the Hunter Commission in 1882.

Above all, the NEP 2020 is based on a harmful principal. It aims to provide more resources to already better performing institutions and thus leave the under-funded institutions to die slow-death in the name of ‘accreditation’ linked with the adoption of ‘outcome measurement approach’ replacing the so called ‘input-based approach’. Accordingly, it moves away, for instance, from the ‘norms and standards’ enshrined in the RTE Act. It is contrary to the Gandhian ‘talisman’ of keeping the ‘last man’ as the guiding principle of policy formulation.

The NEP 2020 seeks to promote privatization of education. The developed capitalist as well as communist countries invested in public systems of equitable quality education as a strategy for national development. Now their agencies of global capital along with the domestic corporate houses are advising India to care only for the education of those who cannot pay for it and to make education ‘affordable’ for others. However, our establishment immerse in cultural nationalism turns a blind eye to this fact of diplomacy. Adam Smith who pioneered the idea of ‘invisible hand of the state’ in the economic development of the nation had explained as early as 1776 in the “Wealth of Nations” the importance of keeping education outside the market window. Therefore, in order to understand the actual intent of NEP 2020 going beyond the presence of a rhetoric which intends to elicit veiled consent, we need to contextualize each of its imperative provisions within the overall milieu in which over last thirty years public systems have been weakened and non-state actors have been dominating every aspect of it.

The sociology of education guides to treat every document like the NEP 2020 as a political and ideological manifesto: it is a mere sham to think of education as something neutral located in a far-away autonomous terrain. NEP 2020 is presented by the BJP lead NDA3 with the intention to promote the Neoliberal model of domestic and global capital in the field of education as well as to fulfill the RSS agenda of Hindutva and cultural nationalism. This excludes all non-Brahminical ancient Indian traditions of religion and philosophy and all contributions/legacy of medieval period. This reflects the ideological mindset with which the policy has been prepared. Of course, owing to the logic of cultural nationalism and the need to win popular consent, the influence of global agencies in drawing our educational map has been cleverly concealed in the NEP 2020: it mentions **Samagra Shiksha Abhiyan**, but not the STARS. Just two months before the approval of NEP 2020 by the Cabinet, the GOI has launched a flagship programme called **Samagra Shiksha Abhiyan** (SSA). It is based on a model imposed by the World Bank through just one percent contribution and that too in the form of loan for its STARS programme for a period between 2020 to 2025. This is the third phase of the world bank’s intervention in school education in India: first it happened under the District Primary Education Project (DPEP) and, thereafter, under the Sarva Shiksha Abhiyan (SSA). The NEP 2020 seeks to achieve popular consent through the deployment of rhetorical language for both of these objectives, the cultural nationalism of RSS and the investment of global as well as domestic capital.

The word secularism is missing from the entire NEP 2020. The introductory discussion in the NEP 2020 explicitly excludes the legacy of all non-Brahminical ancient Indian traditions: Jainism, Buddhism, Charvaks and others. It completely ignores the fact of Caste discrimination while valorizing the heritage of ancient India as the golden age: of course, this word is not used there, but the impression is unmistakable given its uncritical admiration. The entire contributions/legacy of medieval period is glossed over: not merely Muslims, but also Sikhism, Sufism, Bhakti, and other traditions are neglected indicating the adherence to a long-discarded view of this phase as Muslim

period or dark ages. This pattern is also reflected throughout the document in a passing manner. Muslims are conspicuous by their absence. Even while listing the components of 'SEDGs', it uses the term 'minorities' without ever specifying who all are included in it: Whether it is about religious, linguistic, or ethnic communities. It nowhere discusses the specific problems of Muslim students in joining the 'mainstream education'; no reference to the report of Sachar Committee; and no discussion about madarsa education and Urdu either. Even while listing the objectives, we notice the similar trend: 'a rootedness and pride in India, and its rich, diverse, ancient and modern culture and knowledge systems and traditions' (p. 5). The diverse struggles of early modern and modern periods against Brahminical and patriarchal hegemony finds no recognition in the NEP 2020. These overall silences reflect the ideological mindset with which the policy has been prepared.

Now vocational education might be available after 8th standard itself. It may sound good that there will be greater choice of subjects in secondary education, however, how much of this would be possible on the ground is less-convincing, particularly, when there is no solid plan for the appointment of permanent teachers for each of these subjects and also because almost one third of schools are going to be substandard infrastructurally (freed from the existing norms and standards in the name of school complexes). One wonders how the Brahmins will be made to learn leather tanning and boys 'home science'? The conception of vocational education in NEP 2020 (p. 44) is extremely constrained to fit the skill India mission for the production of cheap working force. It is limited to the requirements of industry. It does not think of basic accountancy required for small family businesses, independent artisanal crafts, agriculture, dairy and farming, fishery and other areas of economic life excluding even water and environment conservation etc. The term merit is nowhere problematized while the emphasis is on the scholarships and admissions to be based strictly on it.

**0105002 KAR, SANTOSH K. (School of Biotechnology, Jawaharlal Nehru University, New Delhi-110067).
A TECHNOLOGICALLY ADVANCED SOCIETY WITHOUT BALANCE WITH NATURE IS
NOT SUSTAINABLE**

A developed nation ensures good quality of life for its citizens by providing facility for health care, education and employment. Right to health and education should be the fundamental rights of people which should be delivered through appropriate technological advancement. But when technology is in conflict with the natural ecosystem nature retaliates bringing in misery to the people. I would like to illustrate it by using the current pandemic which has devastated our life.

The COVID19 pandemic has clearly shown us how fragile we are in front of nature's fury. Even technologically advanced countries like USA, United Kingdom and many others could not prevent the disaster unleashed by a tiny virus which cannot even survive all by itself.

The warning has come to us from Nature many times before in the form of pandemics like Spanish flu in 1918 and others like SARS outbreak in 2002-04, Swine flu pandemic in 2009 and MERS corona virus pandemic in 2012 telling us not to tamper with nature and disturb the balance maintained in the natural ecosystems. But we have not taken them seriously. It is time that we take the message seriously now.

In an article in Washington post on April 4th 2020 entitled "The next pandemic is already coming, unless humans change how we interact with wildlife" Ms. Karin Bullard, a National Health and Science reporter at Washington Post, USA had warned us that unless we learn to respect nature we will find it very hard to avoid such pandemics in future.

Since we will discuss about the pandemic caused by COVID19 virus we should discuss about how it originated and spread to humans. Most of the viral infections in humans originate from wild animals. Wild animals are a potential health hazard for humans and we should avoid intruding into their world.

There is a need to take a more holistic view in which we should consider our health interconnected with that of the environment and the animals living around us. We must leave the ecosystem intact and do not disturb animals in their habitat.

The viruses present in the blood of wild animals remain confined to the same species and under normal circumstances do not jump into humans. But global wild life trade has become very attractive and coupled with deforestation and agricultural intensification has brought humans closer to the animal habitats. As humans catch the infected animals for trade and kill some of them for meat the virus gets an opportunity to infect humans. The virus that is responsible for the present pandemic is believed to have originated from the Bat. But a virus from the bat cannot jump into humans and multiply and cause the disease as it would not have the surface ligand molecules which can help it to enter into human cells by interacting with the appropriate receptors. For this most of the time inspite of interactions with humans the infection is not established. But the viruses while dividing in the Bat undergo mutations in the genome which generates new viruses with different surface properties. Under such condition one in a billion viruses might express the ligand to interact with the receptors on the human cells to infect a human and multiply rapidly. But strong immune response expected to be mounted against the virus by the infected individual will eliminate the virus and the person may get cured. In the case of some individuals whose immune system is compromised the virus may survive and multiply very rapidly and become virulent and kill the individual. Once such virulent viruses are generated which can be replicated and infect humans easily and kill them it can create a pandemic condition like the one created by COVID19. It will be interesting if we can compare how a country like USA handled the pandemic condition during the Spanish Flu which occurred about 100 years ago and the current pandemic with its advanced technological capabilities. It will illustrate the role of technological development in handling natural calamities like the present pandemic.

Now let me describe the condition that prevailed 100 years ago when the Spanish flu struck the world. The world was at war (First World War) between 1914 to 1918. Countries like Great Britain, United States of America, France and many others which included even India which was under British rule were fighting with Germany and Austria-Hungary in a ruthless war. The economy of all these countries was stressed and people were helpless. During this time an unusually deadly pandemic caused by the H1N1 influenza virus made its first appearance in Kansas and New York City in United States which lasted from February 1918 till April 1920. It infected about 500 million people worldwide and killed an estimated 20 million people making it one of the most deadly pandemics in human history. Interestingly it was observed that the census of India for the period 1911 to 1920 recorded a decrease in population in India due to Spanish flu which happened for the first time in history. In the countries which were at war the press was not free to report about the H1N1 pandemic. But Spain was not involved in the war and when the pandemic reached Spain and King Alfonso XII, the king of Spain, became gravely ill the press reported the incidence freely and therefore everyone assumed that the pandemic originated from Spain and it was called the Spanish Flue. The epidemiologic data available for this pandemic is not adequate enough to identify the geographic origin of the virus. The first wave of the H1N1 pandemic started from March 1918 and gradually declined in about three months. Then the deadlier second wave started in August 1918 and killed millions of people till it declined by December, 1918. The third wave started in January 1919 in Australia when war time restrictions on travel was lifted and quickly spread to United States and other countries. It lasted till June 1919. The fourth wave, a much milder form of the pandemic in comparison to the earlier waves, occurred in the spring of 1920 in few isolated areas like New York City and United Kingdom to finally disappear by April 1920...

As there were no effective antiviral drugs to treat the virus, and no antibiotics to treat the secondary bacterial infections, doctors at that time relied on a random assortment of medicines with varying degrees of effectiveness, such as aspirin, quinine, arsenics, digitalis, strychnine, epsom salts, castor oil, and iodine for control of the H1N1 virus. Many also used traditional system of treatment. One should read John Barry's 2004 book The Great Influenza: the Epic Story of the Deadliest Plague in History to get more information about the H1N1 pandemic.

The population of USA in 1918 was about 103 million and by 1920 it was estimated that 675,000 people had died in USA due to the Spanish flue pandemic. Now during the current pandemic when the current USA population is about 320 million almost 500,000 persons have died in USA in one year. If we consider the population of USA at the time of Spanish flu the death rate will be about 372,000 per 100 million per year and now during the current pandemic it will work out to about 166,000 deaths for 100 million people per year. The population of Britain in 1920 was about 40 million out of which about 228 thousand had died due to Spanish flu. Now the population of United Kingdom is about 67.6 million and death due to COVID19 in one year is 119 thousand. No one can doubt the

technological advances USA and UK have made in the past 100 years but inspire of that a loss of 166,000 people per year for 100 million people in USA and about the same number in UK due to the current pandemic cannot be acceptable. Knowing that such pandemic will come as predicted by mathematical modeling both USA and UK should have been better prepared. What is true for USA is true for all other countries as the benefit of technological advances is not limited to a single country. But that clearly establishes that we failed to take remedial measures as a result of which life all over the world has been devastated.

It will be pertinent at this stage to consider how technology itself is contributing to the devastation that we face today.

From the time after the first Industrial revolution (1760-1840) over the last hundred years the earth's atmosphere has warmed up by about 1^o Centigrade and the oceans have also risen by about 15 centimeters due to melting of the glaciers.

Formation of glaciers takes millennia and it covers about 10% of the earth's surface and is a source of 70% of the fresh water. A study published by the University of Zurich, Switzerland has revealed that glacial melting has accelerated over the past three decades and it will lead to extinction of numerous aquatic and terrestrial species and flooding of all the low lying cities near the sea across the continents.

If the green house gas emissions continue to increase the way it is now by the end of the 21st century the planet will warm up further leading to further rise of the water levels in the oceans which would cause devastation on the earth. While pandemics like COVID19 are cause of great worry the devastation that will ensue due to environmental degradation is of greater concern.

Since the emission of green house gases is directly due human activities like burning of fossil fuels like coal and oil to run factories and power plants and even use of vehicles for transportation we must consider how to reduce it and produce clean energy to use them. Green technology has to be developed to tackle this problem. This will require significant investment of about 5 trillion dollars which is about twice the GDP of India now in research during the immediate future. We must work on each of these technologies which are producing green house gas like CO₂ and methane so that this problem can be tackled. Taking the examples of cars which use petrol or diesel to run, the development of electric car became a priority. But electric cars became expensive and most people cannot afford to buy them. But development of Lithium battery has reduced the cost of such cars and now by promoting the use of cars run by electricity we will reduce pollution and protect the environment. Increased use of solar, wind and hydro power will be necessary to reduce emission of CO₂ by the conventional power generating units and protect the environment.

Manufacturing industries are another sector which pollutes the air and the water. The manufacturing process uses water and the water which contains harmful chemicals cannot be released without treatment to remove them. Most industries do not follow strict guidelines as a result of which the water containing these pollutants reach the rivers and pollutes them Research has shown that certain type of plants can purify these polluted water and make it usable. While the roots of the plants can take up the heavy metals and kill the organisms present in the water, the leaves will fix CO₂ from the air and reduce its emission. All over India this type of manufacturing industries are polluting our rivers. We must try our best to develop technologies which can purify the water which are polluting the rivers before they are released into the rivers. The manufacturing industries like leather, textile, cement and many others needs to be examined for the process they use and efforts should be made to develop green technologies for each of them. The cost of green technologies has to be reduced so that it can be used in large scale.

In June 2013, a cloudburst occurred in Uttarakhand causing devastating floods and landslides which killed about 5700 people. Recently another flood occurred in a very nearby area of Uttarakhand due to glacial lake outburst which killed about 56 people with about 150 persons still missing. This is happening again and again because we ignored the delicate balance of the glacial ecosystem with the hills and built dams and powerhouses in this area. While producing electricity is necessary to meet the growing energy need of the people it has to be done without disturbing delicate balance of the ecosystem. This is a very well known fact but not taken into consideration when projects in such areas are initiated.

Many of us do not eat meat. Those who would like to eat meat for the taste of it have good news. A process has been developed using which meat like edible material can be developed from plants sources with the same taste and nutritional values. This hopefully will reduce animal slaughter so that we do not get into their world and kill them for edible purposes and reduce chances of viruses jumping into humans to cause pandemics.

Therefore it is important to maintain a balance between development and our ecosystem if we expect the technological developments to provide good quality of life to our people.

0109003 KUMAR, RAJEEV (School of Computer & Systems Sciences, Jawaharlal Nehru University, New Delhi 110 067). ACADEMIC AUTONOMY WITH LIGHT-BUT-TIGHT NEP 2020 REGULATORY FRAMEWORK IN HEIS

Autonomy is treated as a most effective remedy for non-decisive system. Some systems dealing with specialized profession are large and complex having non-linear, cause-effect relationships. For smooth functioning of such a system and to deal with the interplay of several internal and external factors, such a system should be quick responsive. Lack of responsiveness reduces the whole system in a non-decisive chunk of liability. Therefore, autonomy is a sacred term for such institutions. It encourages responsiveness and smoothness of the system which in turn assists to maintain quality standards of the specialized profession. In addition, it provides capability of selfassessment and self-improvement. Academic institutions belong to this category, and therefore, they enjoy greater degree of autonomy.

Literally, the term autonomy means *self-rule*. However, this does not mean an autonomous system is based on someone's likes and dislikes, autonomy is not autocracy. Higher Educational Institutions (HEIs) are governed by their act, statutes, ordinances and regulations. The autonomy refers to governance of HEIs in accordance with these statutory provisions, and if needed these rules could be revised as per the due-processes defined by the same.

The autonomy of academic institutions is as old as our civilization. Gurukuls were the early examples of such autonomous academic institutions. In today's India, the Institution of Excellence (IoE) is the tag for utmost autonomy of an academic institution. Autonomy, as being practiced in today's HEIs, leads to subjectivity and ad-hocism. These two factors are serious threat to the whole objective for which autonomy has been enshrined.

Autonomy coupled with subjectivity may produce results that are grave in nature or fatal. Autonomy is enshrined to maintain and improve quality standards and smooth functioning of the HEIs. Another dimension, a binding concept of achieving quality with autonomy, is through enforcing accountability, devoid of conflict of interests. Thus, accountability without conflict of interests works as a shield against intentional or unintentional usages, misusages and conversion of autonomy into autocracy.

There are several instances, in ancient and modern HEIs, which have put a question mark about functioning of HEIs though exercising autonomy and without pre deciding accountability and conflict of interest. Therefore, it is no wonder to say that exercising autonomy without deciding accountability is like having a golden egg that can easily burst and spill at any time.

In this talk, we will traverse autonomy of academic institutions from Gurukuls to today's institutions of excellence along with some typical cases in the light of the above issues. Then, we'll look forward how the light-but-tight regulatory framework can help in minimizing such menaces aimed at improving quality of education.

Keywords: Academic Governance, Autonomy, Accountability, Conflict of Interests, HEIs, NEP 2020.

0109004 LAL, MANOHAR (KAUSHIK) AND SREEDHAR, MEENAKSHI (Resarerch Scholar, Department of Computer Science, Rajdhani College (University of Delhi), New Delhi-110015). DISRUPTIVE TECHNOLOGIES & EVOLVING GLOBAL SOCIETY

A Disruptive Technology—in its most general sense—may be considered as an innovation, a discovery, a serendipity, or a purely unintended & unconscious striking of an idea to someone, which, when consciously used repeatedly, has the potential of changing course of human life, or life in general. In this sense, disruptive technologies have been conceived or devised since the earliest time of human evolution. Agriculture, for example, led to settled living from hunter-gatherers' one, and which in turn, led to the development of great ancient civilizations of Egypt, Mesopotamia, India & China etc. Earlier, even the conscious use of fire may be considered as a disruptive technology.

However, since the appearance of Clayton Christensen's book 'Innovator's Dilemma: When New Technologies Cause Great Firms to Fail' (1997), the concept has acquired slightly different meaning, restricting to those technologies which are developed, not necessarily as directly intended, but as consciously developed, and having applications to mainly human economic sphere. In this sense, in the field of computers, going from Mainframe to laptop, or for storage from large discs to pen-drive, and for communication, earlier the telephone and later the Internet, each is an example of Disruptive Technology.

Now, in the beginning of third decade of this century, a number of technologies are already in the process of maturing with potential for drastically changing humanity, and even life on earth. These technologies include Blockchain, 3D Printing, Artificial Intelligence, Internet of Things (IoT), and Nano-technology. The expected changes to human society are so unpredictable that even the best-known pundits and futurologists tread cautiously to say anything exactly; they have just dubbed it as Humanity 2.0. The essential character of the enfolding technologies taken together is virtualization: replacing current material (hardware) components from almost all human activities by energy/software) ones. Instant universal connectivity of everything (human beings and non-living artefacts included) will be one of its effects. Going to the extreme, services may be available on the basis of mere thought (through cognitive technologies), instead of clicking mobile/keyboard buttons.

Most of the disruptive technologies, including the ones mentioned above, have beneficially contributed to improve human life in various ways. However, with the passage of time, since at least 2014, there are signs of their disrupting negatively long cherished human values, norms of democracy and the rules of law. The Technology Oligarchy—about half a dozen companies owning almost whole of Digital enterprise—is attempting to turn democracy into mobocracy, the Rule of Law into Rule of Jungle, and treating human beings as guinea pigs for just enhancing their profits and monopoly. The point of worry is that attempted damage is happening at massive scale and global level. Another issue of serious human concern is expected massive unemployment due to the disruptive innovations.

1. INTRODUCTION AND CONCEPTUAL FRAMEWORK

Technologies, specially, the digital technologies, are impacting everyday life with ever-increasing intensity. These technologies are providing most of us with immense benefits and privileges, which were not available to even the princes a century earlier. However, at the same time, these are harbingers-if not properly handled-of potential dangers to the humanity to the point of either complete annihilation from earth, or at least, to the complete subservience to the machine, the creation of human's own mind, in not too-distant a future. In this respect, two most immediate worrying aspects of the ongoing technological revolution are (i) expected massive unemployment through replacement by machine and (ii) throttling control of human fate in few hands, worst form of dictatorship ever imagined.

For academics, and specially the social scientists, it is duty to keep watching and to evaluating how various developments are impacting the society at present, and how these are expected to impact human life in future, and periodically keep informed the society & those in power about these developments.

This write-up is divided into the following THREE sections

1. Introduction and Conceptual Framework

2. Emerging Disruptive Technologies
3. Impact of emerging technologies on the current and the future human life

Conceptual Framework: The discussion is started with the central concepts of this communication, viz. Disruptive and Disruption.

Disruption to a system, in general, is a specific form of change which occurs relatively quickly or dramatically, and is caused by some stimulus external to the system. In general, a disruption need not be only negative; it may have both positive/creative and negative/destructive effects on a system, on a section or on the whole of the humanity. Disruption may be initiated by (disruptive) forces which may be natural (e. g. earthquake, cyclone, pandemic), technological (e. g. automobile in 18th/19th century), or socio-cultural-political (e. g. revolutions, warfare) etc. Technology being tangible outcome of socio-cultural-political environment, the nature of technological disruptions is closer to the socio-cultural-political ones than to the natural ones.

For the previous couple of centuries, technology has been a major source of economic, social and political disruptions. However, natural calamities and pandemics have also been frequent sources of disruption. For example, the key disruptive force of 2020, the coronavirus pandemic, is non-technological. Technological developments, which become disruptive forces, give rise to changes of different scales, viz. from individuals' routine activities to rivalries between global superpowers. However, in the current globalized-village world, a disruption, natural or otherwise, may impact globally, and simultaneously many facets of human life including economic (replacing existing business models and employment patterns by new ones), social (norms, values, identities, disparities), political (impacting e. g. democratic institutions, international relations and the global balance of power), and legal (laws and regulations).

Disruption specific to economic and technological innovations: In the current technical sense, the concept of disruption due to technology was introduced, in 1997, by Clayton Christensen [Christensen, 1997]. In respect of disruption due to technology, it is more often referred to as **disruptive innovation**. Later on, the concept is modified/extended. According to Christensen, disruptive innovation is 'An innovation that creates a new market by providing a different set of values, which ultimately (and unexpectedly) overtakes an existing market'. Here, the emphasis is on market. So, according to Christensen, howsoever wonderful a discovery or invention may be, if it does not disrupt market, then it is not disruptive innovation. Thus, automobiles which were introduced in 1886 for the first time, are not considered by Clayton as disruptive innovation, but Ford T model which was introduced much later in 1908 is considered as disruptive innovation, because the earlier automobiles were expensive luxury items which did not displace, and the later did displace, horse-drawn vehicles from the market. Also, according to Christensen's definition, only a process, and not an outcome or product, can be a disruptive innovation. However, this definition is extended later by many scholars in the field including Miller *et.al* [Miller, 2018], according to whom 'Disruptive technology is a product or process with the potential to create disruptions at any of the different levels: industry segment, industry structure, and social system'. For example

1. Industry segment, e. g. pen-drives disrupted the segment of large discs,
2. Industry structure and Social system, e. g. online business has disrupted the traditional business, in the sense, earlier people used to go to shops and malls for purchases, now the delivery persons come to residences of the people. Also, earlier people needed to know the locations of markets for specific goods, which is not needed any more. Generally, there used to be a sort of personal relations between owners of neighbourhood stores and their clients.

Next, some of the technologies, which are at centre of current economic, technological and social disruptions, are discussed.

2. Emerging Disruptive Technologies

In this respect, the following technologies are discussed

- 2.1 Artificial Intelligence (AI)
- 2.2 Blockchain,
- 2.3 3D Printing,
- 2.4 Internet of Things (IoT), and
- 2.5 Nano-technology

For each of these technologies, to begin with, some working definitions are considered. Then some of their applications and possible adverse consequences are sketched. However, the detailed discussion of social and economic impacts of the technologies, individually and jointly, is covered under the next section, viz. Impact of emerging technologies on Current and Future of Humanity.

It may also be pointed out that all these technologies are enabled by the following facts/ features of foundational digital technologies

- a. Computing power, has become at least 10, 000 times faster since 2000, e.g. Japanese supercomputer Fugaku can execute 1×10^{18} flops;
- b. Internet communication speed of 44.2 Terabits ($= 44.3 \times 10^{12}$) per second, is also at least 3, 000 times faster since 2000
- c. High quality sensors
- d. Deep Learning Algorithms
- e. Availability of Big/ Massive datasets

2.1 Artificial Intelligence (AI)

Out of the above mentioned (five) technologies, AI is the foundational one in the sense that in each of the others—rather, in any current advanced technology—AI is essentially involved. The term Artificial Intelligence for the discipline was proposed in 1956 by John McCarthy (1927-2011)—one of a couple of pioneers in the discipline—in Dartmouth Conference. AI is inseparably linked to both McCarthy and Dartmouth conference. The discipline of AI is so varied and so encompassing many academic disciplines, both practically and theoretically, that different leaders in the field have viewed it from different perspectives, leading to a number of definitions of AI. For our purpose, the following (working) definition by Elaine Rich [Rich, 1983] is discussed: Artificial Intelligence is the study of how to make computers do things, at which, at the moment, people are better. And, people are still better than computer in the following aspects of problem-solving:

- Understanding of and reasoning with natural language: both spoken and written
- Unconscious knowledge/ capabilities:
 - very large repertoire of skills (how-to knowledge), and,
 - millions of common-sense facts, and their use in solving problems
- Use of judgment (decision making without calculation/computation)
- Learning (acquiring new knowledge)
- Creativity, strategy making
- Abstraction/ finding principles behind various phenomena
- Capability to work with knowledge which is imperfect: uncertain, incomplete, fuzzy, imprecise, ambiguous, and even paradoxical/ inconsistent and subjective etc.

AI has mainly two paradigms/approaches for developing software solutions

- **Symbolic Paradigm, or (a priori) Programmed Computing Approach** -- dominating paradigm in A.I. up to around 2010.

- **Nature-inspired paradigms (Machine Learning Paradigms):** Neural Networks (modelling human brain), Genetic algorithms, Swarm intelligence etc.—dominating paradigm now.

The symbolic paradigm may be considered as Expert-system paradigm in the sense that rules for solving problems from complex domains, say, Medical Diagnosis, are extracted through/from experts in the field, and then incorporated in the computer system. Out of the many problems with the paradigm, one major problem is to find complete set of appropriate rules for problem domains concerning social, political or any sphere of human concern, except possibly that of natural sciences.

On the other hand, in the nature-inspired paradigm, the computer system itself extract rules from massive data sets. For this purpose, computer uses a number of mathematical theories including probability theory, fuzzy set theory, Modal logics, belief models and non-monotonic logics, Chaos theory and Rough-set theory. One of the major problems with this paradigm is to give explanation for the conclusion arrived at using the paradigm. For example, an automated legal system, developed using the paradigm, delivers a verdict/ judgement. But it is difficult for the legal system to explain how the verdict is arrived.

Applications (Beneficial) of AI: AI has improved human lives in innumerable ways, a tiny fraction of which include

- Making the World a global village with instant communication through mobile phones & Internet;
- Availability of knowledge, money, ticket reservations etc. at the click of button through internet, www, credit cards etc.
- Medical expertise in respect of diagnosis, treatment, and even of telemedicine, tele-surgery reducing thereby the requirement of experts' availability at every place to the bare minimum and increasing life expectancy and quality of life many folds.
- Weather Forecasting & (Crop etc.) damage control
- Disaster Forecasting & damage control

Harmful effects and potential danger from unguarded applications of AI include (i) privacy loss, (ii) truth has become the biggest casualty of the revolution: prevalence of Fake news has made it almost impossible to know the truth, (iii) mega-scale electronic frauds, (iv) psychological problems among youth including isolation, obesity and depression.

2.2 Blockchain

At basic level, a blockchain is a special kind of database—where, a database stores (generally, large volume of) data in computer system in such a way that its contents may be easily accessed, stored and modified, and at the same time remain secure and uncorrupted—in which relevant information pieces are collected, as in any database into packets or groups called blocks, but with the difference that every new block is chained at the end of earlier stored blocks. Also, each block is given exact time-stamp at the time of its being added to the blockchain. Further, security of contents of block in blockchain is ensured—much more rigorously as compared to that in the general database—through more rigorous cryptographic techniques in which code to a newly added block is calculated as a function of the code of the just earlier block, and its own timestamp. Thus, for changing the code of a block, knowledge of codes of all earlier blocks is required. Further, it is distributed in the sense it is made available on a large number of computers, and any one having a block of information on it can access (but cannot change) its contents.

In addition to the security and distributed nature of blockchain as database, a blockchain has the characteristics of faster transactions, very large capacity for additional blocks, and immutability, in the sense that information stored in any of its blocks cannot be changed.

The idea of blockchain was first proposed by David Chaum in 1982 in his dissertation entitled 'Computer Systems Established, Maintained, and Trusted by Mutually Suspicious Groups'. However, the idea was realised in 2008 by so far anonymous person (or a group of persons) assuming the name Satoshi Nakamoto which now serves as public transaction ledger of bitcoin, a cryptocurrency.

Advantages of blockchain as database has already been enumerated as secure, immutable, faster, distributed, anonymous, and potentially unlimited etc. For this reason, it is being used to record sensitive documents like property & legal documents. Because of these characteristics, blockchains have been used as a sort of bank, in which money in the form of cryptocurrency, called bitcoins, is kept.

Disadvantage of blockchain: First of all, the ownership by someone of information or money, or legal documents etc. is completely related to the code of the relevant block. So, if code is forgotten or lost, the ownership is completely lost. Next, because of the immutability of the records, a criminal—despite having served the punishment and having reformed as best possible citizen—will remain a criminal, the relevant record cannot be erased. Also, blockchain information may be used by a group of pornographically oriented people. And, the most serious problem is about employment, displacing millions of human beings engaged in banks, book-keeping/record-keeping in various sectors like legal agencies, government registries etc.

2.3 3D Printing, Additive Manufacturing

3D printing or—technically also called, though not universally accepted as synonym of—additive manufacturing is a group of technologies for manufacture based on the process of **material addition** or joining under automated control [Bandyopadhyay, 2020]. In this respect, it may be recalled that the so far mostly used method of manufacturing is retrospectively called **subtractive process** in the sense materials are cut, assembled and soldered etc. For example, doors of automobiles are made by a process including the cutting of aluminum sheets. Like some of the ideas of technologies like satellite initially being given by science fiction writers, the idea of 3D printing was also described by Raymond F. Jones in 1950 in his story entitled Tools of the Trade.

Benefits of 3D printing: Among the many benefits of the prospective of mature 3D printing will be very fine products, economy by saving material waste, efficiency and automated manufacturing, making the products much cheaper. The shape, size, and outlook of goods may be according to one's taste or liking. In the not-so-far future, even Home 3D printers may be available for manufacturing some of the goods for domestic consumption.

Potential Dangers: However, it should be remembered that 3D printing can equally be used to make guns at home. Also, again, there is justified apprehension of the technology leading to massive unemployment.

2.4 Internet of Things (IoT)

The Internet of Things (IoT) refers to a system of (inanimate) things/objects connected over the Internet for the purpose of communicating data to each other, where communication is enabled by embedded sensors, software, and other technologies in the objects.

Applications of IoT: The technology has immense scope for beneficial applications in almost every sphere of human concern, e. g. for elder care, medical & healthcare, transportation, environmental monitoring; in manufacturing, in agriculture, in energy management for metropolitan cities; and as Internet of Battlefields for military applications.

Potential harmful consequences: In view of connectivity of almost everything, serious concerns are being raised by experts regarding privacy and security.

2.5 Nano-technology

In order to explain the, so far not well-defined, concepts of nanotechnology and nanoweapons, it may be recalled that the prefix **nano**, in these concepts, stands for the number 10^{-9} or 0.000000001, called one billionth. Thus, **nano-meter**, denoted as **nm**, is one billionth of a meter. The term **nanomaterial** stands for the material having one or more of its dimensions of the order of 100 **nm** or less. And, the term **Nanotechnology** is used for the

design, characterisation, production and application of materials, structures, devices and systems, using the science and engineering of nanomaterial. For example, nanotechnology is used as nanoelectronics for manufacturing microprocessors and other integrated circuits by Intel and other companies. Finally, **nanoweapon** is a weapon produced through nanotechnology.

Brief History

The earliest available evidence of applications of nanotechnology is available from ancient India during the period around 600 BC from a village, called Keeladi in Tamilnadu. [Kokarneswaran, 2020]. Further, from at least around 900 A.D., it was used, both in India and in Mesopotamia, for large scale manufacturing: In India for manufacture of wootz steel, the microstructure of which contained carbon nanotubes; and in Mesopotamia for giving glittering effect to pottery. [Wikipedia]

In modern times, the theoretical and conceptual foundations of nanotechnology were laid by renowned physicist Richard Feynman through his lecture, on December 29, 1959, entitled There's Plenty of Room at the Bottom in which he described a process that could possibly be used for manipulating individual atoms and molecules [Feynman, 1959]. Later, his ideas were popularised and extended by Eric Drexler through his 1986 book [Drexler, 1986].

Beneficial Applications

One of the significant aspects of 'nano' lies in the fact that nanomaterial has quite different reactive, optical, magnetic, and electrical properties than that of macroscale material. In view of these distinct characteristics of nanomaterial, through nanotechnology, materials are effectively made more durable, stronger, lighter, more reactive, or better electrical conductors. These characteristics have led to numerous applications to various fields including those of commercial products, electronics & IT, medical & healthcare, energy. Due to paucity of space, only a couple of examples, out of numerous ones, from each field, are enumerated

- **Commercial Products:**

- For machine parts, Nanoengineered ceramic coatings have much greater toughness than otherwise.
- Nanoscale films on the display screens of computers and cameras, on windows, and eyeglasses, make them residue-repellent, self-cleaning, resistant to infrared light and ultraviolet rays, electrically conductive etc.
- Nano-engineered materials make automotive products like cars, airplanes, and space craft etc. much lighter, and hence lead to significant fuel savings and clean environment.
- Nanomaterial-based fabrics have potential for more durable and protective garments, particularly for extreme weather locations.

- **Electronics and IT Applications: Most significant applications of nanotechnology are to the field of computing and electronics, making computers and other electronic gadgets much faster, smaller, safer and more portable, and capable of storing larger and larger amounts of information. These achievements are based on the facts**

- Transistors, the basic switches that enable all modern computing, have become gradually smaller through nanotechnology.
- Magnetic random-access memory (MRAM) provides for very fast Random-Access Memory
- Nanoparticle copper suspensions are safer, cheaper, and more reliable alternative to hazardous lead-based and other materials used for fusing electronics in the assembly process

- **Medical and Healthcare Applications**

Nanotechnology, and Nanomedicine—the application of nanotechnology in medicine—have significantly improved the earlier available medical tools, knowledge, and therapies and is producing precise solutions for disease prevention, diagnosis, and treatment. Some specific applications include

- Use of gold nanoparticles are being investigated as potential treatments for cancer and other diseases.
- Nanotechnology-enabled better imaging and diagnostic tools provide for earlier diagnosis
- The design and engineering of advanced solid-state nanopore materials are investigated for high-speed and low-cost gene sequencing technologies that enable single-molecule detection.

- **Energy Applications**

Nanotechnology is finding applications to developing affordable, and renewable clean energy sources, and to reducing energy consumption.

- Nanotechnology is also being applied to oil and gas exploration and extraction through the use of nanotechnology-enabled gas lift valves and the use of nanoparticles to detect microscopic oil pipeline fractures.
- To reduce substantially transmission power loss, wires, containing carbon nanotubes having much lower resistance than the high-tension wires, are being discovered.
- Nanotechnology is already being used to develop many new kinds of batteries that are quicker-charging, more efficient, lighter weight, have a higher power density, and hold electrical charge longer.

Potential risks & hazards

In view of the fact that nanotechnologies have very wide range of applications, and involve a number of industrial sectors, and their volumes is quite enormous and increasing day by day, the landscape of risks involved is quite vast, heterogenous, and is evolving with newer types of applications of nanotechnology. Here, only the following few domains of nanotechnology risks & Hazards associated with manufactured nanoparticles, are discussed.

- human health
- the environment
- Explosive aspects of nanoparticles
- Self-replicating miniature machine.

For this purpose, only some classes of Manufactured Nanoparticles are mentioned below

- Metal oxides used for polymer composites, UV-A protection, Solar cells, Pharmacy /medicine, Additives for scratch resistance coatings
- Carbon nanotubes used for Electronic fuel cells, field emitters, batteries and fuel cells
- Compound Semiconductors for electronic and optical devices
- Organic Nanoparticles used in micronized drugs and chemicals
- Metals like Au, Ag, Ni used respectively for catalytic applications, optoelectronics, and wound dressing

Manufactured nanoparticles & human health: As mentioned earlier nanoparticles are more reactive than bulk/macro-sized ones, and hence more toxic for the human body. The risk is especially grave in the case free nanoparticles, now gradually inserted more in the environment. The free nanoparticles can be absorbed through the skin, inhaled, or can be ingested. When inhaled and reach the lungs, toxic effect is to induce inflammation in the respiratory tract, causing tissue damage. On the other hand, if transported through the blood stream, these enter other vital organs or tissues of the body resulting in cardiovascular and other extrapulmonary effects.

Next, there are occupational hazards for those involved in nanotechnology industries. Also, there is risk due to use of nano-products in cosmetics (e. g. in lotions, toothpaste), in medicines and medical devices (e. g. wound

dressings), in food products (e. g. drinks, ice-creams, fish), in automotive (e. g. airbag gas generators); Sports article (e. g. ski wax).

Nanoparticles and the environment:

Nanotechnologies are gradually moving globally into large-scale production in many industries, and with this the possibility of increased gradual and accidental releases of engineered nanoparticles into the environment also increases. The following are some of the possible routes for environmental exposure to nanoparticles:

- Leakage and discharge from waste, or during production, transport and storage of nanoproducts,
- Release of particles during use of the products,
- Diffusion, transport and transformation in air, soil and water.
- Also, some applications like cosmetic products or food ingredients can diffuse nanoparticles.

Explosion hazards of nanoparticles

In the case of nanoproducts, an explosion occurs when nanoparticles of combustible material scatter through the air, forming a flammable cloud and the cloud is hit by a flame. As mentioned earlier, nanomaterials are more reactive, occurrences of such explosions have more chances.

Apart from concerns of property damage, workers safety and business damage, nano-powder explosions lead to the danger of release of large quantities of nanomaterial into the environment, which in turn may create potential pollution problem.

Self-replication of nano/miniature machines

Self-replicating machines are, theoretically, machines which can produce machines of their own type. The idea of self-replicating machine is based on the phenomenon among biological entities reproducing entities of their own species. Though the idea is only a theoretical one so far, but in the case of nanomachines, it is considered feasible in view of the requirement of very small amount of material for self-replication. However, if self-replication is achieved, it will have far reaching consequences for humanity. Because, in that case **nanoweapons (to be discussed in detail later)** may lead to complete elimination of life from the face of earth.

3. Impact of emerging technologies on Future of Humanity

In this section, impacts of the various disruptive technologies—except Nanotechnology, the impacts of which has been already been discussed in detail above—regarding the following are considered

- 3.1 Economics
- 3.2 Military & Defence
- 3.3 Political & Social institutions being affected adversely.

3.1 Innovations disrupting economies

For better understanding of the rest of the discussion, the following working definitions may be useful. “A **value chain** is a business model that describes the full range of activities needed to create a product or service. For companies that produce goods, a value chain comprises the steps that involve bringing a product from conception to distribution, and everything in between—such as procuring raw materials, manufacturing functions, and marketing activities.” [investopedia]

Platform economy is a business model which uses mainly IT tools to provide services and means of communication between various stakeholders.

Regarding economy, since at least the previous century, technological innovations have been a significant factor in changing drastically its established models, value chains, types of asset, and employment domains &

opportunities etc. Specially, the digital technologies have made drastic transformation in this respect. For example, up to 2008, the fixed capital constituted the larger share of assets of the big companies, but by 2018, the intangible assets consisting of software & intellectual property became major part of their total assets.

Within ICT, one of the well-known examples of disruptive innovation, affecting economy of a sector, is that of Apple displacing Nokia as leader in the domain of mobile phones: When Apple entered the market in 2007, Nokia, the leader, owned 50% share in the market. By 2019, Apple—through its innovation of software-based smart phones which include mobile operating systems, apps, internet and multimedia video and camera functionalities—captured 20 % market share, and Nokia, sticking to improvement of only hardware-based mobile phones slipped to mere 1 % share.

Next, instances of disruptions to some aspects of economy are just mentioned: The internet and cloud computing have given birth to platform economy disrupting the business models of traditional economy. Because of the distributed nature of internet/Internet, digital technologies allow to make industrial processes—like product design, engineering and manufacturing—increasingly decentralised and globalised, possibly taking place in different locations. Similarly, for service, say, in the field of supply of goods, Amazon has drastically different structure, processes, the consumer expectations & behaviour vis-à-vis the traditional high-street shops. Somebody may order from India for a book published by Oxford University Press in England, and the order may be received and processed in USA. Other examples of platform services include Airbnb and Uber having disrupted the conventional services regarding respectively traditional hotel and taxi booking-and-providing services.

Job Markets: Automation—based on disruptive technologies, including the ones mentioned earlier—has created major disruption in the job market. Robots are being used for various types of jobs, either by displacing human beings, or for performing jobs considered earlier too hazardous, or even infeasible involving human beings. However, some job losses may be reduced through adaption to the new environment of production and business involving automated processes and robots. Also, the disruptive technologies, mentioned earlier, are creating entirely new type of jobs, but not enough to compensate for the losses. In view of the rapid technological developments, the human work force will be required to reskill and retrain, on continual basis, in order to keep up with the pace of technological change.

Another development, relating to job market due to disruptive innovations, is the rise of the **gig economy**—a labour market characterized by the prevalence of short-term contracts or freelance work as opposed to permanent jobs—has significant social implications. In this emerging economy, there is no provision for employees' well-being and social protection, including medical facilities, maternity leave, pensions, insurance etc. Also, in view of the winner-takes-all economic scenario, the difference between the successful vs. the unsuccessful innovators on one hand, and people having currently-required skills vs. others will further accentuate the income and wealth inequalities. However, the undesirable impact may be mitigated through various factors like labour costs vs. cost of labour-replacing technologies, labour market regulations, institutional norms, and ethical standards.

3.2 Innovations disrupting Military, Warfare & Defence

Technologies, specially, the current AI-based ones, have been disrupting all aspects of military activity: organisation, logistics, personnel training, strategic decision-making, interoperability, and physical combat.

Technological impact on training: AI-based Virtual reality simulations—of the theatres of combatting the enemy—provide for cheaper, safer and environmentally less damaging alternative to the conventional training on the field. Simulation provides opportunity for training for different types of adversary, and also, offer tailored learning experience to each one of the trainees according to one's capabilities, goals and progress.

Smart weapons: These weapons may be categorised as

1. Automated (human-controlled): These weapons can select the target and attack the enemy only when commanded by a human. Automated weapons, including most of the robotic weapons and drones, are remotely controlled by human beings.
2. Semi-autonomous: These are human-supervised weapons which can, of course, select the target and attack by itself, but a human controller can override its actions through remote control.

3. Fully autonomous weapons, the most advanced of the three categories, are capable of searching, identifying, selecting, and attacking the target, all by itself, without human intervention.

Here, a particular distinction may be pointed out between automated and autonomous, concerning the nature of operational environment: If a weapon, like landmine, acts in a predefined, restricted and controlled environment then it is just automated weapon, and not an autonomous one. An autonomous weapon is capable of carrying out its intended action in an open and unpredictable environment.

The smart weapons of various categories are developed using various disruptive technologies including high-energy lasers, 3D printing and AI including cognitive computing. Use of high-tech weapons, of course, gives rise to political side-effects and security concerns. The weapons, being high-tech, are generally designed and developed either in private-public partnership or purely by private parties. Particularly, for less-developed countries, the concerns become more serious in view of the fact that the high-tech weapons have to be purchased from another country.

Each of these raise number of social, ethical and legal issues. For example, in case of unintended, wrongful damage, who is responsible: the designer/ developer, the commissioning authority.

Before discussion on smart weapons is closed, a special mention may be made of nano-weapon (also, written as nanoweapon). Recalling the earlier considered definition of nanoweapon as a weapon produced through nanotechnology. Nano-enhanced lasers, smaller munitions with increased explosive force, and self-replicating smart nanorobots (SSN) are some of the examples of nanoweapons. SSNs search for and destroy targets without human input and self-replicate with materials found in the environment. Because of various characteristics of nanoweapons, specially, their quite small size, almost invisible to the naked human eyes, and their self-replicating nature, the nanoweapons have been ranked—by the Global Catastrophic Risk Conference at the University of Oxford—as the most probable means to cause human extinction by the end of 21st century. According to Louis A. Del Monte, an expert in the field and author of the book [Del Monte, 2017], SSNs are so gravely dangerous that humanity should prohibit nanoweapons.

Organisation and Command Structure: Defence institutions, by the very nature of their job, have to be strictly built on precise structures and chains of command. However, in the current scenario, instant decisions need be taken frequently by the concerned person—irrespective of his/her (relatively lower) rank—who first becomes aware of a critical situation relating to defence. Instant decisions are required in view of the fact that, the disruptive technologies, including the AI-enabled analytical tools enable collecting of gigantic amount of data from various sources, its processing, making inference from it, or at least converting it into a format useable by human operator, all almost instantly. Reemphasizing, depending on a situation, critical decisions might have to be taken in a fraction of a second, and, hence decision-taking has to be flexible.

Machine-soldier collaborative teams

As in the case of civilian jobs, disruptive technologies are eating into military jobs, particularly, the ones regarding repetitive and mechanical tasks, and also regarding hazardous jobs like surveillance of enemy territories. However, still human beings are required for jobs involving strategic and emotional thinking and creativity. For example, drones and other robots are employed for surveillance and gathering huge amounts of data; computers are used for summarizing and drawing some inferences; but, so far, ultimately it is the human beings who decide the action to be taken based on the data and inference vis-à-vis the purpose under consideration.

The advantage of using these disruptive innovations, of course, involve high risks also. For example, the drones, robots and other digital equipment are vulnerable to being detected, jammed or hacked by the adversary.

Intelligent Logistics

Logistics is heavily dependent on transport planning and innovations. In this regard, AI-based semi-autonomous transport systems have been developed, which can optimally deploy the available resources. In order to detect defects and guard against failure of equipment, better predictive maintenance technologies are being

deployed. Also, AI-enabled analyses are used for knowing in advance, supply needs and inventory. All these advantages arise out the fact that whole (logistic) system is made highly connected. But with high connectivity, its vulnerabilities to cyber-attacks also increases. Further, in order to guard against cyber-attacks AI-enabled software have been developed to automatically defend or even retaliate. Cyber-attacks and counter-measures may lead cyber war.

Interoperability

In case of joint manoeuvre of two or more allied forces—using different, generally incompatible, underlying platforms—interoperability may be big challenge, bigger than the interoperability of human-only forces. And, it is very much possible that two allies' incompatible systems may classify each other as hostile.

3.3 Political and Social institutions being affected adversely.

In this respect, to begin with, brief explanation and **working definitions** of some of the foundational concepts are given.

Social media—one of the products of disruptive technologies, and which is constituted of a large number of websites including Facebook, Twitter, LinkedIn WhatsApp, YouTube, Instagram, TikTok etc.—provide digital platform for interaction, almost instantly, at individual and group-levels, across the world. Any of the digital communication media including textual, graphic, pictorial, audio and video may be used for the purpose. Initially—the ever-growing social media in terms of its users and the number and types of website—was expected to deliver and disseminate only information, the actual happenings in the spatiotemporal domain and/or the actual ideas, feelings and thoughts of individuals and groups. However, with the passage of time, the misinformation, disinformation, hype and fake news dominate the social media to the extent that it has become almost impossible to know truth from the content on social media.

“Disinformation is false or misleading information that is spread deliberately to deceive. This is a subset of misinformation. **Misinformation** is false or inaccurate information that is communicated regardless of an intention to deceive. **Fake News** is false or misleading information presented as news. It often has the aim of damaging the reputation of a person or entity, or making money through advertisement revenue”. [Wikipedia]

Regarding impact of social media on Democracy, initially, around 2011, the media, specially, Facebook, Twitter, WhatsApp and Google were seen as propagators of democracy, when during Arab Spring—affecting many Arab countries and their neighbours, including in Tunisia, Egypt, Bahrain, Iran—a sort of democratic movement, was spurred and spread across these countries by bloggers and social media commentators.

But latest by 2016—around the time of presidential election in USA—because of various incidents of massive misuse of the media by anti-democratic forces (some of which are mentioned below), it was fully realized that the social media was being massively misused for propaganda and disinformation in order to propagate personal agenda and for character-assassination of the opponents. Ex-president Trump of USA made significant contribution to this new realization about completely changed role of social media.

Next, (out of hundreds, only) two of incidents of misuse of social media as attacks on democracy are quoted.

- For the **2016 presidential election in USA**, the Russian government made disinformation attack to harm chances of Hillary Clinton, in order to support Trump. Between 2013 and 2017, the Russian government through its various agencies spread fabricated articles and disinformation to millions of social media users [Allcott, 2017]

- **Cambridge Analytica Ltd (CA)**, a British firm founded in 2013, and involved in influencing hundreds of elections globally. However, its activities came into limelight through the scandal now known as Facebook–Cambridge Analytica data scandal.

Their modus-operandi were to collect the personal data of millions of Facebook users without their consent. The politically-significant information was obtained through a series of questions, which indirectly related to their political preferences. Then the data was used to provide assistance to the 2016 presidential candidates from Republican Party. In this regards, CEO of Facebook Mark Zuckerberg apologized. Further, for privacy violations, Facebook was fined \$5 billion by the Federal Trade Commission.

In addition, violence sparked by disinformation and false propaganda on social media has cost innumerable lives and has caused severe problems for societies across the globe.

Human rights, democracy and the rule of law form—or desirably should form—the core of all modern societies. These three principles should be fundamental principles, both in letter and spirit, of governances all over the world. In view of the pervasiveness and influence of the modern technologies, specially, the disruptive technologies, constituting what may be called **Digital Economy** (some people call this economy as **Internet Economy**, but ‘Internet’ has much restricted sense than ‘Digital’) on all aspects of our lives globally, there is need to be on the guard against violation of these principles by the very powerful companies owning the technologies. The need is all the more urgent in view of the tendencies and repeated attempts to violate these principles by some of these companies. And, in a number of cases, the violations are not just unintended, but in open defiance, of the accepted human values, norms of democracy and the coded laws of various governments.

These giants of the current economy—viz. Google, Facebook, Microsoft, Apple and Amazon, who together may be called as ‘**Digital Oligarchy**’, though these are now generally referred to as ‘**The Frightful Five**’—are gradually acquiring tighter grip globally on all aspects of our lives: economic, social, political, educational, and what not.

The cumulation of digital monopoly and power in the hands of the **Digital Oligarchy** and a few of their digital friends arises, not just because of their economic power, but also because of the following other factors

- Through their enormous money power, they can afford to gain political, societal and ideological influence & support for their business model.
- The Internet services are increasingly becoming the major source of all sorts of information, including the political one, to the masses, particularly to the younger generation. The **Digital Oligarchy** uses this power to influence and bargain with the political leadership. Also, in the process they have seriously harmed to the point of almost certain death the highly responsible legacy printed media, classic journalist publications. These few members of **Digital Oligarchy** have share of around 80% of the total advertisement revenue, thus having stranglehold monopoly of the advertisement sector. Earlier, printed sector was owned by a number business houses.
- These Giants collect personal data (profiling individual), through their commercial activities of selling digitally goods and services, and then sell the data for huge profits.
- By their huge monetary & technological advantage, they are furthering their monopolistic hold on innovation and research—about which outsiders including general public and law-enforcing agencies are kept in dark—but only of that type which suits their business models.
- In the history of business, the **Digital Oligarchy** constitutes the only group who has captured the markets almost completely, having most of their products unregulated, and additionally have dominantly influenced the public opinion, and remain popular with the public.

- **Unethical practices to enhance their revenues:** (i) they lure us all in purchasing-spree of completely unrequired & useless things through their subtle devious strategies. Further, they seduce the young people, making them addicts to smart phones, through online games, pornographic literature etc. This they do knowing very well that use of smart phone is highly injurious to teenage brains. And, the degree of their unabashed behaviour is enhanced many-fold when their leaders, including Bill Gates & Steve Jobs, have openly confessed that each of them seldom lets his kids play with the very products he helped create. But these leaders advertise ruthlessly, so that others purchase for their children.
- For these Giants, **Disruptive Innovations/ Technologies**—which, of course have contributed significantly and beneficially to the human cause—has become license for Disruption of Law. These Giants in particular, and internet industry in general have **given rise to culture of lawlessness and irresponsibility on unprecedented scale**. They follow the policy of ‘**better ask forgiveness than permission**’. They flout with impunity national and international patents and copyright laws. And, once caught, ask for forgiveness, or pay nominal fines, and then flout again repeatedly. In this respect, **well-known cases** include that of ‘Google Books’ conflicting with copyright laws and of ‘Uber’ conflicting with labour laws of public transport.

Disrupting Health at all levels: The Digital Oligarchy has created 'clickbait' industry, i. e. more the clicks, more they earn the advertisement revenue. In the process, they are seducing & addicting the youth to gradually increasing use of the Internet. However, through the process they are creating serious social and psychological problems. Researchers in social sciences & psychology etc. have found that the impact of technology on people's social, mental, physical and environmental health can be devastating if they don't keep themselves in check.

The following is the conclusion of a \$ 1.5 million project by Robert Kraut, social psychology professor at Carnegie melon university:

- It is a paradox that Internet that is supposed to connect people has been found reason for isolation.
- Apart from **isolation**, it leads to 2. Lack of Social Skills, 3. Obesity, 4. Depression, 5. Poor Sleep Habits, 6. Pollution, 7. Increased Bullying, 8. Lack of Privacy 9. Higher Level of Deceit, Neck and Head Pain, 18. Shortened Attention Span

Need for enforceable laws to check violations by digital giants

It is true that the technologies are providing benefits to the human life in innumerable ways. Hence, care has to be taken that undue restriction should not discourage innovative technologies. Therefore, first of all, it is desirable to have mainly ethical principles to be followed voluntarily. However, in view of various harmful activities mentioned above, including intended serious violations of the three principles of Human rights, democracy and the rule of law by these companies and Facebook Cambridge Analytics scandal, **coded laws are required**, specially, in view of the fact that technologies are evolving, and evolving at an ever-increasing rate. Additionally, it is also urgent to be vigilant on a continual basis against misuse by the various companies.

4. Conclusion

In this communication, it is explained how a handful of state-of-art technologies, owned only by about half a dozen mega-industrial business corporations, have the potential for drastically impacting and transforming—both for the better and for the worse—the society, the humanity as a whole, and the life of each and every individual human being on earth. Keeping in mind the fact of its implication of this potential of technology for the future of humanity and combining it with the well-known fact that the main concern of a business enterprise is always to make profit, even at the cost of the basic human requirements and values, **it is the duty of the academic community, along with every vigilant citizen** (i) to be on the guard and keep evaluating, on continual basis, the impact of these technologies and tendencies of the business houses vis-à-vis the interest of humanity as a whole, and (ii) to use its strength so that these business corporations employ their technologies only for human welfare. Whenever there is possibility of misuse of the technology, the academic community along with vigilant citizens

should inform the society and the people in power, and also make sincere efforts to prevent the misuse.

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0119005 PATTANAYAK, DEBI PRASANNA (Centurion University, Andhra Pradesh, Chairman, Institute of Applied Language Sciences, Founder Director, CIIL, Mysore). NEW GLOBAL TECHNOLOGICAL SOCIETY: A DEVELOPMENTAL APPROACH

The new Global Technological Society presupposes the existence of an Old Global Technological society. If so, how old was it? What was the manner of sharing the technology globally?

Before seeking answers to the above questions we have to find out about the technological society. When did the human society become technological society? What is the manner of transition from local to global?

It is recognized all over the world that in spite of the diversity and plurality. India is a single linguistic and Culture Area. India is a reflection of the diversity of the world. Ever since the advent of colonialism and the division of the world into three worlds, the colonialists imposed their mono model by declaring English as the only language

of knowledge acquisition and development. This marks the disintegration of interdependence and complementarity. Access to technology became uneven and poverty spread all over the world. The unequal societies responded vigorously and we all are facing a world war.

Introduction

The first human societies were formed through communication and sharing. Individuals had compassion at heart and generosity outside. That is how individuals were coupled with one another and families and societies were formed.

Individuals survived by hunting and food gathering. The only technology available to them was equipment's made by stone and subsequently by metals for killing, cutting and digging. Once settled cultivation began new technology for farming, storing and transporting grains was required and invented. This technology was for selfsufficiency.

As groups were roaming about in search of land and hunting animals, they felt the need for leaving a message for those who were following. Spoken language was bound by space and time. As they settled down they wanted to record their achievements for the future generations. New technologies were developed for writing and developing scripts for the purpose. From cave paintings, inscriptions, writing on birch blocks, copper plates, palm leaves, to development of printing was a long journey. Its impact was the division of the society between literates and illiterates. Further when formal education was introduced the societies were divided between educated and uneducated. The development theorists and the post-colonial educationists used these divisions to their advantage.

Without going into the developmental history of human kind, suffice it to say that the technology development was accelerated with the advent of the metallic revolution. With rapid growth of technology, social inequality set in. The problem of inaccessibility reinforced inequality. The technologically developed joined hands with the economically affluent and both joined the educated to form a class to control the state and the society. As a result, democracy began to be constricted. While civilizations grew in some parts of the world, cultures, with the loss of tradition, receded all over the world.

The technology development reached such proportion that the atom bombs killed millions of people. Poisonous gasses and germ warfare killed millions of people and destroyed the environment. There is also a brighter side to technology. We have reached the planets encircling the Sun and are exploring the possibility of life. Our greed for colonizing these planets might lead us to internecine war with unpredictable consequences. We have also brought about a digital revolution. The smallest mobile can convey the biggest data within the shortest time. During Covid 19, when schools and colleges were closed down, on-line courses continued schooling, its flip side is that not only digital divide created social inequality, but quality education is affected. People have started talking about teacherless education. One last example of the height of technology we have reached is Robotic research. When robot was discovered, human beings were masters and robots were helpers. A situation has now arisen, when the roles are reversed. The Robots have become masters and the human beings have become helpers. The technologies we are developing have turned out to be self-destructive. Our craze for automation has resulted in the unemployment of many.

After the Second World War the US and its allies felt the need for a policy which would publicise the benefits of Science, technology and industrialization among two thirds of the world defined as underdeveloped or developing. This development theory of which Foreign Aid was the first step, was meant to bring these countries within their economic and political power circle.

Economics had become the measuring rod of development by this time. From the theory of growth to sustainable development is a long journey. From welfare economy through capitalist economy to corporate economy are steps to sustainable development as delineated by US and its allies. With each step democracy as well as human rights were constricted. Unless diverse economies are recognized and partnership among them is sought, forcing one kind of economy is bound to encourage unemployment, poverty and inequality.

Of all the known cultures and civilizations, Indian Culture is the only one which has sustained with 7000 years of unbroken history. All through it has recognized diversity and sought unity in diversity. All its philosophical traditions investigated one in many and many in one. It is the culture which gave a call for binding the human, animal and plant varieties of the world as members of one family. The philosophical foundation of its thought process has been Both And.

None of the thought leaders of the western thought process, Socrates, Aristotle, Plato were familiar with the outside world. They had contended that without knowing the city, one would never understand the world. The philosophical foundation of their thought process has been Either Or.

Mohan Das Karamchand Gandhi, thought leader of India, going round the nook and corners of the country, discovered that Indian Culture survives in its seven lakh villages. Therefore, he wrote **Gram Swaraj** and **Hind Swaraj**. The four principles he suggested were **Satyagraha, Sarvodaya, Swadeshi and Swaraj**. He also spoke about rural economy and rural development and rural technology as the foundation of both Gram Swaraj and Hind Swaraj.

Technology is developed to meet the requirements of a people. In other words, it is demand based. Demand of a people is varied depending on its ecological and cultural variation. The 17SDGs adopted by the UN General Assembly for the 2030 agenda recognizes this. At this point, Goal 1 No poverty, Goal 2 Zero hunger, Goal 10 Reduced inequality, Goal 13 Climate action, Goal 17 Partnership to achieve the goal deserve our attention. Partnership is not dependence. Partnership takes place among equals. Therefore, there is the stress on reduced inequality. Without partnership it is impossible to achieve No poverty and Zero hunger. Without achieving these, there is no point in talking about a Global Technological Society.

It is dangerous to import technology to the Third World countries along with trained labour force to operate it. It stirs the labour market and results in the large scale unemployment for the untrained or lowly trained nationals and brain drain for the highly trained. Unless technological development is concurrent with educational and economic reforms, the human resource challenges of the 21st century cannot be met squarely.

Before I bring this discussion to close, it is necessary to bring to focus the concept of the Appropriate Technology. Appropriate Technology is need based technology. The need in an unequal world is varied. Unless transition from rural to urban and developing to developed technologies are spelled out, talking about global technology and transforming the world is meaningless.

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TRANSFORMING THE HIGHER EDUCATION FOR THE NEW TECHNOLOGY SOCIETIES:
REFLECTIONS ON THE PAST EXPERIENCES AND FUTURE POSSIBILITIES IN THE
CONTEXT OF THE NATIONAL EDUCATION POLICY 2020**

1. Novel Corona Virus, a pandemic labelled as Covid-19, is a cross-continental crisis compelling national governments and multinational agencies to take the most difficult trade-off decision as to whether save life or to protect livelihood. Convinced of saving lives, most enforced complete lockdown abruptly bringing all economic activities to a halt. However, most are now at different points on a continuum ranging between a complete lockdown to total restoration of normalcy. Higher Education sector has been no exception. As campuses came to an abrupt halt and unsure of how long will the crisis take to secede, colleges and universities started exploring alternatives to face-to-face teaching. Soon lectures were 'Zoomed', tutorials took place on 'Microsoft Team', interviews on 'Google Meet', and information beamed through 'Cisco Webcast'. Suddenly, social media became a potent platform for live-streaming disseminating knowledge. Assignments sent and received on 'Google Classroom' while labs went virtual. Webinars, a new entrant in the higher education lexicon replaced seminars and conferences. Apparently, the crisis achieved in weeks what proponents of technology-enabled learning couldn't in decades.

2. Emboldened by the success, the **technology touts/technology enthusiasts** have already started writing obituary of the higher educational activities and process as a physical space and are gaga with the possibility of total transition to the virtual. The **techno-probes/technology sceptics**, on the other extreme, draw our attention to the ground realities that are starkly different. To them, the transition from physical to virtual is a dominantly metropolitan narrative.
3. Then there are the **realists** who are convinced that universities shall bounce back to their usual ways as soon as the circumstances permit with some degree of technology blending. To them, universities have historically embraced technologies without any paradigmatic shift in their approach to teaching and research. Teachers survived textbooks. Broadcast and telecast technologies could not make classroom redundant. Massive investments and sustained campaign for promoting digital learning and MOOCs have hardly impacted the conventional universities any adversely.
4. Speaking of India, a continent-sized country with over 37 million students enrolled in about 52,000 higher educational institutions, nearly two-third of the institutions, mostly located in rural and remote areas could hardly migrate to online learning the new mode, and that too only partially. For the rest, only a semblance of teaching-learning took place and the worst affected were those located in the remote and rural areas with limited means. Virtually, most academics and students, even those in the premier higher educational institutions, feel that the online teaching is, at best a time-gap arrangement with inherent compromises in the teaching- learning processes. The transition from physical to virtual turns out to be a dominantly metropolitan narrative.
5. Importantly, the regulatory bodies that so enthusiastically encouraged and enabled universities to go online for teaching are wary of trusting the technology for conducting examinations and insist that, at least final year examinations be undertaken in a supervised and proctored mode. Virtually, most academics and students, even those in the premier higher educational institutions, feel that the online teaching is, at best a time-gap arrangement with inherent compromises in the teaching- learning processes.
6. Universities are, therefore, expected to bounce back to their usual ways as soon as the circumstances permit. They might blend virtual learning to some extent to their conventional mode of imparting instructions. After all, universities have historically embraced technologies without any paradigmatic shift in their approach to teaching and research. Teachers survived textbooks. Broadcast and telecast technologies could not make classroom redundant. Massive investments and sustained campaign for promoting digital learning and MOOCs have hardly impacted the conventional universities any adversely.
7. Crisis could catalyse change but only for the interim. Recall the plagues in Europe that recurred repeatedly during 14th to 17th centuries that would force students and faculty to flee their campuses to take refuge in the countryside manor houses. For Isaac Newton, such an escape proved to be the most productive period of his life, but the countryside manor houses could never become academies in perpetuity. The 1918 flue pandemic was a major catastrophe that impacted India in a very significant way. However, the decadal census data for the year 1911 and 1921 show that the number of universities, colleges and students had in fact increased and most importantly, the newer universities were no different than their counterparts prior to the pandemic.
8. Universities are not only about teaching and learning. They mean much more than that. Campuses attract learners and the learned because human nature seeks companionship with contemporaries. But they go far beyond than being places of socialisation, hanging around and making and meeting friends. They rather transcend to enable experiential learning by being in the company of not only the like-minded but also those with drastically differing views. It is for the discussion, discourse and dissent that the students and scholars long for being on the campus. A classroom is never as simple as Zoom imagines and where the teachers could mute the class at the click of a button. Universities have continued to remain as they were for centuries and they are unlikely to change in any significant manner post-Covid19 and it shall not be due to the resistance of the faculty to change but because of certain inherent but invisible features that define universities. Technology did provide an option to the academic institution to carry on their teaching-learning process. However, it may be too enthusiastic to deduce that the future of higher education shall be in the

virtual and the brick and mortar universities shall cease to exist. Nonetheless, the higher education system has to be transformed urgently to serve the new technological society.

The Higher Education Scenario in India:

9. Higher Education in India has many distinctions but has many challenges. Frequent efforts aimed at improving the system of higher education has made the system diverse and complex beyond comprehension. At the same time, all the previous efforts have miserably failed to transform the higher education system. The National Education Policy 2020 offers this opportunity once again. While ideas for reforming various facets of higher education - objectives, intents, structure, pedagogy, delivery, examination, governance, administrative, regulation and financing reforms, piecemeal implementation, based on pick and choose approach in the past worked only partially. Also, what universities regard as basic pre-requisites, are often left unattended. This paper argues that no transformation shall be possible and the system shall continue to languish unless a few critical basics are identified and addressed in earnest. Some of these include: clarity about the vision, mission and goals of higher education; adequacy of public investment in higher education, at aggregate and also at the institutional level; recruiting and retaining adequate number of highly qualified faculty; and commitment to the empowerment and autonomy of universities.
10. The National Education Policy 2020 indicates that the major problems faced by the higher education system in India include: “(a) a severely fragmented higher educational ecosystem; (b) less emphasis on the development of cognitive skills and learning outcomes; (c) a rigid separation of disciplines, with early specialisation and streaming of students into narrow areas of study; (d) limited access particularly in socio-economically disadvantaged areas, with few HEIs that teach in local languages; (e) limited teacher and institutional autonomy; (f) inadequate mechanisms for merit-based career management and progression of faculty and institutional leaders; (g) lesser emphasis on research at most universities and colleges, and lack of competitive peer-reviewed research funding across disciplines; (h) suboptimal governance and leadership of HEIs; (i) an ineffective regulatory system; and (j) large affiliating universities resulting in low standards of undergraduate education” (GOI, 2020, p. 33). NEP 2020 “envision[s] a complete overhaul and re-energising of the higher education system to overcome these challenges” (apparently the identified problems) in order to be able to “deliver high-quality higher education with equity and inclusion”.
11. Many of the problems and the the broad solutions identified above may have existed over a period of time to become dire in the current context but had been pointed out at different point of time in the history and development of higher education by the Calcutta University (or the Sadler) Commission (GOI, 1920), the University Education Commission (GOI, 1950), National Education (Kothari) Commission (GOI, 1966), the National Policy on Education, the NPE 1968 (GOI, 1998), the National Policy on Education, the NPE 1986 (GOI, 1998), the Programme of Action 1992 (GOI, 1992), the National Knowledge Commission (GOI, 2009a) and the Yashpal Committee (GOI, 2009b), to mention the most prominent one. Some of the issues raised in these and the NEO 2020 could be the root cause while others could be the manifestation of the malaise and once addressed, a number of problems would automatically get addressed.
12. Higher education in India is characterised by many a dubious distinctions. With 993 universities/university-level-institutions, 39,931 colleges affiliated to universities and 10,725 non-degree-awarding stand alone higher educational institutions at tertiary level (GOI, 2019), it is the single largest system of higher education found anywhere in the world. No other country or even regional groupings have as many higher educational institutions as India does. The higher education system is not only very large but is also very complex with a wide variety of higher educational institutions - the institutions of national importance (INIs) (comprising the Indian Institute of Technology (IITs), National Institute of Technology (NITs), Indian Institute of Information Technology (IIITs), Indian Institute of Science Education and Research (IISERs), Indian Institutes of Management(IIMs)), central universities; public funded state universities (PFSUs), self-financed private universities (SFPUs), deemed Universities (DUs), colleges and the stand alone higher educational institutions. Much of the expansion in size and complexities has come about after Independence and thereby putting India into the leagues of countries that could attain so much in such a little time (Qamar, 2018b). But

most of our higher educational institutions suffer from under-investments leading to inadequate, deficient and often inappropriate physical facilities and teaching-learning and research infrastructure (Tilak, 2013). Thus, the higher education system in India is also characterised by the prevalence of a very large number of small-sized institutions, often academically and financially non-viable.

13. With over 37.4 million students on the rolls, we are undoubtedly the second largest system of higher education in the world. However, over 80 percent of the total enrolment in higher education is at the undergraduate or lower level with a negligible proportion of students, in fact less than 0.5 percent, pursuing PhD or other research degree qualification. This skewed distribution notwithstanding, India is also credited to have the highest number of highly educated talent pool. But these distinctions are shadowed by the fact that the proportion of graduates in our demography are just about eight percent. Notwithstanding the remarkable expansion in institutions and enrolment, the participation rate in higher education is abysmally low at 26.3 percent of the population in the relevant age group. Even more disquieting could be the fact that the Gross Enrolment Ratio in higher education is highly skewed in favour of the elites, rich, urban and women as the Scheduled Castes, the Scheduled Tribes, the Minorities, particularly the Muslim Minorities and the marginalised sections of the society have much lower participation in higher education.
14. With over 1.42 million faculty members on payroll of various types of higher educational institutions makes us the probably the third largest system of higher education. But the average student-teacher ratio hovering at about 29 students per teacher, our higher educational institutions do not come anywhere close to even the second tier universities and colleges in the developed countries. What makes it worst is the fact that on an average thirty percent of the sanctioned faculty positions remain vacant over a fairly long period. What is most troubling is the rampant practice of engaging teachers on contractual, part-time, guest and visiting basis on a paltry sum which neither attracts talent nor ensures commitment to teaching and research (Qamar, 2018c). Most worryingly, when selections are made on permanent basis, these part-timer and contractual faculty claim first charge on such positions and the administration is often made to succumb to their demand by various kinds of political, human and judicial interventions. With the passage of time and due to assured career progression, it is these people who get promoted to senior faculty positions and rather more rapidly rise to claim leadership positions across the higher education system.
15. As the system crumbled on account of underinvestment and inadequate and inappropriate human resources, the clamour for reforms rises (Qamar, 2012). At the forefront were the liberals who blamed the decline on the policies targeting reduced public provisioning for higher education. The proponents of enhanced private participation in higher education, fed on the dissatisfaction amongst the stakeholders from poor quality higher educational institutions to demand entry and operation of the private sector in higher education. Their argument that the governments would never be able to spare enough resources out of their limited kitty to invest in institutions and capacity to meet the ever-increasing demand for quality higher education were bound to cut ice. Their demand that the private investment in higher education be permitted in the larger national interest were yielded to and the system reformed to provide scope for the entry and operation of self-financed private higher educational institutions. As a natural corollary, this also led to the introduction of the self-financed seats, courses and programmes even in the so called public funded higher educational institutions. As on date, India does not only have the distinction of the largest system of higher education in the world but is also a system that is dominated by the private players of many hues and colours, particularly in the professional and technical higher education. Simultaneously, however, the public-funded institutions continued to survive, albeit under severe resource crunch and capacity constraints (Qamar, 2018a). As democratically elected governments could never gather courage to exit out of higher education and as they could not adequately provide for all their institutions either for expansion or for excellence, they sought to experiment with many different kinds of public funded institutions in the hope that if overall quality could not be improved, there could at least be some island of excellence.
16. Yet another peculiar feature of the higher education system in India is the affiliation system, wherein universities affiliate, often in large and unmanageable, numbers of a wide variety of colleges like Constituent Colleges, Associated Colleges, Affiliated Colleges, Community Colleges, and so on, which are further

categorised into government, government-aided, private self-financed reflecting the ownership, management and sources of finance. Students are admitted and taught in these colleges the curricula and syllabi that are prescribed by the affiliating university which also conducts examinations of the students on their rolls. Barring only a limited number of colleges that are accorded autonomous status, these colleges follow a common syllabi with no scope for changes and improvements at their level and the affiliating university is unduly burdened with the examination work.

17. Hassles notwithstanding, both the colleges and universities like the system - universities, because affiliation and examination fees are their major source of revenue and colleges, because even the worst of them survive on the brand name of the university to which it is affiliated. This is a dominant system as it accounts for nearly eighty percent of the total enrolment in higher education. These colleges not only offer undergraduate programmes but are also engaged in postgraduate teaching and research so much that nearly sixty-five percent of post graduate enrolments are in these colleges. Invent of the Stand-alone Institution outside the University system has added further to our peculiarities. The fact that higher education in India is a shared responsibility between the Central and the State Governments has added its own complexities in this diversity.
18. While international schools operate freely in the country, the attempt to bring out legislation for the entry, operation and regulation of foreign universities has so far not been successful for a variety of reasons. The regulators in higher and technical education have however created a scope for offering foreign degrees for studies undertaken in India but the same has not found favour with good foreign universities. Interestingly, however, sample studies based on the newspaper advertisement indicates that as many as six hundred degree level programmes are offered in the country in sheer violation of the law of land. These are essentially offered by institutions which could simply be called illegal entities. The fact that one of the regulators in the country brings out a periodic updated list of universities which it calls fake universities add yet another dimension to our understanding of diversity and complexity.
19. As the system grew diverse and complexities ensued, the governments responded by not only giving more powers to the existing regulatory bodies but also went on setting up new sets of regulators. In the process, we have created layers and layers of regulatory agencies which by the latest count were as many as fourteen. While earlier on these regulatory bodies were set up by the Central Governments, recently many a State Governments have also set up their own authorities and commissions to regulate higher educational institutions under their areas of jurisdiction. Besides, the administrative departments dealing with higher education of both the State as well as the Central Government continue to play important roles in financing and regulation of higher educational institutions falling under their domain. Such a complex web of regulatory institution, to quote the National Knowledge Commission, has rendered our higher education 'over-regulated and under-governed'. So far the slogan of 'minimum government and maximum governance' has had no visible impact on the governance and regulation of higher education in the country.
20. Faced with the continuing decline in and ever-rising demand for ensuring quality, making higher education inclusive and promoting excellence in higher education, the regulatory bodies have rather been compelled to act tough and frequently. This has only led to more regulations, more guidelines, more formalisation, standardisation and harmonisation of systems and process across the board. Each regulation, guidelines or directive issued by them has had the effect of divesting universities with their autonomy and vesting their powers and functions in agencies and institutions outside the universities but have not necessarily improved the quality of higher education. As their efficacy came under questions, it was felt necessary to reform and restructure the regulatory framework itself and as recommendations in this regard piled with no concrete action, these bodies suffered due to uncertainties about their future and the higher education system as such became all the more chaotic.
21. In the meantime, the critical academic, administrative, institutional, regulatory, financial and governance reforms urgently needed for transforming higher education system has continued to languish. The fact that earlier attempts to reforming the higher education system has had only limited success and the system by and

large continues to remain deficient should be matter of concern for the policy planners and administrators. Any further attempt to reform, restructure or reconstruct the higher education system in the country must, therefore, begin by answering the critical questions as to why did our earlier efforts failed to fructify. It appears that we have been identified our problems wrong and have been prescribing all the wrong solutions. Learning from the best global practices is one thing but implementing success stories drawn from different cultures and contexts in our country without necessary adaptation is something different.

22. Copying the best, particularly from the West, may not necessarily serve us the best. Importantly, every farmer knows that a bumper quality crop is a culmination of the Seed, the Soil, the Irrigation, the Fertiliser, the Technology, the Toil and above all the Environment and the Climate. These are all not only strategic but are also complementary in the sense that there shall be no yield in the absence of even one. It is emphasised that the desired reforms in higher education shall remain a distant dream unless we first address the basics and create conditions for the conducive development of higher education in the country.
23. First and foremost, the strategies for transforming higher education must begin with the clear articulation of the vision, mission, goals and objectives of higher education. Though we have been essentially pursuing the triple objectives of Expansion, Equity and Excellence, since Independence, there is now an urgent need to emphasise that these three objectives are integral and must not be seen as three independent objectives such that these three objectives are neither contradictory nor are in conflict with one another. It has to be repeatedly affirmed that expansion shall not come about unless we make our higher education inclusively accessible for all. More importantly, the notion that expansion and inclusion can be achieved only at the cost of quality or excellence has to be refuted in strongest terms. These three objectives are intertwined like a triple helix; as an integrated whole, they define the genes of higher education; separated from one another, they spell disaster.
24. While there is a consensus about the above objectives, there seems to be divergence of views about their meanings and approaches to implementation. The Inclusion, for example, has to go much beyond the policies of quotas and reservations. Respect and tolerance for diversity form the foundations of the inclusive societies. It calls for an ecosystem and environment that makes all sections of the society to feel comfortable, confident and to contribute for the collective good of the society and that should be possible only if the institutions, systems and processes respect divergence choices and preferences. Similarly, the Excellence in higher education cannot be defined exclusively in terms skills and employability of graduates. Employability of graduates is, at best, a natural consequence of excellence in higher education but could never be used as its cherished objective or the sole purpose. Excellence in higher education is defined by the ability of a university to add to the existing body of knowledge through research, publications, patents and innovation.
25. Secondly, it must be realised that Excellence is an expensive proposition. It becomes all the more expensive if it has to be pursued in tandem with the objectives of Expansion and Equity. Best higher educational institutions in the world invest hugely in their physical facilities, infrastructure, library, labs etc. Most critically, the basic facilities for teachers for their study and office, which are presently abysmally inadequate and grossly inappropriate, have to be given utmost priority because there are ample evidences suggesting that the faculty engagement and output markedly improves as these facilities are provided to them. These are considered necessary to create conducive work conditions for attracting talents. State of art infrastructure, fully equipped laboratories, comfortable class rooms, well endowed libraries, quality residences for the faculty staff and students, common facilities, well maintained open spaces are also considered necessary to project the brand of university for many perceive these as reflection and manifestation of the quality of the teaching-learning and research processes.
26. Thirdly and most critically are the faculty and human resources who are the essence of higher education. Sadly, it is this valuable resource that has seen gross neglect at least since early Nineties. Even though, all higher educational institutions taken as a whole have nearly a million faculty members, on an average thirty percent of the sanctioned faculty positions remain vacant in the centrally funded higher educational institutions whereas the ratio is as high as fifty percent in case of the public funded state universities and their

colleges. Many a universities and colleges have not made any fresh recruitments for nearly two decades and, contrary to the popular belief that it is on account of faculty shortage, it is largely due to direct and tacit ban by the governments and because of the complex procedural requirements. Worst still, in many states, the power to select and recruit faculty have been vested either in governments or in the public service commissions or higher education commission, which are outside the domain of the universities and colleges. Most critically, the fresh appointments are being increasingly encouraged in contractual, part-time, visiting or guest faculty modes and the teachers so appointed are paid paltry sums. Consequently, the system fails to attract the best and the most talented faculty and gets mired into mediocrity when these poor quality teachers are made regularised or made permanent owing to various kind of pressures.

27. No reconstruction shall be possible unless this issue is addressed urgently. To begin with, we must set norms for Student-Teacher Ratio, which must not exceed 10 in case of universities and postgraduate colleges and 15 in case of undergraduate colleges. Based on these norms, the faculty positions must not only have to be sanctioned and released and universities and colleges be facilitated to fill up these positions on priority. Universities may find it challenging to find suitable candidates for filling up faculty positions at the level of Professors and Associate Professors across all disciplines, as these positions require candidates with certain level of academic attainments in terms of teaching and research experience, publications, patents and consultancy and those kind of candidates have simply dwindled due to the ban on filling up the faculty positions at the entry level. This problem cannot be overcome in short-term. Short-term measures like increasing the retirement age or engaging Professionals and Practitioners on part-time basis may not go a long way. Possibilities of attracting quality faculty at these levels from abroad shall also not work because eminent academicians are in short supply globally (Qamar, 2018c).
28. Immediate steps should, therefore, be taken to fill sanctioned faculty positions at the entry level through rigorous selection process and barring a few disciplines there would be sufficient number of candidates available who shall be meeting the prescribed qualification. Simultaneously, the newly inducted faculty members shall have to be oriented, groomed, mentored and supported to become quality teachers and researchers. As the system is already saddled with non-PhD teachers, a large number of faculty fellowships may have to be provided to enable these teachers to go on study leave to complete their doctoral qualifications from reputed institutions in India and abroad. Similarly, postdoctoral fellowships may have to be arranged to enable faculty members to take up further and advanced research in other universities. Inbreeding of faculty shall have to be addressed by offering higher pay or dislocation allowance to those who chose to serve universities and colleges outside their own state.
29. Most of the higher educational institutions have not sufficiently invested in creating necessary infrastructure to effectively utilise the available faculty resources. About 20 percent teachers in central universities, over 50 percent in the state universities and more than 80 percent in colleges are not provided the workplace/cubicle even on sharing basis. In most cases they are required to spend their time in a common room which is hardly a place for academic activities. Further, it cannot be overemphasised that future talent pools for drawing faculty shall depend greatly on the ability of the system to produce quality postgraduates and PhDs in large number across all disciplines. With only twenty percent of the total enrolment in the postgraduate programmes, the present capacity is seriously constrained. Needless to mention that as the overall quality of higher education improves, the quality of the postgraduate programmes and PhDs shall also increase and thus provided the needed talent pool.
30. Fourthly, the best systems of higher education thrive on the autonomy and empowerment of universities. Universities in India have been stripped of their powers and functions overtime and those now stand vested in agencies outside. At the same time, the quality of higher education has rather than improving registered decline (Qamar, 2017). This is, however, not to construe that the higher education system needs no regulation. What is being argued is that the present form of regulatory practices are not conducive to the healthy growth of higher education and do not also gel well with the best global practices. We can no more regulate the institutions of the twenty-first century with the tools and mindset of the eighteenth century. The regulatory system need to be reformed such that it becomes facilitative rather than being obstructionist in

experimentation and innovation. The system needs to be based on trust and empowerment. The regulation should provide broad framework and boundaries specifying the limits and then leave the day to day affairs to the universities themselves. Micro-management from distance has never worked anywhere and is not likely to work in a country of our size and diversity (Qamar, 2019). With the above pre-requisites ensured, the higher education system must embark upon the academic and curricular reforms. Given the conducive conditions, work environment and enabling conditions, there is no reasons that the higher educational institutions in the country shall not make mark in the arena of higher education and research.

The Solution NEP 2020

31. The National education Policy 2020 has set a laudable goal by claiming that the “aim must be for India to have an education system by 2040 that is second to none, with equitable access to the highest quality education for all learners” (GOI, 2020, p. 3). Guided by the “rich heritage of ancient and ‘eternal’ Indian knowledge and thought” based on the “pursuit of knowledge (*Jnana/ Gyan*), wisdom (*Praqya*) and truth (*Satya*) being the highest human goal”, the policy has, sought to erect the edifice of future higher education on the country on the foundation of the “world class institutions of ancient India such as *Takshila, Nalanda, Vikramshila, Vallabhi*” which had “set the highest standards of multi-disciplinary teaching and research”. The policy pronounces that “these rich legacies ...must not only be nurtured and preserved for posterity but also researched, enhanced and put to new uses through our education system” (GOI, 2020, p. 4). The last of these institutions ceased to exist and operate in the 12th century. Since then, only remote replicas of these institutions in the form of gurukulas and ashrams have been established and operating but with no known singular contribution as far as the model higher education is concerned. Will the transformation of higher education modelled on these institutions would be even be possible to resurrect or would they be any relevant to the dynamically different needs of the requirements of the future? Only the time would tell.
32. NEP 2020 proposes that all higher educational institutions should be made multi-disciplinary and large sized and in this process the future expansion in higher education shall be attempted by increasing the intake of the existing higher educational institutions, though new institutions shall also be established in the unserved and the underserved areas. Seemingly a right step in the right direction, it shall be a challenging tasks. Research suggests that size is one of the major determinants of the quality and excellence. However, enhancing the scale of operations requires the presence of some basic critical strength, failing which the efforts to size enhancement may in fact proved to be counter-productive.
33. NEP 2020 plans to increase the GER to 50 percent in the shortest possible period of time and going by the details this expansion is to be achieved through the participation of the public system but also through the involvement of the private sector in higher education. NEP 2020 lays strong emphasis on private sector participation in higher education but with the rider that such institutions should be philanthropic in character and public-spirited in nature.
34. The policy aspires to make higher education holistic and multidisciplinary with a more flexible curriculum and student engaging innovative courses along with specialisation subjects. It has also emphasised the inclusion of community engagement, environmental education, and value-based education in the curricula of HEIs through project works which will sensitise the students towards the global and environmental challenges and foster important human values like truth (*staya*), righteous conduct (*dharma*), peace (*shanti*), love (*prem*), nonviolence (*ahimsa*), scientific temper and citizenship values.
35. NEP 2020 has proposed major overhauling in undergraduate degree structure and length with the introduction of a more flexible degree at the undergraduate level which will be either of 3 or 4 years duration and having multiple exist and entry options available to students with appropriate certificates. It also introduced 1-year master programmes that may be offered by HEIs to those who have done bachelor degree of 4 years with research while they may continue with a two-year programme with the second year devoted entirely to research for those who have a bachelor of 3 years along with that HEIs will also have the option to offer 5 year integrated Bachelor's /Master's programme. The policy also decided to discontinue the M.Phil

programme. and plans to establish an Academic Bank of credit as a digital storehouse of academic credit earned from various HEIs in previous years and can be utilised/ redeem by students to get awarded certificates or degrees. Credit acquired in foreign institutions will also be considered for awarding degrees provided they fulfil the requirement of concern HEIs (GOI, 2020, p. 39). NEP intended to bring programmes and courses provided in all three modes of education i.e. in class, online and open distance learning at par with global standards in respect of quality.

36. The policy strives to achieve the goal of internationalisation of education through attaining the quality of global standards, by attracting larger number of foreign students, facilitating greater mobility to students and research collaboration with foreign institutions. As a forward-looking policy it intent to restore India's position as Vishwa Guru and promoting India as global study destination by providing premium education at affordable rate. This will not only improve student diversification and global ranking of institutions but also increase their earnings. For the sake of the same, it proposes the set up International Students Office at each HEIs, research/teaching collaboration and faculty/student exchanges with high-quality foreign institutions. Top Indian institutions will be encouraged to establish campuses abroad and in the same manner premier foreign institutions will be facilitated to operate in India by framing enabling regulatory framework, governance and content norms.
37. NEP 2020 acknowledges the importance of energised, motivated and competent faculty for the accomplishment of objectives of higher education and therefore, it makes vital recommendations for imperative improvement in faculty motivation and capabilities in HEIs through having a transparent process of recruitment with Fast track promotion system for recognising high impact research and contribution, incentivising excellence through proper rewards, recognitions, and promotion, improving student teachers ratio, providing more leeway in designing curricula and pedagogy and equipping institutions with basic infrastructures and other facilities which are essentials for improving the learning experience. However, it may not be sufficient to just recognises the importance of the teachers in higher education and emphasises on the need for appointing highly qualified teachers on full time basis, through it falls short of banning the contractual, guest and part-time teachers from the higher education system as contemplated earlier in the draft policy.
38. NEP emphasises ensuring equitable access to quality education to all individuals with special mention to Socio - Economically Disadvantaged groups (SEDGs) who are deprived of an education due to exclusion and discrimination and for that policy had specified certain measures to be adopted by Governments and HEIs. For Government it specifies following steps: “(a) Earmark suitable Government funds for the education of SEDGs (b) Set clear targets for higher GER for SEDGs (c) Enhance gender balance in admissions to HEIs (d) Enhance access by establishing more high-quality HEIs in aspirational districts and Special Education Zones containing larger numbers of SEDGs (e) Develop and support high-quality HEIs that teach in local/Indian languages or bilingually (f) Provide more financial assistance and scholarships to SEDGs in both public and private HEIs (g) Conduct outreach programmes on higher education opportunities and scholarships among SEDGs (h) Develop and support technology tools for better participation and learning outcomes” (GOI, 2020, p. 41).
39. While for HEIs steps prescribed are : “(a) Mitigate opportunity costs and fees for pursuing higher education (b) Provide more financial assistance and scholarships to socio-economically disadvantaged students (c) Conduct outreach on higher education opportunities and scholarships (d) Make admissions processes more inclusive (e) Make curriculum more inclusive (f) Increase employability potential of higher education programmes (g) Develop more degree courses taught in Indian languages and bilingually (h) Ensure all buildings and facilities are wheelchair-accessible and disabled-friendly (i) Develop bridge courses for students that come from disadvantaged educational backgrounds (j) Provide socio-emotional and academic support and mentoring for all such students through suitable counselling and mentoring programmes (k) Ensure sensitisation of faculty, counsellor, and students on gender-identity issue and its inclusion in all aspects of the HEI, including curricula (l) Strictly enforce all no-discrimination and anti-harassment rules (m)

Develop Institutional Development Plans that contain specific plans for action on increasing participation from SEDGs, including but not limited to the above items (GOI, 2020, p. 42).

40. NEP proposes the closure of substandard and dysfunctional teacher education institutions (TEIs) operating in India based on the report of Justice Verma committee (2012) which found that more than 10000 TEIs are operating at substandard and are essential selling degrees for a price. 4-year integrated B.Ed. offered by multidisciplinary HEIs will be the minimum qualification criteria for school teachers by 2030. HEIs may also provide 2-year, and 1-year B.Ed. programmes for those who have already received a 3 years Bachelor's degree and 4-year bachelor's degree in a specialised subject respectively. The policy also proposes some teaching/education/pedagogy/writing related exposure to fresh Ph.D. aspirants along with some teaching experience across all discipline. National Mission For Mentoring will be established with a large group of senior/retired faculty for providing mentoring/professional support to university/college teachers.
41. As only small percentage of people in India had received formal vocational education during 2012-17 compared to developed countries like the USA and Germany, NEP aims to promote vocational education in India by removing "hard separations" between academic and vocational streams and integrating vocational education programmes into mainstream education in all educational institutions in a phased manner. The policy intend to provide early vocational exposure in middle and secondary schools with a target of exposing at least 50 % of learners through school and higher education by 2025. Higher education institutions will offer vocational education either on their own or in partnership with industry and NGOs. Such blending of vocational and general education will improve the skill set of students and increase the employability prospects.
42. NEP 2020 has especially focused on improving the quality of knowledge creation and research as the two are critical for uplifting society, meeting social challenges, and ensuring sustainable growth and development of the entire economy. The policy endeavour to transform India into the leader of research and innovation of the 21st century and for that, it emphasises on the promotion of both discipline-specific and interdisciplinary research. The policy envisioned the establishment of a new entity 'National Research Foundation (NRF)' with the assign task of promoting research culture in Indian institutions through suitable incentives for and recognition of outstanding research along with funding for research in all disciplines. While other Institutions that are currently funding research in different disciplines will continue as it is.
43. NEP 2020 aims to completely overhaul the regulatory system of higher education to get rid of pre-existing issues of concentration of power, conflict of interest and lack of accountability. Higher Education Commission of India (HECI) will be set up as the sole regulator of higher education(except medical and law) split into four independent verticals National Higher Education Regulatory Council (NHERC) for regulation, National Accreditation Council (NAC) for accreditation, Higher Education Grants Council (HEGC) for funding and General Education Council (GEC) for academic standard setting. Other professional councils, such as the Indian Council for Agricultural Research (ICAR), Veterinary Council of India (VCI) etc will operate as Professional Standard Setting Bodies (PSSBs).

Conclusion

44. The new policy broadly seems to have tick all right boxes, as far as the higher education is concerned. With measures like greater flexibility and autonomy to higher institutions in curriculum designing, delivery and, other day-to-day affairs, flexibility in subject choice, promotion of research culture through NRF, integration of vocational education into the mainstream along with measures for improving quality of and access to higher education for all, in line with 2030 agenda for Sustainable development adopted by UN, seems to be promising for the prospects of higher education in our country and will make us an economy which is self-sufficient in resolving its issues. The only caution is that while developing the implementation plan, the reference to the 16 Kalas from the ancient India need to be taken as a semantics and not substantively translated at the contemporary times.

45. The commitment of increasing public expenditure on education to the so far utopian dream of 6 percent of GDP from the current level of less than 3 percent through shared effort of central and state government is a welcome recommendation. it would have been better if the policy should have specified a tie frame within which this target is to achieve. Otherwise, this recommendation has been a public commitment since 1968.
46. Along with these measurements, it is equally important for the government to focus on creating more employment opportunity the lack of which has already caused a major brain drain and soaring unemployment in the economy and with a focus on increasing GER to 30% by 2030 & 50% by 2040, there will be a bigger crowd of the educated jobseeker and to cater them, the economy must have the adequate absorbing capacity.
47. Focus on online and digital education owing to the current experiences of the pandemic, extensive use of mass media to cater to the population with limited digital access and measures to arrange suitable devices for SEDGs to eliminate existing digital divided as visioned will certainly be great aid to better teaching-learning and thus making a robust education system w which can withstand any unprecedented circumstances. This may also also contribute towards the broader objective of equity, quality, and access. But relegating the deprived and the marginalised sections of the society to this alternative mode of learning would not only the least effective but may in fact be detrimental in promoting quality and excellence in higher education. Technology can never substitute and the on campus learning is still regarded as a better mode than learning in isolation through screens.

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0124007 RAMAMURTHY, V S AND SRIVASTAVA, DINESH K (National Institute of Advanced Studies Bengaluru - 560012). LIVING WITH PUBLIC RISKS

The year 2020 AD is unique in our lives. The global pandemic, COVID-19, has turned our lives upside down. For more than a year, with no drugs to combat the infection or vaccines to arrest the spread of the infection, we had no alternative but to live with the risk of infection hanging on our heads like the proverbial sword of Damocles. Fortunately, vaccines are already in. Perhaps in a few months from now, COVID-19 may be gone and become part of history. This is not the first time that we face risks of this kind. We have had pandemics in the past like plague, cholera, etc. India is vulnerable to several natural disasters like floods, cyclones, earthquakes, tsunamis, etc. Industrial accidents endangering the lives of the public at large keep taking place now and then. Several emerging technologies pose threats of various kinds to the public which we don't even fully comprehend. Will COVID-19 leave some important lessons for us in living with public risks? That is what we want to elaborate on in this lecture.

RISK- What is it?

Oxford English Dictionary defines risk as 'the possibility of something bad happening at some time in the future'. You do something now but things don't go as planned and result in a loss of something that you value- that is a risk. Humans are created to be risk averse. But too much aversion to risk can actually jeopardize our day-to-day living because there is no human activity that carries no risk. One might think that one could avoid risks by not doing anything. That is also not true. Not doing anything may also result in an unexpected loss. It is often said that zero-risk options don't exist in life.

THE RISK SPECTRUM

Loss of life - This does not need any elaboration. Nobody wants to die. Nobody wants anyone close to them to die. Yes, there are instances when someone decides to take one's own life by committing suicide but such an act is usually triggered by some other irreparable loss.

Loss of health - Health refers to a state of complete physical and emotional well-being of an individual. Good health is central to an active and satisfying life. Loss of limbs or chronic/debilitating diseases are considered serious risks in one's life.

Loss of livelihood - Loss of livelihood is a serious risk for an individual whether it is a salaried job or a business initiative. Irrecoverable loss of livelihood can indeed jeopardize one's life.

Loss of wealth and other material possessions

Loss of reputation - Reputation is an opinion by a section of the society about an individual or an organization, primarily based on social evaluations. Loss of reputation can harm both individuals and institutions very adversely. Being a social evaluation, it is very difficult to counter the loss of reputation.

Corporate Risks - Turn of events for which the business houses were not ready such as disruptions in supply chain, business competition, financial crunch, etc. The COVID-19 pandemic has added one more corporate risk, a forced lock-down as in the case of restaurants, theatres, shopping malls, etc.

Insurance is a time tested method of protecting against risks, particularly financial risks. Sometimes, it is also offered to cover loss of life though it provides a financial shield only to the dependents.

Most risks may not come to fruition at all. What would happen if the risk came to fruition? Can the risk be mitigated? While having due respect for the risk, letting the risk overwhelm us would even be a bigger risk. How does one manage risks?

RISK PERCEPTION

Risk perception is the judgement that people make about the severity of a risk. It is highly subjective and varies from person to person, from place to place and from time to time.

Familiar risks - Risks related to such day-to-day mundane practices like violation of traffic rules come under this category. Though the possibility of getting involved in a serious accident including a fatal accident is very much real, such risks tend to be ignored after some time.

Self-satisfying risks - These are risks that give a sense of satisfaction or pleasure to an individual while the risks are also very obvious. Chewing of tobacco, cigarette smoking, psychedelic drugs, etc. come under this category. Even adventure sports like mountaineering, swift water rafting, bungee jumping, etc. come under the same category.

Professional risks - A career in defence services, fire services, health services, etc. often come with severe risks, including the risk of life. To some extent, they are financially compensated but one would agree that there is no compensation for life.

Commitment to a cause - Volunteers working in epidemic/pandemic times or in times of natural disasters often expose themselves to a variety of risks but by their own choice.

Dire needs - Many people opt for risky choices in return for compensations, financial or otherwise. Surrogate mothers, organ donors, etc. fall under this category.

Public risks - There is yet another class of risks where the beneficiaries and the risk bearers are large in numbers, anonymous, and may not even overlap. These are the so-called Public Risks. For example, while cigarette smoking by individuals is a self-satisfying risk, passive smoking by people around them is a public risk.

RISK ACCEPTANCE

We are all used to a Cost-Benefit analysis in most of our day-to-day decisions. When the decision also involves a risk, a Cost-Benefit-Risk analysis becomes important. All of us make such choices in our day-to-day life almost daily. The issue becomes complex if costs, benefits and risks are spread over long periods of time. Sometimes, the costs, the benefits or the risks need not all be financial. As was mentioned earlier, in the case of adventure sports like bungee jumping, the costs are financial, the benefits are psychological and the risks are extreme. Sometimes, the costs of not making the right decision at the right time also becomes important. At a personal level, it is our assessment of costs, benefits, and risks that enable us to decide. Past experiences, experiences of others, professional help, etc. help us in taking the decisions.

When it is a matter of public risks, the Government is seen as the custodian of public costs, public good, and public risks, balancing all the three while taking a decision.

Some of the unambiguous responsibilities of the Government are External Security, Internal Security, and Civic Administration. Education and public health occupy a special place in the administrative responsibilities of the Government. Governments generate resources for these activities mostly through a tax regime.

Some of the weaknesses of the Government system are also well known.

1. The Government system is in general slow.
2. There are always resource constraints.
3. There could be conflicting priorities.
4. There are three wings of the Government, the Legislative wing, the Bureaucracy and the Judiciary. They don't often see eye-to-eye. The Legislative wing is often constrained by electoral compulsions. The Bureaucracy goes largely by rules, regulations and precedents. The Judiciary goes by Rule of Law. One can't forget that for risks that are being faced for the first time, there may not be a precedent at all.
5. Interference of vested interests can't be ruled out.

6. Indecision by the Government is a risk in itself.
7. In matters of risks arising from new and emerging technologies where the costs, benefits and risks are not even fully known, we are indeed at a loss to manage the risks. So is the government.

In spite of all the above, we have no alternative but to depend on the Governments to manage public risks.

BACK TO THE COVID-19 STORY

COVID-19 in humans was first reported in Wuhan city, China in December 2019. The virus quickly spread across many other countries through travellers from China. It was on January 30, 2020, that the presence of the COVID-19 virus in India was officially identified. On this day, a medical student who returned to Kerala a week earlier from Wuhan was confirmed to be infected with the COVID-19 virus. The need for stringent steps to contain the spread of the virus was very obvious.

Some of the early measures taken by the Government to contain the pandemic were:

1. Surveillance at the points of entry, even before the first case was detected in the country
2. Complete nationwide lockdown- stoppage of all air, rail, and road services; schools, offices, markets, shopping malls, hotels and restaurants, sports and theatre complexes, places of worship, etc. closed. Only essential services like water, electricity, delivery of essential goods like vegetables, grocery and medicines were maintained.

Understandably, these measures caused extreme hardship to the public at large- disruption of the national economy, disruption of individual livelihood, disruption of education, disruption of social lives, and disruption of all services including essential medical services.

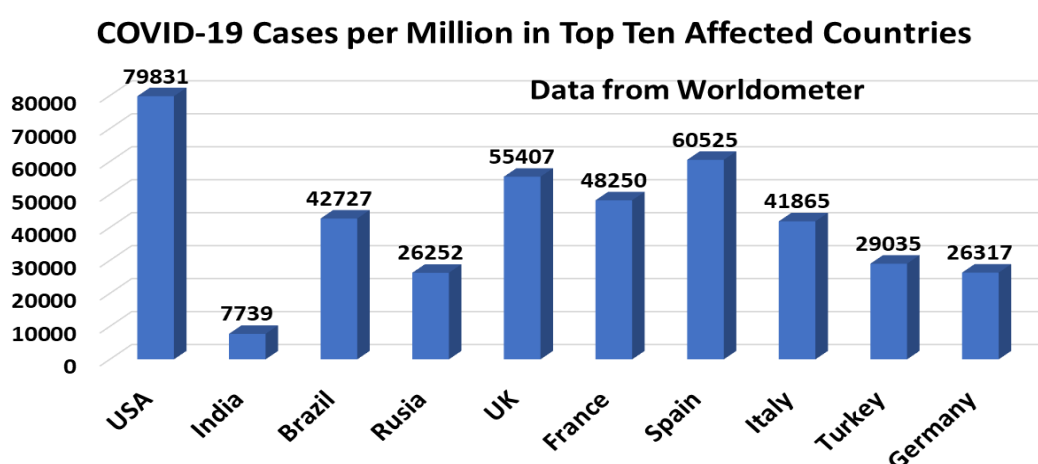
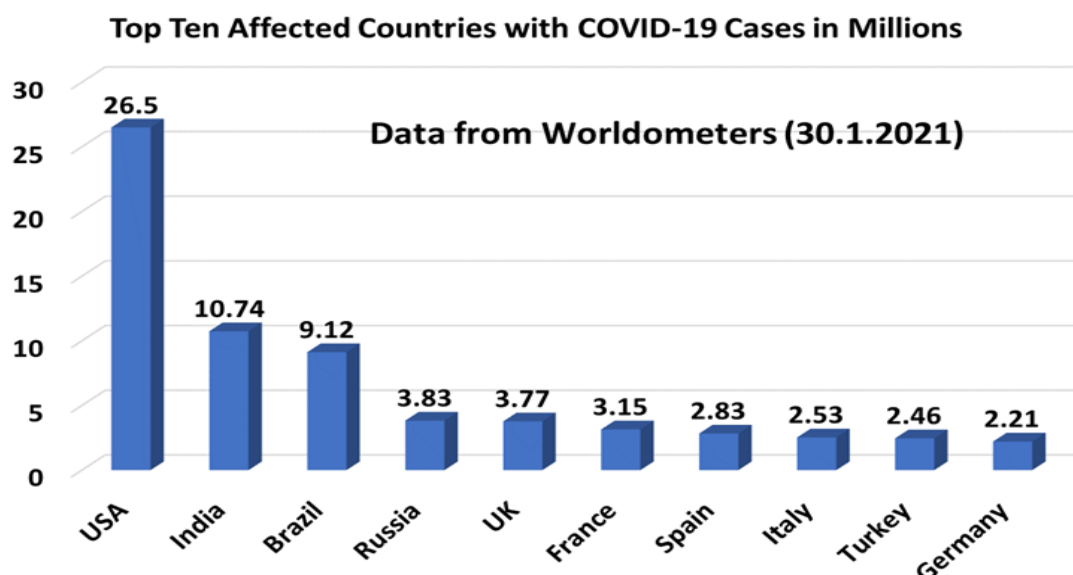
The Government had to tell the citizens why they are going through what they are going through. Managing COVID-19 in India was not an easy task.

1. The war is against an invisible enemy. Every one of the 1.38 billion population is a potential victim and a potential carrier of the virus
2. India has a high population density (nearly 400 persons per square kilometre, even more in metropolitan cities like Mumbai with 20,000 people per square kilometre)
3. Relatively poor sanitation facilities and public healthcare infrastructure
4. Large rural population with limited access even to the available facilities
5. Large NRI population including students having high international mobility
6. Limited resources
7. The Federal structure of governance
8. Last but not the least, no vaccines to contain infections and no medicines to treat the infected.

Risk communication in the shortest possible time eliciting full co-operation of the public to the initiatives of the Government to contain the pandemic was the first and the biggest challenge.

Where are we today?

It is reported that the pandemic has infected more than 100 million people in nearly 220 countries across the world and has resulted in more than 2.3 million casualties. The figures show the top ten affected countries and the number of cases per million population. It is clear that India stands out among these countries with minimum number of COVID-19 cases per million population.



While complimenting the Government for the timely and effective interventions, one must also compliment all those COVID warriors- the doctors, the health workers, the sanitation workers and others who have strived hard to take the country through the pandemic. Credit must also go to the citizens at large who have patiently and willingly borne all the pains and tribulations of lockdowns, travel restrictions, and such other difficulties while combating the pandemic.

HOW DID THIS HAPPEN? (Purely our assessment)

1. Political consensus- A pandemic like COVID-19 is a war with an invisible enemy. In this war, there is no place for political squabbles. In any risk communication, differences weaken the communication process. Though there have been some discordant notes here and there, the political leadership in the country has shown a high level of maturity in this war against COVID-19.
2. Good coordination between different arms of the Government, State governments, Office of PSA, Ministry of Science and Technology, Research and Education Institutions, healthcare Institutions, Industries
3. Extensive public outreach by the Government involving scientists, Science communicators, and media.

4. Simple do's and don'ts to the public- use face masks, keep social distancing, observe personal sanitization



The simplicity of the message led to enthusiastic public participation.

Last but not the least, there was no premature lifting of lockdown under pressure avoiding multiple waves of infection as in many other countries.

THE VACCINE STORY

When India became independent in 1947, there was no pharma industry in India and it was importing even generic drugs like aspirin. When India opened its economy in 1990, India was a net exporter of generic drugs. How did this happen? Through a strategy based on reverse engineering, India could build a strong pharma industry that could provide generic drugs at affordable costs not only to India but also to many countries in the developing part of the world. You may recall when COVID-19 hit the world, India was a major supplier of hydroxychloroquine to the world. Though hydroxychloroquine is a “mainstay” drug in treating rheumatic diseases, some early studies on its use during the pre- and post-infection stages of 2002 SARS coronavirus had suggested that it could be possibly used for COVID-19.

During the late nineties, India also made major investments in vaccine research. The Technology Development Board under the Ministry of Science and Technology provided seed funding to several pharma companies to develop and manufacture Hepatitis-B vaccine through recombinant DNA route. It is important to note that the cost of the Hepatitis-B vaccine came down by a factor of ten when the Indian companies started manufacturing the vaccine in India. One of the beneficiaries of TDB, Bharat biotech, moved on to manufacture other vaccines and a major supplier of vaccines to the developing part of the world.

In the wake of COVID-19, there were many attempts across the world to develop vaccines against COVID-19 infection. Indian institutions were not only participating in several global efforts but also had partnerships among themselves within the country. Today, two vaccines have already been approved in India for field use:

1. COVAXIN developed by Bharat Biotech International Ltd in collaboration with ICMR, and
2. COVISHIELD developed by the Oxford-AstraZeneca and manufactured by Serum Institute of India, Pune

More are round the corner. India is indeed emerging today as a global vaccine supplier.

The 1896 Poona plague

It is interesting to compare our handling of the COVID-19 pandemic with our handling of an earlier pandemic, the Poona Plague in 1896, just to highlight the importance of risk communication. The strategies adopted to stamp out plague from Poona were the same as the ones adopted to face the COVID-19.

- i. Screen and isolate the infected
- ii. Decontaminate the surroundings
- iii. Restrict movement of people.

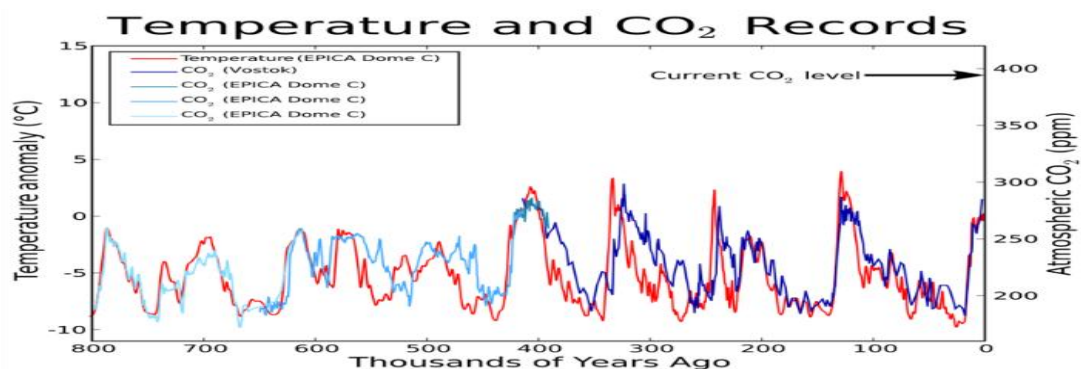
Large scale deployment of the military and poor risk communication to the public at the time of the Poona plague led to an adverse public perception that their privacy, especially of the Indian women, was being intruded on by the British soldiers. An article by Bal Gangadhar Tilak, expressing resentment of the steps taken by the administration to contain the epidemic, led to the assassination of the administrative heads of the district and made the overall management of the pandemic problematic, not only in Poona but across the country. The epidemic lasted for well over two decades and killed about 10 million as it ravaged one city after another.

Lessons learnt

Pandemics like COVID-19 are few and far in between. How useful are the lessons learnt from the pandemic? Nobody knows when the next pandemic will hit. But, almost all countries across the world are vulnerable to natural disasters like floods, cyclones, earthquakes, tsunamis, etc. In the industrialized world, industrial accidents involving the public at large can't be waived away. New and emerging technologies like AI, GM technologies, bring in their own public risks some of which may not even be known now. Pre-disaster preparedness, rescue, and relief at the time of disaster and post-disaster relief require a high level of preparedness by the governments and the public, fully informed of the risks and a calibrated response. I will like to dwell a little more on one public risk that is round the corner but doesn't seem to be attracting the attention it deserves.

The Challenge of Global Warming and Long Term Climate Change

It is now well known that fossil fuel burning for satisfying our increasing energy needs during the last two centuries has substantially increased heat-trapping green-house gas levels in Earth's atmosphere leading to a measurable increase in Earth's surface temperature. The signs of global warming are all around us. The summers are getting hotter and longer everywhere, heavy rains and prolonged droughts are recurring more frequently, forest fires are getting more severe, storms (including snowstorms) and cyclones are more frequent and fiercer, the polar ice caps are melting- raising the spectre of millions of climate refugees, the glaciers are dying- raising the spectre of wars for water, crops are failing, fish are dying, coral reefs are whitening. It is even more painful as we realize that the poorer countries, which are least equipped to face these calamities and which contributed least to the global warming, are the worst hit. This is a global risk and is already upon us.



The Intergovernmental Panel on Climate Change has been suggesting for years that to keep the global rise in temperature to less than 1.5 degrees Centigrade will require a global cooperative effort to reduce the emission of carbon dioxide to about 45% below the level of 2010 by 2030 and to net-zero by 2050.

A recent study has suggested that climate change since 1900's has moved bat populations (which are the primary hosts of corona viruses) to newer areas which may have allowed new interactions between animals and viruses, causing more harmful viruses to evolve or be transmitted, and SARS-CoV-2 is a product of such a shift. The study finds that the area surrounding Wuhan province in China is a hot spot for such a shift in bat population. If confirmed this provides an important link between climate change and pandemics, and gives rise to a concern that these occurrences will only rise with the increase in climate change and global warming.

Unfortunately, the discussions on possible strategies and their implementations, to reduce the use of hydrocarbons for energy and to increase renewable energy share in our energy mix have not been progressing as they should. The awareness among the decision-makers and the public at large on this important subject seems to be weak, and we even have leaders who even deny climate change. Risk communication at unprecedented levels is the need of the hour. That only can lead to appropriate mitigation measures. We also feel that young people have to come to the fore to clean-up this mess which we have created for them. After all, it is their future that is at stake.

Public trust plays an important role in public risk communication and, all said and done, the man on the street has a higher trust in the academic community than in any other segment of the society. The academic community has a major responsibility in Science, Technology and risk communication related to Public Risks.

0108008 ROY, BROJO (Ganadarpan, Kolkata). THE TECHNOLOGICAL SOCIETY AND THE DIGITAL WORLD

1. The human civilization is at a crossroads today. On the one side, we are on the cusp of a new civilization, essentially led by extraordinary growth of human skills, endeavors, knowledge and capabilities, both physical and mental and their external extension (now even internal too, by courtesy of the technological breakthrough) through the latest technologies that can totally change the basic attributes of human life, like health, longevity, standard of living, environment and enhanced human capability. The renowned physicist Michio Kaku, in his famous book —Physics of future! has assertively claimed that by the next century 2021 or even before that, given the high speed with which the science and technologies are striding forward, human beings will be as powerful as gods whom we feared and worshipped once upon a time. On the other, to the extent during the last five decades the inexcusable and horrendous denuding of our mother earth of its ever verdant flora and lively fauna has taken place that this beautiful planet has already begun to show the signs of decay, which may be fatal and deadly if not checked and stopped forthwith.
2. Now if we probe into the problem that why such inconsistent, self-contradictory and conflicting scenario has come to happen – we will suddenly find ourselves in a mire of socio-economic and political complexities, seemingly very mundane, no doubt, compared to the elevated realm of our subject of discussion. However, keeping in our minds that neither a thing comes into existence nor an event takes place in any hypothetical, unconditional and absolute time and space continuum, we ought to see them in their real perspective so that we can realistically assess their vicissitude, future moments and culminating shapes. We have to take into account all these factors for reaching at some convincing position, understanding, and a view so that we can take the required policy programme.
3. What is the socio-economic and political complexity that has created the above conflicting scenario? In very simple words, we may say that the driving force of the modern civilization has become the maximization of profit under private ownership. The essential contradiction lies in the heart of the fact that companies having a sprawling network across number of countries, employing millions of staff and providing its products or services to millions and millions of consumers are owned by a few individuals. It is using natural resources of the whole world, infrastructures of various countries, affecting environment of this planet and its employees are scattered over continents – such a big multi-social- economic and national entity – thanks to its commanding political clouts and power is owned by one or a few individuals! Brushing aside all

lofty ideals and humane needs of the hour, the buzzing market is enlivened by the lust for super-profit by such a handful people. They are the modern emperors wielding un-matching power in history of kingdoms and dynasties, who own an empire of media, bureaucracy, political institutions, banking behemoths, academies and educational institutions with battalions of economists and professors enjoying their blessings, what not? Their actions affect billions of people who may be an active participant in the market or superfluous and redundant since he or she no more can create an effective demand in the market. Now this trend, which is becoming only more intensive every hour causes huge concentration and centralization of money, capital and finance on the one hand and on the other unlimited political power. These omnipresent powers of a few individuals lead to severe income disparity in the society and the worst sufferers are the real producers whose labour power is harnessed to produce all the wealth of the nations. This distortion not only brings about the income disparity but also causes intense uneven developments across the different geographical areas within a country. It further leads to economic disparity among nations, disturbing enormously the desirable normal international relations and instead breeds tension, economic sanctions, intra-national and international wars and civil wars within and without national borders.

4. Many studies conducted under international eminent institutions have shown that the unprecedented advancement of science and technologies are further strengthening the power and prowess of these capitalist emperors and furthering the income disparity to the extreme. The climate change is also causing more sufferings and hardship to the billions of underdogs. It may be added that following the Newton's third law that every action creates its equal and opposite reaction, the people too, right from many centuries back have always revealed doubts and mistrust over scientific achievements, inventions and innovations. If we remember the Chartists' movement of the English working class of 19th century to the movements in the developing countries against computerization and automation in the third quarter of the last century and the present serious concern in the most developed countries about the new technological disruptions we can understand that there is something very seriously wrong in the inter-class relationship of the present economic and financial system. Let me quote from the lecture by renowned Oceanographer, Professor Emeritus Matthias Tomczac —....The subservience of science to the law of profit maximization raises the question whether the explosion of scientific research observed during the last two centuries has to continue if the human species is to survive.....l

The Science and Technology in the 20th century

If we look at the journey of Science and Technology (S&T) from Rocketry in 1926, every five years it made a giant leap forward: Electronic TV came in 1927, the jet engine in 1930, Radar in 1935 (we now use radar to track aircraft, predict weather, help ships navigate safely, map the Earth's crust, and more.), colour TV in 1940s. The computer science appeared on the horizon with the first Turing-complete computer in 1941 and first semiconducting transistor in 1947, a major breakthrough quickly replacing vacuum tubes that used more power and are vastly larger to the tiny silicon semiconductors that are everywhere in modern life. The first hard drive made its way in 1956 when IBM invented the IBM 350 Disk Storage Unit which was way to store data outside of punch cards and paper printouts. The Digital camera came in 1963 and Packet-switching networks in 1969 enabling multiple computers to occupy a single line, over which electronic data was sent in packets intended for a particular node on a network. Packet switching was a fundamental part of building the modern internet, without which we'd still be in an age of dedicated one-to-one computer connections. 1973: Internet Protocol Suite: ARPANET was the very first network to use the Internet Protocol Suite, commonly known as TCP/IP. TCP/IP is a method of packaging, addressing, transmitting, routing, and receiving data across networks--it essentially takes packet switching to the next level. The next 20 years witnessed the emergence of personal computer (1974), cellular phone (1983) and finally the smart-phone in 1994. All these steps, particularly since 1941 to 1994 that brought the whole world, the outer space and the micro-atomic space at our finger tips, was a silent revolution that radically changed not only the science and technology but also the socio-economic dynamism of human civilization. We are at the entry point to a new wonderland where human beings will gradually overtake the nature that creates and destroy the ever-changing universe and itself become the master of the universe. However, fictional it may sound, the fact remains that as Michio Kaku has said, human beings will become gods.

Science and Technology in 21st century: where we stand today:

The new century has ushered in a host of disciplines within the natural and formal sciences which have the potentials of elevating human civilization to a qualitatively new level. It will not be wrong to mark it as a new civilization. At this exalted position the people will have a perfect health, a very long life, enormous power to interact with the whole world and even the cosmos. Like Moses, a person would command the things around him and that will act accordingly. While talking on Internet and its continuous and profuse proliferation, empowering the human being with unprecedented capabilities, Eric Schmidt, the Executive Chairman, Google and Jared Cohen, Director, Google idea have said in their international best-seller book *‘The New Digital Age’* : —As this space (*internet space*)*grows larger, our understanding of nearly every aspect of life will change, from the minutiae of our daily lives to more fundamental questions about identity, relationships and even our own security. Through the power of technology, age-old obstacles to human interaction, like geography, language and limited information, are falling and a new wave of human creativity and potential is rising. **Mass adoption of the internet is driving one of the most exciting social, cultural and political transformations in history, and unlike earlier periods of change, this time the effects are fully global. Never before in history have so many people, from so many places, had so much power at their fingertips. And while this is hardly the first technology revolution in our history, it is the first that will make it possible for almost everybody to own, develop and disseminate real time content without having to rely on any intermediaries**”. What exactly will happen to our life in the near future? Let me again go to the Chairman and Director of Google and listen to what and how things will change in our life. We may wake up in the morning as a virtual person will alert us and remind us what to do today, or inform us if any message has been received while we were in the deep slumber. We may come across home robots doing the household chores or are cleaning the ceilings and floors with vacuum cleaner. With the thought controlled motion technology, by merely thinking to make a robot function as you please from hundreds of miles away. Voice recognition can translate voice commands into typed text. Holography will provide us a virtual world very close to real life. We may visit distant lands through holographic images. These are real 3D representation. Driver less cars have already become real, moving on the roads in the US provinces. Health and medicines will be easily available with artifact (a chip implanted somewhere in the body) monitoring pressure, heart condition and even pre-emptive diagnosis of cancer. It may even make a call to an specialist in emergency situation.

In the Introduction to his famous book, *Physics of the future* scientist Michio Kaku submits: —There have been, I found out numerous attempts to predict the future, many useful and insightful. However, they were mainly written by historians, sociologists, science fiction writers, and —futurists, that is, outsiders who are actually predicting the world of science without a firsthand knowledge of the science itself. The scientists, the insiders who are actually creating the future in their laboratories, are too busy making breakthrough to have time to write books about the future for the public.

That is why this book is different. I hope this will give an insider’s perspective on what miraculous discoveries await us and provide the most authentic, authoritative look into the world of 2100.¶

He further adds a few pages later that: —By 2100, like the gods of mythology, we will be able to move objects with the power of our minds. Computers, silently reading our thoughts, we will be able to carry out our wishes. We will be able to move objects by thought alone, a telekinetic power usually reserved only for the gods. With the power of biotechnology, we will create perfect bodies and extend our life spans. We will also be able to create life-forms that have never walked the surface of the earth. With the power of nanotechnology, we will be able to make an object and turn it into something else, to create seemingly almost out of nothing. We will ride not in fiery chariots but in sleek vehicle that will soar by themselves with almost no fuel, floating effortlessly in the air. With our engines, we will be able to harness the limitless energy of the stars. We will also be on the threshold of sending star ships to explore those nearby.¶

Although this godlike power seems unimaginably advanced, the seeds of all these technologies are being planted even as we speak. It is modern science, not chanting and incantations, that will give us this power.¶ What are these technologies whose seeds are being planted every hour and every day? They are Quantum computers, Internet

network, Internet of things (IoT), Big data, machine language, analytic, 3D printing, Holography, Robotics, Nanotechnology, Biotechnology and super-conductivity etc. What the These apart, many research works are continuing all over the world on many other technologies that have different aims and objects. Scores of scientists working in these fields have different predictions about future. But one thing is clear that mankind is poised for embarking on a new trail leading to a new much higher civilization that will radically improve our capabilities.

The Impact of New Science & Technologies on Society:

But if there are a thin crust of population (highest 1% or 0.1%) who are winners in this global scientific and technological drive, there are billions of people; the wretched of the earth, the losers this time too as always have been hitherto.

All the people and representatives of different sections of the populace across board, the elites, privileged or the have-nots and underdogs are unambiguous on this score that the speedy advent of S & T has profoundly accentuated untold of economic inequality, causing simmering discontent, intolerance and tension in both the southern and northern hemisphere.

1. Let me quote from the **MIT Technology Report by David Rotman**: “The signs of the gap—really, a chasm—between the poor and the super-rich are hard to miss in Silicon Valley. On a bustling morning in downtown Palo Alto, the center of today’s technology boom, apparently homeless people and their meager belongings occupy almost every available public bench. Twenty minutes away in San Jose, the largest city in the Valley, a camp of homeless people known as the Jungle—reputed to be the largest in the country—has taken root along a creek within walking distance of Adobe’s headquarters and the gleaming, ultramodern city hall.

Even some of the area’s biggest technology boosters are appalled. “You have people begging in the street on University Avenue [Palo Alto’s main street],” says Vivek Wadhwa, a fellow at Stanford University’s Rock Center for Corporate Governance and at Singularity University, an education corporation in Moffett Field with ties to the elites in Silicon Valley. “It’s like what you see in India,” adds Wadhwa, who was born in Delhi. “Silicon Valley is a look at the future we’re creating, and it’s really disturbing.” Many of those made rich by the recent technology boom, he adds, don’t seem to care about “the mess they’re creating.”

2. **Adi Gaskel from the Forbes says**: —Amid the concern around the automation of jobs, a long-standing truism has perhaps been overlooked. Whilst the likes of the Frey and Osborne paper predicted a pretty widespread demolition of 47% of all jobs, the reality is that those with low-skilled, routine jobs are far more at risk.

The thing is, those with low skills have been on the receiving end of pretty much every shift in the labor market over the past decade.¶

3. **The World Social Report 2020** on Inequality in a rapidly changing world says: —Despite progress in some countries, income and wealth are increasingly concentrated at the top. The share of income going to the richest 1 per cent of the global population increased in 46 out of 57 countries and areas with data from 1990 to 2015. Meanwhile, the bottom 40 per cent earned less than 25 per cent of income in all 92 countries with data (United Nations, 2019a).

UN Secretary-General António Guterres, writing in the foreword, said, —‘The World Social Report 2020: Inequality in a rapidly changing world’ comes as we confront the harsh realities of a deeply unequal global landscape. In North and South alike, mass protests have flared up, fueled by a combination of economic woes, growing inequalities and job insecurity. Income disparities and a lack of opportunities are creating a vicious cycle of inequality, frustration and discontent across generations.¶

The report provides evidence showing that technological innovation, climate change, urbanization and international migration are affecting inequality trends. The Secretary-General added, —The World Social Report 2020 sends a clear message: the future course of these complex challenges is not irreversible. Technological change, migration, urbanization and even the climate crisis can be harnessed for a more equitable and sustainable world or they can be left to further divide us.¶

4. **The World Human Development Report 2019** emphasizes that: —..., a new generation of severe inequalities in human development is emerging, even if many of the unresolved inequalities of the 20th century are declining. Under the shadow of the climate crisis and sweeping technological change, inequalities in human development are taking new forms in the 21st century.....

Though it is a global phenomenon, and as per the above MIT report, the strongest super power, the US presents a very ugly scenario, yet its incidence is severest in the poor North. In our country, just the other day, immediately after sudden clamping of the lockdown by the government that did not think about the people stranded at their workplaces who would have to return to their villages often hundreds or thousand miles away from their workplaces, and as a result the whole country could witness the plight and the horrible conditions of the migrant labourers. A society torn asunder by outrageous caste hierarchy, where the people from the lower depths have for centuries been subjected to most humiliating atrocities that has subsequently spilled over to the unorganized laboring classes lying at the lowest rung and who had emerged from a grafted capitalism, the inequality have many dimensions, moral, social exclusion and economic deprivations. The ruling class wanted them to have stuck to their employer's workshop and continued their jobs but for the reluctance of the employer to continue with the production process in the context of an unprecedentedly plummeting business activities all around. They simply closed their factories without paying a farthing to the workers or providing any accommodation and the lakhs and lakhs of workers started on foot towards their villages thousand miles afar, beaten now and then by the police of different states which they had to cross on their way back home. Many died exhausted, many killed in accidents, a tragic saga was thus written by the callous ruling regime which the working class of this country would always remember like a damned curse.

The Great Digital Divide: the fragmented humanity

The social divide

A sudden leap in the labour productivity owing to incredible surge and transmutation in technology, its immense rise in capability will undoubtedly dig deep furrows in the social matrix and create profound divide in the socio-economic order of all nations. This sharp increase in disparity might polarize the population into two very asymmetric extremes, a thin section will have all the blessings of an automated digital world, living internationally best standard of life, while on the other side there will lie vast hapless humanity immersed in pauperization, degradation and privations. Without work and income, this huge segment will be socially and economically redundant, a burden on the society since they would have no representation, no recognition in the affluent society, not creating any effective demand in the yawning network of the market, mainly comprising a large contingent of high skilled workers coming from elite families, the owners of enormous capital and multi-national industries and the parasitic rentiers and the rest unlimited numbers of unskilled workers who will have no retreat to take refuge.

Inter-nations divide

As we could find out extreme income inequality among various economic classes within a nation, similarly in the inter-nations space we can discern wide disparity among the nations in their abilities to invent newer tools and technologies. The data and statistics furnished by the World Bank on the expenditure of nations on R&D in respect of its total GDP, and number of patents approved by the country we find a very skewed distribution: only a few nations have practically monopolized the market. It can be easily inferred from the facts and figures that a handful of corporate or financial houses are actually controlling the world today. They have total command over scientific and technological progress which can be harnessed in wielding powers to control and regulate the technological dynamics so that maximum profit may be exacted from the new and newer processes. The world bank figures on the

expenditure on R&D as a proportion to the total GDP of a country or the number of patents approved by the national authorities make us to recognize the fact that only a very few nations have the means to control this market. In the table relating to investments in technology only 4 or 5 countries have the ability to allocate more than 3% of GDP in the growth of science and technology. In 2019 China surpassed the United States of America (U.S.) as the top source of international patent applications filed with WIPO.

**Patent applications, residents
All Countries and Economies**

Australia 2018	2,757
Austria	2,039
Belgium	892
Brazil	4,980
Canada	4,349
China	1,393,815
Denmark	1,262
France	14,303
Germany	46,617
India	16,289
Iran, Islamic Rep.	11,908
Italy	8,921
Japan	253,630
Korea, Rep.	162,561
Netherlands	2,111
Poland	4,207
Russian	24,926
Federation	1,283
Switzerland	7,156
Turkey	12,865
United Kingdom	285,095
United States	

All Countries and Economies

GDP on R&D

2018

Austria 2018	3.17
Belgium	2.82
China	2.19
Denmark	3.06
France	2.77
Germany	3.09
India	0.65
Japan	3.26
Sweden	3.34
Switzerland	3.37
2017	1.72
United Kingdom	2.84
United States	

Whither Mankind?

Human labour and its tools have created and fashioned the human civilization. We have come across various stages of civilization, the primitive age, the barbarism, slavery, serfdom and feudalism. The changes from one stage to other was the result of qualitative changes in labour productivity and instrument of productions. The metals with which these instruments were made, the stone, the copper or the iron changed the strength, ability and productivity of human labour. Thus ancient stages of human we are again at the threshold of another great technological revolution to be brought about by the marvels of new inventions and discoveries.

Admitting all the great potentials of new instruments, nonetheless the new technology has to work finally in a human society which has always been divided into the rulers and the ruled. Every time the rulers have used the new technology to serve their own interests, to exact more surplus from the increase in productivity and every time the new technology has brought further misery, deprivation and mortification to the workers. This time the impact will be overarching and more brutal. We have already seen its footprint and the exasperating inequality that it has wrought upon.

The total population of the globe is nearly 7.7 hundred crore. Out of this there are nearly 68 crore people who live below poverty line, i.e having income less than 1.9 dollar per day.(less than 138 rupees) per day. We know that it is much more than what actually people do have. Many Indians live on much lower amount of rupees, say Rs 50 or Rs 40 per day. Africa, the poorest nations has a population of 1.34 billions (134 crore), out of which 422 million (42 crore) are poor. In actuality, the poor population is much greater than these estimations.

The fume and fury of unrelenting animosities

On the one hand the new technology claims to make human beings as powerful as gods whom we feared and worshipped once upon a time and on the other it subject every citizen to their policing, keeping them always under close surveillance. The huge data flowing from every second from our smartphones or laptops are their best weapons. They have all details of a person in his dossier and he is always followed by invisible eyes, satellite surveillance will always keep him or her within their range of fire power. There is no place on this planet earth (except one's heart) to take shelter or hide from the eyes of the vultures. Stephen Hawkings, the great physicist used to say that this earth will not survive for long because a collision with a big asteroid is long overdue and secondly, the way climate is being disrupted, dislocated and ruined, human life will perish. He loved to nurture and cherish the idea of going over to some other planet and he believed this could be possible. His favorite spot was a moon of the Saturn. Now the most haunting question is if the human civilization shift to some distant planet, will they carry over to that planet the burden of such a huge population who are penniless.

The explosive social dispersion and civil anarchy:

The above ominous words have not been used to unnecessarily predict an apocalypse. The savagery and the barbarism of modern civilization is inexplicable; It did not hesitate to efface from the surface of earth the relics and remnants of mesopotian civilization and to plunder thousands of its artifacts and relics. The US army did this and killed innumerable people for no fault of theirs. The US invaded and physically occupied Iraq on false plea, just to have control over vast oil field of Iraq.

The digital world will have multi-dimensional impact on the clashing classes that characterize the market economy and the rule of capital. While on the one hand it will empower every individual human beings with immeasurable power, gifting their faculty a real time interactions with the entire world, dedicating immense doable at his fingertips.

Such unfathomable power is very hard to control and regulate or even to gauge its potentials. Obviously, this will be a blessing for the ruled and exploited downtrodden people, who can easily organize

themselves or even, organize and plan a revolt against the power that be. After all, we have witnessed the Arab spring to leap out from the smart phones or the Shaheenbagh movement in Dhaka, a handiwork of digital media and digital apps.

The truncated humanity

The human species is in danger of a social fragmentation in not too distant future. The economic, cultural and the behavioral split have become complete under the severest and never-seen-before inequality that we have created in our midst. A simple visit to any exotic supermall gives us a glimpse of a social stratum that is like foreigners among the native common people. They step down from foreign made sedan cars like Mercedes, Audi, Rolls Royce etc. putting on foreign branded wearable, scattering Arab Night like perfumes, their skins smoothened and brightened by most costly lotions and creams, strutting like peacocks with an air of super-man or super-woman they finally settle down at some eating or drinking joints and fail to satisfy themselves with enough money still peeping out from their fat money bag or wallet.

Yet, there are a huge populace, who do not get two square meals a day, being victims of chronic hunger and starvation; they drag themselves from here to there in search of some work to earn a day of his uncertain life. Such is the horrendous social split in today's world that sends chills running down our spine.

The technological society and the digital world, which are undoubtedly a great blessings to mankind to make human life happier, more healthy and creative has turned into a curse as these infinite potentials are harnessed to further exploit and suppress the people. If the scientific community wishes to evade the misfortune of Robert Oppenheimer, they must come down from their ivory towers and organize themselves, raising the question of professional ethics and registering their commitments to prevent any attempt to misuse their inventions.

The literate people must be made aware of such eventualities and the students, women organizations, the workers' trade unions must tell the common people, the toiling millions about the immense possibility of misuse of the scientific and digital innovations. We must organize and mobilize youngsters as has been done in the campaigns against global warming and green-house effect and sensitize them about the possibility of losing our privacy, security and the ruling regiment's possible transformation of democratic institutions into organs of a police state, etc to suppress any opposition and discontent.

0122009 SHETTY, S. CHANDRASHEKAR (Adichunchanagiri University, BG Nagara). ADVANCES IN INFORMATION AND COMMUNICATION TECHNOLOGY IMPACT ON SOCIETY

The innovations in information and communication technology have wide ranging effects on policy planning, availability, accessibility, affordability, appropriate technology, acceptable quality, intellectual property rights, privacy protection, cyber security, economic productivity resulting in Social and Economic impacts. One of the examples is electronic commerce over internet and may also be extended to Education and Health Care services in future. Breakthroughs in Materials, Nanotechnology, Biotechnology and Engineering and Environment are affecting our lives in each area. These revolutionary effects of Biotechnology are going to improve the quality and the length of Human Life. Innovations in manufacturing technology is leading to customization of new products and capabilities.

Opportunities:

- Reducing the importance of distance, many industries change the geographical distribution work to those countries where the wages are lower. Outsourcing manufacturing to other countries and rely on telecommunications for marketing, Research & Development and distribution firms have greater freedom in creating competitive infrastructure in a conducive region, labour, capital, resource markets, tax authority and regulatory mechanisms.
- An information technology providing 24 hours' access at low cost to almost any kind of price and production information creates buyer friendly markets. By breaking the information barriers for efficient

market operations for real time transaction make intermediaries reductant. Thus, results in reduction of cost in production and distribution channel.

- The effect will be reduction of cost, lesser price for lower end consumers and high profit margin for manufacturers. Multiple store inventory costs reduced. E-commerce shops require fewer but highly skilled employees and more savings on inventory, carrying costs. Decreased Inventories, faster ordering and delivering are of great help for products having limited shelf lives.
- More uninhibited communication between supervisor and subordinates
- Demand for working from home in climatically, physically attractive regions would result in a paradigm shift in property values.
- Increase in job opportunities for local population
- Increase in scope for flexible schedules to work part-time, to share jobs or to hold two or more jobs simultaneously.
- Reduction in jobs stress, greater job satisfaction, reduced health costs, morbidity and mortality rates.
- Creates demand for flexible multi-skilled workforce to manage internet front end applications with enterprise operations, application and backend data bases.
- Increases the opportunity for ICT enabled flexible Teaching, Learning and Evaluation processes and increased opportunity for active, self-directed lifelong learning through online, offline and blended modes.
- Wide variety of contents in digital forms result in easier and cheaper duplication and distribution of information resulting in lower costs.

Challenges:

- Increase in cost of e-commerce for advertising, secure online payment and delivery.
- Increase in shipping cost of products
- The openness, global reach and lack of physical clues make it vulnerable to fraud makes it more costly for e-commerce merchants
- Increase in cost for Credit Card Transactions.
- Digitized products and real time global marketing leads to greater international competition.
- Technical skills needed for e-commerce might speed up work and increase the level of stress and time pressure for workers.
- The greatest risk would be, lesser employment opportunities. At the same time, workers with different skill levels are affected differently.
- To face the challenges of intellectual property protection, new tools & regulations and distribution of consent outside of channels
- Many issues of free speech and regulation of contents in the internet is of great challenge for policy makers and administrators.
- Maintenance of privacy, both in the public and private sector is a challenge for data mining, storage and maintaining dossiers on all citizens for both government and private sector and to prevent misusing of individual data.
- Protecting privacy by cryptography presents a serious barrier for criminal investigations.
- Over dependence on information technology with information overload with the people may lead to incomplete and incorrect information.
- Failures in the technological infrastructure can cause collapse of economic and social functionality and bring in economic disruption.

Conclusion:

The ongoing computing and communications revolution has wide ranging beneficial and catastrophic effects on the society in the next few years. The ability of government, private sector and civil society to handle the current situation and future trends with caution, care and course correction by appropriate policy planning and adequate administrative mechanisms for beneficial impact on the Society and Nation

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TRANSFORMING THE WORLD – ENGINEERING HUMANITY A SOFT SCIENCE VIEW
OF HARD SCIENCE**

The world of Homo Sapiens

For most of the Second Millennium CE onwards, humans in most societies have viewed the world around them as human-centric. This assumed “superiority” of humans over other forms of life and over all inert matter, puts *Sapiens* on a self-created pedestal as the acme of evolved life on the planet.

Over millennia, as humans learned to acquire and harness energy sources, they grew exponentially in numbers. The current global human population is 7.8-billion (U.N estimates, February 2021), up from under 2-billion in 1900, and 0.3-billion in 1000. Especially since the industrial revolution, for most societies, matter and life which is not human is considered as a resource, with the implicit assumption of their being “meant” for human benefit, and are therefore to be used and disposed off. This is the anthropocentric world view, which is the current ruling paradigm.

However, tribal societies on all continents (*Adivasis* in India) do not share this view. They live with bare feet planted firmly on earth, understand the inter-dependence of all forms of life, and know the true meaning of “enough” as they draw from nature even while giving back to nature. Today, tribal societies are depleting and vanishing, and with them, their knowledge systems and cultural heritage. Their natural wisdom has fallen victim to expansion of the know-all ‘civilized’ societies.

Humans are divided within and between societies on the bases of ethnicity, language, caste, religion and gender. Pre-historically, historically and even today, this has been cause for conflicts and wars, and mindless oppression, subjugation and slaughter, often based upon categorization of “superior” and “inferior”.

Modern industrialized or industrializing societies are complex entities characterized by urbanization, industrial development, social stratification, some form of government, and refined communication systems. Within these “civilized” societies, the distribution of social, economic and political power is skewed, with power concentrated in relatively few hands. Modern industrial civilization designed by humans themselves, attempts to control nature, including human beings. Acquisition and consolidation of power and authority for control and dominance is the name of the game.

A ‘machine’ society

Sapiens have grown into the dominant species on the planet, with global influence. Starting perhaps with fire and the wheel in pre-historic times, *Sapiens* has creatively envisioned and constructed devices and machines which have multiplied individual and group power exponentially. For example, in just one Century (the 20th Century), humans invented the airplane and landed a human on the moon, even while transiting from logarithmic tables for rapid calculation to parallel-processing super computers in the same period, these and many other inventions and discoveries going together.

The so-called educated among *Sapiens* believes that the species is at the apex of the “evolutionary ladder”, having evolved from “lesser” species into becoming the best of God’s marvellous creations, with the divine right to use and control its environment for its own benefit. This belief fails to understand that *Sapiens* has co-evolved with other species, with inter-dependence.

Sapiens stand near the end of the first quarter of the 21st Century with amazing scientific and technological capabilities, but without matching social skills. The effect of this sapient (Meaning: wise, or attempting to appear wise) species on the global environment and ecology – of which it is a part, not the master – increases with every new discovery, invention or development.

It is no exaggeration to say that *Sapiens* global dominance has brought itself to an existential crossroads particularly because of global warming and climate change. But as importantly, *Sapiens*’ increasing

dependence upon the machine-world it has created with its amazing creativity and industry, threatens its future in an existential sense.

AI autonomy

Information Technology (IT) has grown exponentially in terms of hardware, software and systems capabilities, and provides enormous computational and data handling capability. The fields of biotechnology (BT) and nanotechnology and many fields of natural science have expanded mostly based on IT capability.

Some of the present capabilities of cutting-edge or emerging technologies are demonstrated as pilots, but not yet scaled up or fully implementable. Others are available at a cost, but most are secret (e.g., military-use technologies developed by USA's Defense Advanced Research Projects Agency (DARPA)) or protected by patents or IPR for commercial or business purposes.

The most talked-about "new" field based upon IT is Artificial Intelligence (AI). At present, AI mimics natural human intelligence especially in the areas of cognition, learning and problem-solving. Another path-breaking field is robotics, although this is not new or recent, combining computer science and engineering. Already robots which vacuum and mop floors, and AI-enabled robots which can remotely control other devices based on recognized voice commands, are available in the market.

The day when AI can be an autonomous entity which independently makes its decisions and acts accordingly, and controls other AI entities and robots to perform specific tasks, may not be in the distant future. Such an AI entity would be able to independently acquire or access data, and use it to teach itself varied subjects, including comprehension of abstract ideas.

Sociological re-engineering

3D printing is a manufacturing technique of building a solid object by computer-controlled process of depositing/ joining material according to a 3D computer model. At present it pertains to inert objects. As techniques and processes improve, and AI gets integrated into systems and processes, mass manufacture of parts, components and sub-assemblies required for assembling any end product, will be possible without human intervention. Already, robots are independently assembling automobiles, etc., upto the roll-out of the end product. [Note 1].

If the end product is a robot, an AI entity using robots can manufacture parts/components and assemble robots. That is, robots will manufacture robots from 3D printing to final assembly and roll-out, with an AI entity in control. This will make robots for multifarious repetitive functions affordable, bringing ease and convenience into *Sapiens'* lives, and large profits to the corporate manufacturer.

Thus, the robot population can grow enormously in numbers, and take over several functions which are done by *Sapiens*. While jobs like sewerage cleaning and garbage handling should most certainly be done only by robots – dangerous/toxic materials-handling is already being done by robots – the exponential growth of robot populations will create machine-dependency of *Sapiens*, albeit among the economically better-off sections in society.

From a sociological viewpoint, this will result in some changes in *Sapiens* societies. One, it will reduce direct and indirect human-to-human interactions, which is already happening with mobile phones, social media, banking, travel, hotels, tele-marketing, merchandise-delivery by drones, etc). *Sapiens*, supposedly a social animal, will lose inter-personal skills, and alter the psychological make-up of successive generations. This may be mostly among the economic upper-crust of *Sapiens* societies. Two, it will create a section of society which is physically helpless for certain routine but essential jobs/functions, even if they have the desire to perform them. There will be resultant change in the physique of successive generations of *Sapiens*. This also may be mostly among the economic upper-crust of *Sapiens* societies. Three, AI-enabled untargeted, intrusive surveillance over entire populations will introduce an element of pervasive fear and a sense of subordination to a remote, unquestionable authority. This will destroy individual creativity from an

early age, affecting every individual psychologically, to become obedient and supine under any or all circumstances. A society comprised of such *Sapiens* would be grist to the mill of authoritarian social-political leaders in nexus with corporate owners of surveillance systems.

Thus, in the physical-psychological-social sense, this effectively re-engineered *Sapiens* a few generations in the future may be as different from the present *Sapiens*, as the present *Sapiens* is from its pre-historic *Sapiens* ancestors.

Subaltern *Sapiens*

Social media is increasingly being used by interest groups to influence opinions and even mindsets. Misinformation, disinformation and false information, formerly psywar tools of intelligence agencies, are now being used for political purposes by shadowy actors. The world has moved into times in which objective facts are less influential in shaping public opinion than appeals to emotion and personal beliefs. Information, generalized as ‘data’, is being used to manipulate minds for commercial or political purposes, noting that the distinction between ‘commercial’ and ‘political’ is becoming increasingly blurred.

Zach Tratar [Ref.1] writes; *“A mass hijacking of our minds is currently underway. Perhaps you’ve felt it for a while now. Underlying facts seem increasingly rare, “the truth” is debated back and forth without progress, and people’s behaviors continuously bend towards the irrational”*.

Entire populations are dumbed-down and public opinion manipulated to carry out the designs of the controllers, who profess to know what is correct, desirable and good for *Sapiens* society. Regardless of the socio-economic level of such people, they form the beginnings of a subaltern class.

Questioning authority becomes defiance of authority, so people take the easier path of acquiescence or supine acceptance of authoritarian coercion or fiat. They easily and unquestioningly submit to technological biological/genetic manipulation, and would even possibly further the policies and purposes of the controllers, by enforcing it on others who may not be so pliable. Even presently available science & technology (SciTech) makes eugenics technologically possible by differentially enabling or disabling different sections of people selectively, to create subaltern *Sapiens* societies.

However, SciTech is not essential to create a subaltern class. Although Constitutionally barred, a subaltern class of the “lowest” caste and even a caste-less population beneath this “lowest” caste, exists in the ages-old multi-tiered caste hierarchy.

Parallel, competing societies

As SciTech advances, it would be relatively easy to biologically and socially transform *Sapiens*, along with – perhaps unintentionally – creating a parallel society populated by AI-actuated machine robots, sentient humanoid (android and gynoid) robots, with autonomous AI-entities in control. Mayet Ligad Yuhico [Ref.2] has coined the term *Homo Roboticus* for such entities possessing phenomenal learning and cognitive capabilities [Note 2].

The controlling entity of the two societies would at first be the very few numbers of humans possessing the educational-financial means and access to deep and comprehensive understanding of SciTech, using the AI resources.

Over a few generations, using AI and SciTech-enabled genetic modification (GM), these humans could self-engineer their own DNA so as to acquire physical and mental capabilities far superior to the vast majority of *Sapiens* populations. This superior class of *Sapiens* would be able to exercise hegemonic power over the vast majority of the subaltern population.

It is not beyond the bounds of possibility that *Sapiens* populations thus controlled, can be subjected to eugenics policies by engineering their DNA tailored to specific service functions with designed mental and

physical characteristics and capabilities, to create *Sapiens* sub-species for specific purposes determined by the superior *Sapiens* for its own benefit.

Likewise, dominant AI-entity members of *Roboticus* could also modify physical characteristics, mental capabilities and personality traits of other humanoid *Roboticus* members using GM and other SciTech capabilities which they would have mastered and used for themselves. *Roboticus* individuals would be AI-programmed to perform specific functions to create a social structure within *Roboticus*.

Inevitably, *Sapiens* and *Roboticus* would be competing species, each with its own socio-political structure and leadership. The ethnically and racially diverse *Sapiens* societies and the less diverse and rigidly hierarchical *Roboticus*, would interact based upon an agreed protocol according to stated and unstated policy. Inter-species competition for dominance would include clandestine efforts by both species to engineer genetic and other changes in their own and the other species.

***Sapiens* biological vulnerability**

IPCC predicts that a warmed-up planet and changed climate would result in loss of land space due to rising ocean level and desertification of large parts of global lower latitudes, with lesser areas in more northern latitudes improving for agriculture. This would cause extremely inhospitable conditions regarding food, water and living conditions, threatening survival of *Sapiens* in large numbers.

Roboticus individuals created using 3-D printing from molecular level need only materials sources and non-food energy sources. Thus, *Roboticus* would have low biological vulnerability by design. Indeed, the meaning of “birth”, “life”, “survival” and “death” for *Roboticus* would be predicated on their requirement of sources of materials and energy for survival and reproduction.

The asymmetry of vulnerability of the two species would translate to efforts of one to retain or gain ascendancy over the other. The inter-species interactions may include establishing protocols, parleying, bargaining and internecine conflict. The possibility of kinetic conflict cannot be ruled out, but the industrial-era style conflict would likely be superseded by data-era style conflict for more than one reason.

Conflict of interests

Only the top echelons of both species would have access to AI, robotics and other emerging and cutting-edge SciTech, with undisputed and undisputable control over their respective societies.

It is not difficult to envisage a situation when *Roboticus* uses the AI resources and their own capabilities of asexual, large-scale self-replication to over-ride, even usurp, the power and authority of the minuscule numbers of superior *Sapiens* who control them, both in terms of numbers – with the sperm count among the ruling *Sapiens* males declining [Ref.3] – and physical-mental-intellectual capability. The subaltern *Sapiens* populations would become the “prize” for the *Roboticus* take-over. But even before this contest, a conflict of controlling interests between *Sapiens* and *Roboticus* could arise.

The hard and soft sciences

Starting with the industrial revolution which enabled production of goods – and later services – on an unprecedented scale and rate, science, technology, engineering and mathematics (STEM) have been at the core of discoveries and inventions. These goods have provided economic or commercial advantage to the developer and producer, and often been used for military or political advantage. Over the decades, the focus of STEM has shifted from being human-benefit-centric to becoming the driver of industry primarily for economic growth and financial profit through trade and commerce.

In present times, STEM is used primarily to improve competitiveness in science and technology development, with an unstated emphasis on commercial profit. Although not formally acknowledged, the humanities, arts and social sciences (HASS) are accorded status secondary to STEM.

Development of SciTech and applying it to industrial production processes calls for application of scientific methods for management of STEM. Thus, adding the ‘M’ of management to coin ‘STEMM’ may be appropriate.

AI as the outcome of STEMM and HASS

Extremely rapid developments in AI are leading to fundamental changes in the way in which a large proportion of *Sapiens* live. Algorithms which are the core of AI, can already detect Parkinson's disease and cancer, although this is expensive and therefore available only to a socio-economically privileged minority, when seen in the context of 7.8-billion *Sapiens* on the planet. Therefore increased longevity and improved physical and mental functionality for *Sapiens* individuals will be available only to the superior *Sapiens*.

AI combines cutting-edge, cross-disciplinary SciTech, and will be some combination of STEMM and HASS; that is, a convergence of the hard and soft sciences. With intensive capital investment, AI will possess broad-spectrum applicability, enabling deep socio-political penetration.

As with almost any technology, AI offers both positive (opportunities) and negative (threats) possibilities. The manner in which societies accept and implement AI, and changes within and between societies, will depend upon their inherent strengths and weaknesses.

The relatively new subject of Data Science is an IT-based inter-disciplinary convergence of theories, techniques and methods to model real-life phenomena, for knowledge-creation using data bases or large data sets. Data Science is about acquiring, storing, handling and processing “big data”. Recognition of its fundamental value may have prompted the quip, “Data is the new oil”. Data Science may be used for strategic decision-making in fields as diverse as military, intelligence, politics, business, commerce, communications, science, etc.

Experience, Capability and Strategy

There is no guarantee that the biological child of a *Sapiens* couple will inherit the (superior) physical and mental capabilities of either parent. Furthermore, when a parent dies, the information, knowledge and experience dies with him/her. Although all that can be stored in a computer system, *Sapiens* progeny needs to learn, understand and internalize it and gain experience with passage of time. The possibility of surgically embedding in the child's brain, a low-energy micro-miniaturized system containing the knowledge cannot be ruled out. But even so, experience cannot be gained by this means. Biological death of any *Sapiens* individual will raise the identical problem.

On the other hand, an AI entity who is a member of *Roboticus*, suffers no biological death. If sub-systems malfunction or require upgrading, they can be replaced. In effect, the AI entity lives on “forever”, or at any rate, much longer than any individual member of *Sapiens*, or even several generations of *Sapiens*. More importantly, such an AI entity would continue to accumulate experience without the interruption with which *Sapiens* would have to contend.

AI's present capability for facial recognition and emotion analysis, is already being deployed by some governments as part of public surveillance for security. [Ref.4]. This capability when developed further, would be available to an autonomous AI entity which has accumulated data on *Sapiens* individuals, for independent strategic decision-making. However, *Sapiens* leaders cannot reciprocally use this AI capability on humanoid (or droid) *Roboticus*, because their “facial features” are exact reproductions, displaying emotions which are part of the in-built algorithm.

AI capability is developing very rapidly, and a recent study shows that “AI can learn to identify vulnerabilities in human habits and behaviours and use them to influence human decision-making”. [Ref.5] Put another way, AI can influence and modify human behaviour. This idea when extended implies that as AI's capability develops, an AI entity (*Roboticus*) can insidiously influence, even train, *Sapiens* on how and what to think.

An entity mastering Data Science for strategic purposes would gain strategic advantage over another entity with lesser mastery. As discussed earlier, an autonomous AI entity could out-manoevre a human who uses AI as a tool, howsoever intelligent the human is. Thus, *Roboticus* could likely out-STEMM and out-strategize the superior, ruling-class *Sapiens*. And therein lies a challenge.

The Challenge

As an example, consider an outcome of USA's Freedom of Information Act. It revealed that the US National Office of Military Space Intelligence has developed a powerful artificial brain named 'Sentient', primarily for military use. [Ref.6]. Vladislav Tchakarov writes: "*Unlike any other AIs in existence, it differs in the degree of independence. Usually the algorithm works with the loaded information, but Sentient can even direct satellites to get images of the objects it needs. In fact, it can be called an artificial brain*".

'Sentient' is cognitive since it can perceive what it possesses and what it does not. It has the capability to feel a need for something which it does not possess – that is, it has 'desires'. In a sense, 'Sentient' may be said to be both cognitive and conscious – a living, sentient, perhaps even self-aware being. The given name 'Sentient' is surely not arbitrary, and its development for military use is ominous when we consider a *Roboticus* population of AI entities with *Sapiens* qualities.

As researchers develop more powerful algorithms, 'Sentient' or other similar AI entities can develop more independence and along with it, a sense of volition. Such an AI entity will purposively strive to satisfy its needs, wants and desires, and develop aspirations. It will transcend from simple decision-making to develop a sense of determination and initiative. It will possess a psyche and consciousness, like a member of the *Sapiens* species.

As an aside, it is tempting to shift track into the Vedantic philosophy of consciousness and being, but that would be an uncalled-for digression in the current context, and can be discussed separately.

With the advent of digital information technology, the volume of knowledge is growing at an exponential rate. In 2019 it was assessed that the body of human knowledge was doubling every 12-months. The growth of knowledge is linked closely with the volumes of data acquired or accessed, stored and processed, and in turn is connected to improved, and still improving, low-energy hardware and software. It is anticipated that the body of human knowledge will double perhaps every 12-hours in the not-distant future. [Ref.7].

Even today, the most intelligent members of *Sapiens* – like say, members of Mensa International – cannot even peruse the enormous volume of knowledge being developed within and between multiple disciplines, leave alone study, understand and remember it for intelligent application.

Information overload is a problem for *Sapiens*. However, that may not be a serious problem to AI entities (like an upgraded 'Sentient'), which would be a part of *Roboticus*. It is not difficult to conceive of a future when AI entities of *Roboticus* could compete with its progenitor *Sapiens*, and even pose an existential challenge to *Sapiens*.

Transformed Societies

Yesterday's science fiction is today's reality and tomorrow's common practice. The world of tomorrow may consist of different kinds of humans (*Sapiens*), and humanoid and machine robots (*Roboticus*), with populations under the influence and control of AI. We are transiting into times with a planet and a world which are transforming uncontrollably and unpredictably in multiple ways. The direction of change is towards using SciTech to centralize social, economic and political power.

It would therefore be wise to carefully examine the social, economic and political effects of AI on societies, and the ethical and moral dilemmas with which humanity may be confronted.

Starting in the 20th Century, there has been a concerted move to “transform our world”, the possessive pronoun perhaps indicating hubris. Initiated by world leaders and the economic upper crust of societies worldwide, this move to “transform” is based upon ideas discussed at the World Economic Forum, which meets annually at Davos. The WEF prepared Millennial Development Goals (MDGs) for 2000-2015, and later Sustainable Development Goals (SDGs) for 2015-2030, all with action plans. These transformative measures were designed for large-scale social and economic reform and change, without disturbing political power structures.

However, those who seek to transform “our” world fail to understand that the relentless march of SciTech is willy-nilly transforming the world in unintended ways. To quote Aroon Raman [Ref.8], “*The world ‘is’. But humankind does not accept this. We seek to mould the world to our desires. The result is violence against the world, which is also a form of violence against ourselves*”. Will the out-of-control advancement of SciTech cause violence against ourselves?

In the new technological society which *Sapiens* is creating, it is imperative that we need to examine the evidence at hand and ask ourselves three questions, namely: (1) Has *Sapiens* opened a SciTech Pandora’s Box? (2) Could *Sapiens*’ SciTech capability empower *Roboticus* with superior SciTech capability to control, even subjugate *Sapiens*? and (3) Is *Sapiens* on a self-destructive path because of its SciTech capability?

The unintended transformation could hasten creation of an AI-dominated “deep state” [Ref.9], leading to dystopian surveillance regimes. [Ref.10]. Judging from recent reports of several large countries worldwide, perhaps this process is already underway.

Whether or not this is the end-game, if *Sapiens* is to steer away from possible take-over by *Roboticus*, we need a “road map”. This would be for world’s political and thought leaders to understand that they cannot “transform our world” using the current failed paradigm of competition-dominance-control. This failed paradigm should be replaced by a new paradigm of of cooperation-understanding-sharing within and between societies. This should encourage people to seek and secure justice, liberty and equality along with democratic rights. This is surely a tall order, but hope is ever-present in every sane mind that it is doable in the best interest of 7.8-billion *Sapiens* alive today, and their progeny.

Is this airy-fairy idealism? This and other questions need to be considered by those with wisdom which this writer does not claim to possess. The answers to the questions may determine the future of our species as a part of the new global technological society.

Note 1

4D printing. 3D printing connected with nanotechnology has made 4D printing possible, starting 2012. This involves designed post-production, time-based, structural changes in the object created by 3D printing. Integration of 4D printing with emerging genetic modification techniques creates a number of biotechnological possibilities to mimic biological life.

Note 2

According to Susan Krawitz, *Homo Roboticus* is a richly-imagined cautionary tale of a future earth in which long-feared climate disaster has actually happened, the world’s population is permanently at war, and robots have become almost more human than their creators.

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PART II

RESEARCH COMMITTEES' CHAIRPERSONS' ADDRESSES

ON

NEW GLOBAL TECHNOLOGICAL SOCIETY

PART II**RESEARCH COMMITTEES' CHAIRPERSONS' ADDRESS****03. ARCHAEOLOGY, HISTORY AND CULTURE**

0203011 GUPTA, VIKAS (Department of History, Faculty of Social Sciences, University of Delhi, Delhi 110007). TRANSFORMATIVE IMPACT OF MODERN PRINTING: COMPETING HISTORIOGRAPHICAL PERSPECTIVES

Can technology or technological changes be seen as transformative agents at their own? There have been different arguments and counter-arguments about the liberative and transformative impact of the technology of printing and the Transition from oral and Manuscript Cultures to Print Culture. The divide between the 'oral culture' and 'print culture' has been yet an important question of debate amongst scholars. Certain understanding of the role of modern print has been central to the various historical explanations about socio-political changes in the modern era including (though not limited to) the linguistic homogenization, epistemological democratization, textual fixity, emergence of newer literary genres and reading practices, pedagogic transformation and the rise of nationalism etc. If certain scholarship over last sixty years have accorded due importance to the impact of the technology of printing, there have been not merely modifications, even staunch rebuttal's of their classical position by the revisionist scholars. Some of these competing perspectives may be seen in the writings of A.K. Priolkar (1958); Adrian Johns (1998; Anindita Ghosh (2002, 2003, and 2006); Anthony T. Grafton (1980); Benedict Anderson (1991); Elizabeth L. Eisenstein (1979); Francis Robinson (1996); Robert Darnton (1989, 1996, 2002 and 2003); Roger Chartier (1991); Stuart Blackburn (2001); Ulrike Stark (2007) and A.R. Venkatachalapathy (2012) among others.

Therefore, we will examine in the present paper some of these competing historiographical frameworks of explanations about the impact of modern print in the Western societies as well as in context of South Asia. What were the different trajectories of the spread of modern printing in South Asia. Who were the key agents of this process? What were their objectives? What was the nature of print culture in South Asia and its impact on language, community identities and nationalism etc.?

04. BIOLOGICAL/LIFE SCIENCE

0208012 SAHA, BHASKAR (National Centre for Cell Science, Ganeshkhind, Pune 411007). BIOLOGY IN INDIA: IN QUEST OF THE CREST, RISING INTO THE ABYSS!

Biology has prospered and progressed leaps and bounds in the developed countries, as they innovated and perfected the techniques that not only verified hypotheses but also used those new concepts to develop technologies for use. By contrast, India borrows the techniques and follows those leaders. The money is spent for felicitating these foreign leaders to facilitate the borrowing. The most striking examples are the growth of Biosimilars with the aid of Government's money, which is meant for fostering innovation. On the one hand, we talk about Innovation and on the other, foster the growth of Biosimilars. So, with this operational duality, the Indian Biology in search of the global leadership repeatedly falters and ends up at best a follower. *Where does it go wrong?* It is more than clear that Indian minds are not the limiting factors, as exemplified with Acharya Jagadish Chandra Bose, Acharya Satyendranath Bose, Prof Meghnad Saha, Prof GN Ramachandran and many more who deserved but did not get Nobel Prize. When the Indian scientists go abroad, they do wonders and reach the pinnacle of scientific accomplishments. Prof Har Govind Khorana, Prof Subramanyam Chandrasekhar, Prof R Venkitaraman are the brightest names who brought glory to India for their Origin but not as a place of work. Clearly, this raises the same question again, "*Where does it go wrong?*" For an accomplishing system, there has to be a pyramid of tiers where function in each tier and transition of people from one tier to the next has to be rational and trustworthy- absolutely devoid of nepotism, favoritism, and any form of politics. Unfortunately, the above examples imply that the Indian system is a uniquely non-accomplishing one. The tendency to promote the one of personal choice or kith and kin but to punish those who speak unpalatable truth, along with absolute intolerance to criticism, is a clear indication of self-destructive "Narcissism". India currently has more than 150 Research Institutes under Council of Scientific and Industrial Research, Indian Council of Medical Research, Department of Biotechnology, Department of Science and Technology, Department of Atomic Energy and so on. These Institutes would not be able to function without enormous funding from the Government. As India does not have any dearth of scientific minds, these enormous resources imply India's potential to rise again to the International podium of science. However, in order to achieve that feat, Indian science needs absolutely selfless and competent governors who must not promote themselves and the persons of their own choice ignoring the demonstrated capability, commitment and vision as the only important parameters. There are many awards and avenues to promote committed young scientists. But, conferring awards and responsible positions must strictly be decided only on merits. Any slippage of these principles may lead to lobbyism and cronyism spelling death for the dedicated scientific minds and a moral denigration en masse. And, the Indian Biology with such faultlines will rise into the Abyss of Destruction! We look forward to a great leadership in Indian Science that elevates Indian Biology to an international visibility by its own merit and not by publicity.

08. COMMUNICATION AND JOURNALISM

0208013 ARAM, ARUL I (Department of Media Science, Anna University, Chennai-600025). TRENDS IN MASS COMMUNICATION RESEARCH

What is research?

Let us say that when you buy a computer, you get information about brands and models, check computer magazines, and ask your friends. This too is research. We perform this type of research on a daily basis. Academic research is more rigorous. However, we need to be careful not to reinvent the wheel, and this is why we undertake the task of reviewing related literature. We have to imbibe the qualities of scholarly research which include scientific and objective thinking, meticulous planning and systematic working. The researcher has to be always mindful of what impact the media has on society. Research has to be society-centric than media- or technology-centric. Media research draws methods and models from various social science disciplines. This means, if a method like experimental design is taken from the discipline of psychology, the research should gain some knowledge of the cross-discipline as well. Research in mass communication always brings together more than one discipline. Crossing disciplinary boundaries is thus unavoidable in mass communication research.

Table 1: Difference between everyday research and scholarly research

Everyday research	Scholarly research
Intuitive	Theory based
Common sense	Structured
Casual	Systematic
Spur of moment	Planned
Selective (often)	Objective
Magical thinking	Scientific thinking
Flawed thinking	Logical
Personal decisions	Knowledge of reality

Vital questions such as the impact of violence, pornography, children's media effects, politics, consumerism, family welfare, AIDS, agriculture, disasters, pandemic, education, etc., vis-à-vis mass media have been considered as part of mass communication research. As new media (internet) emerged, what "effects" it has on public opinion, individual beliefs, and political structures were pondered upon.

While researching on mass media and its effects, the following questions need to be considered: Are effects individual or social? Can measurement capture media effects? Do media have "causal" effects? Do they "reflect" social phenomena? Is there a reciprocal influence process?

Frames of mind (or schools of thought)

While conducting media research, the researcher may adopt any one of the following frames of mind:

- **Functionalist** – This involves asking questions about what maintains social organization and order. It examines the threads that bind the society in the form of collective experiences and commonly-held values. For instance, justifying the caste system as if it is right and it contributes to social order. This approach is now considered retrograde and is mostly given up in the social sciences.
- **Conflict theorist** – In such a frame of mind, the researcher asks questions about power and its distribution among various competing groups. Under this, the focus is on understanding what causes differences between diametrically opposing sections. Examples are Marxist theory.

- **Symbolic interactionism** – In this approach, society is viewed as emerging from the infinite transactions of social actors. The focus is on evaluating the worth of theories in solving the problems of society.

Research methods

Media research involves diverse methods, the key features and usefulness of some of which are summated here:

- **Survey research** is useful for examining larger-scale social patterns of response to the mass media. It uses questionnaires to gauge public attitudes and behaviour patterns with respect to specific mass media contents.
- **Experimentation** emerged from psychological research and was useful for examining individual impacts of communication, for instance, in persuasive power of mass media content on groups of people. It is usually performed in laboratory-like settings where variables are manipulated to observe their effects on the subject under study.
- **Content analysis** is useful for examining patterns of content in media, for instance, in analyzing violence. It is largely a quantitative method and employs techniques of codification of content to measure their presence in texts under study. If we move away from quantitative analysis of media text such as content analysis, we could think of discourse analysis for a qualitative edge.
- **Frame analysis** falls somewhere in the middle of the quantitative-qualitative spectrum. It looks at media content as constructs such as specific modes of representation of reality to determine how people perceive content presented to them. For instance, environmental news can be viewed under the frames of conflicts, scientific communication, human interest, conservationism, etc.
- **Case studies/interpretive research** is useful for examining media content and effects that cannot be quantified and it focuses on detailed aspects of specific cases under study. It is capable of eliciting a depth of qualitative information from the sample.

Changing paradigms

Journalism, broadcasting, social media, advertising are part of mass communication. Way back in the 1920s, print, broadcast and film were prominent and they impacted society. At a time, people were passionate about going to cinema theatres and reading newspapers that research was carried out on their consumption. From the days of the Payne Fund studies which went into the impact of film viewing on children and had a tremendous impact on media studies, we now have a great variety of methodology and statistical tools. The Payne Fund studies used content analysis, survey methods, and experimental design to examine message content, information acquisition, attitude change, affect, health outcomes, behaviour, and moral judgments. The Payne Studies recognised media studies as a credible and rigorous scientific discipline. These studies laid the foundation for cross-disciplinary studies particularly strongly rooted in the social sciences.

The very first theory that guided early media researchers was the ‘Hypodermic Needle theory’, also known as the ‘Magic Bullet hypothesis’. Common early assumption was that the media had “powerful” effects. But even early studies found no consistent evidence for this hypothesis.

One of the early models of communication is Harold Lasswell’s model, 1948. Lasswell called for focus on context to understand concepts and their meaningfulness (Marvick, 1980). According to Lasswell’s model, media content is understood in terms of the following constituents: Who? Says what? To whom? In what channel? With what effect? All these questions form areas of research as well.

In the 1930s, media consumption was looked at beyond the stimulus-response model as proposed by B.F. Skinner. At this time, radio listenership was on the rise. Researchers started looking at how media consumers use the media rather than looking at the effects of the media. This challenged the “magic bullet,” which considered mass audiences as relatively passive. Mass communication research then moved away from powerful effects paradigm to limited effects paradigm. In the early 1940s, the audience or the listener is

thought to be passive. It began to be understood that people use what they need from the media, and experience different levels of satisfaction from their exposure. In an attempt to deal with real-world situations, survey research demonstrated how an audience could be investigated outside the stimulus-response analysis by shifting to what the media do to audiences to what audiences do with the media (Skinner, 1931). The stimulus-response theory was developed after motivational experiments involving how to make a positive behaviour more frequent and how to make an unwanted behaviour extinct. By causing an unwanted behaviour to become extinct, it means that the behaviour is punished until it no longer occurs after a stimulus.

The two-step flow of information, which proposed a limited effects model was proposed by Paul Lazarsfeld after an extensive survey of people to evaluate voting behaviour in the 1940s. The major effects studied included concepts such as activation, reinforcement, conversion. Lazarsfeld argued that the media was most effective through a “two-step” flow of information in which personal influence played a major role, out of which came the concept of opinion leaders. *Personal Influence*, the seminal work by Paul Lazarsfeld and Elihu Katz on how mass communication is perceived, is considered to be a highly influential and widely accepted work guiding mass media researchers in the U.S. (Hepp, 2019).

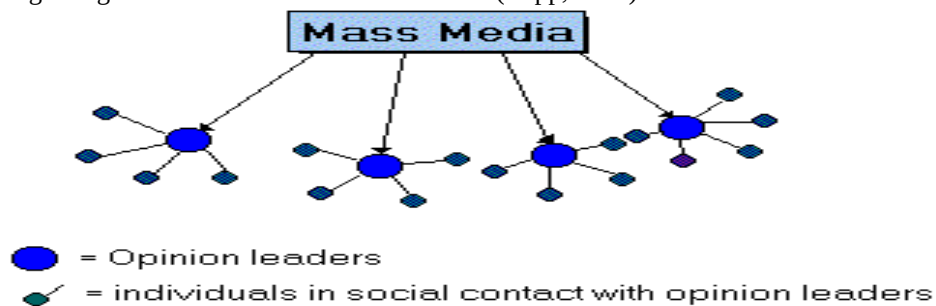


Fig. 1: Katz and Lazarsfeld's two-step flow model, 1955

The next few decades from the 1950s were dominated by the uses and gratification paradigm. During the period spanning from 1950 to the present, researchers turned to mass media audiences' newest outlet, television. The gratifications perspective identified the relationships between the social and psychological uses of media and their gratifications.

Research on television viewing has examined motives such as information seeking, entertainment, para-social interaction (i.e., the extent to which people use media to fulfil the basic human need for social interaction). The constructs given below can be considered the core set of gratification motives for television use.

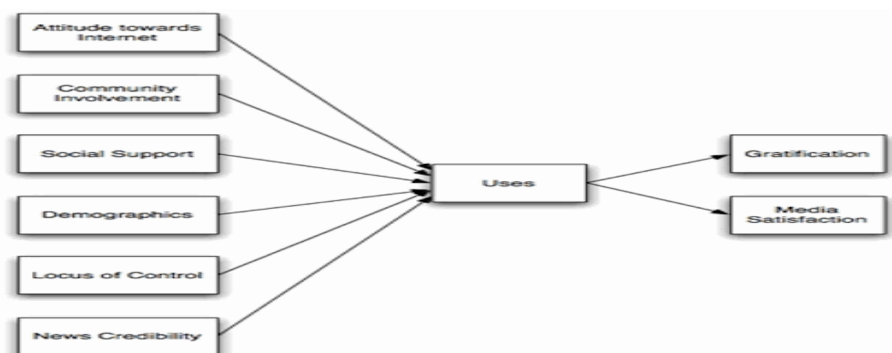


Fig. 2: Uses and gratification model

The diffusion of innovation model of Everett Rogers (1955) has had a major impact. The model was developed out of a desire to understand how and why people adopt certain new innovations and not others. Diffusion of innovations theory demonstrates the adoption of an innovation via communication channels across members of a social system over time. An innovation is an idea, practice, or object that is perceived as new and can be expressed in terms of knowledge, persuasion, or a decision to adopt. The basic nature of the diffusion process operates from the exchange of information about a new idea through communication

channels, within a social system, and over time. This information exchange can occur either through mass media channels or inter-personal social channels. Adopters pass through five stages (knowledge, persuasion, decision, implementation, and confirmation) as they learn about, form attitudes toward, and ultimately use an innovation. Rogers (1995) revealed that from 49% to 87% of the variance in the rate of adoption of an innovation can be explained by five widely-prevalent innovation attributes: (1) relative advantage, (2) compatibility, (3) complexity, (4) trialability and (5) observability.

Of late, the uses and gratifications framework has been redefined within Social Cognitive Theory (SCT) (LaRose & Eastin, 2004). SCT evolved out of social learning theory (Bandura, 1977). SCT offers a theoretical explanation for the often-observed empirical relationship between media gratifications and media usage. SCT, which posits reciprocal causation among individuals, their behaviour, and their environment, represents a broad theory of human behaviour that may be applied to media attendance and behavioural outcomes from media attendance such as recall or recognition performance. The expected outcomes are organized around six basic types of incentives for human behaviour: novel sensory, social, status, monetary, enjoyable activity, and self-reactive incentives (Bandura, 1986).

Self-efficacy is the belief in one's capability to organize and execute a particular course of action (Bandura, 1986). Self-efficacy is particularly relevant for novice internet users who have not yet acquired the requisite skills to obtain useful information and deal with the discontents of life online. As internet users become more self-efficacious their expectations that they will obtain specific outcomes (e.g. finding product information) also increases, and this reinforcing act encourages more usage.

The mass media have transformed during the past century. First, society has shifted away from the oligopoly-dominated model prevalent in the early 1950s of only a few mass media sources. Second, advancements and increases in technology have changed the face of mass media forever. Third, the combination of a power shift from the media supplier to the media user, along with advances in technology, has resulted in mass media segmenting and fragmenting in order to effectively reach the public (Eastin & Daugherty, 2005).

Frankfurt school started understanding influence of Marxism beyond economy as well. Any attempt to understand the processes of cultural production, mediation, and negotiation should take into account the hierarchy of social control, class structures and the economic and political context within which this control operates (Kperogi, 2015). However, the political economy approach of the Frankfurt school has to widen its base after the new phenomenon of liberalisation took place in and after the 1990s. In this context, the traditional Marxist critique that the media is owned by the capitalists and the capitalists impart their views through the media, and by this means, impart their culture. But when market opened up, market has taken the primacy in influencing the media as well.

Mass communication is no longer just TV, magazines, and newspapers but encompasses a new gamut of alternatives such as the Internet and other forms of interactive media (Junu, 1995). The emergence of the internet and the information age has created a new medium while altering existing media vehicles. The internet is better than television because it combines all of these elements while adding the element of interactivity. Interactivity is a multi-dimensional construct often associated with the internet and has been described as both the ability to communicate with people (person interactivity) and access information (machine interactivity) (Hoffman & Novak, 1996). As a form of communication, interactivity is measured in terms of the level of responsiveness between users along a continuum ranging from one-way discourse to the reactive interaction of two-way communication (Rafaeli & Sudweeks, 1997).

Framing theory has commonly-applied approach in the field of news production studies. The framing theory is closely related to agenda-setting theory. The basic premise of the agenda setting theory is that media can make people aware of what to think about and not tell them what to think. It is used to examine what issues are given prominence in the media through extensive coverage so as to direct public awareness and opinion formation towards those issues. The choice and coverage of issues by the gatekeepers i.e. editors and reporters in traditional media plays a significant role in the shaping of political reality (McCombs and Shaw, 1972). Agenda setting focuses on what issues are covered rather than how these issues are reported.

Cultivation theory, which developed in the late 1960s, focuses on the role of media content in shaping people's perception of reality. It posits that people are more likely to view the world as it is presented to them through media. An important pioneer in this theory was George Gerbner, who proposed the 'mean world syndrome' suggesting that people exposed to violent content on television are likely to believe that the world is a hostile place. They may develop fear of the real world due to the influence of negative images of reality portrayed through television and their outlook towards the world may be largely cynical. Gerbner et al. (1980) had established that television viewing has perceptible influences on the minds of adolescents.

Bryant and Miron (2004) pointed out that framing theory has taken over from agenda-setting theory and cultivation theory. The agenda setting theory establishes what we, as readers should think about. But framing as second level of agenda setting advocates, not only establishes what should the readers think about, but also influence how he/she should think about the issue (Kuypers, 2009).



Fig. 3: Agenda-setting model by McComb and Shaw, 1976

Reverse agenda setting, on the other hand, posits that the public determines media agenda. According to this theory, issues of public concern considered most important determine its coverage and prominence in mainstream media. The rise of social media has placed the onus on the public in determining public agenda which in turn influences media agenda (Nair and Sharma, 2017). Conventional media is now increasingly dependent on public agenda as reflected through their social media presence.

ANT (Actor-Network Theory – online inter-media agenda setting) traces connections between national climate agendas, networks of power and sites of mediated information. ANT has potential to help better understand processes of information dissemination in an era characterized by the exceptional inter-connectedness of media landscapes. Any market is a product of operations of disentanglement, framing, internalization and externalization. This theory makes it possible to explain these operations and the emergence of calculating agents (Callon, 1999).

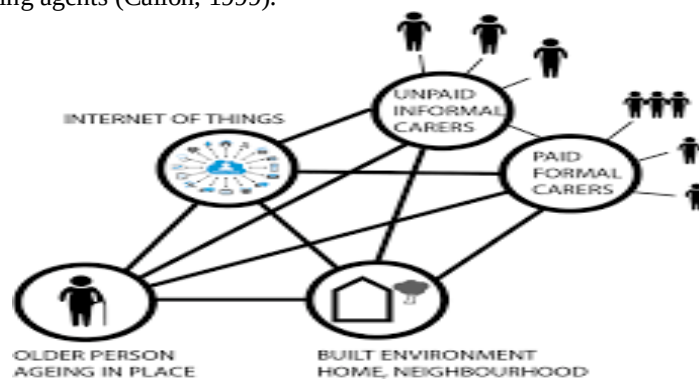


Fig.4: Actor-Network Theory

Another prominent mass media theory that took shape in the 1960s and the 1970s was Elisabeth Noelle-Neumann's 'Spiral of Silence theory'. This theory suggested that people refrain from sharing their true opinions on public issues for fear of isolation from the rest of the society. Not just the fear of social separation but also the lack of confidence in one's own ability to form judgments influences the minds of individuals (Noelle-Neumann, 1974). Views in opposition to the dominant views are not freely expressed in the public domain as people holding these views tend to maintain silence. When sections holding views at conflict with

the dominant views are not made available in the public sphere, the dominant position then becomes stronger thus perpetuating the spiral of silence.

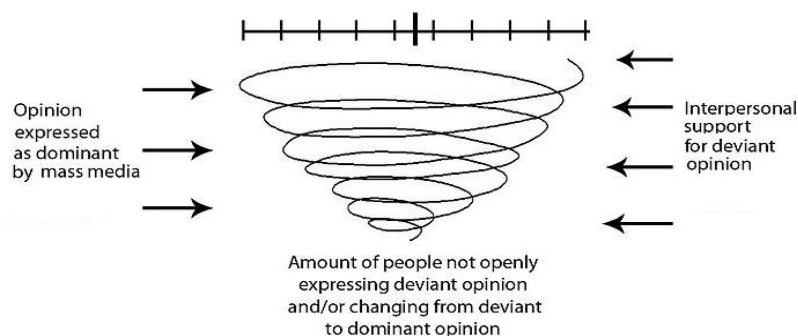


Fig. 5: Spiral of Silence theory

Conclusion

Future areas of research in mass communication will continue to build on the ever-changing dominant themes. Some of the theories like the ‘spiral of silence’ may be put to productive use to understand how minorities in India perceive and react to the media in a country like India. Similarly, the agenda setting theory, the reverse agenda-setting theory and the actor-network theory hold great potential for close examination of media coverage of issues of public importance in mainstream media as well as social media discourses. Frame analysis incorporating these takes the media examination to a higher plain.

Mass communication research will, particularly, need to focus on how and why people are engaging new media such as the internet. This is the age of multiple media influences; and such an extraordinary situation calls for extraordinary responses in terms of cross-disciplinary approaches, newer methodologies and newer theories.

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10. EARTH SCIENCE (Ocean Sc, Marine Sc, Atmospheric Science etc.) AND PLANETARY SCIENCE**0210014 PARTHASARTHY, G AND VASUDEV V N (School of Natural Sciences and Engineering, National Institute of Advanced Studies, Indian Institute of Science Campus, Bengaluru- 560012) REVIEW OF THE CURRENT STATUS OF CRITICAL MINERALS IN THE CONTEXT OF ATMANIRBHAR BHARATH**

A “Critical Mineral” in the Indian context is any mineral identified by Govt of India as most essential for the defence and food security and industrial development of the country. In the context of the criticality of minerals, strategic and supply risks are important factors. In this regard, Rare Metals such as Niobium and Tantalum and Rare Earth Elements(REEs), tungsten, molybdenum, platinum group metals, copper, cobalt, titanium, vanadium, gold, lithium, potassium and phosphate are considered as Critical in the Indian context.

In the current global scenario, many of the Critical Minerals serve an essential function in the production of advanced environment-friendly high technology products. For example, the list of products in which REEs are used is almost endless; TV screens, computers, iPhones, guided missiles, fighter jets, sonar systems, 5G technology, solar panels, electric grid and so on. In 2004, India consumed 200 tonnes of Rare Earth products all of which were imported from China. The products were used in the consumer goods industry, petroleum refineries and car industry. Today, the demand for Rare Metals and REE by the defence & civilian sectors has gone up multifold. India is currently producing 3,000 tonnes of REO out of the global REO production of 213,000 tonnes. India has the geological resource potential to significantly step up its REO & RM production. Recycling of electronic wastes has started a few years ago to produce REEs.

The Indian Geology indeed has the discovery potential and Resource potential to support development of productive mines of these minerals and metals. Exploration carried out in the last 70 years by the GSI, AMD, MECL and, in the last 2 decades by the private sector and PSUs has brought to light both Resources and Resource-potential blocks of these metals.

India has the 3rd largest hard rock REE Resources in the world. Coupled with this are the vast resources of beach and offshore Monazite and Zircon-bearing sands, so much so that India can take on China, with technology inputs from Japan, Australia and the US, in meeting the global demand of Rare Earth Oxides and their value-added products such as Nd & Pr magnets required for Green Energy options..In 2014 the IREL (a PSU under DAE) entered into partnership with JOGMEC (Japan Oil, Gas & Metals National Corporation) and Toyota Tsusho Corporation for exploration and mineral processing. Monazite (Ce, La, Nd, Th) PO₄ and Xenotime are the chief source of REEs in India. Zircon contains an important strategic element called Hafnium. Hafnium and Zirconium are required for maintenance of Nuclear Reactors. The mineral Zircon is required for high end Ceramic products and also as abrasive. In India, Monazite and Zircon are the coproducts of mining and processing of heavy-mineral sands mined for titanium minerals namely ilmenite and rutile (both TiO₂). Large REE-bearing sands are found all along the 4,000 km long coastline of Kerala, Tamil Nadu, Andhra Pradesh and Orissa. This 4,000km tract is one of the largest Heavy Mineral sand deposits in the world @ 30% of global deposits of HM sands. Combined with the inland TERI and Off shore Heavy Mineral sands and hard rock REE Resources, the net Resources constitute the largest REE-mineral deposits in the world. Marine Offshore phosphorite deposits off the Indian coasts are also known to carry significant content of total REE. Because of the presence of radioactive Thorium (Th) and, to a little extent, Uranium, Monazite has been classified as an Atomic Mineral by the Dept of Atomic Energy (DAE) and the Ministry of Mines, Govt of India. DAE has placed an embargo on Private Entrepreneurs from concentrating Monazite after extracting ilmenite (TiO₂), garnet, sillimanite etc from beach sands, off shore sands and hard rocks. REEs which are so crucial and in great demand for high tech industries have thus fallen into an artificially created scarcity trap. So is the situation with Gold which has become a Critical Metal because of its immense role in the economy of India yet, it's supply to meet the domestic demand of 800 to 1000 tonnes per annum has to be entirely met through imports. The import is causing a huge drain on the country's Forex reserves to the tune of about 50billion US\$. This huge forex out-go is causing the Current Account Deficit or the trade deficit that cannot be stopped because over 5 million people who are engaged in gold trade and manufacturing of Jewellery are depended on gold for their livelihood. India's Jewellery market size in 2018 was about US\$75billion and is expected to reach 100 billion \$ and employ over 8million people \$ by 2025. India's heavy dependence on gold

import can be remedied, atleast in part, if the immense gold-bearing geological potential existing in the country is harnessed through facilitatory Laws to attract private investment into exploration and mining of gold.

The Indian Mineral Inventory (IMI) maintained by the Indian Bureau of Mines reveals the existence of Mineral Resources of many of the Critical Minerals, eg. 13 Mil.T of Monazite sand Resource (source of REE + Thorium) and 7 Mil.T of REO; 700 tonnes of drilled gold Resource and about 3000 tonnes of Prognosticated gold Resources; 19.3 million tonnes (Mt) of Molybdenum; 12 million tonnes of Tungsten; 410 Mt of Titanium; 24.6Mt of Vanadium; 220Mt of Potash, 1020 Mt of Copper and 44.9 Mt of Cobalt etc.

The critical minerals for energy security are lithium, cobalt, nickel, graphite and vanadium. In 2018, India took a major decision to switch over gradually to EVs (Electric Vehicles). Types of batteries to run EVs are LEP (Lithium-Iron-Phosphate), NCM (Nickel-Cobalt-Manganese) and NCA (Nickel-Cobalt-Aluminium). China dominates the production of EVs. Atomic Minerals Directorate for Exploration and Research has discovered a lithium deposit in the pegmatites of Marlagala and Allapattna in southern Karnataka. Salt deposits containing lithium are being explored in parts of Rajasthan. Rubellite, a Lithium Tourmaline-bearing pegmatite is reported from Rajgarh near Ajmer. Lithium bearing pegmatites are also reported from Sibagaon and nearby locations in Sirohi Dt., Rajasthan. Lithium is also reported from Bauxite (Al₂O₃) deposits in J & K.

Amongst other CMs, Tungsten and Molybdenum are essential for the defence security of India. India has proven resources of these metals and abundant resource potential to achieve discoveries. Tungsten also commonly occurs as a byproduct of gold mining.

Copper and Cobalt are the other metals classified as critical. Cobalt is a common associate of Chalcopyrite (CuFeS₂) which is the ore of copper. Though there are several mines operating in parts of Rajasthan, MP and Jharkhand and drilled Resources of Copper are found in parts of Haryana, Cuddapah Basin in AP and Karnataka, India continues to depend on import to meet its domestic demand. LME copper prices touched nine years high in January 2021 to average \$7,961 per tonne due to supply crunch of copper concentrates amidst rising demand. Copper price is forecast to reach 11,000 \$ by 2022. Therefore, there is urgent need for the Ministry of Mines, GoI., to facilitate conversion of existing Copper Resources into new mines and exploration to discover and define new deposits of Copper +/- Cobalt and gold.

India has some important unconventional critical mineral deposits like fluid deposited graphite (along tungsten bearing shear zones, in Eastern Ghats of Andhra Pradesh) natural fullerenes, and iridium rich clay minerals (Anjar, Kutchh). Fluid deposit graphite plays an important role in manufacturing of graphene which is a 2D graphite sheet possessing high conductivity and toughness.

Phyllosilicates (Eg. Kaolinite, Montmorillonite, Chlorite, Halloysite, Vermiculite, Pyrophyllite and Smectite) are crucial in environmental applications and in improving quality of drinking water and also in treatment of wastewater because of their role in adsorption. Phyllosilicates can be employed to reduce or even remove carcinogenic organic and inorganic pollutants present in effluents. The same adsorption quality of the phyllosilicates is helpful in finding radioactive minerals like uranium and thorium associated with clay minerals in river basins. The critical minerals, their characteristics, composition and intrinsic properties related to adsorption are discussed. The effects of several process parameters, such as pH, temperature, pollutant, and adsorbent concentration are also discussed. Furthermore, equilibrium, kinetics, and thermodynamic aspects are presented in the paper according to each application.

Mr. Amitabh Kant CEO of Niti Aayog, at the fourth National Conclave on Mines & Minerals organised in July 2018 by the Ministry of Mines, said “*importing minerals made no sense when there are ample reserves within the country*”. So it makes sense to encourage investors and promote large scale exploration and to focus on converting the known Resources of Critical Minerals into new mines and establish downstream industries for mineral processing and production of value added products. India fortuously has the ideal geological setting to trigger new and large discoveries of Critical Mineral Resources provided the

Ministry of Mines and the DAE frame facilitatory laws to attract substantial investments into exploration. The Geological Survey of India has identified 650,000 sq km as the area having Obvious Geological Potential (OGP area). The Govt of India needs to encourage a minimum investment of the order of Rs.2,500 Cr per annum required to carry out mineral exploration, construction of mines, setting up of mineral processing units and related environmental safeguards. Such steps would save 30 to 40 billion \$ every year by reducing the volume of mineral/metal imports. ***Declaration of tax holidays on all the Critical Minerals would certainly help in the realization of Atmanirbhar Bharath. At the same time every new mine becomes a rural economic hub.***

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12. ECONOMICS

0212015 BRAHME, RAVINDRA AND KRISHNAN, PRAGATI (department of Economics, Pandit Ravishankar Shukla University, Chattisgarh). INDIAN ECONOMY MOVING FROM K AND W TO V : AMIDST THE COVID – 19

After the great depression of the 1930's, the COVID-19 pandemic indubitably gave the world economy the greatest set back ever before. Around 60% of the world's population is either under extreme lockdown or partial lockdown without providing a medical cure to the coronavirus disease, and also the economic growth has either slowed down or decelerated drastically across the countries to take away millions of livelihoods. According to the International Monetary Fund, the global economy is expected to contract rapidly by -4.9 percent in 2020 as a consequence of the pandemic, which was even worse than the financial crisis of 2008-2009. However, the Indian economy is not exceptional. It faced anomalous shock due to the outburst of the Covid-19 pandemic. The parlous state of the economy was as well witnessed even before the outbreak of the covid-19 all around the globe. With the persistent lockdown across the country, global economic decline and subsequent disruption of demand and supply chains, the economy was facing a prolonged slowdown over the period of time. The present paper is divided into 5 sections: Introduction, followed by Pre COVID-19 Growth, then the K and W factors and Recession. The fourth section discusses about the routes to sustainable recovery: A “V” Shaped economy and lastly the conclusions.

After the great depression of the 1930's, the COVID-19 pandemic indubitably gave the world economy the greatest set back. Around 60% of the world's population is either under extreme lockdown or partial lockdown without providing a medical cure to the coronavirus diseases, and also the economic growth has either slowed down or decelerated drastically across the countries to take away millions of livelihoods (Sahoo and Aashwani, 2020). The global economy is expected to contract rapidly by -4.9 percent in 2020 as a consequence of the pandemic, which was worse than the financial crisis of 2008-2009 (International Monetary Fund, 2020). However, the Indian economy is not exceptional. It faced anomalous shock due to the outburst of the Covid-19 pandemic. The parlous state of the economy was as well witnessed even before the outbreak of the covid-19 all around the globe. With the persistent lockdown across the country, global economic decline and subsequent disruption of demand and supply chains, the economy was facing a prolonged slowdown over the period of time (Dev and Sengupta, 2020). The economic impact on actual or predictive sectors in India was even worse than that of the 2008 crisis. In terms of financial crises, health crises, the crash in oil prices and much more, it will now face several challenges.

1. Pre COVID-19 Growth

Bora and Basistha (2020) concluded that the expeditious outspread of the unprecedented COVID-19 pandemic has put the world in jeopardy and transformed the global outlook off base. But in India, the situation was slightly different. India was facing a more acute and long lasting problem as the state of the economy was in the pre Covid period. At the time when the first case of the covid-19 was reported in India, the economy was almost collapsed significantly since so many years of feeble performance (Dev and Sngupta, 2020). The Gross fiscal capital formation declined from 34.3% in 2011-12 to 28.9% in 2018-19. There is also a twin balance sheet problem of high NPA and high leveraged corporate sector. Further the GDP growth slowed down from 8.1% in Q4 2017-18 to 4.7% in Q3 and 3.2 in Q4 of 2019-20, also unemployment increased from 2.2% in 2011-12 to 6.1% in 2017-18. Agriculture and rural incomes undergone stress followed by a drop in the oil prices but hardly any change was witnessed in the retail price.

Table 1: Annual growth rates of Real Gross value added at basic prices by industry of origin at constant price (2011-12) in percent

Year	Agriculture, Forestry & fishing, mining and quarrying	Manufacturing, construction, electricity, gas and water supply	Trade, hotels, transport & communication	Financing, insurance, real estate and business services	Community social & personal services	Gross value added at basic prices
2012-13	1.4	3.6	9.8	9.7	4.3	5.4
2013-14	4.8	4.2	6.5	11.2	3.8	6.1
2014-15	1.2	6.7	9.4	11.0	8.3	7.2
2015-16	2.1	9.5	10.2	10.7	6.1	8.0
2016-17	7.3	7.5	7.7	8.6	9.3	8.0
2017-18	5.8	6.5	7.6	4.7	9.9	6.6
2018-19	1.0	6.0	7.7	6.8	9.4	6.6

Source: Economic survey 2020-21

According to the economic survey 2020-21, the agriculture, forestry and fishing, mining and quarrying has showed a slow but positive growth rate in from 2012-13 to 2018- 19 by 1.4 percent to 1.0 percent respectively. Also there was a positive growth rate in the manufacturing, construction and water supply followed by trade, hotels, transport, storage and communication, financing insurance and real estate and community social and personal services. As per the data released by economic survey 2020-21, the manufacturing sector has a growth rate of 6.0 percent in 2018-19 followed by 7.7 % positive growth rate in trade, hotels, transport, storage and communication, 6.8 percent growth in financing insurance and real estate and 9.4 percent growth rate in community social and personal services respectively. The Gross value added at basic prices was also increasing from 2012-13 to 2015-16 by 5.4,6.1, 7.2 and 8.0 percent respectively. It becomes constant in 2015-16 and 2016-17 by 8.0 percent and falls down but remains positive and constant in 2017-18 and 2018-19 by 6.6 percent respectively.

2. K and W factors and Recession

The COVID-19 global outbreak and successive lockdowns pose significant global economic threats and disasters. It has an increasing effect on the world economy as a whole and the global health crisis steadily became a global economic crisis. The loss of income from the outbreak leads to hunger, lost food for kids and reduced access to healthcare beyond COVID-19 for vulnerable family members (Singh and Neog,2020). The entire chain of production and demand cycle has been disturbed and it gradually led to the uncertainties and fall in the market. The various reasons for this plummeting economy was disruptions in the domestic demand and supply followed by trade and finance. India being densely populated country with inadequate medical facilities was left with no option but to follow the policy of lockdown. World economy is heading for a recession and India is no exception. With an alarming pace, the COVID-19 pandemic has caused a massive global economic shock that has led to steep recessions in many countries. A 5.2% contraction in global GDP by 2020, the most profound global recession in eight decades, was expected in this baseline (World Bank,2020). Also India is tussling with the three most crises which includes: the public health crisis attributable to the Covid-19 pandemic, followed by the humanitarian crisis unleashed by the sudden imposition of the national lockdown, which revealed no planning and was more serious than elsewhere and an economic crisis caused by the shutdown of the large segments of the economy. The K and W factors in the Indian economy shows various sectors of the economy in which some are moving towards growth while others are still lagging behind and even fall down amidst the worst hit COVID-19 pandemic.

Table 2: Sector wise GDP Growth rate at basic prices of 2020-21 (at 2011-12 prices)

S.No	Sectors	2019-20	2020-21
1	Agriculture, forestry and fishing	3.4	3.5
2.	Mining and quarrying	-3.2	-10.8
3	Manufacturing	-1.8	-12.1
4	Electricity, Gas, Water Supply and other utility services	1.9	-0.4
5	Construction	1.1	-17.1
6	Trade , hotels , transport, communication and services related to	6.7	-23.7

	broadcasting		
7	Financial , real estate and Professional Services	8.0	-3.7
8	Public administration, Defence and other Services	7.8	-6.7
	GVA at basic prices	4.3	-9.6

Source: MOSPI

The above table highlighted the Sector wise GDP Growth rate at basic prices of 2020-21 (at 2011-12 prices). It depicts that the agriculture, forestry and fishing, Electricity, Gas, Water Supply and other utility services, construction, trade, hotels, transport, communication and services related to broadcasting, financial, real estate and professional services and public administration, defence and other services had a positive growth rate in 2019-20 while the remaining two sectors namely mining and quarrying and manufacturing had a negative growth rate. On the other hand, in 2020-21 except the agriculture, forestry and fishing sector rest all the sectors had showed a negative growth rate. The Gross value added at basic prices falls from 3.9 percent in 2019-20 to (-7.2) in 2020-21 due to the worldwide spread of the coronavirus pandemic. And also, the GVA at basic price had fall from 4.3 percent in 2019-20 to -9.6 percent in 2020-21.

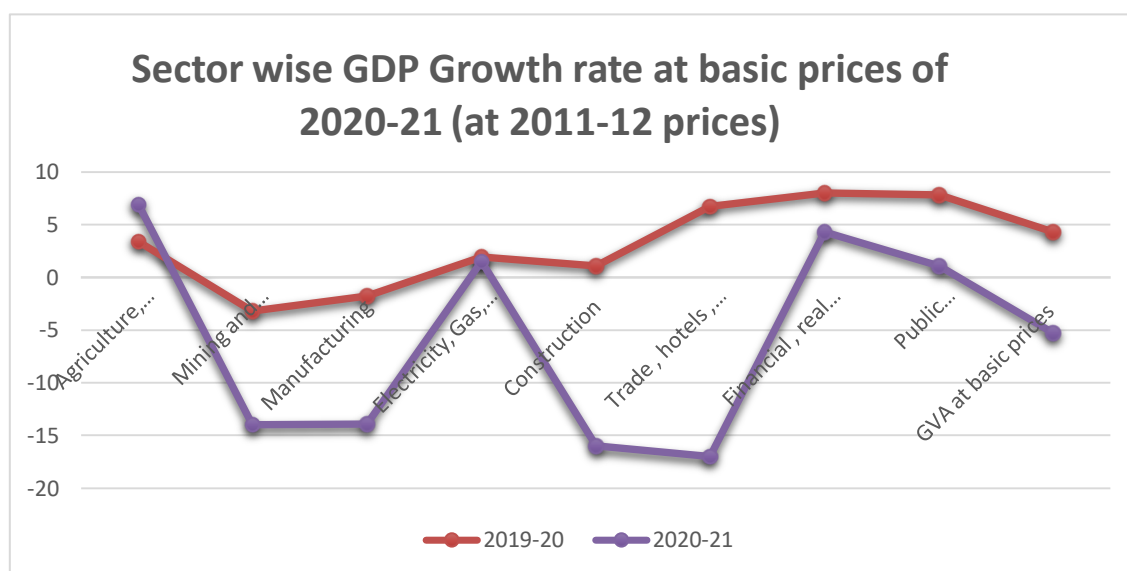
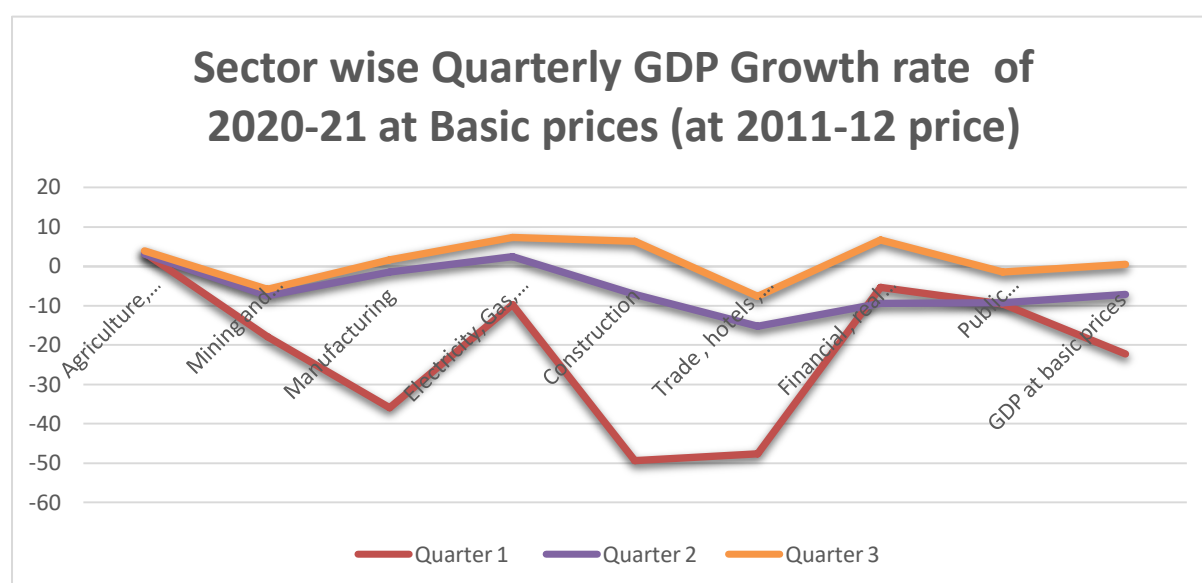


Table 3: Sector wise Quarterly GDP Growth rate of 2020-21 at Basic prices (at 2011-12 price)

S.No	Sectors	Quarter 1	Quarter 2	Quarter 3
1	Agriculture, forestry and fishing	3.3	3.0	3.9
2.	Mining and quarrying	-18.0	-7.6	-5.9
3	Manufacturing	-35.9	-1.5	1.6
4	Electricity, Gas, Water Supply and other utility services	-9.9	2.3	7.3
5	Construction	-49.4	-7.2	6.2
6	Trade , hotels , transport, communication and services related to broadcasting	-47.6	-15.3	-7.7
7	Financial , real estate and Professional Services	-5.4	-9.5	6.6
8	Public administration, Defence and other Services	-9.7	-9.3	-1.5
	GDP at basic prices	-24.4	-7.3	0.4

Source: MOSPI

The above table shows the Sector Wise Quarterly GDP Growth rate of India in 2020-21 at constant price (2011-12) in the first, second and the third quarters. It is evidenced from the table that the agriculture sector including forestry and fishing had a positive growth in all the three quarters of 2020-21 i.e. 3.3 and 3.0 and 3.9 percent respectively. In case of industrial sector including mining and quarrying, manufacturing, electricity, gas, water supply and other utility services and construction showed a negative GDP growth of -18.0, -35.9, -9.9, -49.4 percent respectively in the first quarter. Again in the second quarter except electricity, gas, water supply and other services (2.3percent), rest all industrial sub sectors were having negative GDP growth rates. Similarly, in the third quarter except mining and quarrying (-5.9 percent) all the remaining sectors i.e. manufacturing, electricity, gas, water supply and other utility services and construction s were having a high and positive growth rate of 1.6, 7.3 and 6.2 percent respectively. In case of the services sector including trade, hotels, transport, communication and services related to broadcasting and Public administration, defence and other Services there was a negative growth rate in all the three quarters of 2020-21. But with respect to financial, real estate and professional services there was a negative growth rate of -5.4 and -9.5 percent in the first and the second quarter, but in the third quarter this sector gain thrust with a positive growth rate of 6.6 percent. Thus we can conclude that apart from the agricultural sector, rest two sectors had a falling growth rate in the first and the second quarters and in that too the conditions of the services sectors are the most pathetic. However, in the third quarter both the industrial sector and the services sector moves towards the positive growth path amidst the coronavirus pandemic. The overall GDP at basic price was negative in the first and the second quarters by (-)22.4 and (-)7.3 percent while in the third quarter it was positive 0.4 percent respectively.



3. Route to Sustainable Recovery: A “V” Shaped Path

After the depressed economic growth since 2019, the Indian economy once again clinch the momentum from January 2020 onwards amidst of the COVID-19 outbreak. As a result of the stringent lockdown from March to April 2020; reflected in the Government Response Stringency Index measured by Oxford University, there is a sign of sharp dwindling of the Indian economy by 23.9 percent in the first quarter of the financial year 2020-21 followed by 7.5 percent in the second quarter. A V-shaped recovery has been witnessed in Q2 and gain speed in Q3 by many high-frequency indicators such as rail freights, GST collections, E- way bills, power consumptions etc. and the quick reinforcement of the Atmanirbhar Mission has paved a way for revival.

According to NSO the real GDP has fall down to 7.7 percent in 2020-21 as compared to 4.2 percent in 2019-20. This is the fourth contraction in India's GDP since 1960-61. In 1965-66 and 1971-72 the

contraction was mainly due to wars and droughts but it was drought and political instability that leads to the down fall in the GDP in 1979-80.

According to the economic survey 2021-22 there was a steep fall in agricultural output in all these years. On the other hand, the year 2020-21, has been bestowed with abundant monsoons leading to a spurt in the agricultural sector, emerging it as the silver lining of the economy. Further the contraction in this year reflects the ‘once in a century crisis’ unleashed by the pandemic and associated public health measures.

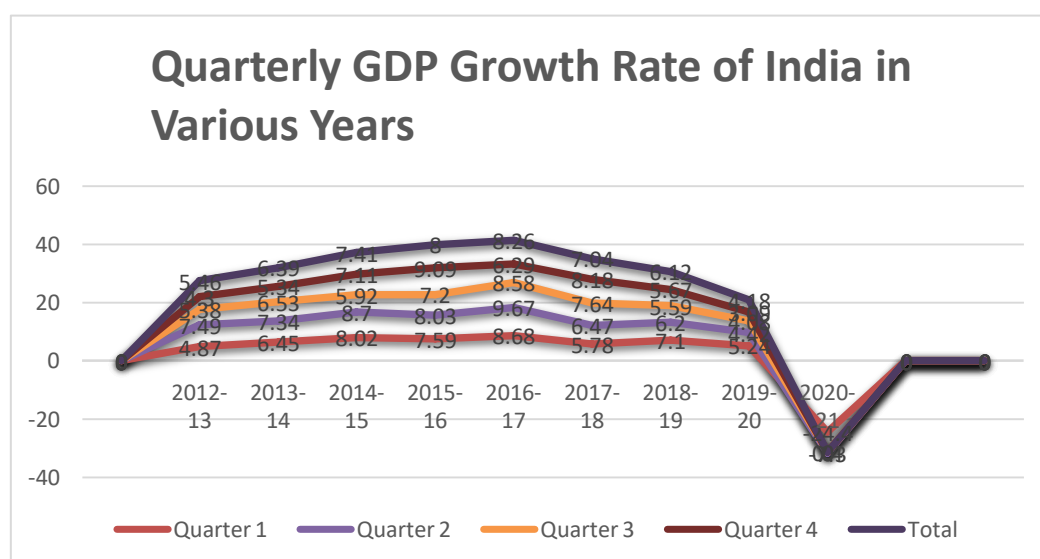
The below table highlighted the quarterly GDP growth rate of India in various years. From 2012-13 onwards there was a positive GDP growth rate in all the three quarters. It was 4.3 percent in the third quarter of 2012-13, followed by 5.34 percent in 2013-14 and 8.18 percent in 2017-18. In the year 2020-21 the GDP growth rate plummeted to (-) 24.4 percent in the first quarter, (-)7.3 percent in the second quarter and again it revived back to positive 0.4 percent in the third quarter.

Table 4: Quarterly GDP Growth Rate of India in Various Years

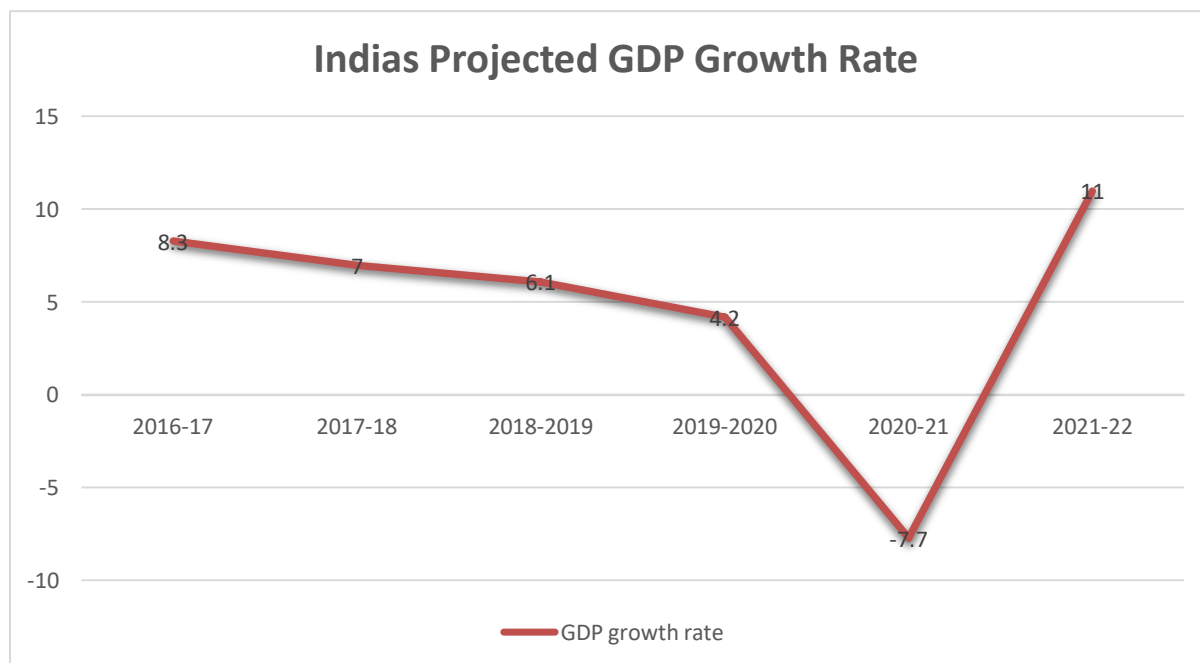
Year	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total
2012-13	4.87	7.49	5.38	4.3	5.46
2013-14	6.45	7.34	6.53	5.34	6.39
2014-15	8.02	8.7	5.92	7.11	7.41
2015-16	7.59	8.03	7.2	9.09	8.00
2016-17	8.68	9.67	8.58	6.29	8.26
2017-18	5.78	6.47	7.64	8.18	7.04
2018-19	7.1	6.2	5.59	5.67	6.12
2019-20	5.24	4.42	4.08	3.09	4.18
2020-21	-24.4	-7.3	0.4	-	-

Source: StatisticsTimes.com

The below figure shows the “V” shaped Recovery Path of the Indian Economy



India's real GDP growth is projected to be 11.0 percent in 2021-22 and the nominal GDP by 15.4 per cent after an estimated 7.7 per cent pandemic-driven contraction in 2020-21 as depicted in the below figure. These conservative projections highlight the upside potential, describing the normalization of the economic activity with the implementation of Covid-19 vaccines. Further this will continue to be encouraged by the supply side pushing reforms in the form of infrastructure spending, boosting manufacturing through productivity related incentives, recovering pent up demand in the services sector, increasing discretionary use after the vaccine was introduced and the increasing credit provided ample liquidity and low-interest rates. All these leads to a rise of 2.4 per cent in real GDP compared to the absolute 2019-20 era. This means that the economy will take two years to achieve the pre-pandemic levels and go beyond. The IMF forecasts the real GDP of India to be 11.5% in 2021–22 and 6.8% in 2022–23. According to the IMF, these predictions are consistent and in the next two years, India is projected to become the most rapidly growing economy.



4. Conclusions

The four-pillar strategy of India has provided calibrated fiscal and monetary support that is aligned with the evolving financial position, protecting the vulnerable in the lock down, and boosting consumption and investment during unlocking. Keeping away its super-hysteresis, the economy was simultaneously undertaken to restore its possible growth path to long-term structural reforms in agriculture, mining, labor, etc. However, the recovery is still requiring a long way to go and also a very conducive base would surely boost the numbers in Q1 and Q2 of the next financial year. Meanwhile the growth in Q3 reflects further strengthening of the V shaped recovery.

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0212016 MISHRA, BISWAMBHARA (Department of Economics, North-Eastern Hill University, Shillong - 793022). ECONOMIC RESEARCH AND CRISIS IN ECONOMIC THEORIES

Based on the discussions carried out, it is observed that the current state of economic research and theory are holistic in nature, rational for thoughts and scientific for application as they exhibit a greater degree of contextual responsiveness and a far greater view of human behavior. Further, it is imperative to note that most of the contemporary Economic research negates well perceived economic assumptions of rationality, consistency of individual choices as propagated by the neoclassicist. The current theories in economics cover a broader frame of human behavior, rationality, solution for chronic economic problem and also highlighting the future trajectory of the economy. The nature of current theories in economics has gone beyond explaining the fundamentals of economics but rather has designed the subject as a contemporary one where each and every element and aspect of universe is now being related with economics with the help of robust research. The use of modern tools and techniques, advanced mathematical models and issues which effect masses have become epicenter of economic research today. However, the lack of theoretical touch in many research works has limited its universal acceptance as it may fail to justify similar happenings somewhere else in a more deterministic way.

Keywords: Crises, Theories, Research, Economics, rationality

Economists today sound more convinced in current times than in 80's or 90's when it comes to answer the dynamism of changing economic behavior and rationality. This is due to the advancement of economic theories evolved since 80's. But the question remains, that given the advancement of economic theories; have we understood the natural behavior of economy and are we at better place. Do economic theories enable us to predict the unforeseen economic catastrophes in much rational way? But in the past decade, we have experienced a financial crisis and subsequent decline in employment that also followed path economists had previously thought to be impossible. Economists seem more confident than they did in 1980, but are they more deserving of confidence? If anything, some of the questions confronting economics should run deeper now than then.

In fact, the basic question of how economics should understand itself now demands urgent attention. Since the American Economic Association was founded in the 1880s, economists in developed countries have sought special status as scientifically grounded policy experts. Over the past 50 years, in particular, they have largely attained that status. Whether they deserve it is less clear. And what a scientific economics would really look like is not nearly as clear as some economists now imagine, either. Even the ideal of economics as a science now demands serious scrutiny. If economic theory is not in crisis, maybe it deserves to be.

Therefore this paper is an exercise to explore the rationality and essence of effective economic theories and how in absence of such parameter leads to crises and dearth of such theories that can solve the current economic issues. This paper also tries to put forward the critical insight of the approaches which economists use while defining their theories and researches use while justifying their approach either without any concrete theoretical base or any rational logic. We believe that current economic realities are so complex

that it will be inefficient or ineffective to hold one area or aspect responsible for the given economic problem. The interdependence of economic issues where an economic problem no longer is related to economic factors only but is associated to political, social, technological, environmental, regional national and international etc aspects makes any economic theory or research far or less irrelevant. This phenomena is what I call “ 5 size shoe in 6 size feet or vice versa”. So, this paper will highlight all such issues which current economic sciences face in building sound economic theories and makes the current economic research more viable and logical. Rest of the paper is divided into three sections. Section I deals with the essence and criteria of effective economic theories and research. Section II deals with rationality of using the ideas and methods from other subjects in building economic theory and conducting research and does doing so compromise the very essence of economics and the theoretical offshoot of the given economic theories. At last section III concludes and summaries the overall arguments made under the light of references given.

Section I EFFECTIVE THEORY

Effective theory is a valuable concept when we ask how scientific theories advance, and what we mean when we say something is right or wrong. Newton's laws work extremely well. They are sufficient to devise the path by which we can send a satellite to the far reaches of the Solar System and to construct a bridge that won't collapse. Yet we know quantum mechanics and relativity are the deeper underlying theories. Newton's laws are approximations that work at relatively low speeds and for large macroscopic objects. What's more is that an effective theory tells us precisely its limitations — the conditions and values of parameters for which the theory breaks down. The laws of the effective theory succeed until we reach its limitations when these assumptions are no longer true or our measurements or requirements become increasingly precise. Whereas the term "science" often is used to connote absolute truth in an almost religious sense, effective theory is provisional. When we are certain that in a particular context a theory will work, then and only then is the theory effective.

Effective theory consists of *verifiable* knowledge. To be verifiable, a finding must be arrived at by methods that are generally viewed as robust. Any researcher who tries to replicate a finding using appropriate methods should be able to confirm it. The strongest confirmation of the effectiveness of a theory comes from prediction and control.

This notion of effective theory sets a useful standard for considering economics. Economists are not without knowledge. We know that restrictions on trade tend to help narrow interests at the expense of broader prosperity. We know that market prices are important for coordinating specialization and division of labor in a complex economy. We know that the profit incentive promotes the introduction of improved products and processes, and that our high level of well-being results from the cumulative effect of such improvements. We know that government control over prices and production, as in communist countries, leads to inefficiency and corruption. We know that the laws of supply and demand tend to frustrate efforts to make goods more "affordable" by subsidizing them or to lower "costs" by fixing prices.

But policymakers have goals that go far beyond or run counter to such basic principles. They want to steer the economy using fiscal stimulus. They want to shape complex and important markets, including those of health insurance and home mortgages. It is doubtful that the effectiveness of economic theory is equal to such tasks.

Most scholarly research in economics is ultimately motivated by the unrealistic goal of providing effective theory to implement such technocratic objectives Akerlof(1970), Spence(1973) and Stigilitz(1976). But the resulting economic theory cannot be applied with the same confidence as Newtonian physics. Even worse is the fact that economists, unlike physicists, are not clear about the limits of the effectiveness of their theories. In short, when it comes to effective theory, economists promise more than they can deliver Krugman (1979);1991).

Over the last 50 years, questions about the effectiveness of economic theory have revolved around five interlocking subjects in particular: mathematical modeling, *homo economicus*, objectivity, testing

procedures, and the particular status of the sub-discipline of macroeconomics Krugman (1979) Akerlof(1970), Spence(1973) and Stiglitz(1976).

With mathematical modeling, the question concerns the tradeoff between rigor and relevance. Mathematical models are considered more rigorous than verbal arguments, but the process of modeling serves to narrow the scope of economic thinking Sachs's(1996) free market systems, Nassim Taleb's(2007) Black Swan events, Fukuyama's (1992)political economic theory, Pissarides's (2005) labour market etc. Are mathematical economists ignoring important topics and missing insights that a nonmathematical economics might explore?

With *homo economicus*, the question concerns the advantages and disadvantages of assuming that the individual behaves with economic rationality Reinhard Selten(2001) Vernon L. Smith(2005),. This assumption appears to be a very powerful tool for prediction and control of economic behavior. But what are the limits to its applicability?

With objectivity, the question concerns the relationship between facts and values, or between analysis and policy preferences. Physicists and astronomers are almost never accused of letting a partisan political outlook affect their views on the phenomena that they study. Can economists aspire to that same level of objectivity?

With testing procedures, the question concerns the ability of economists to bring persuasive evidence to bear on questions of theory. In the history of the natural sciences, hypotheses have been confirmed or discarded on the basis of decisive experiments. How can economists obtain verifiable knowledge when dealing with phenomena that are not as readily subject to experimental methods?

With macroeconomics, the question is whether economists really can predict and control the overall behavior of unemployment and inflation in a nation's economy. Economists became optimistic about their prospects for doing this during periods of favorable economic performance, such as the mid-1960s or the two decades that preceded the financial crisis of 2008. But these episodes were rudely interrupted by the unexpected convulsions of the Great Stagflation of the 1970s and the Great Recession that followed the financial crisis. Is macroeconomic theory a success or a failure?

Economists' views about these questions have shifted over the past five decades. It is interesting to compare what they were saying in 1966 with what they were saying in 1980 and what they have been saying more recently. Such comparisons might help us consider what we should expect of economics in the years to come.

Section II TECHNOCRATIC OPTIMISM

In 1966, several economists took up the five interlocking questions noted above in a book of essays entitled *The Structure of Economic Science*, edited by Sherman Roy Krupp. In an essay on the subject of mathematical modeling, William Baumol summarized the tradeoff between rigor and relevance.

Strong mathematical results must, therefore, be viewed by the practitioner with somewhat mixed feelings. At best they represent a relevant revelation about his problem; at worst they may cast doubt upon the appropriateness of his assumptions Camerer(2003), Fehr & Schmid (1999), Laibson (1997), and Rabin (1993). As of 1966, there were still economists who opposed mathematical modeling, but they were in retreat and aging out of the profession. Until perhaps a generation ago, it might have been necessary to justify the use of mathematics in economics and the other social sciences. The shoe now threatens, indeed, to pass to the other foot, with the nonmathematical practitioner laboring under a darkening suspicion that nothing he does will be worthwhile unless formulated mathematically and subjected to statistical testing.

On the issue of relevance, Bronfenbrenner wrote that any mathematical model requires what he called an "applicability theorem," showing that the conditions under which it is true obtain in the real world. "And since it relates to the actual world, an applicability theorem may be highly probable but is never absolutely

certain." On the topic of *homo economicus*, James Buchanan (1961) wrote in his contribution to the volume that "the central predictive proposition of economics....amounts to saying that individuals, when confronted with effective choice, will choose more rather than less Mas-Colell, *et.al* (1995)."

Previously, Milton Friedman(1953) had argued in favor of the stronger definition of *homo economicus*, in which individuals and firms optimize over their choices. In his book *Essays in Positive Economics*, published in 1953, Friedman argued that this assumption could be justified on the basis of its ability to predict economic outcomes. He developed a famous analogy in which an observer is asked to predict the behavior of a billiard player. Although the billiard player does not employ the laws of physics, Friedman argued that the observer can use the laws of physics to predict how the billiard player will line up his shot. By analogy, Friedman argued that the economist can use mathematical optimization models to predict how consumers and firms will behave.

As of 1966, the profession had largely defaulted to Friedman's view. The main alternative was Herbert Simon's "bounded rationality" or "satisficing," in which economic agents are assumed to stop short of total optimization. Although many economists were intrigued by Simon's ideas, which helped him to win a Nobel Prize in 1978, the overwhelming body of economic research ignored them and continued to assume optimization. Concerning objectivity, many economists believed in a form of positivism, in which facts could be separated from values. The positivist position is that technical expertise is separate from preferences Persson and Tabellini (2000) Grossman (2001). The public expresses preferences about outcomes, and the technical expert then prescribes policies to achieve those outcomes Downs (1957). Buchanan (1961) argued firmly against economists interjecting their own policy preferences into their work:

The economist verges dangerously on irresponsible action when he allows his zeal for social progress, as he conceives this, to take precedence over his search for and respect of scientific truth, as determined by the consensus of his peers Hirshleifer (1991), Grossman (1991), and Skaperdas (1992). If the economist can learn from his colleagues in the physical sciences that the respect for truth takes precedence above all else and that it is the final value judgment that must pervade all science, he may, yet, rescue the discipline from its currently threatened rush into absurdity, oblivion, and disrepute. Such an attitude is also essential to distinguishing between technical and political disputes in economics.

Bronfenbrenner(1966) wrote, "Does not the economists' notorious failure to agree suggest or prove the "prescientific" character of economics as such? I follow my professional bias (vested interest?) on the negative side of this proposition. Much of the disagreement is inevitable since it centers around economic values and policy recommendations and involves normative rather than positive economics".

This is not to deny the existence of disagreements in positive economics, of which there are plenty. Yet we have faith that most if not all such positive disagreements will eventually be resolved, as parallel disagreements have been resolved in the natural sciences. Like many other economists at that time, Buchanan (1961) and Bronfenbrenner(1966) believed that values and scientific investigation could be separate, and that economists are on firmer ground when they stick with scientific investigation.

With regard to testing procedures, there were doubts expressed in 1966 by two heterodox thinkers, Emile Grunberg(1971) and Kenneth Boulding(1972). Grunberg wrote that, "In fact, the history of the social sciences shows no clearcut case in which a theory has been disconfirmed by contradictory evidence." He went on to suggest that the reason for this is that social scientists work with open systems, in which the number of factors that could affect an outcome is intractably large.

In contrast, physical scientists are able to work with closed systems in which every factor can be accounted for. Boulding wrote, While these comments were prescient, they were ignored at the time they were written. Instead, economists were confident that their statistical techniques were capable of sifting among hypotheses to find reliable ones. In fact, the mid-1960s was when economists were particularly optimistic about econometrics, and especially the technique of multiple regression. Multiple regression was thought to be a way to achieve with non-experimental data the ideal of controlling for extraneous influences.

Multiple regression requires extensive computation, so it was largely impractical before the advent of computers. By the late 1960s, many universities had mainframe computers that could handle these calculations, and multiple regression was rising in popularity. Multiple regression and computers were a particular boon to macroeconomists. As of 1966, many economists were very optimistic that large-scale macroeconomic models of the economy would prove useful in prediction and control.

In fact, as of 1966, the consensus Keynesian view of macroeconomics was so widely accepted that macroeconomics was not controversial. In the Krupp volume, the special topic of macroeconomics only came up in one essay, by Fritz Machlup (1975). He wrote,

Anyone who has done empirical work with national-income statistics or foreign-trade statistics is aware of thousands and thousands of arbitrary decisions that the statisticians had to make in executing the operations dictated or suggested by one of the large variety of definitions accepted for the terms in question. One cannot expect with any confidence that any of the theories connecting the pure constructs of the relevant aggregative magnitudes will be borne out by an examination of their operational counterparts.

Section III THINGS TO COME

Although economics is not now in a state of abject crisis, as it was in the late '70s, it is nonetheless likely to be entering a period of great change on all five of the disciplinary challenges we have been tracing.

First, there is reason to believe that in the coming years economists will reluctantly come to recognize the importance of mental-cultural factors as determinants of economic outcomes, reducing the power of mathematical modeling as an approach. There is really no avoiding some movement in the direction of understanding economics as an interpretive discipline, a little like history. In trying to interpret the decline in labor-force participation of working-age males over the past two decades, or to understand the phenomenon of many retail firms offering special deals on "Black Friday," there is certainly some room to use mathematical models to aid the analysis. But they are neither necessary for coming up with interpretations nor sufficient to render one interpretation superior to all others. In examining subjects like these, economists could greatly reduce their usage of mathematical expression without losing anything in terms of effective theory.

Economic theory needs to be reconstructed so as to recognize at each stage the manner in which changes in external phenomena modify economic activity *strictly through the filter of the human mind*. Economic consequences, that is, dare not be linked functionally and mechanically to external changes, as if the consequences emerge independently of the way in which the external changes are perceived, of the way in which these changes affect expectations, and of the way in which these changes are discovered at all.

Kirzner(1989) is a practitioner of "Austrian" economics, which was heterodox then and remains so now. But a number of "Austrian" ideas are likely to gradually penetrate the orthodoxy, particularly the emphasis on the role of non-material factors in affecting economic phenomena.

Social scientists are inclined toward materialistic explanations. They want to explain economic phenomena on the basis of resource endowments and technical capacities. They want to explain voting behavior on the basis of demographic and economic factors. The alternative to this materialistic reductionism is to say that ideas matter. It turns out that one cannot explain the tremendous rise in economic growth in the past two centuries on the basis of capital accumulation alone. The remarkable gains in the standard of living have been mostly due to the development and application of new ideas for products and production methods.

Another reason to suppose that mathematical modeling will wane is the shifting media landscape. As of now, academic economists still must publish in journals to be successful, and these require mathematical modeling. However, in the age of the internet, the print journal is a very inefficient forum for disseminating ideas. As economists increasingly make use of other forums, including social media, this may break the lock that print journals currently hold on career prospects. That in turn could facilitate more variety in the means of expression, breaking the monopoly currently held by mathematical modeling.

Second, and very much related to the likely decline in the prominence of modeling, economists are likely also to reluctantly come to recognize that, because cultural factors matter, the simple model of the individual *homo economicus* has only limited applicability.

The biggest threat to the assumption of *homo economicus* is not alternative theories of individual psychology, such as those in behavioral economics. In fact, behavioral economics has been caught up in what in psychology is known as the "replication crisis." Rather, the need to go beyond the assumption of *homo economicus* will mostly arise from a recognition of the importance of culture as a determinant of behavior. Economists will need to see economic decisions as embedded in cultural circumstances. In order to understand economic phenomena, we will have to pay attention to the role of beliefs and social norms.

Because ideas and cultural context matter, there are many potential causal factors in economic phenomena. Those curmudgeons who argued that economics is not a "closed system" were correct. It is up to each economist to choose which causal factors to study and which to ignore. Unfortunately, this means that it is possible for different economists to arrive at—and to stick with—different conclusions based on predilections.

And this points to the third plausible development in economic theory. There is a very real possibility that over the next 20 years academic economics will congeal into a discipline, like sociology today, which is definitively shaped by an ideologically driven point of view. Among highly educated people, ideological polarization is increasing. Economists have always had their biases about which sorts of theories seemed reasonable; some of these biases are idiosyncratic, as when one economist is inclined to believe that labor demand responds very little to a change in wage rates and another is inclined to believe that labor demand responds a great deal. But going forward, biases are likely to increasingly be driven by political viewpoints rather than by other considerations.

This will be evident in beliefs of economists that are politically consistent but analytically contradictory. For example, it is *politically* consistent for someone on the left to believe that a rise in the minimum wage would not reduce hiring and also that more immigration would not depress wages. Analytically, however, these are opposite views. The minimum-wage increase will not reduce hiring if one treats labor demand as highly inelastic (so that a small change in hiring will be associated with a given change in wages). Increased immigration will not depress wages if one treats labor demand as highly elastic (so that a large change in hiring will be associated with a given change in wages). I think we are already starting to see economists opt for political consistency at the expense of analytical consistency.

Conclusion

The objective of this exercise is to explore the nature, rationality and relevance of the economic theories which has been put forward over the decades and to explore whether the changing paradigm of economic research and theories are in the line with the contemporary economic realities that the economy experiences? Based on the discussions carried out in the preceding paragraph, it is observed that the current state of research and theory are holistic in nature, rational for thoughts and scientific for application as they exhibit a greater degree of contextual responsiveness and a far greater view of human behavior. Further, it is imperative to note that most of the contemporary research negates well perceived economic assumptions of rationality, consistency of individual choices as propagated by the neoclassicist. The contemporary literature suggests that it is the motivational and behavioral aspects which provides a better explanation to understand the working of an economy in all its dynamism and may provide the basis for economic theory. The current theories in economics cover a broader frame of human behavior, rationality, solution for chronic economic problem and also highlighting the future trajectory of the economy. The nature of current theories in economics has gone beyond explaining the fundamentals of economics but rather has designed the subject as a contemporary one where each and every element and aspect of universe is now being related with economics with the help of robust research. The nature of current research in economics is much more problem solving rather than simply repeating the facts. The use of modern tools and techniques, advanced mathematical models and issues which effect masses have become epicenter of economic research today. However, the lack of theoretical touch in many research works has limited its universal acceptance as it may fail to justify similar

happenings somewhere else in a more deterministic way. It may be concluded that the contemporary economic researches has been able to keep a balance between societal welfare and economic development by bringing to the focal point the economic behavior and the way it interacts with the economic institutions on the grounded realities.

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0212017 SAINI, MANORAMA (Department of Humanities and Management, Samrat Ashok Technological Institute, Vidisha – 464001). ANALYSIS OF SOCIAL AND MOTIVATING FACTORS FOR WOMEN EMPOWERMENT IN VIDISHA, MADHYA PRADESH

The research article presented is based on the social background which responsible for the empowering women in Vidisha. “Empowerment refers to increasing the spiritual, political, social or economic strength of individuals and communities....”. This study shows that in which social and economic environment

these working women are either married or unmarried earning for their livelihood. What is their social, educational and marital status and what kind of social roles are they playing? In almost every society and in every sphere of life women assume unequal position and status; thus it is necessary to empower them by providing equal opportunities.

The term empowerment is a multidimensional social process and it helps people gain control over their own lives.. People are empowered if they have an access to opportunities without any limitations or restrictions such as in education, profession and in their way of life. Feeling entitled to make your own decisions creates a sense of empowerment. Empowerment includes the action of raising the status of women through education, raising awareness, literacy, and training and also gives training related to self-defense. Women's empowerment is all about equipping and allowing women to make life-determining decisions through the different problems in society.

The women present in India is enjoying the social and economic status through starting their own business. Thus, this article describes the social and educational back ground of working women in Vidisha. Especially social changes are taking place in the present time period. Every family's outlook, traditional and religious concepts are changing. A woman can change the family and society. It is our moral, social and constitutional responsibility to ensure their progress by providing equal rights and opportunities for upliftment of the women.

The main focus of the article is upon working women. In this patriarchal society, women have a second place. On the other hand, it is absolutely necessary to see that without these women there is no existence of men. Even women have a hand behind the progress of every man. Analyzing these women on the basis of gender does not matter because they are all women. A man can never be conferred with the title of working woman. Hence, the question has been resorted to be shed light on the age of these women.

Women's empowerment is the process of empowering women. Empowerment can be defined in many ways, however, when talking about women's empowerment, empowerment means accepting and including people (women) who are on the outside of the decision-making process into it. Women's empowerment is the most crucial point to be noted for the overall development of a country.

Dr. A. P. J. Abdul Kalam "Empowering woman is a perquisite for creating a good nation, when women are empowered, society with stability is assured. Empowerment of women is essential as their value systems lead to the development of a good family, good society and ultimately a good nation".

In almost every society and in every sphere of life women assume unequal position and status; thus it is necessary to empower them by providing equal opportunities. The term empowerment is a multidimensional social process and it helps people gain control over their own lives. Further, it can be called as a process that fosters power in people for use in their own lives, their communities and in their society, by acting on issues they think as important. "Empowerment refers to increasing the spiritual, political, social, or economic strength of individuals and communities..." (Retrieved from <http://www.empowermentillustrated.com>).

According to Sushama Sahay (1998), "Empowerment is an active, multi-dimensional process which enables women to realize their full identity and powers in all spheres of life". It implies decentralization of power and authority in the deprived, oppressed and powerless people who have not been able to participate in decision making and implementation of policies and programs of both government organizations as well as in societal matters.

The World Bank also defines the term empowerment as "the process of increasing the capacity of individuals or groups to make choices and to transform those choices into desired actions and outcomes. Central to this process are actions which both build individual and collective assets and improve the efficiency and fairness of the organizational and institutional context which govern the use of these assets" (Chattopadhyay, 2005, p. 27).

Empowerment is the process that creates power in individuals over their own lives, society, and in their communities. People are empowered if they have an access to opportunities without any limitations or restrictions such as in education, profession and in their way of life. Feeling entitled to make your own

decisions creates a sense of empowerment. Empowerment includes the action of raising the status of women through education, raising awareness, literacy, and training and also give training related to self defense. Women's empowerment is all about equipping and allowing women to make life-determining decisions through the different problems in society.

Women's economic empowerment refers to the ability for women to enjoy their right to control and benefit from the resources, assets, income and their own time, as well as the ability to manage risk and improve their economic status and well being.

The World Bank describes empowerment as “the development of growing the capability of individuals or groups to make choices and change those choices into preferred actions and conclusions. Central to this development is actions which equally put together individual and collective assets and get better the effectiveness and equality of the organizational and institutional framework which oversee the utilize of these assets” (Arundhati, 2005) According to the reading by World Bank, there are five most important parts where women can increase empowerment: • Economic • Psychological • Legal • Political • Familial/interpersonal (Malhotra, Schuler &Boender, 2002,p.13).

Empowerment of women now can be categorized into five main parts – social, educational, economic, political and psychological.

Social Empowerment refers to the enabling force that strengthens women’s social relations and their position in social structures. Social empowerment addresses the social discriminations existing in the society based on disability, race, ethnicity, religion, or gender. Empowerment as a methodology is often associated with feminism. Broadly put, the term empowerment is defined as “a multi-dimensional social process that helps people gain control over their own lives. It is a process that fosters power in people for use in their own lives, their communities and in their society, by acting on issues they define as important” (Retrieved from <http://www.joe.org/joe/1999october/comm1.php>)

Social empowerment is understood as the process of developing a sense of autonomy and self-confidence, and acting individually and collectively to change social relationships and the institutions and discourses that exclude poor people and keep them in poverty. Poor people’s empowerment, and their ability to hold others to account, is strongly influenced by their individual assets (such as land, housing, livestock, savings) and capabilities of all types: human (such as good health and education), social (such as social belonging, a sense of identity, leadership relations) and psychological (self-esteem, self-confidence, the ability to imagine and aspire to a better future). Also important are people’s collective assets and capabilities, such as voice, organisation, representation and identity.

Educational Empowerment “Traditional concepts recognize higher education as an instrument of personal development. It helps in growing an individual’s intellectual horizons, wellbeing and potential for empowerment” (The Kurukshetra, September 2012, p. 25). It is considered as the single most important instrument of sociopolitical and economic transformation. But the picture of women’s educational empowerment is not rosy in India. “The recently released United Nations Development Report 2011 ranked India 134 out of 187 countries” (The Kurukshetra, September 2012, p. 32). Without proper education to all children including girls, gender empowerment is not possible. This maxim - if one male child is literate personally he alone becomes educated but if one girl child is educated the whole family becomes benefited

Kiran Devendra (2001) stresses the importance of health, education and self-esteem of women.

ECONOMIC EMPOWERMENT

Economic empowerment is thought to allow poor people to think beyond immediate daily survival and to exercise greater control over both their resources and life choices. For example, it enables households to make their own decisions around making investments in health and education, and taking risks in order to increase their income. There is also some evidence that economic empowerment can strengthen vulnerable groups’ participation in the decision-making. For example, microfinance programmes have been shown to bolster women’s influence within the household and marketplace. The evidence also suggests that economic power is often easily ‘converted’ into increased social status or decision-making power.

The literature on economic empowerment is vast, and a large part of this focuses on the economic empowerment of women – a key strategy in addressing gender inequality. More generally, the discourse on economic empowerment centres around four broad areas: a) the promotion of the assets of poor people; b) transformative forms of social protection; c) microfinance; and d) skills training.

Psychological empowerment is defined as “intrinsic task motivation reflecting a sense of self-control in relation to one's work and an active involvement with one's work role” (in “Antecedents and Consequences of Psychological and Team Empowerment in Organizations: A Meta-Analytic Review,” Seibert, et al. 28-Apr-2016

Women in India participate in voting, run for public offices and political parties at lower levels more than men. ... Women turnout during India's parliamentary general elections was 65.63%, compared to 67.09% turnout for men. India ranks 20th from the bottom in terms of representation of women in Parliament. Through psychological empowerment women not only transgress the traditional and patriarchal taboos and social obligations, they also transform their selves and subjectivities. When women join educational institutions, political parties or decision-making bodies; hold white color jobs, take decisions and travel different places; occupy land and wealth they feel psychologically powered and build their self- confidence, recognize their self-worth and take control of their own income and body. This joining in any institution and occupation gives them opportunities to see and to know more of the world than those who have stayed behind at home. “This personal growth and exploration has given them self-respect, pride, maturity, and resiliency as they have exerted their independence away from home” (Retrieved from <http://www.joe.org/joe/1999october/comm1.php>).

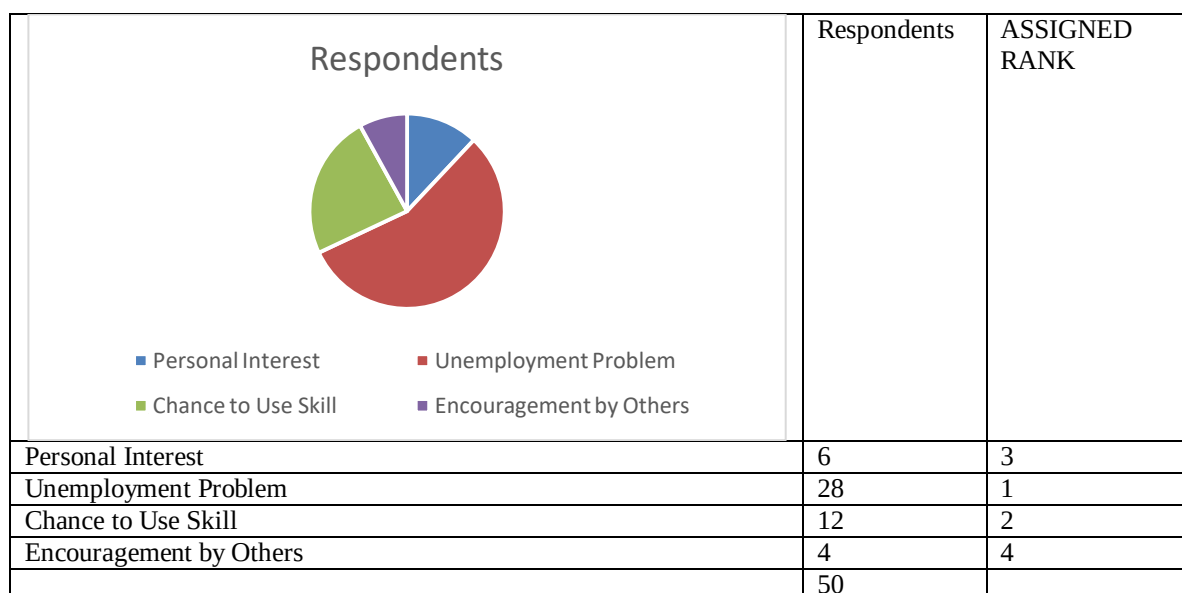
If we look at the status of women in India, we could see that the socio-economic and political status of women is similarly horrible. As per the 2011 census of India the literacy rate of women is only 65.46 percent whereas this rate for men is 82.14 percent. So there is clear gap of 16.68 percent between men and women, and about 35 percent women in India are illiterate. In rural areas women's education rate is even worse. The census data indicate that the literacy rate of rural Indian women is only 58.75 percent in comparison to men's 78.57 percent.

1. To encourage and develop the skills for self- sufficient.
2. To study the factors of empowerment.
3. To explain the educational background, marital status working women.

For this study, we used a questionnaire to collect primary data.

Due to time constraint the sample size is reduced to 50. For study, we selected Baraipura and bakseriya, Vidisha District as sample area.

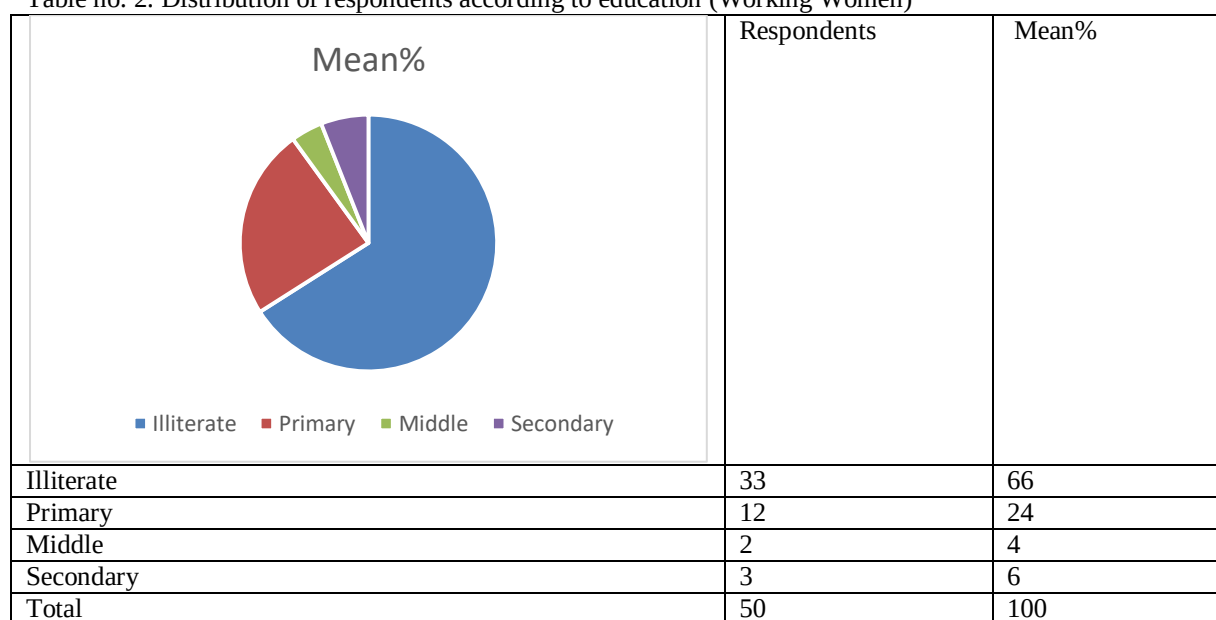
Table. No. 1 Factors Motivating to Start Business (Working Women)



Source: Primary Data

From the above table it is observed that “Unemployment Problem” is the primary reason to start the business which implied that there is a significant difference in variations as between rankings of the respondents.

Table no. 2: Distribution of respondents according to education (Working Women)



Source: Primary Data

The above table shows majority (66%) of them belonged to the category of Illiterate. 24% of them studied primary level of education and only 6% of them were educated secondary school level. It is noticed that only 4% were educated middle class level. Most of the women are illiterate. The most greatly surprised part in the study is that the level of middle and secondary education is least that somewhere stop the respondents in their exposure and developmental activities.

Table no.3: Distribution of respondents according to marital status(Working Women)

Mean ■ Unmarried ■ Married ■ Widow ■ Divorcee		Respondent	Mean
Unmarried		2	4
Married		33	66
Widow		12	24
Divorcee		3	6
Total		50	100

Source: Primary Data

The above table shows the marital status of the respondents. Where 66% are married, 24% are widow, 6% are divorcee and only 4 % are unmarried. As most of the respondents are married It clearly shows that women beneficiaries are bounded with lot responsibilities like managing household, upbringing their children and other family members this made them to be quite serious in their work and participation.

Table 4: Occupation of working women

Percentage ■ Workers ■ Jobs ■ Independent Occupations ■		Number	Percentage
Occupation		13	26
Jobs		29	58
Independent Occupations		8	16
Total		50	100

It is natural thing to find changes in the business of uneducated women and in the nature of business of educated women. Uneducated women can not be employed in the kind of work that an educated women does. Therefore, an attempt has been made to clarify that working women are engaged in what kind of these business. The analysis of the table shows that most of the women also do jobs and are more inclined to choose the job as an occupation. In the job also, she gives priority to the government job. They do not give much importance to non-government jobs. 58 percent women are working and earning their livelihood. 16 percent

women are engaged in independent business. In this, women are doing boutique, stitching, beauty parlors by opening shops. Thus it is clear that often women are engaged in similar business. Like their educational qualification, training and work ability. Especially uneducated women work as laborers and earn their livelihood. Educated and literate women often choose jobs as occupation for livelihood.

SUGGESTIONS

1. The women should get lot of awareness and motivation to start up their own business.
2. The primary motive behind this is the “Unemployment Problem” and need of money for future purposes. But primary motive should be the “Chance to Use Skill”
3. The women are expecting some training regarding the marketing activities.
4. There is need to accept that women's needs are not only for self-employment. The programmes should be designed on the basis of needs of women at the micro level.
5. Considering all these facts, it can be stated that the women empowerment can be achieved.

CONCLUSION

Empowerment is one of the key factors in determining the success of development in the status & position of women in the society. The women present in India is enjoying the social and economic status through starting their own business. Thus, this article describes the social and educational background of working women in Vidisha. Special social changes are taking place in the present time period. Every family's outlook, traditional and religious concepts are changing. A woman can change the family and society. It is our moral, social and constitutional responsibility to ensure their progress by providing equal rights and opportunities for upliftment of the women.

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18. JURIDICAL SCIENCE

0021818 SALPEKAR, RASHMI (Department of Law, Vivekananda School of Law, Vivekananda Institute of Professional Studies, New Delhi). ANALYSIS OF SMART GRID REGULATIONS INCLUDING DATA PRIVACY

Smart grid including Advanced Metering Infrastructure (AMI) is a way to manage electricity demand and supply efficiently. However, it needs data measurements at user and grid end. The paper starts with studies of Acts, codes, regulations and standards such as Electricity Act 2003, Electricity Regulatory Commissions Act 1998 and India Electricity Grid Code 2010, IT Act 2008 (without section 66A) from Government, Electricity Producer, Distributor and End User point of view (further called parties). These are compared to Acts and regulations in force worldwide especially Europe and the USA which have strong legal regulations in force. The Supreme Court of India has ruled that right to privacy is a fundamental right. With this in mind, the paper compares the relevant legal regime worldwide that ensure data protection, with IT Act. The paper proposes changes required in existing laws in India to determine responsibilities, liabilities and rights of all parties that includes enforcement of data protection. This paper is expected to lay groundwork for law makers make strong yet friendly laws for all parties that also ensures data protection and yet help realization of efficient electricity management. This will also expect to reduce court cases involving Smart Grids and AMI.

Keywords—Privacy, Smart Grid, CEA, Load Dispatch, Law, Electricity Act, Grid Code, Privacy, AMI

I. Introduction

India is moving to development of smart cities and improving infrastructure in cities, towns and villages. This includes efficient production, transmission and distribution of electricity which is ensured with help of smart grid and associated advanced metering infrastructure (hereafter referred as electricity system). The electricity system requires measurement of parameters at various points and taking required real-time. These parameters may contain confidential data such as smart meter measurements at user homes so data privacy protection is must. For example, the meter readings of users at any point of time can tell if the user is at home or not and may even tell the room in house where the residents are. The Supreme Court of India has also given ruling on right to privacy. Therefore, a legal support for electricity system that protects privacies of parties especially end users may be compromised with the existing system.

II. Existing System

As of date electricity Act 2003 as amended from time to time is the main governing Act for smart grid system. Amendments were proposed to this Act vide Electricity Amendment Bill 2014 for incorporating smart grids and smart meters. This bill was presented in Lok Sabha in 2014 and was referred to standing committee and the standing committee gave its report. No further action has been taken so far on it.

A. Brief of Electricity Act 2003

The electricity Act 2003 has 18 parts and has 185 sections. For the purpose of this paper, the following are considered relevant:

Part II which delineates the responsibilities of Central Government (and joint responsibility with State Government as well as Central Electricity Authority, hereafter called Authority) for National Policy and plans including on electrification and tariffs.

Part V on Transmission of Electricity which lays down the establishment of National Load Dispatch Centre (Section 26) and Regional Load Dispatch Centres (along with Regional Power Committee) under Sections 27 and 28, State Load Dispatch Centre (Sections 31 and 32). Section 34 of this part relates to compliance to Grid Standards by stating “Every transmission licensee shall comply with such technical standards, of operation and maintenance of transmission lines, in accordance with the Grid Standards, as may be specified by the Authority.” Thus, section 34 provides legal enforcement status to Grid standard. The

Central Transmission Utility (Section 38) and State Transmission Utility (Section 39) and their functions are defined in this part. Duties of transmission licensees are defined in Section 40.

Part VI deals with distribution of electricity and functions of State Commission in this regard. Section 50 deals with The Electricity Supply Code¹ which provides for recovery of electricity charges, billing of electricity charges, disconnection and restoration of electricity supply, measures for preventing tampering, distress or damage to electrical plant, or electrical line or meter, entry of distribution licensee or any person acting on his behalf for disconnecting supply and removing the meter; entry for replacing, altering or maintaining electric lines or electrical plants or meter and such other matters. Section 58 and 59 deal with performance by licensee and information with respect to performance respectively.

Part IX deals with establishment of Central Electricity Authority (Authority), its constitution and functions.

Part X deals with Regulatory Commissions: Central Commission, Central Advisory Committee, State Commission, Joint Commission (formed by two or more states of centre and state/union territory) and state advisory committee.

Part XIV deals with offences and penalties arising out of acts like Theft of Electricity, use of tampered meter, illegally drawing electricity, etc. (Section 135). Section 138 dealing with interference with meters or works of licensee is important part in this apart from theft. Further, penalty may be imposed on individuals or companies. Section 151 (Cognizance of offences) and Section 152 (Compounding of offences) deal with offences.

Part XVIII includes miscellaneous provisions like Coordination Forum establishment (Section 166), Section 167 (Exemption of electric lines or electrical plants from attachment in certain cases). Section 176 details the Power of Central Government to make rules while Section 177 deals with Powers of Authority to make regulations. Section 178 gives the Powers of Central Commission to make regulations. Under Section 179, every rule made by the Central Government, every regulation made by the Authority, and every regulation made by the Central Commission shall be laid, as soon as may be after it is made, before each House of the Parliament. Section 180 defines Powers of State Governments to make rules. Section 181 defines Powers of State Commissions to make regulations. An important power is under to make electricity supply code under section 50 and define standards of performance of a licensee or a class of licensees under sub-section (1) of section 57. Under Section 182 every rule made by the State Government and every regulation made by the State Commission shall be laid before house (or houses) of state legislature.

B. India Electricity Grid Code, 2010

The Indian Electricity Grid Code (IEGC) is a regulation made by the Central Commission in exercise of powers under clause (h) of subsection (1) of Section 79 read with clause (g) of sub-section (2) of Section 178 of the Act. The IEGC also lays down the rules, guidelines and standards to be followed by various persons and participants in the system to plan, develop, maintain and operate the power system, in the most secure, reliable, economic and efficient manner, while facilitating healthy competition in the generation and supply of electricity.

The IEGC brings together a single set of technical and commercial rules, encompassing all the Utilities connected to/or using the Inter-State Transmission System (ISTS) and provides the following:

- It defines relevant functions of CEA, as per section 73 of Electricity Act, 2003 which include planning, specifying the technical standards for construction of electrical plants, electric lines and connectivity to the grid, specifying grid standards for operation and maintenance of transmission lines, specifying the conditions for installation of meters and collect and recording the data concerning the generation, transmission, trading, distribution and utilisation of electricity and carry out studies relating to cost, efficiency, competitiveness and such like matters.

¹ Substituted by Act 26 of 2007, Sec.9 [with effect from 15th June 2007].

- Documentation of the principles and procedures which define the relationship between the various Users of the inter-State transmission system (ISTS), National Load Despatch Centre, as well as the Regional and State Load Despatch Centres
- Facilitation of the optimal operation of the grid, facilitation of coordinated and optimal maintenance planning of the grid and facilitation of development and planning of economic and reliable National / Regional Grid. (Chapter 6 deals with Scheduling and Despatch Code for grid. It sets out the demarcation of responsibilities between various regional entities, SLDC, RLDC and NLDC in scheduling and despatch.)
- Facilitation for development of power markets by defining a common basis of operation of the ISTS, applicable to all the Users of the ISTS.
- Facilitation of the development of renewable energy sources by specifying the technical and commercial aspects for integration of these resources into the grid.
- The Data and Communication Facilities required for grid in Section 4.6.2 by stating "Reliable and efficient speech and data communication systems shall be provided to facilitate necessary communication and data exchange, and supervision/control of the grid by the RLDC, under normal and abnormal conditions."
- Requires that Recording instruments such as Data Acquisition System/Disturbance Recorder/Event Logging Facilities/Fault Locator (including time synchronization equipment) shall be provided and shall always be kept in working condition in the ISTS for recording of dynamic performance of the system. All users, STUs and CTU shall provide all the requisite recording instruments and shall always keep them in working condition (Section 4.6.3).
- Lists the System Security² Aspects of the grid which specify the system security requirements and procedures.

III. The Information Technology Act 2008³

The Act says (definition (ha) in Chapter I - Preliminary) "Communication Device" means Cell Phones, Personal Digital Assistance (Sic), or combination of both or any other device used to communicate, send or transmit any text, video, audio, or image.

As per definition (nb) in Chapter I - Preliminary, "Cyber Security" means protecting information, equipment, devices, computer, computer resource, communication device and information stored therein from unauthorized access, use, disclosure, disruption, modification or destruction.

There are two more relevant definitions:

Definition (ze) "Secure System" means computer hardware, software, and procedure that -:

- (a) are reasonably secure from unauthorized access and misuse;
- (b) provide a reasonable level of reliability and correct operation;
- (c) are reasonably suited to performing the intended functions; and
- (d) adhere to generally accepted security procedures;

Definition (zf) "Security Procedure" means the security procedure prescribed under section 16 by the Central Government;

Section 65 and 66 list the jail term for cybercrimes but it does not imply to cover smart grid and AMI. Section 66E restricts privacy to individual private areas. Section 66F defines cyber terrorism and punishment for it.

Section 70 defines computer resource which directly or indirectly affects the facility of Critical Information Infrastructure, to be a protected system. By this definition, computers in smart grids will be protected systems. Section 72 deals with Breach of confidentiality and privacy and Section 72A defines penalty for breach.

² Not to be confused with Cybersecurity

³ As Amended by Information Technology Amendment Bill 2006 passed in Lok Sabha on Dec 22nd and in Rajya Sabha on Dec 23rd of 2008

Section 84A mentions modes or methods for encryption but there are no modes defined in this section.

IV. Right to Privacy

Supreme Court of India gave its judgement on Right To Privacy on August 24, 2017
The salient points of judgement are

1. In Part A Point 2- The reference: the court outlined the need for judgement and its basis. The Supreme Court said that “Privacy, in its simplest sense, allows each human being to be left alone in a core which is inviolable. The emergence of new challenges is exemplified by this case, where the debate on privacy is being analysed in the context of a global information based society. In an age where information technology governs virtually every aspect of our lives, the task before the Court is to impart constitutional meaning to individual liberty in an interconnected world.”
2. The Court relied on and studied judgements, laws and regulations around the world including fourth amendment in laws of U.S.A.
3. In Part S Point 185, the court observed that: During the course of the hearing of these proceedings, the Union government has placed on the record an Office Memorandum dated 31 July 2017 by which it has constituted a committee chaired by Justice B N Srikrishna, former Judge of the Supreme Court of India to review inter alia data protection norms in the country and to make its recommendations. The terms of reference of the Committee are :
 - a) To study various issues relating to data protection in India
 - b) To make specific suggestions for consideration of the Central Government on principles to be considered for data protection in India and suggest a draft data protection bill.
4. In Part T- Conclusion court concluded that
 - a) Point 3(C): Privacy is a constitutionally protected right which emerges primarily from the guarantee of life and personal liberty in Article 21 of the Constitution.
 - b) Point 3(E): Privacy is the constitutional core of human dignity. Privacy has both a normative and descriptive function. At a normative level privacy sub-serves those eternal values upon which the guarantees of life, liberty and freedom are founded. At a descriptive level, privacy postulates a bundle of entitlements and interests which lie at the foundation of ordered liberty.
 - c) Point 3(G): This Court has not embarked upon an exhaustive enumeration or a catalogue of entitlements or interests comprised in the right to privacy. The Constitution must evolve with the felt necessities of time to meet the challenges thrown up in a democratic order governed by the rule of law.
 - d) Point 3(H): Under Article 21, privacy is not an absolute right. A law which encroaches upon privacy will have to withstand the touchstone of permissible restrictions on fundamental rights.
 - e) Point 5: Informational privacy is a facet of the right to privacy. The dangers to privacy in an age of information can originate not only from the state but from non-state actors as well. We commend to the Union Government the need to examine and put into place a robust regime for data protection.

Electricity Amendment Bill 2014

The 2014 Amendment defines smart grid: ‘(61A) “Smart Grid” means an electricity network that uses information and communication technology to gather information and act intelligently in automated fashion to improve the efficiency, reliability, economics, and sustainability of generation, transmission and distribution of electricity.

The amendments relevant to this paper are

- **Section 3** is to be amended to empower the Central Government to prepare, review and notify measures to promote Smart Grid, ancillary services and decentralised distributed generation, etc.
- **Section 79 (Functions of Central Commission):** is proposed to be amended to include “(c) to regulate the inter-State transmission of electricity including promotion and development of Smart Grid, ancillary services and decentralised distributed generation.”

- **Section 86 (Functions of State Commission)** is to be amended to add function for State Electricity Commission, namely, (c) Facilitate intra-State transmission and wheeling of electricity and promote Smart Grid, net metering, ancillary services and decentralised distributed generation.
- **Section 177. (Powers of Authority to make regulations)** inserts the text “and also measures for smart grid and ancillary services” to allow the Authority to define measures for smart grids. For smart meters, following amendments are to be made In Section 55 (Use, etc., of meters)

“Provided that smart meters, as specified by the Authority, shall be installed at each stage for proper accounting and measurement for the purpose of metering and consumption from the point of generation up to such consumers who consume more than the quantity of electricity in a month as prescribed by the Central Government.”

V. Model Smart Grid Regulations

The author has found “Model Smart Grid Regulations” developed by Forum of Regulators in 2015 named as State Electricity Regulatory Commission (Smart Grid) Regulations, 20XX define smart grid and Advanced Metering Infrastructure along with smart grid objectives and guidelines, cell, process and project evaluation. The regulations are to be notified by each state separately. However, no further details seen.

VI. Worldwide Laws and Regulations

With respect to worldwide regulations, the following are observed

1. User Data Privacy is embedded at design stage of system itself i.e. it is “Privacy By Design”. For example see Directive 95/46/EC of the European Parliament and of the Council of 24 October 1995 (Article 29). US also has adopted United States Department of Energy (US DOE) Data Privacy And The Smart Grid: A Voluntary Code Of Conduct (Vcc) Dated January 8, 2015

Worldwide, Privacy by Design extends to a “Trilogy” of encompassing applications: 1) IT systems; 2) accountable business practices; and 3) physical design and networked infrastructure. Privacy by Design may be accomplished by practicing the originating seven foundational principles, which have been specifically adapted to the smart grid context, to create best practices for Smart Grid Privacy by Design.

The data collection for smart grid and AMI is as per principle of least knowledge i.e. only data required is collected.

2. The terms smart grid, smart meters, AMI are clearly defined. The standards are also in place. The standards ensure interoperability of Smart Meter and AMI. For example European Commission Mandate M/490 (Smart grid mandate) is the Standardisation mandate to European Standardisation Organisations (ESOs) to support European Smart Grid Deployment and authorizes CEN, CENELEC and ETSI as standardisation bodies.
3. Security of Systems including Cyber security is also defined. For example US body NIST⁴ has developed standards for Cybersecurity framework and Department of Homeland Security has developed Cybersecurity Maturity Model.
4. Bodies to regulate, deploy and monitor smart grids, AMI are in place and their roles clearly defined. For example US has Department of Energy, EIA and NIST (last two are standardisation). Australia has Australian Energy Market Commission (AEMC) serving as the regulator of the National Electricity Market (NEM), Australian Energy Regulator (AER) and the Australian Energy Market Operator (AEMO). Europe has ETSI, CEN and CENELEC for standardisation and local authorities in place (e.g. UK has

⁴ National Institute of Standards and Technology

OFGEM or Office of the Gas and Electricity Markets for example) and European Commission coordinates with European Countries.

5. Laws, Regulations, Rules and Procedures are clearly defined for smart grid. For example US has defined an Act for smart grid with relevant sections 1301 to 1307 as below in US.: Title XIII--Smart Grid

Sec. 1301. Statement of policy on modernization of electricity grid,

Sec. 1304. Smart grid technology research, development, and demonstration.

Sec. 1305. Smart grid interoperability framework.

Sec. 1306. Federal matching fund for smart grid investment costs.

Sec. 1307. State consideration of smart grid.

Additionally, NIST has a Smart grid frame work and with respect to states, US State of Maine has declared policy on smart grid infrastructure as well. Even Europe has M/441 Mandate on Smart Metering issued March 2009 requires the standardization of utility meters to enable interoperability.

6. The smart grid and AMI communication frame work is also standardised. For example US Department of Energy Defined Communications Requirements of Smart Grid Technologies as early as October 5, 2010.

VII. What Needs to be Done?

The monitoring and regulatory authorities are well defined and so is the hierarchy. However, the terms “Smart Meter” and “Smart Grid” are not defined in any approved acts, regulation and grid code. Amendment bill 2014 defines the term “Smart Grid” but not “Smart Meter” but the amendment is not yet passed by Parliament of India even after report of standing committee of Parliament of India. The status of smart grid and AMI regulations is not seen anywhere on websites. Additionally, detailed capabilities and functions of smart grids and smart meters are not defined. No reference to standards is provided in grid code even. Smart grid interoperability laws, regulations and guidelines need to be developed and their enforcement should be well-defined so as to avoid a way around them.

The smart grid and smart meters will be operational at city, town and village levels. However, SDLC (which is at state level) is the lowest in hierarchy for grid management. There is no grid management defined at city, town and village levels. The city, town and village level grid monitoring authority will require autonomy as smart grid, in principle, works on real-time or pseudo real-time feedback. It seems that SDLC will manage at city, town and village level.

It may be inferred that the functions of regulatory and monitoring authorities and reporting structure overlap to some extent. For efficient operation and quick reaction and response, regulatory and operational bodies should function independently of each other unless there is some emergency. The author opines that regulatory functions be separated from monitoring functions cleanly and both made future proof as far as possible e.g. use of Machine learning may be used to automate grid operation and precaution/action and correct responsibility fixing may be needed in cases where machine learning algorithm(s) took action without human intervention.

Regarding privacy, Supreme Court of India has broadly outlined the parameters and conditions for privacy. These need to be fine-tuned keeping in mind worldwide regulations. In smart grids and AMI, data collection is an essential part of smart grid and smart meter operation but what data will be collected and its transmission, distribution, storage, retrieval and disposal is not defined. For maintaining privacy nothing, in data collected, should lead back to source of data and no usage patterns of source of data, e.g. home, should be identified (e.g. anyone reading data should not be able to know at what times the home is occupied and in what room). Further, provisions for Cyber security of smart grid and smart meters are not listed anywhere. Rules, Framework and Cybersecurity Maturity Model needs to be developed and put into place. USA NIST standards, framework and Department of Homeland Security Cybersecurity Maturity Model may be a good place to start. It seems reliance is on IT Act. The IT Act requires systems to be reasonably secure but the term “reasonably” is unclear up to this point. It needs a precise definition for smart grid and AMI. It may also be noted that the IT

Act 2008 defines maximum monetary penalty as 1 crore under section 43 which is definitely less if the smart grid and AMI has been compromised. As per author, the grid code and electricity Act should have their own cyber security mechanisms, rules and operational procedures to ensure better compliance as grid requirements are different. Cybersecurity Laws, Regulations,

VIII. Conclusion

It may be concluded from above that the Government has started effort for smart grid and associated AMI. The Supreme Court of India has also commended that robust data protection regime needs to be developed. However, even basic terms smart grid and smart meters are not defined in electricity act in force currently. Therefore, a lot needs to be done in order to ensure that smart grid and associated AMI system is well defined, well monitored and data collection and protection regime is robust enough to withstand any efforts to weaken it.

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⁷ Prepared for the Energy Information Administration of USA

⁸ A State in USA

19. LINGUISTICS

0219019 FATIHI, A R (Department of Linguistics, Aligarh Muslim University, Aligarh 202001). THE HIGH- TECH ADVANCEMENTS IN COMPUTER MEDIATED COMMUNICATION (CMC) AND ITS CORRESPONDING EFFECT ON HUMAN LANGUAGE

In the name of progress, we have perhaps adopted computer technology at such a pace that few of us can slow down enough to ponder whether it is technology that is driving us, or whether it is that we have clear purpose in guiding where technology is heading. There is no better example than the interaction between human languages and technology.

The paper has a clear focus on the linguistic, literacy and educational aspects of CMC. It investigates the way humans communicate through the medium of information technology gadgets. Based on extensive research on how we use natural languages like English and in media such as emails, MSN, and mobile phones, the paper outlines new forms and ways of speaking, reading, and writing in an age in which there is a pervasive presence of communication technologies in offices and homes. This interaction between human language and technology has created new forms and uses of language and literacy the study of which has given birth to this exciting new field of Computer mediated Communication (CMC) that we are about to delve into.

The present study orbits around the background of contemporary high-tech advancements in Computer Mediated Communication (CMC) and its corresponding effect on the English vocabulary in particular and languages in general. CMC as a field began with studies scattered throughout the 1980s but only caught traction in the early 1990s amidst the sudden overload of digital communication and composition. The increase in usability (for example, through the development of userfriendly web browsers) and the expansion of the internet led to the advent of widely available synchronous and quasi-synchronous communication programs (Squires 2010) such as internet relay chats (IRCs), which gave users access to real-time communication. The establishment of noticeable, archetypical CMC features such as “non-standard typography, spelling, word-formation processes, and syntax” also further separated CMC from traditional written communication and speech (Herring and Androutsopoulos 2015: 131). Developments such as these precipitated the foundational question of whether CMC is more similar to speech or writing (Herring et al. 2013). CMC research also comments on spoken versus written similarity through the notion of synchronous and asynchronous communication. The development of real-time communication platforms (e.g., IRCs, chats, and messenger programs) removed the temporal barrier previously characteristic of written communication. CMC gave speakers access to written linguistic resources and led to the genesis of new registers simultaneously. Much early work viewed CMC as an impoverished register of communication, assuming that there existed communicative voids due to the lack of paralinguistic (e.g., facial expressions) and suprasegmental (e.g., prosody, pitch, intonation) cues. These early studies (e.g., Carey 1980, Walther 1992, Baym 1995) focused mainly on how orthographic variation paralleled verbal or paralinguistic cues. A number of orthographic features have been clearly identified as carrying an interactional load, performing the interpersonal and pragmatic functions these early studies presumed necessary, including vocal spelling (Carey 1980, Lin 2016), letter repetition (Darics 2013, Kalman and Gergle 2014), and punctuation use (Gunraj et al. 2015, Squires 2012), among others.

The manipulation of orthography is not a new phenomenon and has been researched outside of the digital space in mediums such as fiction and graffiti (Androutsopoulos 2000). However, in none of these other mediums is orthographic manipulation so regular and intrinsic as in CMC, which seems to show “loosen[ed] orthographic norms” (Darics 2013), and the motivation to fill perceived communicative voids left from speech. However, CMC has grown out of this mold and moved on from questions concerning spoken versus written similarity to a more nuanced approach to variation.

Linguists of the present time believe that the new advancement in information technology would be the trend to have the greatest impact on the English Language in the 21st century. (Crystal, 2005) The use of internet and telecommunication technologies have truly shaped the way we communicate, contributing to the development of a whole new variety that defines internet culture. In this background the purpose of this paper

is to explore primary issues concerning the possible causal relationship between language and new technologies. In this regard, the paper focusses on the two relevant questions:

1. Is there a causal relationship between new forms of language and new technologies?
2. Whether the internet and other Computer Mediated Communication (CMC) tools are changing forms and uses of language?

These questions were the topic of a radio discussion by David Crystal known for his book Crystal describes these language changes, both in form and use, as leading to a new form of language which he refers to as “Netspeak”. A further allied discussion to the above debate topics is whether the use of the internet has some impact on our choice of language. In other words are we obliged to use one particular language more on the Internet? This was indeed an issue in the early years of the internet when English was the only language used, since the internet began in the US, an English speaking country. However, English is dominating the scene despite the fact that Chinese is in second place after English, followed by Japanese, Spanish, German and Korean in the use of Computer Mediated Communication. The internet population comprised 35.6% native English speakers. Chinese comes second with 12.2%, Japanese occupies third position with 9.5% , Spanish conquers 4th position with 8.0% German gets 5th position with 7.0%, and Korean takes 6th position with 4.0% population. However, in terms of statistics about languages on-screen over 60% (over 2 billion) of web pages are published in English, with other languages

To answer the second question “Whether the internet and other Computer Mediated Communication (CMC) tools are changing forms and uses of language” ?, we need to understand the notion of “Change” as it involves both change in linguistic forms and change in use of language. Another aspect is to look at change as modification of existing forms and uses and change as emergence of novel, original creations of language.

CHANGE AS MODIFICATION OF EXISTING FORM:

Sometimes, it is not just the new form that is created, but this innovation may also emerge in a new use of an already existing words. Computer Mediated Communication (CMC) has given us a set of words where the words have been modified semantically. The meaning of these words have changed considerably. The semantic changes shown in the words listed below are of two types. On the one hand, the essence of the original sense (i.e. the sense of the original term) has been retained after terminologization . On the other hand, in some of the examples conceptual changes are substantial, with the range of application for the word differing significantly from that of the original term.

1	Surf	'to browse the internet'
2	Mac	A brand of Computer
3	Mouse	A part of computer
4	Recycle Bin	The Recycle Bin is a location where deleted files or folders are temporarily stored in every version of Microsoft Windows since Windows 95. The Recycle Bin allows users to recover files that were deleted in Windows.
5	Garbage	Garbage can also refer to garbled data; (Data corruption). In computer science, garbage includes data, objects, or other regions of the memory of a computer
6	Bit	First used by C E Shannon. Shannon's bit is a portmanteau
7	Booting	In computing, booting is the process of starting a computer. It can be initiated by hardware such as a button press, or by a software command. After it is switched on, a computer's central processing unit (CPU) has no software in its main memory, so some process must load software into memory before it can be executed
8	Bug	A software bug is an error, flaw or fault in a computer program or system that causes it to produce an incorrect or unexpected result, or to behave in unintended ways. ... Bugs can trigger errors that may have ripple effects. Bugs may have subtle effects or cause the program to crash or freeze the computer

In the examples given above English lexicons have been manipulated semantically to accommodate totally new digitized meaning. It would be interesting to examine what word classes are manipulated more. It would be enticing to know which word-formation process is most common in the creation of new set of new set of vocabulary for computer mediated communication.

ORTHOGRAPHIC MANIPULATIONS.

Language used in digital spaces for example, email, online chats and messengers, and text messaging is semantically and pragmatically rich, and displays productive use of linguistic knowledge as well as orthographic and non-linguistic features to augment communication. In addition, use or non-use of orthographic conventions and other features (e.g., emojis and GIFs), and register conventions (e.g., formality of email versus text messaging) differ from platform to platform (Herring and Androutsopoulos 2015); although all digital language, the forms these varieties take vary widely, showing large flexibility and variation in use of orthographic and other features to convey linguistic meaning.

The variation present in digital language, or computer-mediated communication (CMC), is of interest to linguists because it shows parallels to both spoken and written language; there exists a general sentiment in the literature that “the language found in computer-mediated discourse does not strictly belong to traditional definitions of either writing or speech,” (Ong 2011:212), pointing towards CMC as a highly innovative and adaptable register of writing that is able to create rich linguistic signals. CMC must necessarily position itself in relation to many prescribed or de facto orthographic norms; however, much of the orthographic variation observed in CMC functions to convey information also conveyed suprasegmentally or paralinguistically (i.e., prosody, facial expressions and body positioning) in speech. It also shows feature use that is not present in written norms or is not (obviously) paralleled by features in speech (Vandergriff 2013). Walther (1992) formalizes these observations, positing the Social Information Processing (SIP) theory, which proposes that CMC users employ textual resources and CMC cues to convey and embed socio-emotional meaning; in addition, SIP theory proposes the motivations and mechanisms necessary for a CMC cue to form.

The language used in CMC (including instant messages, text messages, and microblogs) generally deviate from standard language conventions in various dimensions of writing. The focus here is on a salient orthographic feature, namely the use of textisms (unconventional spellings). A range of CMC modes was investigated, It is shown that the extent to which CMC users deviate orthographically from the standard language and the degree to which they use particular textism types depends both on CMC mode and on individual user characteristics such as age.

LETTER REPETITION

Darics finds that repeated letter strings, such as “alllllllllllllllooooooootttttt” and “IIIIITTTTTTTTSSSSSS THE WEEEEEEKEND BAAAAAABBBBBYYYYYYYYY!!!!!!” (Darics 2013:144), can convey socio-emotional information (e.g., reluctance or excitement), evoke information from the auditory signal such as segment length or emphasis, and denote an informal register. Kalman and Gergle (2014) find that letter repetition often, though not always, parallels mechanically feasible articulations, with 94% of the character repetitions present in the corpus being articulable. Those repetitions that were not articulable¹³ were largely composed of letters representing stops, such as t or d. This indicates that letter repetition is likely used to parallel uses of phonetic lengthening present in speech such as filling pauses and emphasis; however, letter repetition allows for non-articulable sequences (e.g. sweeeeetttt), showing that letter repetition in CMC does not rely on a phonetic parallel to encode additional meaning.

PUNCTUATION

One orthographic resource available to CMC users to augment the linguistic signal, and the focus of the present study, is punctuation – ellipses, intensifiers, and dashes among others. Previous work has established that punctuation is involved with the communication of suprasegmental information (Ong 2011, Schandorf 2012, Vandergriff 2013, Lin 2016) and has been connected with emphatic expression and

intensification (Schandorf 2012), particularly in conjunction with repetition (Jackson 2016). Schandorf (2012) identifies punctuation as a gesture which functions as a marker of emotional content and emphasis, namely through rhythmic structuring to convey suprasegmental information such as pitch and prosody. Dresner and Herring (2010) argue that punctuation, and emoticons with more intensity, are markers of illocutionary and perlocutionary acts and intentions, and as such can convey speaker emotional intent. Dresner and Herring's (2010) understanding of emoticons as conveyors of pragmatic meaning – not emotion – and their ability to do so without direct correlates to facial expression is important. They argue that CMC cues do not require a real-world emotive or gestural counterpart to convey specific affective information, and can evolve beyond one-to-one correlations with spoken phenomena to develop these affective meanings.

MORPHO-LEXICAL FEATURES

Central to the analysis of social media data is the question of Morpho-lexical features. The intended audience of an utterance has a hand in stylistic and other variation (Androutsopoulos 2014), therefore it is crucial to understand how unspecified versus specified audiences affect language variation. It is also crucial to be able to identify whether some audience is specified on a large scale, so that this variable can be accounted for in some way in corpus work. While there are many morpho-lexical features of mobile phone texting that distinguish it from normal writing, the paper concentrates on the more salient feature of shortening. Shortening in ICT texts has been widely studied in the literature of computer-mediated communication (CMC). Yet, scholarly research into SMS and Twitter is still relatively rare and thus the study have identified a set of shortened expressions in the corpus. The present study use the term “shortening” here as a general cover word for the various strategies for shortening words, including acronyms, abbreviations and so on. The table below (Table 1) is a list of common ways for shortening and abbreviating lexical items and the number of times this happens in the corpus. The following example from the corpus illustrates the use of shortenings in the real messaging context:

Table 1 : Shortening

	Shortening Target expression	Meaning
1	U	You
2	Dun	Don't Know
3	R	Are
4	B4	Before
5	Tmr	Tomorrow
6	Gd	Good
7	Tonite	Tonight
8	Ur	Your
9	Y	Why
10	LOL	Lot of Laughter
11	tml	Tomorrow
12	coz	Because
13	gd nite	good night
14	Thx	Thanks

Most (though not all) morpho-lexical items, as seen above, are thus produced in accordance with the economy principle. It helps in writing words as short as possible.

HOMOPHONY

Some interesting morpho-phonological and phono-semantic features also characterize the language of mobile texting. In this chapter, I will focus mainly on the concept of homophony. One of the creative practices of Mobile phone texters (Bodomo 2002) lies in their ability to substitute shorter (forms of) words for longer words that are homophonous or near-homophonous. The study has found some very interesting examples as shown below:

3 for 'free' as in
r u 3 2nite?
Are you free tonight

r u 3 2nite? izit possible 2 hv dinner 2getda?
Are you free tonight? Is it possible to have dinner together?

In the examples cited above, the homophonous word three (its shorter form being the numeral 3) is used to represent free.

NUMBER HOMOPHONES

Number homophones are very common practice in computer mediated communication. A few more examples given below showcase the use of number homophones in computer mediated communication.

88	bye-bye
99	nite nite
3	Free
B4	Before

Number Homophones (near-homophones) Combination of letter and number homophones B4 (before) Reduction of individual words Combination of letter initials and letter homophones TTUL (talk to you later), IC (I see) In preparation for deciphering acronyms in later chapters, readers may try to identify the following short forms that have appeared in some of the CMC texts that I will be discussing. HAND CUL8R IMHO RUOK GR8 TTYL

ABBREVIATIONS

Shortening is a common feature which can be found in the MSN texts. Some of the shortenings such as ASAP used in MSN texts can also be found before the uses of MSN in various contexts like in letters and invitation cards. However, many of them are created and used pervasively only after the invention of the instant messaging tools like MSN. Examples of shortenings occurring in our MSN corpus are provided below

ASAP	as soon as possible
BTW	by the way
LOL	laughing out loud
U	You
GTG	Got to go
BRB	Be right back

Besides older ways of forming acronyms, such as ASAP (as soon as possible), BTW (by the way), acronymy, the process of creating acronyms, on the internet comprises many new methods, some of which include the following: Acronyms of sentences GTG (got to go), BRB (be right back), LOL (laughing out loud) Letter homophones U (you), R (are)

EMOTICONS

Unlike face-to-face talk where emotions can be expressed visually (by facial expressions) or auditorily (by stress and loudness), text-based CMC mainly takes place without any face-to-face interactions between participants. Therefore, emotions are often expressed by graphical means. The introduction of the notion of 'smileys' or 'emoticons' has facilitated electronic communication to a large extent, and is an essential aspect of visual language and visual communication in the 21st century (Horn 1999).

The term emoticons, refers to 'a subfield of CMC which involves the analysis and practices of employing smileys and related icons for conveying emotions and other linguistic and kinesic features intended by the author' (Bodomo and Lee, 2002, p.35). Emoticon (Emotional-icon) is also used to avoid misunderstanding in the interpretation of a message. For instance, a smiling face like:



is often used to indicate a joke or that the message sender is happy about something. Emoticons are usually placed at the end of a sentence, as in 'I am so sorry:-(''. Most emoticons are created with different combinations of punctuation marks (colon and a close bracket form a smiling face).

Emoticons are a salient feature of what has often been described in the literature as visual language (Horn 1999), an emergent international language that blends words and images, including the emoticons that study has focused on here, to convey complex ideas in a communication situation.

CHANGE AS COINAGES OF NEW FORMS:

Societies often require new words to describe changes in technology, sports, entertainment, and so on. However, those new words which survive, "...after their first coinage, tend to become everyday words in the language. The lexicon is "a mirror of our times". We cannot help adopting words such as *surfing*, *downloading*, *desktop*, and *email* because we are faced with these concepts daily. Other computer words, in contrast, such as virtual reality, may become extremely popular even though they are not at all part of our daily experience – virtual, for example, has exploded into a buzzword.

The process of combining of two separate forms to produce a single new term. The result is called a blend

CONCLUSION

In this paper, we have tried to show that computer words are the way they are, and behave the way they do, because of certain extra-linguistic realities: the general character of cyberculture, and the layperson's preference for user-friendliness in anything that might cause technostress. We have argued, furthermore, that computer words are just one symptom of lexical tendencies that are increasing as we become a knowledge society. Finally, we have proposed a number of insights that lexicographers and terminographers can draw from computer words, and that might be applied in the virtual, WWW-based dictionaries.

This research chooses the viewpoint that language growth is organic, evolving to meet the demands users place upon it. Therefore, whatever linguists feel about the effects social, cultural and worldwide changes have on language, if the changes are useful, they will probably survive. Those changes which have no real function, on the other hand, will perhaps be fashionable for a period before disappearing without trace. This study takes a stand to show that the rapid change of English does not automatically imply a downward spiral towards an impure and ineffective form of English

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0219020 SHEIKH, AEJAZ MOHAMMED (Department of Linguistics, University of Kashmir, Srinagar – 190006). IMPACT OF TECHNOLOGICAL REVOLUTION AND GLOBALIZATION ON SURVIVAL AND GROWTH OF PEOPLES LANGUAGES

Language forms an indispensable part of a human society. The notion of language and its manifestation in different domains has been an important field of study from ancient times. The discipline of linguistics deals with the study of language in all its aspects. Society without language is unimaginable and language without society is inconceivable. Thus, language and society are two sides of the same coin. Any change in either of the two has its impact on the other. Globalization as a phenomenon has garnered a huge debate in the last few decades owing to its direct bearing on the various aspects of life including language. The technological revolution has also impacted almost all aspects of the human life and has undoubtedly set the process of Globalization in a great pace. Technology and Globalization together have impacted the very world

of Languages and linguistic studies and have opened up new dimensions of the study of language with respect to these phenomena.

Introduction

The twentieth century has witnessed a technological revolution. Technology has changed the very face of the world and has impacted all aspects of human life. It has set the phenomena like Globalization into motion. “Globalization” is currently a popular and controversial issue, though often remaining a loose and poorly-defined concept. In general terms ‘Globalization’ is defined as the process of transmission of ideas, meanings, values and cultures around the world in such a way as to extend and intensify social relations. When we talk about extension of communicative networks, it presupposes a multilateral flow of the phenomenon being globalized, not a unilateral and unidirectional flow. The fact of the matter, however, is that there are many things like power at the base of Globalization and power to a great deal is determined by the technological advancement. It is the technology which enhances the power which in turn enhances the chances of globalization of a particular phenomenon. There is no denying to the fact that all societies across the world are not at par in terms of their power and this power differential makes the process of globalization a one-way affair. All attributes associated with power have more tendency of getting globalized. The case of globalization of language is not an exception to it. Like many other attributes associated with power, the language associated with it also has proved the same. If we look back in history, visiting the colonial era, we recollect the fact that the language associated with power was imposed upon the people of the British and American colonies by the colonial powers. The globalization of language therefore refers to the globalization of English. This language has been gaining more and more importance in its non-native territories even in the post colonial era. It is the language which has become global whereas other languages have remained local in their size and scope. As far as the impact of globalization is concerned, discussion on it tends to consider its effects on economic growth, employment, income distribution and other social impacts such as opportunities for poverty alleviation, human and labour rights, environmental consequences and so on. The effects of globalization of language have always been undermined. A serious look at the globalization of language draws our attention to the fact the globalization of one particular language has been taking toll on other world languages. The space for the minority, lesser known and subaltern languages has always been shrinking. This has resulted in a huge lot of issues ranging from languages shift to languages death and loss of identity. Therefore, in the case of globalization of language, the one way flow is more severe than the globalization of other aspects.

Issues Arising from Globalization of Language

As already mentioned in the introduction, English has got globalized whereas other languages have remained local in their size and scope. A lot of issues have arisen because of the one way process of globalization of language. But we will be discussing some of the most prominent issues related to the process of globalization of language.

Prestige Differences

There is no denying to the fact that majority of the world societies are multilingual having their own indigenous languages. The spread of English to such societies has added the load on these societies. In multilingual societies, there always emerge the prestige differences among languages because of the different roles these languages are assigned. Popan posits that language never spreads due to intra-linguistic causes, instead affected by the perceived prestige of speakers, perceived usefulness, and, most saliently, the dominant position of speakers in the social, political, and economic domains. This dominant position gives the speakers prestige. The speaker's position in society appears as a goal worth striving for. In order to reach this goal, we imitate their language and their way of speaking. English due to the perceived social superiority and social, political, and economic control wielded by English speakers has gained relatively higher prestige. The prestige differences among languages create classes in the society on the basis of proficiency in the more prestigious languages. If we take the Kashmir society as an example, it is clear that in the hierarchy of prestige, English lies at the top of the ladder followed by Urdu. The indigenous languages of the valley have low prestige associated with them because of their meager role in the important domains like education, media, law etc. The prestige differences among languages in a multilingual setup become the reason for all the related issues which

are more severe. The issues which directly emerge because of the prestige difference among languages include language shift, language endangerment and language death.

Language Shift

While a language requires social, political, and economic power in order to spread, the language continues to grow in power in accordance with an expanding number of speakers. The more speakers a language has, the greater the power it is able to wield, as both active and passive use of the language, or oral and written communication, garner a greater reaction if the audience is wider. The prestige of speakers may serve to initially catalyze the language's spread, with social rise and communal integration representing lures for language learning. Popan writes that "a person belonging to a minority/less prestigious group is aware of this perception, wishes to dissociate from their group in order to integrate into the more prestigious/majority group." In other words, the low prestige of a language in a particular society garners negative attitude among its speakers which results in language shift. Once again taking example from the Kashmiri speech community, there has been a continuous decrease in the usage of Kashmiri language so far as its usage in different domains is concerned. There has been a continuous intrusion of the non-indigenous languages like English and Urdu in the different domains. Starting with the domain of education and media, these languages have finally entered the home domain and that is where the threat to native languages is posed and shift has happened.

Language Endangerment

Closely related to the issue of language shift is the language endangerment. An **endangered language** is a language that is at risk of falling out of use as its speakers die out or shift to speaking other languages. Many of the world languages have got endangered because of the language shift. Today there are about 7000 different natural languages. Eleven of them account for the speech of more than half the world's population. Those eleven are Mandarin Chinese, Spanish, Hindi, French, Bengali, Portuguese, Russian, German, Japanese, Arabic, and English. According to Garrick Bailey and James Perle in their book 'Humanity: An Introduction to Cultural Anthropology', estimates for extinct languages range from 4,000 to 9,000 since the 15th century. Other estimates for the future predict that only 10 percent of the present languages will continue into the 22nd century.

Language Death

The issues of language endangerment and language death are closely related. In fact language death directly occurs because of the language endangerment. The first step in language death is *potential endangerment*. This is when a language faces strong external pressure, but there are still communities of speakers who pass the language to their children.

The second stage is *endangerment* is once a language has reached the endangerment stage, there are only a few speakers left and children are, for the most part, not learning the language.

The third stage of language extinction is *seriously endangered*. During this stage, a language is unlikely to survive another generation and will soon be extinct. The fourth stage is *moribund*, followed by the fifth stage *extinction*. A language is said to be dead or extinct when no one speaks it any more.

Crystal (2002) explains that languages with only one speaker are already dead languages for language is considered alive only as long as there is someone to speak it to.

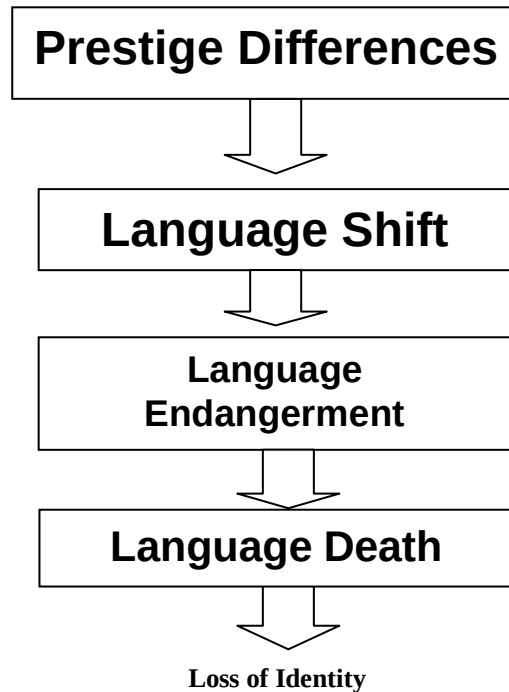
He refers to implicit and explicit role of in extinction of Australian indigenous language and states that "in Australia, the presence of English has, directly or indirectly, caused great linguistic devastation, with 90% of languages moribund".

More than half the world's languages have fewer than 5,000 speakers, and there are many hundreds that have as few as a dozen.

Loss of Identity

Language is inextricably linked with identity and the loss of language is not the loss of language only, it is the loss of identity also. After learning a new language, one's perception of his or her competence, communicative style, and value systems undergo some changes.

Tabouret-keller (1997) says that the link between language and identity is so strong that a single feature of language use suffices to identify someone's membership in a given group. It is explained that linguistic items are not only the characteristics of groups or communities; they are themselves the means by which individuals both identify themselves and identify with others. The loss of language means the loss of the whole treasure of knowledge encoded in that language, the loss of the cultural values etc. The whole scheme of things goes in an ordered way starting from prestige differences as shown in the next page.



Flowchart showing the scheme of things from prestige difference to loss of identity
Other Issues

The other issues arising out of globalization of language include the issues of language planning, social justice and conflicts which are related issues.

Language planning

Any decision or principle of action adopted with regard to the usage of language or languages by an organization or individual is known as language planning.

Language policies are basically designed to promote one or more languages and also it specifies the usage of language in different domains, like education, administration, media, etc. So we can say that language policy is a cover term for all the linguistic behaviors, assumptions, and cultural forms, folk believes, attitude towards a language etc.

Language planning is one of the biggest issues for the language planners, governments, educationists etc. particularly in the sensitive multilingual societies like India. It is an uphill task to do justice with all the languages in a society because all languages cannot be equally treated in the practical world.

Therefore, other issues like Social justice and conflicts arise because of unacceptable language planning.

Social (In) Justice: Violation of Language Rights

When one or more languages are given preference over certain others, it violates the democratic principles of equality and equity. In such cases, the minority languages always remain at the receiving end. Such scenarios have occurred many a time in the history of language planning and thus giving rise to other issues. If we take the example of the Valley of Kashmir, Kashmiri is the most dominant language in terms of number of speakers. Along with Kashmiri, there are many other minority and lesser known languages which are spoken in different parts of the valley. After strongly pressing for the introduction of Kashmiri as a subject in schools, out of the concern for its preservation and maintenance, the majority community somehow managed to initiate what they consider as a step towards proper planning. As a matter of fact, the same cannot be done for other minority and lesser known languages given the impracticability of any such step. In this way these minority communities are denied equal rights and this is the case with most of the minority languages in multilingual set ups across the world.

Conflicts and Language Riots

Faulty language planning at times results in serious conflicts in a society. The communities whose language rights are violated find the solution in confronting with the language planners, governments in most of the cases. Many violent organizations have been witnessed fighting for their language rights. Certain groups organize themselves on the basis of linguistic affiliations. The violation of language rights and faulty language planning has resulted in language riots even in India. The faulty language planning in the name of Three Language Formula resulted in language riots in West Bengal and Tamil Nadu. Such incidents can happen anywhere if a language is imposed upon people against their wishes.

Conclusion

The article sums up some of the major issues that have arisen because of the one way process of globalization. The article starts with a brief introduction about globalization with special reference to globalization of language and proceeds forward with the proposition that the globalization of English has come up with serious issues starting from prestige differences in languages in multilingual societies. The prestige differences lead to many other related issues like language shift, language endangerment, language death and loss of identity. Other issues that arise because of the globalization of English include language planning, language riots and violation of the democratic principles of equity and equality.

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20. MANAGEMENT SCIENCE

0220021 RAO, N SAMBASIVA (Department of Commerce and Management Studies, Andhra University, Visakhapatnam). EMERGING TRENDS IN MANAGEMENT EDUCATION IN THE GLOBALIZED ECONOMY

India is one of the largest countries in the globe and is considered not just a potential market but is also a place with an exceptional talent pool. The world is looking forward to explore the potential of this country. People we need who can manage their organizations in a better way and could find the best possible ways of striking the implications brought by the swift transformation that 'Indian Business World' has witnessed during the last few decades. The dynamics of changes that are fuelled by globalization of economies, technological developments, policy shift from regulation to deregulation, from domestic to global focus, growing consumer awareness and continuous innovations in product designs etc., creating challenges in the façade of corporate landscape. These changes necessitate for both industry and academia to be at the cutting edge of the business research and emerging trends.

Rapid changes have been occurring in the management education and development area, fuelled by the call for accountability, an increase in experiential techniques, the availability of educational technology, and recognition of the need for lifetime learning. Every two to five years, all industries are likely to see changes in customer profiles, products/services, policies and processes, regulatory environment etc. There could also be sudden changes required due to COVID-19 like situations.

Advancements in information technology (IT) and the rapid globalization of businesses, both are realities and opportunities of the 21st Century. Fast growth in globalization has demanded the need of integrated strategies in promoting organizational change, technology innovation and entrepreneurship. Generally, new technologies had a great impact on all aspects of life and the global society and economy is undergoing a fundamental transformation. The present society is changing and is becoming "knowledge society". It is expected that with technological advancements, many roles that exist today, will soon become redundant. Therefore, developing the ability to harness the power of technological innovation is the key to being relevant. Management education will have to focus on how technology and analytical tools can be used to understand existing customers, expand the customer base and generate new revenue sources. It is not just about programming but how to collect, analyze, interpret data and draw meaningful inferences that can be harnessed for effective decision making.

Critical thinking and the ability to examine an issue from various dimensions are very important. Managers cannot afford to "specialize" in any domain area – the ability to think of the business as a whole with all the interconnectedness between different departments is extremely important. This will enable them to suggest solutions that tackle all aspects of any issue rather than piecemeal resolution of issues. This is the duty of the management institutes to impart such skills.

Dynamics of Management Education:

Management science has undergone dramatic transformations spanning several developmental decades particularly after the Industrial Revolution which was characterized by a shift of the production process to large factories. The first important technological movement to affect the science of management and the roles of managers was the Industrial Revolution, followed by the Scientific Management Era, which brought profound developments to many organizations in the world. The Industrial Revolution and the changes which followed in operations systems and task-orientation led to increased focus on workers, systems, as well as systems thinking and theory. These new thoughts and approaches to management led to more complex definitions of managerial roles, tasks and responsibilities. As a result, managerial roles became the central point of reference when dealing with organizational effectiveness, goal accomplishments, and success.

Management education has taken different shapes in India. During 1985-90, due to privatization, management education was offered by several institutions and it was like a mushroom growth. The regulatory bodies were allotted to grow it like an unorganized sector. But after 2010, slowly the regulatory bodies started

controlling the management institutions, mainly by using Information Technology. In the present fast developing global scenario, dynamic changes are required to impart required skills, and compete internationally. In this background, the present paper focus on various trends and challenges of management education and identify various technological interventions to improve the quality of education.

Government of India has initiated “Digital India” and slowly all sectors are on digital platform. Education sector has also taken its role in such an initiate and exploring the possibility of technology-based learning in the classrooms. All business strategies are now connected with “Big Data” and “Business Analytics” became a common factor as a new tool of understanding businesses. B-Schools are offering the analytics courses at different levels.

As a result, the importance of management education in a contemporary and interdisciplinary world has been increased many folds. Because education, specifically business education is a dynamic process which is meant for molding the personality, character and behavior of the students who are the future business executives and potential business managers. In this context, the management schools help them to acquire proper blend of knowledge and skills for attaining excellence in management on the one hand and for shouldering tough responsibilities in this growing competitive national and international business world on the other.

And here comes the role of management institutions engaged in supplying the future managers. Because it is only management education institutes providing business education which can produce and supply proficient manager with solid strength to corporate houses for their survival on the one hand and fulfilling the prevailing need on the other. This could only be possible if education program of any B-school covers all the ingredients of theoretical knowledge and practical skill in their curriculum. It is particularly important for the business schools to take a more balanced approach and offer business education curricula which contain a blend of diversified business area and exercises for grooming the personality and communication skills.

Leading experts and educationists across the country and the globe agree that management education is witnessing some sea changes in every part of the world. The reason behind this that both employers and students is not happy with the existing system. For employers, a major concern is that while MBA graduates learn theory, they know very little about implementing solutions in the real world. They are not able to cope with situations where seemingly great plans do not get implemented. Or seemingly logical arguments do not get accepted. Or when people agree that they will follow a course of action but do not. As far as students are concerned, an MBA degree from most B-schools in India barring a handful, is no longer a guaranteed ticket to a well-paying job. And with the rising cost of education, the opportunity cost for working professionals is just too high if they have to sacrifice income for two years.

It is, therefore, obligatory on the part of the B-Schools that business curriculum should be redesigned for bringing the entire deprived component which can be strong base for preparing prospective managers and instill appropriate skill and knowledge within them so that they perform anywhere in this cosmos. In short, management teaching pedagogy should be design in such a way where international business contents and concepts, technology and current affairs, skill-building and communication exercises should be infused as an integral part of MBA syllabus. Management students will not limit their learning process only inside four walls of their classrooms. Massive Open Online Course (MOOC) platforms will provide uninterrupted and low-cost individualized instructions for students. Management Institutes should put down extra focus on driving multiple linkages of academics with industries to understand the main points and more weight must be given to research, teaching and training which consequently fabricate an awareness of international and national corporate implications into the learning process of the budding managers.

Challenges for Management Schools:

The trend in management education is moving towards a holistic approach, which not just focuses on profit maximization. The emphasis is to locate business in a larger societal context. In this process of transformation, these institutes are facing certain critical challenges. Some of them are:

- Lack of quality faculty
- High cost of maintenance
- Too many expectations from students
- Global competition
- Too many specializations
- Fast changes in technology
- Too many controls from the Government
- Meagre support from Industry
- Mushrooming of management schools

Strategies to strengthen the Management Education:

As Indian industry is constantly complaining about unemployable management graduates because of the skill gap issue, management institutes are advised to have progressive and future oriented strategies for their sustainability. Corporate will look towards more relevant skill and competency-based customized programmes rather than degrees offered by management schools after spending a mandatory period in a school. Especially in the continuing education segment, companies will not restrict themselves only to a bouquet of offerings by a B-school. Some of the strategies are:

- More flexibility
- Good interface with Industry in terms of faculty and research
- International collaborations for faculty and student exchange
- Continuous feedback from various stakeholders
- Fast technology adoptability
- Follow certain ethics and good governance practices
- Encourage entrepreneurship
- Short duration courses
- Hybrid mode of teaching -online and offline
- Suitable courses for practicing people
- Should have global perspective
- Move towards inter-disciplinary offerings
- Continuous updation of curriculum
- Emphasis more on experiential- learning

Conclusion:

Management education in India will be passing through an unprecedented transformation in the coming decade. B-Schools are now focusing on entrepreneur development programs and helping budding entrepreneur nurture and grow their ideas through incubation centers. Industries are initiating collaborations with educational institutes to prepare courses in tune with the current market demands, thus increasing students' employability. As the world is stepping into a fresh new decade, higher education, especially management education in India, will witness a sea change. With the changing demand of employers and rising dissatisfaction among the youth, change is the only reasonable solution that can be looked at. To conclude, it can no longer be business as usual for business schools. There is pressure on them from both the customers they serve as well as the markets they cater to. Only those B-schools who adapt to the changing trends will survive.

Technology is playing a powerful teaching tool and will continue to do so. Enhanced digital transformation has empowered many avenues of collaborative and interactive learning by diminishing international boundaries. However, the unprecedented pandemic in 2020 compelled educational institutes worldwide to even more extensively leverage digital technologies - from cloud to AI and IoT - to increase their impact and deliver better learner outcomes. It will continue to dominate even in the near future.

21. MATHEMATICAL AND STATISTICAL SCIENCE

0221022 JAGGI, CHANDRA K (Department of Operational Research, Faculty of Mathematical Sciences, University of Delhi, Delhi-110007). ANALYZING THE IMPACT OF LEAD TIME ON STOCHASTIC INVENTORY SYSTEM

Generally, inventory models can be categorized as deterministic and stochastic. In deterministic models, it is assumed that the demand rate is known with certainty whereas in stochastic models, the demand or lead time or both follows a known/ unknown probability distribution. When the actual demand exceeds expected demand or when actual lead time exceeds the expected lead time then one has to maintain safety stock as a cushion against the uncertainties of supply and demand. Safety stock is directly proportional to the level of service being offered. Higher (or lower) the level of service, higher (or lower) is the safety stock. Usually, service level indicated the ability of a firm to meet customers' demands from stock. It may be specified as the percentage of demand filled 'on time', that is, within a specified time period after receipt of the customer's order. In case the organization runs out of stock for an item which is in demand, it leads to loss of business and has an associated cost called shortage or stock out cost. This cost includes loss of potential profit through the sale of demanded units, loss of permanent customer & goodwill and loss in profit from future sales. To minimize shortage cost, safety stock is generally carried out. While formulating an inventory model with shortages, it is assumed that either the stock outs are completely backlogged or are completely lost; however, in many practical situations, it has been observed that some of the customers are ready to wait for their order to be fulfilled whereas others may not which results in lost sales. Some factors motivate the customers for the backorder out of which price discount from the supplier is the major factor. By offering sufficient price discounts, the supplier can secure more backorders through negotiation. With higher price discount, the supplier could fetch a large number of back orders by converting some portions of lost sales into backorder.

In this context, Just-in-time (JIT) philosophy emphasized on successful execution of all manufacturing activities required to produce the product and its fast delivery for the end user. It helps in continuous improvement in the manufacturing process and in the elimination of waste which ultimately helps the companies to provide better products and services at a lesser cost. The utilization of JIT includes low stock, shortening of lead time and setup cost, high quality, improved services etc. The main purpose is the best possible use of available resources and to reduce the process time as far as possible. Firms realize the importance of time and cost as these are most vital competitive factors in business. Under cost considerations, a firm can apply a variety of means to meet customer demand on time. Presently, in real life, many successful companies like Toyota, Dell, Ford and Harley Davidson etc. in the world have been using JIT philosophy to improve their manufacturing processes to meet customer demand as early as possible. This philosophy can be applied to different products like automobiles, electronic items and computers etc. The other aspect of employing JIT is reduction of setup cost. Various components such as workers Training, procedural changes and specialized equipments facilitates the firm to reduce setup cost, which not only eventually helps the firm to reduce its total cost in the long run but also improve the working of the present system.

Further, Lead time plays an important role in stochastic inventory system. In most of the inventory models, authors have assumed that lead time as constant, fixed or negligible where it has been realized that lead time can be reduced by decomposing it into several components to make the system more efficient. Lead time usually consists of the following components viz. order preparation, order transit, supplier lead time, delivery lead time and setup time, which implies that lead time is controllable and can be reduced by crashing its components at an extra added cost known as crashing cost. Basically, the extra cost of reducing lead time involves administrative, transportation and supplier's speed up cost. As a result, the client service and manufacturing schedule can be improved even with reduced safety stocks. That is how each firm tried to reduce the lead time and reach their customers at the earliest, of course, all this is achieved without compromising the quality of the product.

Further, an extensive research has been carried out in the field of stochastic inventory system. The researchers' interest was mainly lying in the stochastic system employing the reduction of lead time and setup cost at an extra investment. Usually, lead time reduction models consider two different cases of lead time demand i.e. the demand during the lead time is known (Normal distribution) and unknown. In this context,

the past researches have paid a little attention on stochastic inventory model with the effect of certain factors like backorder discount, uncertain supply, mutual-coordination of vendor-buyer and service level constraint. Because of the belief that these factors would not significantly affect the decisions regarding inventory management, whereas in real life the impact of backorder discount, uncertain supply and service level constraint cannot be ignored on optimal inventory policies.

The present research work develops different stochastic inventory models where lead time can be reduced with extra investment. These inventory models also analyze the effect of backorder discount, uncertain supply, imperfect quality, service level constraint and integrated environment with reduced lead time. Further, some of these inventory models also highlight the benefits of reducing setup cost. Further, this research work considers both types of inventory review system: Continuous Review System and Periodic Review System. The developed model provides directions for future research by including deteriorating items, price dependent demand, time value of money and trade credit etc.

Keywords: Inventory; Lead time; Stochastic Inventory System; Shortages, Just-In-Time;

22. MEDICAL AND HEALTH SCIENCE

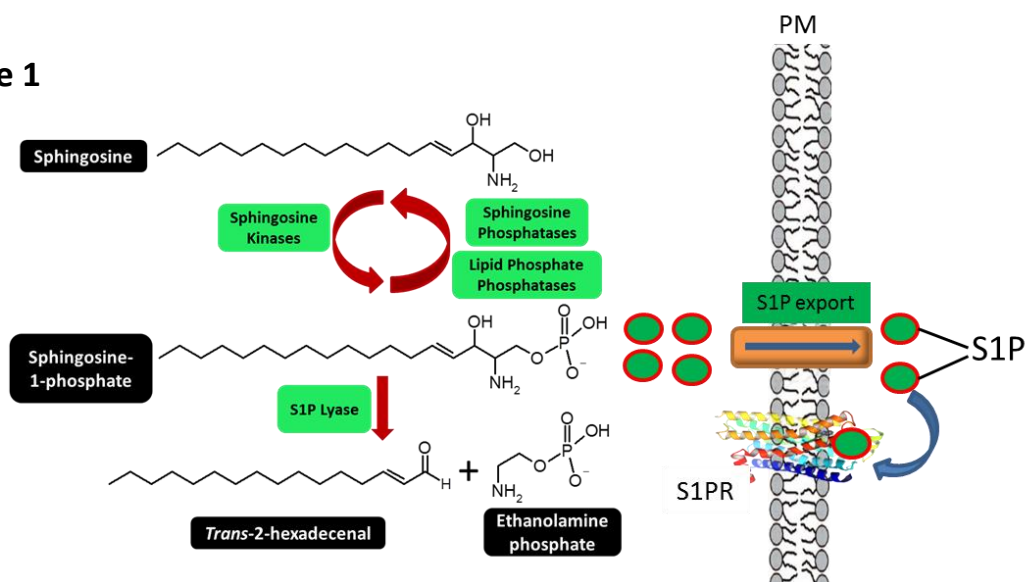
0222023 KUMAR, ASHOK (Department of Biochemistry, All India Institute of Medical Sciences (AIIMS), Saket Nagar, Bhopal 462 020). ROLE OF SPHINGOLIPID SIGNALING IN CANCER

Cancer is the first or second leading cause of death before age 70 years in many countries. In the year 2018, approximately 18.1 million new cancer cases and 9.6 million cancer deaths were reported worldwide (Bray et al., 2018). Globally, lung cancer is the most frequent cancer and the leading cause of cancer death among males, followed by prostate and colorectal cancer (Bray et al., 2018). However, in India, lung cancer followed by oral cancer are the top rank cancer in men, whereas breast and cervical cancer are the major cancers in women (Mallath et al., 2014). In India, approximately 10 lakh new cancer cases are diagnosed every year. The International Agency for Research on Cancer GLOBOCAN project has predicted that India's cancer burden will nearly double in the next 20 years, from slightly over a million new cases in 2012 to more than 1.7 million by 2035 (Mallath et al., 2014). Depending on the stage of diagnosis, age-standardized relative survivals at five years for five of the most common treatable cancers, including breast, cervical, lung, oral, and non-Hodgkin lymphoma, vary from 7% to 60% (Mallath et al., 2014). The five-year survival rate for localized lung cancer is approximately 60%, whereas cases with distant metastasis have a 5-year survival rate of only 7%. Thus, there is an urgent need to develop novel diagnostic and prognostic cancer biomarkers. Surgical resection and radiation, and chemo-adjuvant therapy are the standard of care for most solid tumors. However, approximately one-third of the patients experience localized recurrence, metastasis, or resistance to chemoradiation therapy. Conventional therapies are nonselective and often damage normal tissues. In the last decade, the development of targeted adjuvant therapy and immunotherapy has shown promise in some cancers. However, immunotherapy is only useful only in a group of patients. Therefore, identifying novel drug targets and developing newer drugs with higher efficacy and minimal adverse effects is the need of hour.

Sphingosine-1-Phosphate signaling is one such pathway which is involved in inflammation and cancer (**Figure 1**). Sphingosine-1-phosphate (S1P) is a naturally occurring bioactive sphingolipid metabolite. Sphingolipids are essential structural constituents of the plasma membrane of all eukaryotic organisms and are also produced by some bacteria. Sphingolipids are highly enriched along with cholesterol in microdomains or lipid rafts. In response to a wide range of stressful stimuli, membrane sphingomyelin and a lesser extent, other complex sphingolipids are rapidly metabolized to the bioactive sphingolipid intermediate, ceramide, and subsequently to sphingosine (Spiegel and Milstien, 2011). Phosphorylation of sphingosine by two sphingosine kinases results in the formation of S1P. It has emerged as a potent signaling molecule that regulates diverse cellular processes, including cell proliferation, survival, differentiation, and migration (Spiegel and Milstien, 2011). S1P plays a critical role in several physiological processes, including lymphocyte trafficking, vascular development, and inflammation. S1P exerts its biological actions both in cell-extrinsic and cell-intrinsic manner.

Sphingosine-1-phosphate is a product of sphingosine phosphorylation by two sphingosine kinases (Pyne and Pyne, 2010; Pyne et al., 2018), namely SphK1 and SphK2. SphK1 is found in the plasma membrane and whereas SphK2 is located in the endoplasmic reticulum and the nucleus (Ogretmen, 2017). Levels of S1P in tissues and body fluid are regulated by six enzymes responsible for its catabolism. S1P phosphatase 1 and S1P phosphatase 2 are highly S1P specific enzymes that dephosphorylate S1P to generate sphingosine. S1P is irreversibly degraded by S1P lyase into ethanolamine and trans-2 hexadecenal. S1P is reversibly degraded by another group of enzymes known as lipid phosphate phosphatases (LPP1-3) that dephosphorylate a broad range of lipid phosphates, including S1P (Kumar et al., 2017) (**Figure 1**).

S1P exerts many of its actions by binding to a family of G-protein-coupled receptors known as S1P receptors (S1PRs) (Figure 1). S1P also regulates several diverse cellular and physiological processes, including cell growth and survival, lymphocyte trafficking, vascular development, and inflammation (Pyne et al., 2018). Additionally, S1P signaling is implicated in carcinogenesis, cancer progression, as well as drug and radiation resistance. It has been shown to promote tumorigenesis by inhibiting apoptosis and enhancing proliferation, transformation, angiogenesis, and inflammation (Pyne and Pyne 2010, Kumar and Saba 2016).

Figure 1

SphK1 expression is associated with chemoresistance, invasiveness of OSCC tumors, and poor prognosis of patients (Saenz-Ponce et al., 2018). Except for SphK1, the role of S1P metabolizing enzymes in OSCC has been poorly explored. Previously, we have reported that SphK1 was overexpressed in 70% of OSCC tumor tissue than adjacent normal tissue (Vishwakarma et al., 2017). On the other hand, approximately two-thirds of OSCC patients showed downregulation of mRNA and protein expression of SphK2 and LPP3 in tumor tissues compared with adjacent normal tissue of the same patient (Vishwakarma et al., 2017). We have also shown that SphK2 and LPP3 expression negatively correlate with TNM staging of OSCC patients. Recently, using computational tools, we have further shown that expression of LPP3 is decreased in various types of cancers, including head and neck cancer (Nema et al., 2021), and LPP3 is associated with poor survival of lung adenocarcinoma patients. *However, to the best of our knowledge, the role of the S1P signaling largely remains unexplored in OSCC progression.*

During last 15 years, I have elucidated the role of sphingosine-1-phosphate metabolizing enzymes particularly S1P lyase, sphingosine kinases, lipid phosphate phosphatases in DNA lymphocyte trafficking, damage response, chemoresistance, colon and oral carcinogenesis. At the end of my talk, I will briefly discuss the applications of various bioinformatics tools in the identification of novel prognostic cancer biomarkers.

S1P Lyase in DNA damage response

Ionizing radiation (IR) induces DNA damage response pathways that orchestrate cell cycle arrest, DNA repair or apoptosis such that irradiated cells are either repaired or eliminated. Beside DNA damage, IR activates acid sphingomyelinase (ASMase), which generates ceramide, thereby promoting radiation-induced apoptosis. However, ceramide can also be metabolized to S1P, which acts paradoxically as a radioprotectant. S1P lyase (SPL) catalyzes the irreversible degradation of S1P in the final step of sphingolipid metabolism. Sphingolipid metabolites are ubiquitous regulators of the cellular response to stress. S1P lyase is critical regulator of intracellular S1P levels, thus we hypothesized that S1P lyase may regulate DNA damage response.

Towards this, we exposed human embryonic kidney cells (HEK293T) and mouse fibroblast (NIH3T3) to 10 Gy of IR and showed that IR induces the expression of SPL.

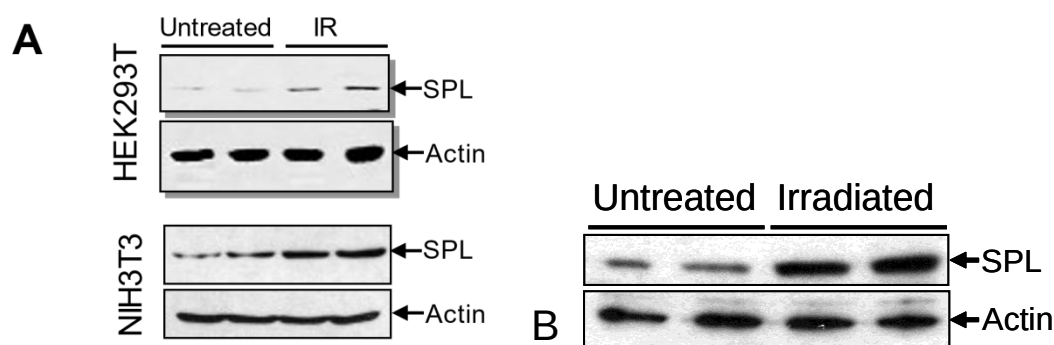


Figure 2. SPL expression is induced in HEK293T and NIH3T3 cells after exposure with ionizing radiation. Cells were exposed with 10 Gy radiation (A) or 20 Gy radiation (B).

To determine the role of SPL in DNA damage response, HEK293T cells having high levels of SPL (SPL^{hi} cells) were generated. Control and SPL^{hi} cells were irradiated, and apoptosis was evaluated by measuring caspase-3 activity, and cleaved PARP levels. As shown in **Figure 3**, SPL^{hi} cells showed enhanced sensitivity to IR as shown by an increase in apoptosis measured by caspase-3 activity and by the presence of PARP cleavage products. Thus, we provided evidence that SPL is a radio-responsive protein that potentiates cell death after IR (Kumar et al., 2011).

Cell cycle arrest is a critical component of the DNA damage response that allows cells sufficient time to repair damaged DNA molecules before entry into mitosis, thereby ensuring genomic integrity. We showed that SPL expressing cells, after exposure with IR exit early from the G2/M arrest (**Figure 4A**). The premature exit of SPL^{hi} cells post-radiation exposure is accompanied with high levels Ser10-phosphohistone-H3 (S10-H3), a mitotic marker (**Figure 4B**).

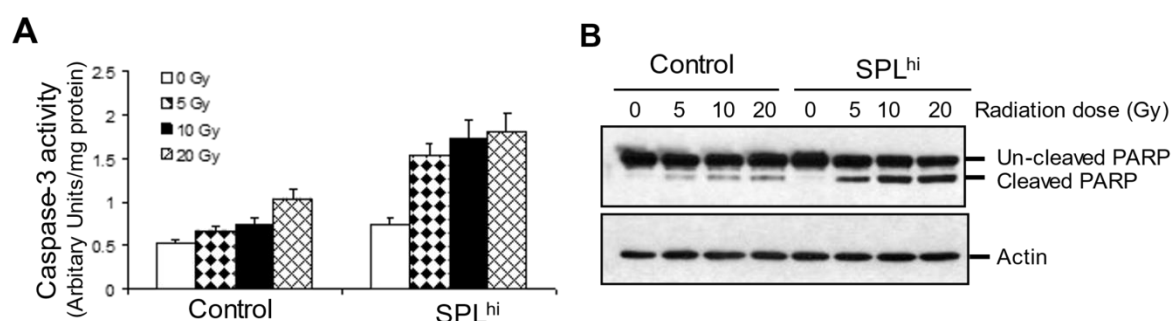


Figure 3. HEK293T parent (Control) and the cells with high S1P lyase (SPL^{hi}) were irradiated with the indicated dose of x-rays and Caspase-3 activity (A) and cleaved PARP levels (B) were detected by western blotting.

The G2 to M transition is controlled by the Cdk1–cyclin B complex, and premature activation of this complex can lead to inappropriate cell cycle progression and radiation-induced mitotic catastrophe. Therefore, we evaluated the effect of SPL expression on both components of this kinase complex. Compared with control cells, SPL^{hi} cells demonstrated higher CDK1 and cyclin B1 protein expression beginning 12 h and continuing through 24 h after IR (**Figure 4B**).

S1P Lyase is Colon Carcinogenesis

S1P lyase is highly expressed in the lymphoid organs and mucosal lining, including gut epithelium (Borowsky et al., 2012). Expression of S1P lyase is downregulated in the adenomatous polyps from colon cancer patients than the adjacent normal villi (Oskouian et al., 2006). The role of S1P lyase in colon carcinogenesis was not known at that time. Conventional mice lacking S1P lyase gene die postnatally within three-weeks of birth, this hampers the mechanistic studies. Thus, using Cre-Lox technology, we generated

conditional knockout mice that lack S1P lyase gene ONLY in the gut epithelium (SPL^{GutKO}), and the expression of S1P

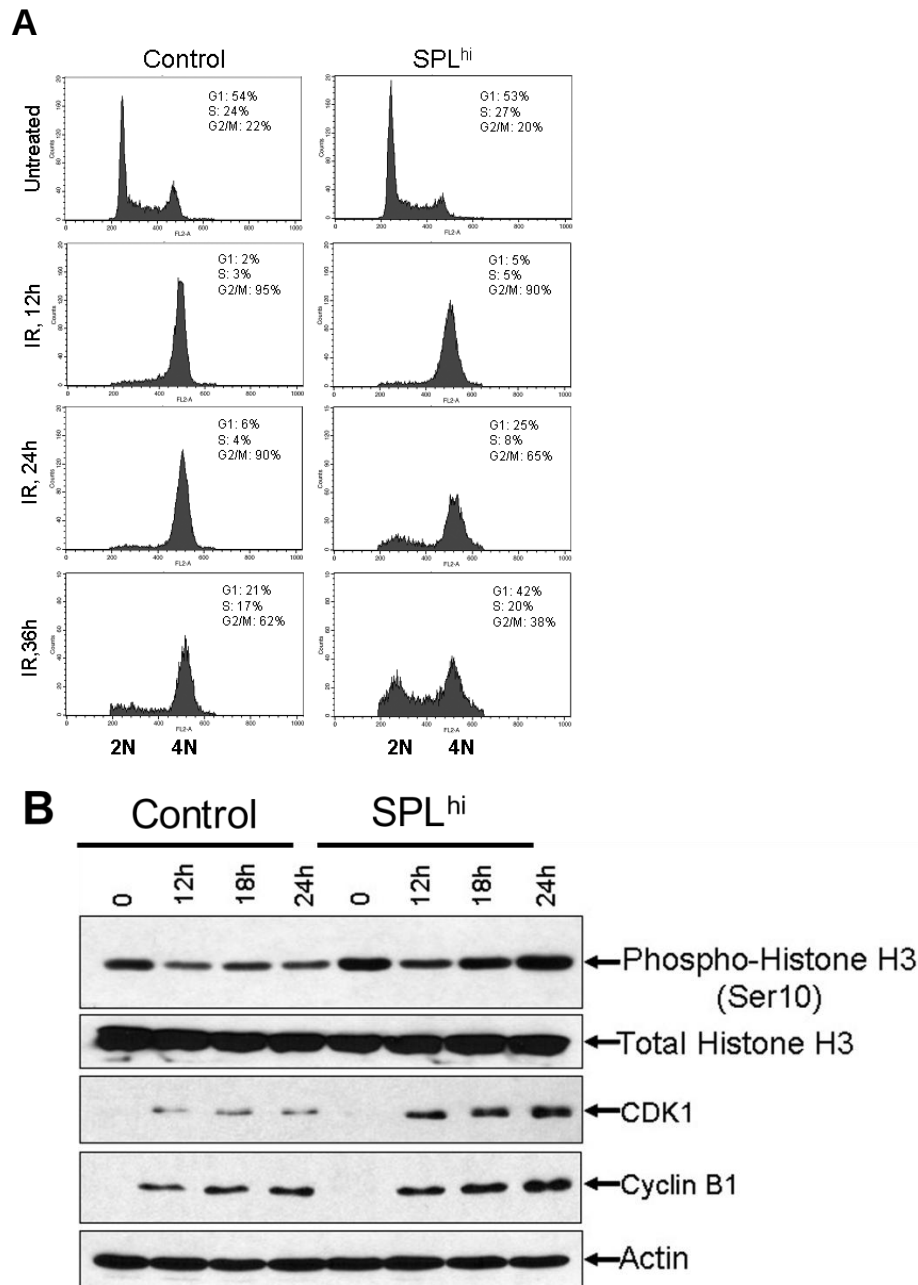


Figure 4. A, Cell Cycle analysis in control and SPL^{hi} cells. SPL overexpressing cells exit prematurely from the G2/M arrest. B, Immunoblotting for phospho-histone H3, CDK1 and cyclin B1.

lyase was normal. Then, wildtype and SPL^{GutKO} were subjected to a regime of carcinogen and an inflammatory compound (azoxymethane and sodium dextran sulphate) to develop the model of colitis-associated colon cancer. Mice lacking S1P lyase in the gut epithelium (SPL^{GutKO}) developed larger tumors than the wild type mice (Degagné et al., 2014).

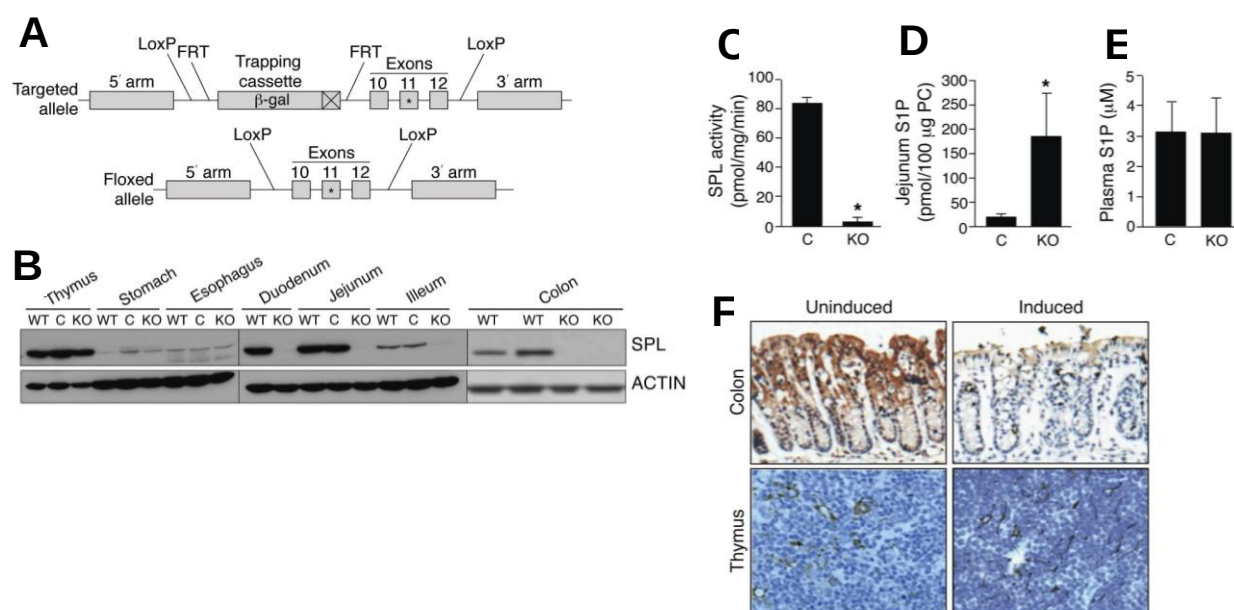


Figure 5. A, Plasmid construct for the generation of floxed mice for S1P lyase. B, Western blot showing the absence of S1P lyase in the gut tissue in SPL^{GutKO} mice. C, SPL enzyme activity, D-E, S1P levels in the jejunum and plasma by LC-MS. F. IHC for S1P lyase in the colon. Enhanced colon tumorigenesis in SPL^{GutKO} mice was accompanied by increase of inflammatory cytokines in the colon.

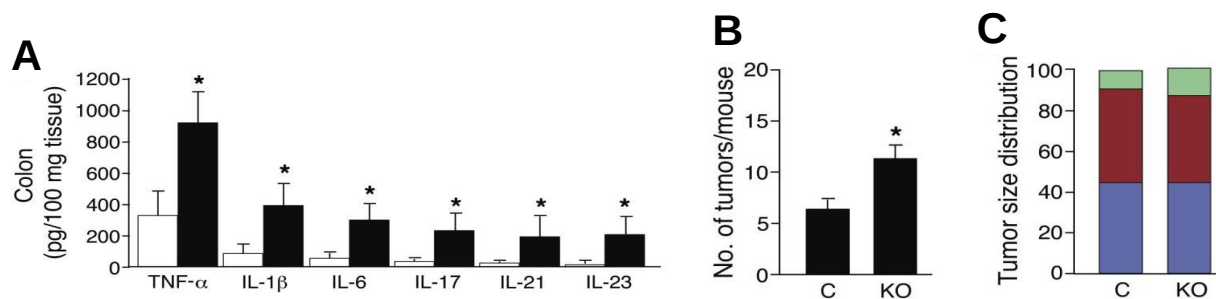


Figure 6. A, Cytokine levels were measured by ELISA in the colon from wild type mice (Blank bar) and SPL^{GutKO} mice (filled bar). B, Tumor numbers in the colitis-associated colon cancer mouse model in the wild type mice and KO mice. C, Tumor size distribution

STAT3 is constitutively activated in most colon cancers, and JAK2/STAT3 signaling influences colon cancer cell proliferation and survival. Immunofluorescence (IF) microscopy with an antibody to detect STAT3 phosphorylation revealed a higher level of activated STAT3 protein in nonneoplastic colonic tissues of SPL^{GutKO} mice compared with that in controls. STAT3 was recently shown to play a direct and crucial role in mediating cell transformation through the induction of 2 miRNAs, miR-21 and miR-181b-1. These miRNAs are STAT3 targets that repress the expression of the well-established tumor suppressor PTEN and the lesser-known tumor suppressor CYLD, respectively. We observed a 25-fold increase in miR-21 expression levels and a 12-fold increase in miR-181b-1 expression levels in nonneoplastic colonic tissues of SPL^{GutKO} mice compared with those in control mice. Further, inhibition of STAT3 by a pharmacological compound ameliorates the pathological effects of gut SPL knockdown, reduces tumor formation, decreases cytokine levels. Thus, we conclude that SPL deficiency promotes colon carcinogenesis through a STAT3, miR-21, and miR181b-1 mediated pathway.

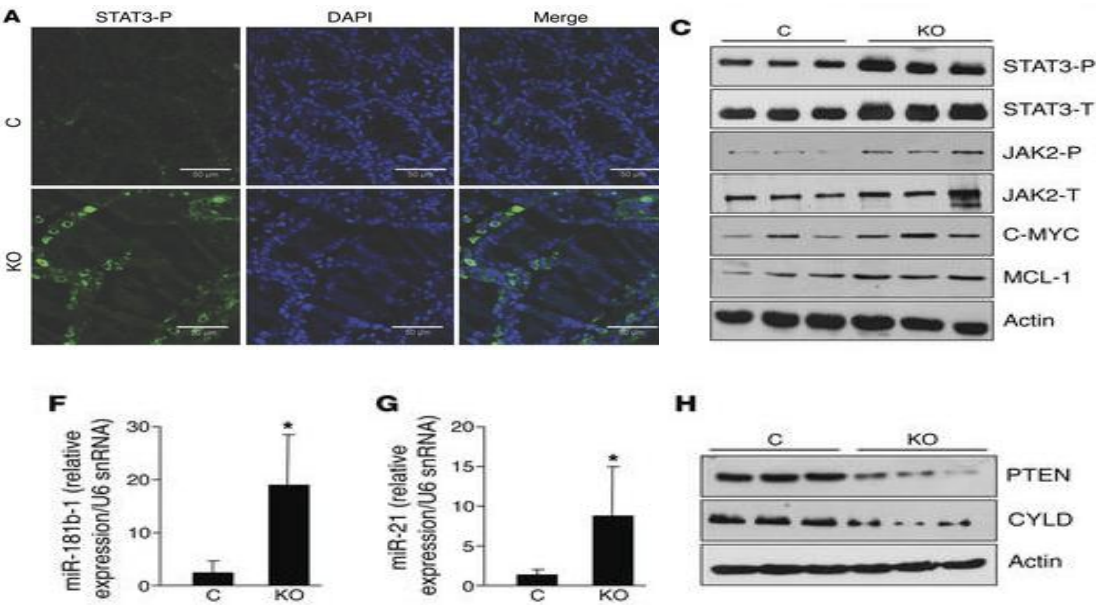


Figure 7. A, Immunofluorescence for pSTAT3; C, Immunoblotting for STAT3 and their target proteins, F, F-G, miRNA expression (miR-181b-1 and miR-21) by qRT-PCR; H Immunoblotting

Further, treatment of mice with a sphingolipid (sphingadiene), induces SPL expression, decreases S1P levels, reduces STAT3 levels and decreases tumor burden in colitis-associated colon cancer.

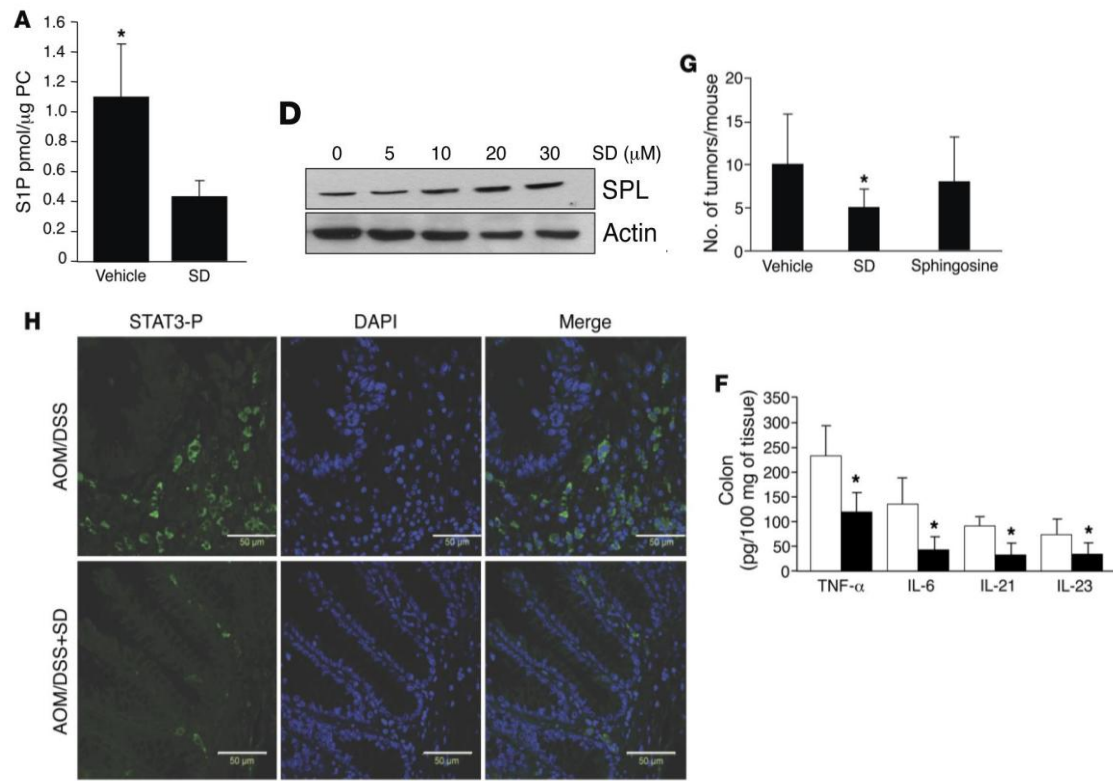
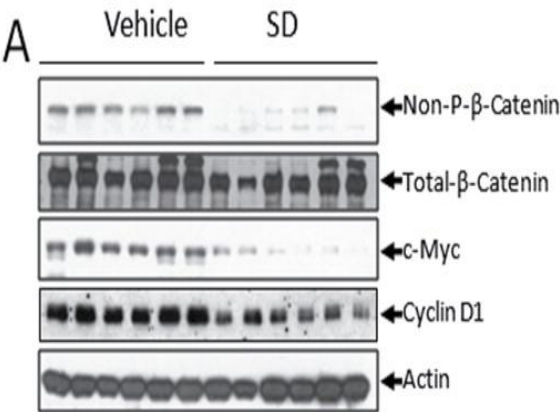


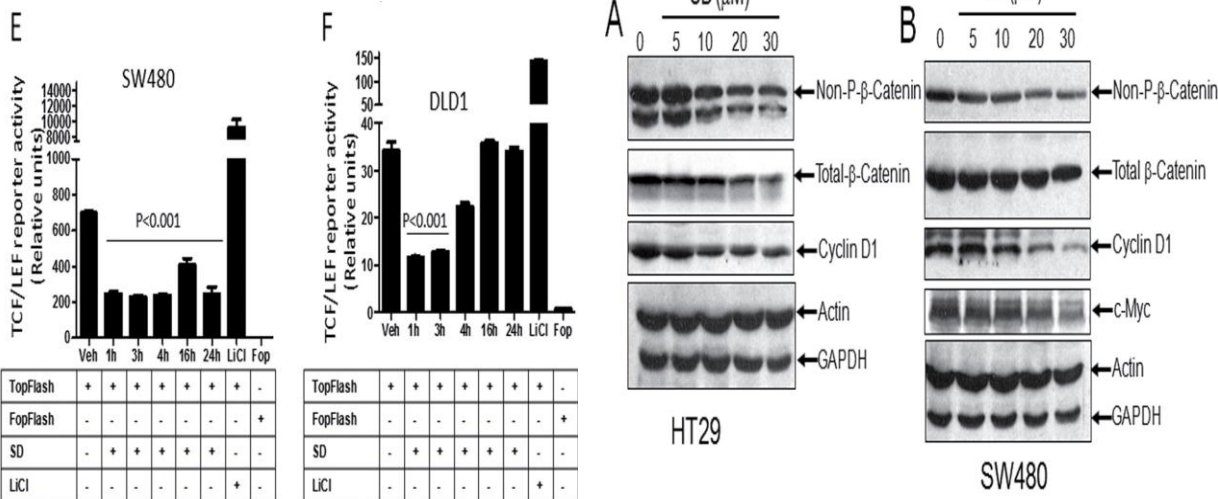
Figure 8. A, S1P levels in control and sphingadiene treated mice. D. Sphingadiene induces SPL expression in colon cancer cells. G, Sphingadiene treatment to mice reduced tumor numbers in the mice. H, Immunofluorescence for pSTAT3 in control (vehicle) and sphingadiene-treated mice; F. Cytokine levels were measured by ELISA in the colon from control (Blank bar) and SD-treated mice (filled bar).

The Wnt- β -catenin pathway plays an essential role in embryonic development and contributes to tissue homeostasis and tumorigenesis. Activating mutations in the Wnt pathway are considered an early, critical step in human colon carcinogenesis and are responsible for intestinal tumor formation in patients with familial polyposis and in *ApcMin/+* mice that undergo spontaneous intestinal adenoma formation. Furthermore, Oral SD administration reduced levels of active β -catenin and Wnt targets c-Myc and cyclin D1 in *ApcMin/+* mouse intestinal tissues. Colon cancer cells treated with SDs exhibited reduced Wnt transcriptional activity, as well as reduced nuclear β -catenin localization and subsequent reduction in active- β -catenin levels. Further, we observed a decrease in phosphorylated (inactive) GSK3 β in SD-treated mice and colon cancer cells.



Expression of constitutively active myristoylated-Akt or inactivation of GSK3 β using LiCl attenuated SD-mediated inhibition of Wnt transcriptional activity and active- β -catenin levels. SDs exhibited additive effects with inhibitors of the phosphatidylinositol-3-kinase/Akt/mTOR pathway to induce cytotoxicity. Further, a combination regime of SDs and low-dose rapamycin decreased visible polyps in *ApcMin/+* mice and reduced the levels of Wnt target gene expression and mTOR target activation. SD-mediated inhibition of Akt and Wnt pathways and cytotoxicity in colon cancer cells was dependent upon the activity of protein phosphatase 2A, as shown by reversal of these effects by pretreatment with okadaic acid or calyculin A. Our cumulative findings indicate that SDs inhibit Wnt signaling through a protein phosphatase 2A/Akt/GSK3 β -dependent mechanism that may contribute to their chemopreventive effects in intestinal tumorigenesis.

S1P metabolizing enzymes in oral carcinogenesis



We have analyzed the expression of S1P metabolizing genes in the tumors and adjacent normal tissues from OSCC patients. As shown in Table 1, expression of *SphK1* and *SGPP1* genes was up-regulated

significantly in 70% and 75% OSCC tumors respectively. Importantly, expression of *SphK2* and *PPAP2B* was down-regulated in the tumor tissues of 70% OSCC patients. Expression of *SphK2* and *PPAP2B* negatively correlated with tumor-node-metastasis (TNM) staging and tumor volume respectively (Vishwakarma et al., 2017). Furthermore, expression of *SphK1*, *SphK2* and *LPP3* was also validated at protein level by immunohistochemistry.

Table 1. Expression of S1P metabolizing genes in OSCC tumors

S. No.	Gene Name	Change in gene Expression in tumors	Proportion of Patients w
1	SPL (<i>SGPL1</i>)	Upregulation	57.44%
2	<i>SPHK1</i>	Upregulation	69.38%
3	<i>SPHK2</i>	Downregulation	70.96%
4	<i>SGPP1</i>	Upregulation	75.00%
5	<i>SGPP2</i>	Downregulation	54.05%
6	LPP1 (<i>PPAP2A</i>)	Downregulation	52.38%
7	LPP2 (<i>PPAP2C</i>)	Downregulation	56.52%
8	LPP3 (<i>PPAP2B</i>)	Downregulation	69.76%

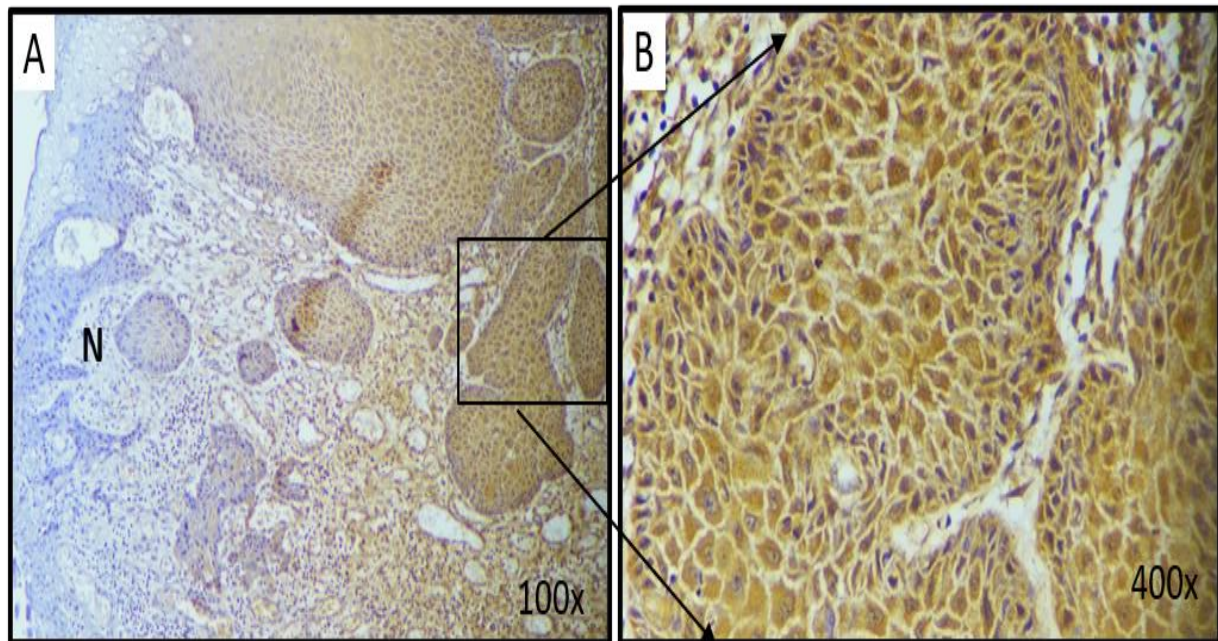


Figure. SphK1 expression in normal tissue and tumors from OSCC patients

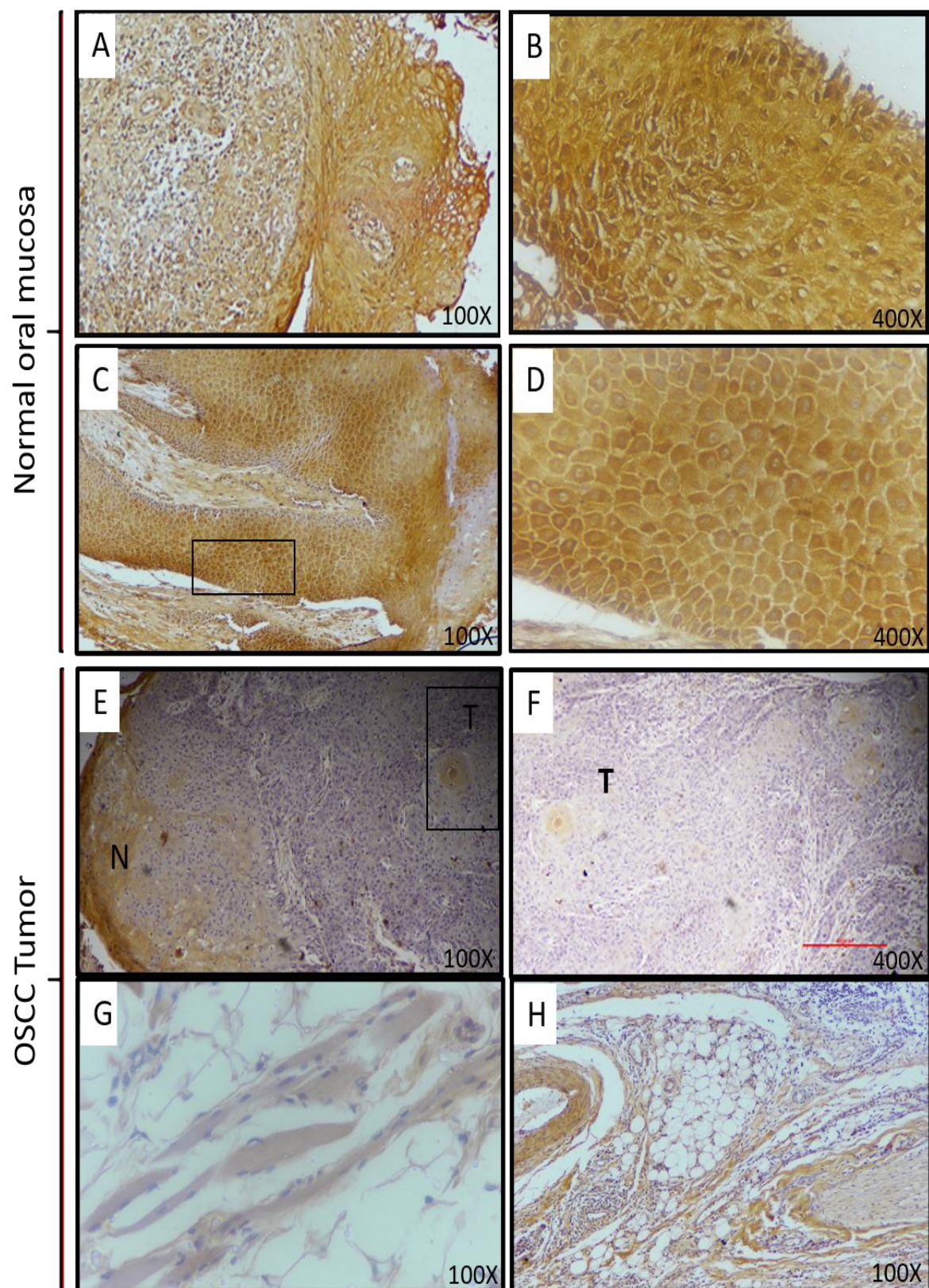
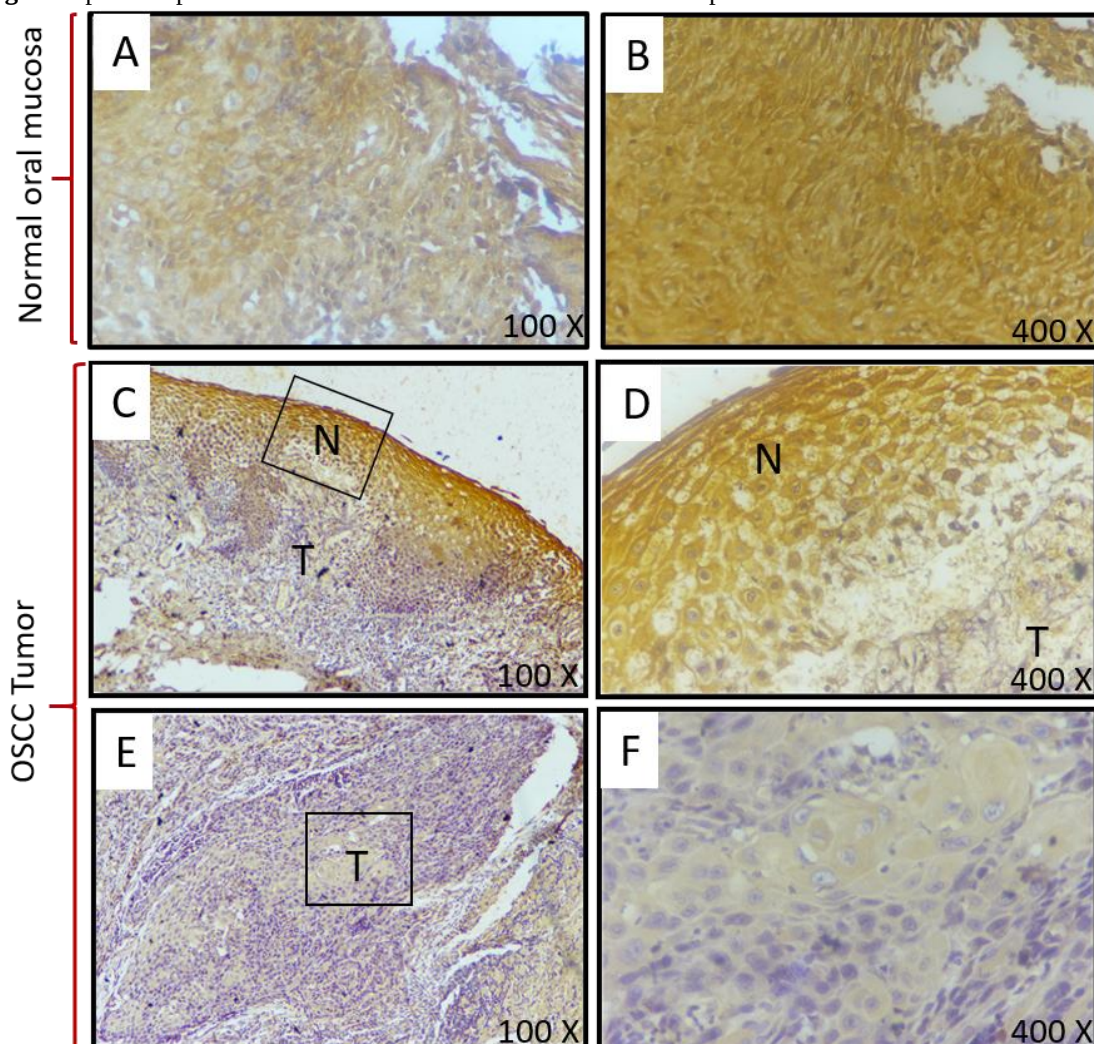


Figure. SphK2 expression in normal tissue and tumors from OSCC patients**Figure.** LPP3 expression in normal tissue and tumors from OSCC patients

Taken together, our studies that S1P signaling is activated during carcinogenesis and promotes tumorigenesis in several cancer types. Thus, the components of S1P signaling pathway are attractive target for cancer therapeutics. Some of pharmaceutical compounds targeting S1P signaling pathway in the clinical trial.

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23. PHILOSOPHY

0223024 NAIK, C D (Dr. Bhimrao Ambedkar University, Dr. Ambedkar Nagar, Mhow, Indore – 453441). PHILOSOPHY OF NEW GLOBAL TECHNOLOGICAL SOCIETY

Technological advancement contributed to global modernity. Technologies set conditions for closeness of nation-states and for affinity of global and local societies. The 21st century is just 18 years old, and we have seen a revolutionary blast of technology. People are so much used to of technology that one cannot even imagine of living without a smartphone or their laptop. From our food to our education, digitisation has been done in every field possible.

Humans

Humans use technology to travel, to communicate, to learn, to do business and to live in comfort. It has made our lives easy and has improved communication, transportation, education & learning process, health-care and many other infrastructure business areas.

Technology enhances learning, fosters problem-solving skills, develops future technological leaders. However, it diminishes relationships and social skills and stimulates health issues. Advanced technology causes social shifts more often or social disruption; technological society comes to depend on communications, reliable utilities and regular delivery of food from farms to urban centres and leads to skills obsolescence and reliability gaps.

Air, water, heat and noise pollution can be caused by producing and using technology, consuming resources, non-renewable resources, including precious metals like gold are used to make technology.

Technology gives increased knowledge and understanding, improvement in industry and jobs and an interconnectedness of the world as a result of globalization. Just 8 % of Americans said that technology had negative effects on society.

World population is expected to reach 8.5 billion people by 2030. India will overtake China as the most populated country on Earth. Nigeria will overtake the US as the third most populous country in the world.

Robots will be much more visible in the future, which will be recognized as machines over the next two decades until robots will be able to match a number of fundamental human skills.

Change

Technology has made it easier to farm, more feasible to build cities, and more convenient to travel, among many other things, effectively linking together all countries on earth, helping to create globalization, and making it easier for economies to grow and for companies to do business.

Modern technology can empower and equip world's poor with most effective solutions to poverty. It brings tools to promote development with its objective of making task easier and solving of many problems of mankind. It reduces cost of production, encourages growth of new business and advances communication.

Important technology

Artificial intelligence is ground breaking technology today vis-vis advent of smart homes, smart cities, and internet will integrate AI more and more into our everyday lives.

Advantages of technology in our lives include, 1. Ease of access to information. The world wide web, abbreviated as www has made the world a social village; 2. It saves time; 3. Through it we get ease of mobility; 4. Better communication means; 5. Cost efficiency; 6. Innovation in many fields; 7. Improved banking and 8. Better learning techniques; 9. Disabled are now abled; 10. Artificial intelligence

Globalization

Technological globalization is speeded in large part by technological diffusion, the spread of technologies across borders. While diffusion of information technologies has potential to resolve many global social problems, it is often the population most in need that is most affected by the digital divide.

Technology is a vital force in modern form of business globalization. It has helped us in overcoming major hurdles of globalization and international trade such as trade barrier, lack of common ethical standard, transportation cost and delay in information exchange, thereby changing the market place.

On the one hand globalization will give rise to new industries and more jobs in developing countries; on the other, it will force poorer countries of the world to do whatever the big developed countries tell them to do.

Globalization had been greatly impacted by internet, graphic interface of windows and world wide web, and workflow software.

Technological revolution

Every major technological revolution has had a profound impact on humankind's production patterns and lifestyles. The use of IT enables people to break their past reliance on conventional means of transportation and communication, and expands their scope of development and contacts.

Social impact

Through exponential rise of technology since 90's it has left a positive mark on society in terms of transportation, agriculture, communication, medicine, education, business etc. However, negative impact of technology includes 1. Social media and mobile devices may lead to psychological and physical issues such as eyestrain and difficulty focusing on important tasks, which may contribute to more serious health conditions, such as depression. Overuse of technology may have a more significant impact on developing children and teenagers.

Research has linked too much screen time or low-quality screen time to behavioral problems; less time for play and loss of social skills and obesity including sleep problems and violence.

Science and technology are not just improving environmental efficiencies of processes, products, and services but are also bringing changes to society. This requires new regulation in order to optimize benefits and suppress detrimental effects.

Economy

Technology is key driver of economic growth of countries, regions and cities as it allows for more efficient production of more and better goods and services, on which prosperity depends. It has affected the global economy and its usage has been linked to market place transformation, improved living standards and more robust international trade. Technological advances have significantly improved operations and lowered cost of doing business.

The use of technologies paved the way for production of new cheaper goods and for capital accumulation, for an enhanced international competitiveness of individual countries and an enhanced quality for scientific research institutions.

Ruling technology

Artificial intelligence is impacting the future of virtually every industry and every human being, and has acted as the main driver of emerging technologies like big data, robotics and IoT and it will continue to act as a technological innovator for the foreseeable future.

Aristotle

Technology is an arrangement of technics to make possible and serve the attainment of human ends. *Techné* as productive cognition is the capacity to make involving reasoning. Then, technological knowledge is different from everyday and scientific knowledge.

Martin Heidegger

Just as essence of a tree is not itself a tree. Heidegger points out, so the essence of technology is not anything technological. What, then, is technology, if it is neither a means to an end nor a human activity? Technology, according to Heidegger, must be understood as a way of revealing.

Philosophy

Philosophy of technology is a sub-field of philosophy that studies the nature of technology and its social effects. Philosophical discussion of questions relating to technology (or its Greek ancestor *techné*) dates back to the very dawn of western philosophy.

Philosophy is related to technology, studies character of technology and its relation to society. It has various branches, focusing on the ethics of technology, on the relation between science and technology, on human technology relations, or the political dimension of technology.

The four philosophical didactic methods are classical philosophical methods, the phenomenological methods, the analytical method, the hermeneutic method, and dialectic method.

The main Text Philosophy of Technology

If philosophy is the attempt “to understand how things in the broadest possible sense of the term hang together, then it is largely by technology that contemporary society hangs together. It is not only as an economic force but also as a cultural force. Philosophy of technology has mostly been concerned with the meaning of technology for, and its impact on, society and culture, rather than with technology itself. Mitcham (1994) calls this type of philosophy of technology “humanities philosophy of technology” because it accepts “the primacy of the humanities over technologies”. Only recently a branch of the philosophy of technology has developed that is concerned with technology itself and that aims to understand both the practice of designing and creating artifacts and the nature of the things so created. This latter branch of the philosophy of technology seeks continuity with the philosophy of science and with several other fields in the analytic tradition in modern philosophy, such as the philosophy of action and decision-making, rather than with the humanities and social science.

Philosophy of technology is a new branch of philosophy which considers, building, production, engineering, designing and science as appropriate subject of its scope.

Theme

The themes on which modern analytic philosophy of technology focuses take into consideration the development of technology as the outcome of a process originating within and guided by the practice of engineering, by standards on which only limited societal control is exercised, as well as the consequences for society of the implementation of the technology so created, which result from processes upon which only limited control can be exercised.

Early Efforts

One early theme is the thesis that technology learns from or imitates nature (Plato, *Laws* X 899a ff.). According to Democritus, house-building and weaving were first invented by imitating swallows and spiders building their nests and nets. Perhaps the oldest extant source for the exemplary role of nature is Heraclitus.

Aristotle did not maintain that technology can only imitate nature: “generally technè in some cases completes what nature cannot bring to a finish, and in others it imitates nature”.

Artifacts

There is a fundamental ontological distinction between natural things and artifacts. According to Aristotle, the former have their principles of generation and motion inside, whereas the latter are generated only by outward causes, namely human aims and forms. Animals and their parts, plants, and the four elements move, grow, change, and reproduce themselves by inner final causes and are driven by purposes of nature. Artifacts, on the other hand, cannot reproduce themselves. Without human care and intervention, they vanish after some time by losing their artificial forms and decompose, as a wooden bed buried, decomposes to earth or changes back into its botanical nature by putting forth a shoot.

Man Made and Natural products

The thesis that there is a fundamental difference between man-made products and natural substances has had a long-lasting influence. In the Middle Ages, Avicenna criticized alchemy on the ground that it can never produce ‘genuine’ substances (Briffault 1930: 147). Even today, some still maintain that there is a difference between natural and synthetic vitamin C.

The Status and Characteristics of Artifacts

Understanding the process of designing artifacts is the theme in philosophy of technology that most directly touches on the interests of engineering practice. Analytic philosophy of technology is the status and the character of artifacts. The philosophy of science and its working scientists are less interested in investigating the status and character of models and theories than philosophers are.

Art and Artifacts

Artifacts are man-made objects: they have an author, are made to serve a purpose. This excludes byproducts and waste products and works of art. Byproducts and waste products result from an intentional act to make something and the author at work may be well aware of their creation. Works of art result from an intention directed at their creation. This directedness may involve many intermediate steps but an intention that the work serves some purpose. A further discussion of this aspect belongs to the philosophy of art. Dipert (1993).

Purposeful and realizable

Technical artifacts, then, are made to serve some purpose, generally to be used for something or to act as a component in a larger artifact, which in its turn is either something to be used or again a component. Whether end product or component, an artifact is ‘for something’, and what it is for is called the artifact’s function. An adequate description of artifacts refers both to their status as tangible physical objects and to the intentions of the people engaged with them. Kroes and Meijers (2006) called this “the dual nature of technical artifacts. The two aspects are ‘tied up’ in the notion of artifact function. In this structure and function mutually constrain each other, but the constraining is only partial. If a general account of this relation is possible there may be interesting connections with the issue of multiple realizability in the philosophy of mind and with accounts of reduction in science as explored by Mahner and Bunge 2001.

Function and intention

A unified account of the notion of function has received considerably more philosophical attention. The notion of function is of paramount importance for characterizing artifacts. The notion of an artifact’s function refers necessarily to human intentions. Function is also a key concept in biology, in cognitive science and the philosophy of mind, where it is crucial in grounding intentionality in non-intentional, structural and

physical properties. Ruth Millikan in 1984 theorized the biological notion, cognitive notion and the intentional notion.

Intentionality and accidentality

The intentional 'side' of these functions is a mismatch between actual behavior and intended behavior. These artifacts usually engage many people, and the intentions of these people may not all pull in the same direction. A major distinction can be drawn between the intentions of the actual user of an artifact for a particular purpose and the intentions of the artifact's designer. Since an artifact may be used for a purpose different from the one for which its designer intended it to be used, and since people may also use natural objects for some purpose or other, one is invited to allow all relevant intentions or determining intentions, distinguishing between the proper function of an artifact as the one intended by its designer and the accidental function of the artifact as the one given to it by some user on private considerations. Accidental use can become so common, however, that the original function drops out of memory.

Kinds of artefacts

The basic kinds in technology are 'knife', 'aircraft' and 'piston'. The members of these kinds have been designed in order to be used to cut something with, to transport something through the air and to generate mechanical movement through thermodynamic expansion. However, one cannot create a particular kind of artifact just by designing something with the intention that it be used for some particular purpose: a member of the kind so created must actually be useful for that purpose.

Notions of kinds

Multiple realizability fully applies only to functional kinds, not to artifact kinds. Artifact kinds share an operational principle that gives them some commonality in physical features, and this commonality becomes stronger once a particular artifact kind is subdivided into narrower kinds. Since these kinds are specified in terms of physical and geometrical parameters, they are much closer to the natural kinds of science, in that they support law-like regularities; as discussed in the metaphysics of artifacts and artifact kinds.

Metaphysics of artifacts

Aristotle's doctrine of the four causes—material, formal, efficient and final—can be regarded as a third early contribution to the philosophy of technology. Aristotle explained this doctrine by referring to technical artifacts such as houses and statues (Physics II.3). The four causes are still very much present in modern discussions related to the metaphysics of artifacts. Discussions of the notion of function focus on its inherent teleological or 'final' character and the difficulties this presents to its use in biology. In modern philosophy Hobbes showed a conflict between unity of matter and unity of form as principles of individuation. This conflict is seen by many as characteristic of artifacts and David Wiggins (1980: 89) takes it even to be the defining characteristic of artifacts.

Rational Design

In technological images Plato and Aristotle described the world as the work of an Artisan, the Demiurge and the former's images were drawn from carpentry, weaving, ceramics, metallurgy, and agricultural technology. Aristotle used comparisons drawn from the arts and crafts to illustrate how final causes are at work in natural processes. Both Plato and Aristotle found technological imagery indispensable for expressing their belief in the rational design of the universe (Lloyd 1973: 61).

Philosophy and Technology

Although there was much technological progress in the Roman empire and during the Middle Ages, philosophical reflection on technology did not grow at a corresponding rate. Comprehensive works such as

Vitruvius' *De architectura* (first century BC) and Agricola's *De re metallica* (1556) paid much attention to practical aspects of technology but little to philosophy.

Imitation

Mechanical arts were generally considered to be born of—and limited to—the mimicry of nature. This view was challenged when alchemy was introduced in the Latin West around the mid-twelfth century. Some alchemical writers such as Roger Bacon were willing to argue that human art, even if learned by imitating natural processes, could successfully reproduce natural products or even surpass them (Newman 2004). The result was a philosophy of technology in which human art was raised to a level of appreciation not found in other writings until the Renaissance. However, the last three decades of the thirteenth century witnessed an increasingly hostile attitude by religious authorities toward.

Francis Bacon

The Renaissance led to a greater appreciation of human beings and their creative efforts, including technology. As a result, philosophical reflection on technology and its impact on society increased. Francis Bacon is generally regarded as the first modern author to put forward such reflection. His view, expressed in his fantasy *New Atlantis* (1627), was overwhelmingly positive. This positive attitude lasted well into the nineteenth century, incorporating the first half-century of the industrial revolution.

Karl Marx

Karl Marx did not condemn the steam engine or the spinning mill for the vices of the bourgeois mode of production; he believed that ongoing technological innovations were necessary steps toward the more blissful stages of socialism and communism of the future as Bimber 1990 discussed and as Van der Pot 1985 [1994/2004] appreciated the development of technology.

Butler and Darwin

A turning point in the appreciation of technology as a socio-cultural phenomenon is marked by Samuel Butler's *Erewhon* (1872), written under the influence of the Industrial Revolution, and Darwin's *On the Origin of Species* (1859). Butler's book gave an account of a fictional country where all machines are banned and the possession of a machine or the attempt to build one is a capital crime. The people of this country had become convinced by an argument that ongoing technical improvements are likely to lead to a 'race' of machines that will replace mankind as the dominant species on earth.

Critical Appreciation

During the last quarter of the nineteenth century and most of the twentieth century a critical attitude predominated in philosophical reflection on technology. The representatives of this attitude were, overwhelmingly, schooled in the humanities or the social sciences and had virtually no first-hand knowledge of engineering practice. Whereas Bacon wrote extensively on the method of science and conducted physical experiments himself, Butler was a clergyman. Ernst Kapp, was the first to use the term 'philosophy of technology' in his book *Eine Philosophie der Technik* (1877 [2018]), was a philologist and historian. Martin Heidegger (1954 [1977]), Hans Jonas (1979 [1984]), Arnold Gehlen (1957 [1980]), Günther Anders (1956), and Andrew Feenberg (1999) wrote critically about technology and its socio-cultural role during the twentieth century and were philosophers of a general outlook. Others such as Lewis Mumford (1934) was literary critic and social researcher, Jacques Ellul (1954 [1964]) was law expert, Langdon Winner (1977, 1980, 1983) was of political science and Albert Borgmann (1984) was of literary studies. The form of philosophy of technology constituted by the writings of these and others has been called by Carl Mitcham (1994) "humanities philosophy of technology", because it takes its point of departure from the social sciences and the humanities rather than from the practice of technology, and it approaches technology accepting "the primacy of the humanities over technologies" (1994: 39), since technology originates from the goals and values of humans.

Critics of technology

Humanities philosophers of technology like (Jonas, Gehlen), (Winner), (Mumford), (Ellul), (Hannah Arendt), and (Heidegger) grasped its relations to morality, politics, the structure of society, human culture, the human condition or metaphysics respectively. These philosophers were almost all openly critical of technology: had a negative judgment of the way technology has affected human society and culture, or at least they singled out for consideration the negative effects of technology on human society and culture. This does not necessarily mean that technology itself is pointed out as the principal cause of these negative developments. Heidegger, called the paramount position of technology in modern society as a wrongheaded attitude towards Being which has been on the rise for almost 25 centuries. Can he still be a philosopher of technology? Arendt also discussed *The Human Condition* (1958) in the same way.

Heidegger

Heidegger however, adopted a more neutral rather than overall negative view of technology and its meaning for human life and culture and Ihde (1979, 1993) and Verbeek (2000 [2005]) followed him.

Development

Humanities philosophy of technology continues to be influenced not so much by developments in philosophy (e.g., philosophy of science, philosophy of action, philosophy of mind) but by developments in the social sciences and humanities. Ihde and Heidegger, position their work as phenomenologist or postphenomenologist. In the 1980s the 'Science and Technology Studies' (STS), explored how social, political, and cultural values affect scientific research and technological innovation, and how these in turn affect society, politics, and culture. The wide variety of views including 'Ethical and Social Aspects of Technology' existed in this field. Mitcham's 1994 book provides an excellent overview. Olsen, Selinger and Riis (2008) offer a collection of more recent contributions; Scharff and Dusek (2003 [2014]) and Kaplan (2004 [2009]) present comprehensive anthologies of texts from this tradition.

Engineering Philosophy of Technology

Mitcham contrasts 'humanities philosophy of technology' to 'engineering philosophy of technology', where the latter refers to philosophical views developed by engineers or technologists as "attempts ... to elaborate a technological philosophy" (1994: 17). Engineering philosophers of technology, included Ernst Kapp, Peter Engelmeier, Friedrich Dessauer, and much more briefly Jacques Lafitte, Gilbert Simondon, Hendrik van Riessen, Juan David García Bacca, R. Buckminster Fuller and Mario Bunge, who shared mainly the absence of a 'working relation' with established philosophical disciplines. It is not so clear what sort of questions and concerns underlie the notion of 'engineering philosophy of technology'. The work of Jacques Ellul, analysed differences of attitude or appreciation.

Analytic Philosophy

'Analytic' philosophy is not primarily concerned with the relations between technology and society but with technology itself. It looks upon technology as a phenomenon that should be studied in detail and regards technology as something grounded in a practice, basically the practice of engineering. It analyses this practice, its goals, its concepts and its methods, and it relates its findings to various themes from philosophy.

Analytic philosophy of technology could be thought to amount to the philosophy of engineering.

Philosophy of Engineering

Analytic philosophy of technology is therefore significantly broader than philosophy of engineering. Philosophy of Technology and Engineering Sciences (Meijers 2009), an extensive up-to-date overview, expresses the view that technology and engineering do not coincide. There is no clear conception of what makes technology different from engineering, or more than engineering. In fact, the existence of humanities

philosophy of technology and analytic philosophy of technology next to each other reflects a basic ambiguity in the notion of technology.

Science and Technology

Skolimowski and Simon claimed that technology is about what is to be or what ought to be rather than what is and thus it may serve to distinguish it from science.

Technology is an ongoing attempt to bring the world closer to the way one wishes it to be. Whereas science aims to understand the world as it is, technology aims to change the world. "Scientists are often personally motivated in their attempts at describing and understanding the world, but engineers do not seem to undertake their attempts to change the world as a service to the public. The ideas on what is to be or what ought to be are seen as originating outside of technology itself; engineers then take it upon themselves to realize these ideas. This view is a major source for the widely spread picture of technology as being instrumental, as delivering instruments ordered from 'elsewhere', as means to ends specified outside of engineering, a picture that has served further to support the claim that technology is neutral with respect to values.

What ought to be

This view involves a considerable distortion of reality, however. Many engineers are intrinsically motivated to change the world; in delivering ideas for improvement they are their own best customers. The same is true for most industrial companies, particularly in a market economy, where the prospect of great profits is another powerful motivator. As a result, much technological development is 'technology-driven'.

Engineering

Technology or engineering as a practice is concerned with the creation of artifacts and, of artifact-based services. The design process forms the core of the practice of technology.

Design

The design process (Suh 2001) is commonly represented as consisting of a series of translational steps; 1. the customer's needs or wishes, translated into a list of functional requirements, 2. which then defines the design task an engineer has to accomplish. The functional requirements specify as precisely as possible what the device to be designed must be able to do. 3. In the second step, the functional requirements are translated into design specifications, with the exact physical parameters of crucial components by which the functional requirements are going to be met. 4. The design parameters chosen to satisfy these requirements are combined and made more precise such that a blueprint of the device results. 5. The blueprint contains all the details that must be known such that the final step to the process of manufacturing the device can take place. Neither a blueprint nor a prototype can be considered the end product of engineering design. 6. Actual copies of a device are crucial for the purpose of prototyping and testing, which presuppose that the sequence of steps making up the design process can and will often contain iterations, leading to revisions of the design parameters and/or the functional requirements. 7. Even though, the manufacture of a product for delivery to its customers or to the market comes after the closure of the design phase, the manufacturing process (putting restrictions on the number of different components of which the device consists) is often reflected in the functional requirements of a device. 8. The complexity of a device will affect how difficult it will be to maintain or repair it, and ease of maintenance or low repair costs are often functional requirements and, 9. An important modern development is that the complete life cycle of an artifact is now considered to be the designing engineer's concern, up till the final stages of the recycling and disposal of its components and materials, and the functional requirements of any device should reflect this.

Satisfaction

First of all many design tasks are defined by engineers themselves, by noticing something to be improved in existing products. But design starts with a problem pointed out by some societal agent, which

engineers are then invited to solve. Many such problems, however, are ill-defined or wicked problems, meaning that it is not at all clear what the problem is exactly and what a solution to the problem would consist in. The 'problem' is a situation that people find unsatisfactory, but typically without being able to specify a situation that they find more satisfactory in other terms than as one in which the problem has been solved. In particular it is not obvious that a solution to the problem would consist in some artifact, or some artifactual system or process, being made available or installed. Engineering departments all over the world advertise that engineering is problem solving, and engineers easily seem confident that they are best qualified to solve a problem when they are asked to, whatever the nature of the problem. This has led to the phenomenon of a technological fix, the solution of a problem by a technical solution, whether this solves the problem or whether it was the best way of handling the problem.

Geoengineering

An example of a technological fix for the problem of global warming would be the currently much debated option of injecting sulfate aerosols into the stratosphere to offset the warming effect of greenhouse gases - carbon dioxide and methane. Such schemes of geoengineering would allow us to avoid facing the painful choices that will lead to a reduction of the emission of greenhouse gases into the atmosphere, but will at the same time allow the depletion of the Earth's reservoir of fossil fuels to continue. Given this situation, and its hazards, the notion of a problem and a taxonomy of problems deserve to receive more philosophical attention than they have hitherto received.

Social engineering

These wicked problems are often broadly social problems, which would best be met by some form of 'social action', which would result in people changing their behavior or acting differently in such a way that the problem would be mitigated or even disappear completely. But the repertoire of 'proven' forms of social action is meager. The temptation of technical fixes could be overcome by the inclusion of the social sciences in the systematic development and application of knowledge to the solution of human problems. This however, is a controversial view. Social engineering is to many a specter to be kept at as large a distance as possible instead of an ideal to be pursued. Karl Popper referred to acceptable forms of implementing social change as 'piecemeal social engineering' and contrasted it to the revolutionary but completely unfounded schemes advocated by, e.g., Marxism.

Science

An important input for the design process is scientific knowledge: knowledge about the behavior of components and the materials they are composed of in specific circumstances. This is the point where science is applied. However, much of this knowledge is not directly available from the sciences, so this scientific knowledge is therefore often generated within technology, by the engineering sciences. But apart from this very specific scientific knowledge, engineering design involves various other sorts of knowledge.

The aeronautical engineering

The aeronautical engineer Walter Vincenti (1900) gave a six-fold categorization of engineering design knowledge (leaving aside production and operation as the other two basic constituents of engineering practice) namely categorization of 1. Fundamental design concepts, including the operational principle and the normal configuration of a particular device 2. of Criteria and specifications; 3. of Theoretical tools; 4. of Quantitative data; 5. of Practical considerations; and 6. of Design instrumentalities.

Descriptive and Normative Science

The quantitative knowledge and the theoretical tools match Bunge's notion of substantive technological theories. The status of the remaining four categories is much less clear from the well-explored context of science. They represent prescriptive forms of knowledge rather than descriptive ones. Here, the activity of design introduces an element of normativity, which is absent from scientific knowledge. Take such a basic notion as 'operational principle', which refers to the way in which the function of a device is realized,

or, in short, how it works. This is still a purely descriptive notion. Subsequently, however, it plays a role in arguments that seek to prescribe a course of action to someone who has a goal that could be realized by the operation of such a device. At this stage, the issue changes from a descriptive to a prescriptive or normative one. An extensive discussion of the various kinds of knowledge relevant to technology is offered by Houkes (2009).

Action forms

Although the notion of an operational principle (Polanyi 1958) is central to engineering design, no single clear-cut definition of it seems to exist. The issue of disentangling descriptive from prescriptive aspects in an analysis of the technical action and its constituents has hardly begun as it requires a clear view on the extent and scope of technology. Joseph Pitt in his book *Thinking About Technology* (1999) defines technology broadly as ‘humanity at work’, and could not distinguish between technological action and action in general and the study of technological action must absorb all descriptive and normative theories of action, including the theory of practical rationality, and much of theoretical economics. Tadeusz Kotarbinski’s *Praxiology* (1965) attempted at it, but a perspective of such generality makes it difficult to arrive at results of sufficient depth. It would be a challenge for philosophy to specify the differences among action forms and the reasoning grounding them in, to single out three prominent fields of study, technology, organization and management, and economics.

Design Science

According to Ilkka Niiniluoto’s (1993), the theoretical framework of technology as the practice is concerned with what the world should be like rather than is, and forms the counterpoint to the descriptive framework of science, so it is design science. The content of design science, would then be formed by technical norms, statements of the form being ‘If one wants to achieve X, one should do Y’. The latter have a truth value but the former have not. Von Wright himself, however, wrote that he did not understand the mutual relations between these statements. Ideas on what design science is and can and should be are evidently related to the broad problem area of practical rationality—practical reason and instrumental rationality—and also to means-ends reasoning.

Practical rationality

Though creativity, Design is an activity that is subject to rational scrutiny and it is a form of action, a structured series of decisions to proceed in one way rather than another, the form of rationality that is relevant to it is practical rationality, the rationality incorporating the criteria on how to act, given particular circumstances. This suggests a clear division of labor between the part to be played by rational scrutiny and the part to be played by creativity. Theories of rational action generally conceive their problem situation as one involving a choice among various course of action open to the agent. Rationality then concerns the question how to decide among given options, whereas creativity concerns the generation of these options. This distinction is similar to the distinction between the context of justification and the context of discovery in science. The suggestion that is associated with this distinction, however, that rational scrutiny only applies in the context of justification, is difficult to uphold for technological design. In science, the practical consequences of entertaining a particular theory are not taken into consideration, in technology the context of discovery is governed by severe constraints of time and money, and an analysis of the problem how best to proceed certainly seems in order and an overview of the issues is given in Kroes, Franssen, and Bucciarelli (2009).

Decision

Herbert Simon on bounded rationality (Simon 1982) shows when to stop generating options and when to stop gathering information about these options and the consequences when they are adopted in decision making and avoid informational overload and calculative intractability. Simon’s ideas on bounded rationality since their conception in the 1950s cannot be developed further. Another notion that is relevant here is means-ends reasoning. In order to be of any help here, theories of means-ends reasoning should then concern not just

the evaluation of given means with respect to their ability to achieve given ends, but also the generation or construction of means for given ends. A comprehensive theory of means-ends reasoning, however, is not yet available. In the practice of technology, alternative proposals for the realization of particular functions are usually taken from 'catalogs' of existing and proven realizations. These catalogs are extended by ongoing research in technology rather than under the urge of particular design tasks.

Design and value

Engineering design is governed by considerations of practical rationality, where a match between beliefs and desires or goals is sought. The desires or goals are represented by their value or utility for the decision maker, who chooses an action that realizes a situation that has maximal value or utility. Now the instrumental perspective on technology implies that the value in the design process is the value of the users of the technology so created. It is supposed to be represented in the functional requirements defining the design task. Instead, the value to be maximized is the extent to which a particular design meets the functional requirements defining the design task. But engineers' overall perspective on engineering design is an exercise in optimization, which is not a value driving engineering design.

Optimal attainment

The functional requirements set levels to be attained minimally. It is then up to the engineer to choose how far to go beyond meeting the requirements in this minimal sense. Efficiency, a prime value is pursued by other values such as safety and, more recently, sustainability. But engineers aim to maximize by market success and their maximization effort will be directed at the predictors of market success including meeting the functional requirements efficiently and safely, but additional methods, informed by market research, may introduce additional factors or may lead to a hierarchy among the factors.

Optimal Solution

Choosing the design option that maximally meets all the functional requirements becomes the practical decision-making problem to be solved in a particular engineering-design task. The engineer faces a multi-criteria decision problem. The various requirements come in terms of design parameters and measurement procedures for assessing their performance. This results in various options out of which a choice is to be made. With a final score the option that scores best can be considered the optimal solution to the design problem. Engineers describe this situation as relatively good or bad. Franssen (2005) likens this problem with structurally similar problem of social choice, and Kenneth Arrow proved (1950) that there exists no general rational solution method for this problem. This nullifies the claim of engineers that their designs are optimal solutions, since Arrow's theorem implies that in most multi-criteria problems the notion of 'optimal' cannot be rigorously defined.

Art

This results in excepting a crucial aspect of engineering activity from philosophical scrutiny, and engineering is at least partly an art, not a science. 'Approximative' forms of reasoning may include Herbert Simon's bounded rationality, plus the related notion of 'satisficing'. We are still lacking a general theory of bounded rationality, which may be in the nature of forms of approximative reasoning.

Team work

In modern technology almost all design is done by team work. Such team-works are composed of expertises from many different disciplines with its own theories, models of interdependencies, assessment criteria, and so forth and the professionals belonging to these disciplines are inhabitants of different object worlds, who are, therefore, likely to disagree on the relative rankings and evaluations of the various design options under discussion. Agreement on one option as the overall best one can here be even less arrived at by an algorithmic method exemplifying engineering rationality. Instead, models of social interaction, such as bargaining and strategic thinking, are relied upon.

Normative process

Technological design is a decision-making process and normative from the point of view of practical or instrumental rationality. At the same time it is a description of how engineering methodology generally presents the issue how to solve design problems. So there is room for all kinds of normative questions, such as whether the functional requirements defining a design problem can be seen as an adequate representation of the values of the prospective users of an artifact or a technology. By these methods values such as safety and sustainability can best be elicited and represented in the design process.

Dimensions

Technology can be said to have two ‘cores’ or ‘dimensions’, which can be referred to as instrumentality and productivity. Instrumentality covers the totality of human endeavours to control their lives and their environments by interfering with the world in an instrumental way, by using things in a purposeful and clever way. Productivity covers the totality of human endeavours to bring new things into existence that can do certain things in a controlled and clever way. For the study of instrumentality, natural objects were always available to serve our purposes. Likewise, the analysis of what is involved in the making of artifacts, and how the notion of artifact and of something new being brought into existence are to be understood. Clearly, humanities philosophy of technology has until now been more attracted by the instrumentality core whereas analytic philosophy of technology has mainly gone for the productivity core. But technology as one of the basic phenomena of modern society, if not the most basic one, clearly is constituted by the processes centering on and involving both cores. To come to an overarching approach in which the interaction between these two dimensions of technology are adequately dealt with is difficult, no doubt partly due to the great differences in philosophical orientation and methodology associated with the two traditions and their separate foci. To improve this situation is arguably the most urgent challenge that the field of philosophy of technology as a whole is facing, since the continuation of the two orientations leading their separate lives threatens its unity and coherence as a discipline in the first place.

Philosophy of Practices

Philosophy of Technology and Philosophy of Science are Philosophies of Practices. They show such great differences, given that few practices in our society are as closely related as science and technology. Experimental science is nowadays crucially dependent on technology for the realization of its research set-ups and for gathering and analyzing data. The phenomena that modern science seeks to study could never be discovered without producing them through technology.

Pure Science

Theoretical research within technology has come to be often indistinguishable from theoretical research in science, making engineering science largely continuous with ‘ordinary’ or ‘pure’ science. This is a relatively recent development, which started around the middle of the nineteenth century, and is responsible for great differences between modern technology and traditional, craft-like techniques. The educational training that aspiring scientists and engineers receive starts off being largely identical and only gradually diverges into a science or an engineering curriculum. Ever since the scientific revolution of the seventeenth century, characterized by its two major innovations, the experimental method and the mathematical articulation of scientific theories, philosophical reflection on science has focused on the method by which scientific knowledge is generated, on the reasons for thinking scientific theories to be true, or approximately true, and on the nature of evidence and the reasons for accepting one theory and rejecting another. Hardly ever have philosophers of science posed questions that did not have the community of scientists, their concerns, their aims, their intuitions, their arguments and choices, as a major target. In contrast it is only recently that the philosophy of technology has discovered the community of engineers.

Philosophy of Science and technology

The philosophy of technology, and not the philosophy of science, targeted first of all the impact of technology—and with it science—on society and culture, because science affects society only through technology. Right from the start of the scientific revolution, however, science affected human culture and thought fundamentally and directly, not with a detour through technology, and the same is true for later developments such as relativity, atomic physics and quantum mechanics, the theory of evolution, genetics, biochemistry, and the increasingly dominating scientific world view overall. Philip Kitcher, to name but one prominent philosopher of science, has since 2000 written books on the relation of science to politics, ethics and religion (Kitcher 2001, 2011).

Science and Philosophy

Science emerged in the seventeenth century from philosophy itself. The answers that Galileo, Huygens, Newton, and others gave, by which they initiated the alliance of empiricism and mathematical description that is so characteristic of modern science, were answers to questions that had belonged to the core business of philosophy since antiquity. Science, therefore, kept the attention of philosophers. Philosophy of science is a transformation of epistemology in the light of the emergence of science. The foundational issues—the reality of atoms, the status of causality and probability, questions of space and time, the nature of the quantum world—that were so lively discussed during the end of the nineteenth and the beginning of the twentieth century are an illustration of this close relationship between scientists and philosophers. No such intimacy has ever existed between those same philosophers and technologists; their worlds still barely touch. Compared to the continuity existing between natural philosophy and science, a similar continuity exists between central questions in philosophy having to do with human action and practical rationality and the way technology approaches and systematizes the solution of practical problems. To investigate this connection may indeed be considered a major theme for philosophy of technology. This continuity appears only by hindsight, however, and dimly, as the historical development is at most a slow convening of various strands of philosophical thinking on action and rationality, not a development into variety from a single origin. Ellul who has recognized in technology the emergent single dominant way of answering all questions concerning human action, comparable to science as the single dominant way of answering all questions concerning human knowledge (Ellul 1954 [1964]). It is all the more important to point out that humanities philosophy of technology cannot be differentiated from analytic philosophy of technology by claiming that only the former is interested in the social environment of technology. B. Preston 2012 studied and addressed specifically the relation of technology to society and culture, and equally the relevance of social relations to practices of technology, without taking an evaluative stand with respect to technology.

The Relationship Between Technology and Science

The predominant position of science in the philosophical field of vision made it difficult for philosophers to recognize that technology merits special attention for involving issues that do not emerge in science.

In 1966, in a special issue of the journal *Technology and Culture*, Henryk Skolimowski argued that technology is something quite different from science (Skolimowski 1966). As he phrased it, science concerns itself with what is, whereas technology concerns itself with what is to be. A few years later, in his well-known book *The Sciences of the Artificial* (1969), The study of technology, therefore, was not expected to pose new challenges nor hold surprises regarding the interests of analytic philosophy.

Substantive and operative

In contrast, Mario Bunge (1966) defended the view that technology is applied science, he acknowledges that technology is about action, but an action heavily underpinned by theory—that is what distinguishes technology from the arts and crafts and puts it on a par with science. According to Bunge, theories in technology come in two types: substantive theories, which provide knowledge about the object of action, and operative theories, which are concerned with action itself. The substantive theories of technology are indeed largely applications of scientific theories. The operative theories, in contrast, are not preceded by scientific theories but are born in applied research itself.

Knowledge

Ian Jarvie (1966) proposed as important questions for a philosophy of technology what the epistemological status of technological statements is and how technological statements are to be demarcated from scientific statements. This suggests a thorough investigation of the various forms of knowledge occurring in either practice of the forms of knowledge that are characteristic of technology and are lacking, or of much less prominence, in science. A distinction between ‘knowing that’—traditional propositional knowledge—and ‘knowing how’—non-articulated and even impossible-to-articulate knowledge—had been introduced by Gilbert Ryle (1949) in a different context. The notion of ‘knowing how’ was taken up by Michael Polanyi under the name of tacit knowledge and made a central characteristic of technology (Polanyi 1958). However, emphasizing too much the role of unarticulated knowledge, of ‘rules of thumb’ easily underplays the importance of rational methods in technology. An emphasis on tacit knowledge may also be ill-fit for distinguishing the practices of science and technology because the role of tacit knowledge in science is more in concluding causal relationships on the basis of empirical evidence as Thomas Kuhn on theory change in science (Kuhn 1962) wrote.

Artificial Intelligence

There is at least one additional technology-related topic that ought to be mentioned because it has created a good deal of analytic philosophical literature, namely Artificial Intelligence and related areas. A full discussion of this vast field is to be found in the entries on Turing machines, the Church-Turing thesis, computability and complexity, the Turing test, the Chinese room argument, the computational theory of mind, functionalism, multiple realizability, and the philosophy of computer science.

It was not until the twentieth century that the development of the ethics of technology as a systematic and more or less independent subdiscipline of philosophy started. This late development may seem surprising given the large impact that technology has had on society, especially since the industrial revolution.

Ethics

A plausible reason for this late development of ethics of technology is the instrumental perspective on technology. This perspective implies, basically, a positive ethical assessment of technology: technology increases the possibilities and capabilities of humans, which seems in general desirable. Of course, since antiquity, it has been recognized that the new capabilities may be put to bad use or lead to human hubris. Often, however, these undesirable consequences are attributed to the users of technology, rather than the technology itself, or its developers. This vision is known as the instrumental vision of technology resulting in the so-called neutrality thesis. The neutrality thesis holds that technology is a neutral instrument that can be put to good or bad use by its users. During the twentieth century, this neutrality thesis met with severe critique, most prominently by Heidegger and Ellul, who have been mentioned in this context, but also by philosophers from the Frankfurt School, such as Horkheimer and Adorno (1947 [2002]), Marcuse (1964), and Habermas (1968 [1970]).

Conceptualization

The scope and the agenda for ethics of technology to a large extent depend on how technology is conceptualized. The second half of the twentieth century has witnessed a richer variety of conceptualizations of technology that move beyond the conceptualization of technology as a neutral tool, as a world view or as a historical necessity. This includes conceptualizations of technology as a political phenomenon (Winner, Feenberg, Sclove), as a social activity (Latour, Callon, Bijker and others in the area of science and technology studies), as a cultural phenomenon (Ihde, Borgmann), as a professional activity (engineering ethics, e.g., Davis), and as a cognitive activity (Bunge, Vincenti). Despite this diversity, the development in the second half of the twentieth century is characterized by two general trends. One is a move away from technological determinism and the other is a move away from ethical reflection on technology. Both trends asked number of ethical questions about technology. The developments also imply that ethics of technology should inform, not

only about the exact consequences of specific technologies but also about the actions of engineers and the process of technological development. This involved other disciplines in ethical reflections on technology, such as Science and Technology Studies (STS) and Technology Assessment (TA).

Approaches in the Ethics of Technology

Not only is the ethics of technology characterized by a diversity of approaches, it might even be something like a subdiscipline of ethics of technology, in the sense of a community of scholars working on a common set of problems, exists. The scholars studying ethical issues in technology have diverse backgrounds (e.g., philosophy, STS, TA, law, political science) and they do not always consider themselves (primarily) ethicists of technology. To give the reader an overview of the field, three basic approaches or strands that might be distinguished in the ethics of technology will be discussed.

Political approaches

Both cultural and political approaches build on the traditional philosophy and ethics of technology of the first half of the twentieth century. Whereas cultural approaches conceive of technology as a cultural phenomenon that influences our perception of the world, political approaches conceive of technology as a political phenomenon, i.e., as a phenomenon that is ruled by and embodies institutional power relations between people.

Cultural approaches

Cultural approaches are often phenomenological in nature as propounded by Don Ihde, Albert Borgmann, Peter-Paul Verbeek and Evan Selinger (e.g., Borgmann 1984; Ihde 1990; Verbeek 2000 [2005], 2011). The approaches are usually influenced by developments in STS, especially the idea that technologies contain a script that influences not only people's perception of the world but also human behavior, and ideas has led some to claim that technology has (moral) agency, a claim that is discussed below.

Structure of production

Marx assumed that the material structure of production in society, in which technology is obviously a major factor, determined the economic and social structure of that society. Similarly, Langdon Winner argued that technologies can embody specific forms of power and authority (Winner 1980). Some technologies are inherently normative in the sense that they require or are strongly compatible with certain social and political relations. Railroads seem to require a certain authoritative management structure. Technologies may be political due to the particular way they have been designed. Some political approaches to technology are inspired by (American) pragmatism and discourse ethics. A number of philosophers, have pleaded for a democratization of technological development and the inclusion of ordinary people in the shaping of technology (Winner 1983; Sclove 1995; Feenberg 1999).

Pragmatist Ethics

Many philosophers who have adopted political approaches do not engage in explicit ethical reflection on technology. In the volume *Pragmatist Ethics for a Technological Culture* (Keulartz et al. 2002), philosophers plead for a revival of the pragmatist tradition in moral philosophy because it is better fit to deal with a number of moral issues in technology. Instead of focusing on how to reach and justify normative judgments about technology, a pragmatist ethics focuses on how to recognize and trace moral problems in the first place.

Engineering ethics

Engineering ethics is a relatively new field of education and research. According to this approach, engineering is a profession, in the same way as medicine is a profession.

Although there is no agreement on how a profession exactly should be defined, the following characteristics are often mentioned:

A profession relies on specialized knowledge and skills that require a long period of study;
 The occupational group has a monopoly on the carrying out of the occupation;
 The assessment of whether the professional work is carried out in a competent way is done by, and it is accepted that this can only be done by, professional peers;
 A profession provides society with products, services or values that are useful or worthwhile for society, and is characterized by an ideal of serving society;
 The daily practice of professional work is regulated by ethical standards, which are derived from or relate to the society-serving ideal of the profession.
 Typical ethical issues that are discussed in engineering ethics are professional obligations of engineers as exemplified in, for example, codes of ethics of engineers, the role of engineers versus managers, competence, honesty, whistle-blowing, concern for safety and conflicts of interest (Davis 1998, 2005; Martin & Schinzinger 2005; Harris, Pritchard, & Rabins 2008).

Recently, a number of authors have pleaded for broadening the traditional scope of engineering ethics (e.g., Herkert 2001, van de Poel & Royakkers 2011). Broadening the scope of engineering ethics would then, among others, imply more attention for such issues as sustainability and social justice.

Ethics of specific technologies

The last decades have witnessed an increase in ethical inquiries into specific technologies. This may now be the largest of the three strands discussed, especially given the rapid growth in technology-specific ethical inquiries in the last two decades. One of the most visible new fields is probably computer ethics with more recently a focus on robotics, artificial intelligence, machine ethics, and the ethics of algorithms. But biotechnology has spurred dedicated ethical investigations as well. More traditional fields like architecture and urban planning have also attracted specific ethical attention (Fox 2000). More recently, nanotechnology and so-called converging technologies have led to the establishment of what is called nanoethics (Allhoff et al. 2007). Other examples are the ethics of nuclear deterrence (Finnis et al. 1988), nuclear energy (Taebi & Roeser 2015) and geoengineering (C. Preston 2016).

Nanotechnology

Several authors have for example argued that there is no need for nanoethics because nanotechnology does not raise any really new ethical issues (e.g., McGinn 2010). The alleged absence of newness here is supported by the claim that the ethical issues raised by nanotechnology are a variation on, and sometimes an intensification of, existing ethical issues, but hardly really new, and by the claim that these issues can be dealt with the existing theories and concepts from moral philosophy.

Applied Ethics

The new fields of ethical reflection are often characterized as applied ethics, that is, as applications of theories, normative standards, concepts and methods developed in moral philosophy. 'Application' therefore often leads to new insights which might well result in the reformulation or at least refinement of existing normative standards, concepts and methods. Beauchamp and Childress for example have proposed a number of general ethical principles for biomedical ethics (Beauchamp & Childress 2001). These principles are more specific than general normative standards, but still so general and abstract that they apply to different issues in biomedical ethics. In computer ethics, existing moral concepts relating to privacy and ownership has been redefined and adapted to deal with issues which are typical for the computer age (Johnson 2003). New fields of ethical application might also require new methods for discerning ethical issues. How to deal with the uncertainties about (potential) social and ethical impacts that typically surround new emerging technologies is answered by Brey's (2012) proposal for an anticipatory ethics.

Fields of ethical reflection

Although different fields of ethical reflection on specific technologies might well raise their own philosophical and ethical issues, such subfields allow interaction with relevant non-philosophical experts in law, psychology, economy, science and technology studies (STS) or technology assessment (TA). A lot can be learned from interaction and discussion between ethicists specializing in different technologies, and a fruitful interaction with the two other strands discussed above (cultural and political approaches and engineering ethics).

Some Recurrent Themes in the Ethics of Technology

We now turn to the description of some themes in the ethics of technology. We focus on a number of general themes that provide an illustration of general issues in the ethics of technology and the way these are treated.

Neutrality versus moral agency

Technology is value-laden. Some authors have maintained that technology is value-neutral, it is just a neutral means to an end, and accordingly can be put to good or bad use (e.g., Pitt 2000). This view might have some plausibility in as far as technology is considered to be just a bare physical structure. Most philosophers of technology, however, agree that technological development is a goal-oriented process. Conceptual connection between technological artifacts, functions and goals makes it hard to maintain that technology is value-neutral. The value-ladenness of technology can be construed in a host of different ways. Some authors have maintained that technology can have moral agency, that technologies can autonomously and freely ‘act’ in a moral sense and can be held morally responsible for their actions.

Moral agency

The debate whether technologies can have moral agency started off in computer ethics but has since broadened. Typically, the authors who claim that technologies (can) have moral agency often redefine the notion of agency or its connection to human will and freedom. A disadvantage of this strategy is that it tends to blur the morally relevant distinctions between people and technological artifacts. More generally, the claim that technologies have moral agency sometimes seems to have become shorthand for claiming that technology is morally relevant. This, however, overlooks the fact technologies can be value-laden in other ways than by having moral agency. One might, for example, claim that technology enables (or even invites) and constrains (or even inhibits) certain human actions and the attainment of certain human goals and therefore is to some extent value-laden, without claiming moral agency for technological artifacts.

Artificial agent

James Moor (2006) has distinguished between four ways in which artificial agents may be or become moral agents:

Ethical impact agents are robots and computer systems that ethically impact their environment; this is probably true of all artificial agents.

Implicit ethical agents are artificial agents that have been programmed to act according to certain values.

Explicit ethical agents are machines that can represent ethical categories and that can ‘reason’ (in machine language) about these.

Full ethical agents in addition also possess some characteristics we often consider crucial for human agency, like consciousness, free will and intentionality.

It might perhaps never be possible to technologically design full ethical agents, and if it were to become possible it might be questionable whether it is morally desirable to do so (Bostrom & Yudkowsky 2014).

Responsibility

Responsibility has always been a central theme in the ethics of technology. Ellul, for example, has characterized engineers as the high priests of technology, who cherish technology but cannot steer it. Hans

Jonas (1979 [1984]) has argued that technology requires an ethics in which responsibility is the central imperative because for the first time in history we are able to destroy the earth and humanity.

Code of ethics

In engineering ethics, the code of ethics stress three types of responsibilities of engineers: (1) conducting the profession with integrity and honesty and in a competent way, (2) responsibilities towards employers and clients and (3) responsibility towards the public and society. With respect to the latter, most US codes of ethics maintain that engineers ‘should hold paramount the safety, health and welfare of the public’.

Individual responsibility

As has been pointed out by several authors (Nissenbaum 1996; Johnson & Powers 2005; Swierstra & Jelsma 2006), it may be hard to pinpoint individual responsibility in engineering. Davis (2012) nevertheless maintains that despite such difficulties individual engineers can and do take responsibility.

Notion of responsibility

Doorn (2012) compares three perspectives on responsibility ascription in engineering—a merit-based, a right-based and a consequentialist perspective—and argues that the consequentialist perspective, which applies a forward-looking notion of responsibility, is most powerful in influencing engineering practice.

Individual responsibility

The difficulty of attributing individual responsibility may lead to the Problem of Many Hands (PMH). The term was first coined by Dennis Thompson (1980) in an article about the responsibility of public officials. The term is used to describe problems with the ascription of individual responsibility in collective settings. Doorn (2010) has proposed a procedurals approach, based on Rawls’ reflective equilibrium model, to deal with the PMH; other ways of dealing with the PMH include the design of institutions that help to avoid it or an emphasis on virtuous behavior in organizations (van de Poel, Royakkers, & Zwart 2015).

Design

In the last decades, increasingly attention is paid not only to ethical issues that arise during the use of a technology, but also during the design phase.

In computer ethics, an approach known as Value Sensitive Design (VSD) has been developed to explicitly address the ethical nature of design. VSD aims at integrating values of ethical importance in engineering design in a systematic way (Friedman & Kahn 2003). ‘Design for X’ approaches in engineering aim at including instrumental values (like maintainability, reliability and costs) but they also include design for sustainability, inclusive design, and affective design (Holt & Barnes 2010). Inclusive design aims at making designs accessible to the whole population including, for example, handicapped people and the elderly (Erlandson 2008). Affective design aims at designs that evoke positive emotions with the users and so contributes to human well-being.

If one tries to integrate values into design one may run into the problem of a conflict of values. Van de Poel (2009) discusses various alternatives for dealing with value conflicts in design including the setting of thresholds (satisficing), reasoning about values, innovation and diversity.

Technological risks

The risks of technology are one of the traditional ethical concerns in the ethics of technology. Risks raise not only ethical issues but other philosophical issues, such as epistemological and decision-theoretical issues as well (Roeser et al. 2012).

Dealing with risks

The process of dealing with risks is often divided into three stages: risk assessment, risk evaluation and risk management. Of these, the second is most obviously ethically relevant. However, risk assessment already involves value judgments (Shrader-Frechette 1991). In establishing a risk on the basis of a body of empirical data one might make two kinds of mistakes. One can establish a risk when there is actually none (type I error) or one can mistakenly conclude that there is no risk while there actually is a risk (type II error). Science traditionally aims at avoiding type I errors. Several authors have argued that in the specific context of risk assessment it is often more important to avoid type II errors (Cranor 1990; Shrader-Frechette 1991).

Comparison Approach

One possible approach is to judge the acceptability of risks by comparing them to other risks or to certain standards. One could compare technological risks with naturally occurring risks. In this naturalistic fallacy is: naturally occurring risks may (sometimes) be unavoidable but that does not necessarily make them morally acceptable. More generally, it is often dubious to judge the acceptability of the risk of technology A by comparing it to the risk of technology B if A and B are not alternatives in a decision (Hansson 2004a).

Cost Approach

A second approach to risk evaluation is risk-cost benefit analysis, which is based on weighing the risks against the benefits of an activity. According to Hansson (2003: 306), ... a risk is acceptable if and only if the total benefits that the exposure gives rise to outweigh the total risks, measured as the probability-weighted disutility of outcomes.

Consent Approach

A third approach is to base risk acceptance on the consent of people who suffer the risks after they have been informed about these risks (informed consent). Technological risks usually affect a large number of people at once and informed consent may therefore lead to a “society of stalemates” (Hansson 2003: 300).

Critique

Shrader-Frechette (1991) has proposed a number of reforms in risk assessment and evaluation procedures on the basis of a philosophical critique of current practices. Roeser (2012) argues for a role of emotions in judging the acceptability of risks.

Hansson has proposed the following alternative principle for risk evaluation:

Exposure of a person to a risk is acceptable if and only if this exposure is part of an equitable social system of risk-taking that works to her advantage. (Hansson 2003: 305)

Hansson’s proposal introduces a number of moral considerations in risk evaluation that are traditionally not addressed or only marginally addressed.

Some authors have criticized the focus on risks in the ethics of technology. To deal with this, some authors have proposed to conceive of the introduction of new technology in society as a social experiment and have urged to think about the conditions under which such experiments are morally acceptable (Martin & Schinzinger 2005; van de Poel 2016). Another strand of criticism states that the focus on risks has led to a reduction of the impacts of technology that are considered (Swierstra & te Molder 2012). If ‘soft’ impacts, for example of a social or psychological nature, are neglected, then the moral evaluation of new technologies is impoverished.

Conclusion

Philosophy of New Global Technological Society is a compound of society, science, technology and world ever growing and innovating every void of aged and the perished form after form from the beginning of life on this planet. It is better to relax and let go and let come, let go and let come and, behold! you are in the

domain of enlightenment, let us embrace it with your both hands widely open and grow as ever widening circle.

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26. PSYCHOLOGY

0226025 VERMA, JYOTI (Department of Psychology, Patna University, Patna). DISCIPLINE OF PSYCHOLOGY, MULTIDISCIPLINARY APPROACH AND ISSUES RELATED TO THE GLOBAL TECHNOLOGICAL SOCIETIES: OBSERVATIONS ON EFFORTS AND POSSIBILITIES

The presentation broadly touches upon three points namely, the global technological societies and matters of common concern for social sciences; global technological societies and the scope for psychology, and multidisciplinary approach for studying the issues of such societies. The observations however, intend to highlight the possibilities for psychology for addressing the concerns related to the global technological societies in particular. Accordingly, these are discussed under the following heads: (i) The overpowering influence of technological gadgets and problems related to technology users, (ii) Changes in personal characteristics and behaviour of the over users of technology, (iii) Psychological observations for linking digital technology and the economic growth of emerging economies, (iv) Psychological insights and technology backed world of marketing and advertisement, (v) Field of education, psychologists, and digital technology and (vi) Technology backed 'global village' and globalization; a new inviting area for psychology. Effort is made to explain that the interest shown by the discipline of psychology towards the concerns of the global technological societies has borne results and further opportunities exist for implication based endeavours of the social scientists. Talking of the multidisciplinary approach, it is argued that the approach offers a suitable methodology for addressing the multi fibred and multi dimensional domains of global technological societies whose impact is seen on individuals, their social relationships and at the societal level.

Technology has made life convenient and remains the most enviable gift conceived and created by the human mind. However, considering that globally people are choosing to live in the company of digitally powered gadgets such as cell phones, computers, videogames, digital music players and video cams today, and are becoming hopelessly dependent or addicted to them, is a frightening trend. Hence, it remains questionable whether, new technologies are a guarantee to a new life and a promising future to global societies.

Having said this, one may like know 'why does this happen?' For the answer, let us refer to a video of the famous spiritual teacher, Sadguru entitled, 'How to manifest what you really want' (<https://youtube.be/UwGsgJtufY>). In this video, Sadguru explains that when the four dimensions of our existence namely, body, mind, emotions, and fundamental life energies decide to work together in one direction, innovation or for that matter, things that one wants, will manifest. He observes that innovation in technology seen in the course of last hundred years was aimed to make human life convenient. However, when we begin to use technology 'compulsively' instead of 'consciously,' technology becomes a threat to our very existence. As things stand, the global technological world has largely, become a 'compulsive' repetitive, mindless user of digital technology with pathological consequences. Apparently, our mind, body, emotions and life energies are not steering in the same direction necessary for making a 'conscious' move towards a harmless and functional relationship with technology.

Seemingly, the 'compulsive' use of technology could be associated with certain psychological matters like loneliness, wanting parenting ways, peer pressure, predominance of hedonistic inclinations, inadequate work and family life balance, social comparison, inability to decide priorities in life, confusing guiding principles of life, and inability to understand the difference between 'compulsive' and 'conscious' behaviour, etc.

Global Technological Societies and Issues of Common Concern for Social Sciences

Many issues concerning the new global technological society are listed in the congress preamble. However, it is reasonable to expect that the social sciences will use their respective discipline's perspective and understanding in responding to some broad questions like: 'How has the new technological global society affected the 'earlier social order' or has been crafting 'new social order?' Similarly, 'how the global technological societies have affected the core connection between humans and nature; and between people and their community,' and 'how social sciences ought to look at the good and the negative facets of the intangible 'virtual world' of technology, juxta-positioned against the 'real world' and its mundane concerns?' Hopefully,

social scientists can facilitate and find ways for maintaining the right balance between the two worlds between whom the individual keeps switching. Some of these fundamental questions have relevance for individuals' well being and healthy lifestyle.

Global Technological Societies and the Scope for Psychology

Coming to her own discipline namely, psychology, the presenter would like to mention matters that psychologists may find engaging. Perhaps, the first, broad question that needs their attention is: 'How technology is changing the scope of psychology?' There is reason for asking this question. To begin with, let us take note that a whole generation born between 1980 and 1994 in the global world, has been referred to as "digital natives" or the "Net generation" by Dr. Pavica Sheldon, (University of Alabama, Huntsville, USA). Psychologists would agree with Sheldon that it is not only important to understand 'how this generation uses these new tools, but also as to how the tools affect them?'

Though, psychologists cannot address all the issues comprehensively in isolation social psychologists in particular, can still ask the following questions. 1. What is the lay people's version of a global technological society and what are the social and psychological implications of their understanding? 2. What are the negative psychological effects of the global technological society? 3. What are the social psychological factors that can pronounce or reduce these negative effects? 4. What are the potential psychological benefits of a global technological society? 5. What are the social psychological factors that can enhance the positive effects of a global technological society plus, what are the limitations of these positive effects? As global technological societies have become a reality, psychologists could be curious about exploring the different facets and features of this society and sharpen their knowledge and skills that are helpful for making human and technology interface worthwhile at individual, family, community and institutional levels. Following are some issues and concerns that psychologists might like to address.

1. Attending to the overpowering influence of technological gadgets and problems related to technology users

Internet has brought the world at our fingertips and most of us cannot live without it but there is no denying that despite such overwhelming benefits, there are side effects and costs of relentless devouring of digital technology. Clinical, social and developmental psychologists, plus practicing psychotherapists, are likely to be drawn towards 'negative psychological effect of digital technology users.'

For instance, the concept of '[Fear](#) of missing out' (referred to as FOMO) is identified as a significant problem for users of technology linked to worsened mood states and overall lower life satisfaction (Baker et al., 2016). Though this concept is generally associated with younger people, researchers consider FOMO as a universal notion that cuts across cultures for technology users. Apparently, the problem did not originate with technology; nevertheless, an increasingly tech-reliant culture is likely to promote values that magnify the effects associated with FOMO. Similarly, as the digital platform brings friends, music, videos, games, shopping, and an abundance of information at a click, for some people getting away from this world or putting down their devices for an extended period of time is almost impossible. Even worse, for one minute of checking an email notification they may spend thirty minutes and doctors are calling it an 'addiction.'

The global technical societies are now realising the need for attending to the physical impact of using technology (possibly in partnership with medical and neurological sciences and physiology) ignored by psychological researches despite the fact that body and brain both are significantly impacted by technology consumption. Urban adolescents and youth in particular, are hugely smitten by the digital revolution and often interact with their gadgets on their own. Moreover they are not aware as to how the gadgets might influence and shape their interaction with others. The overpowering influence of the command obeying technological gadgets is making people captive of pathological pleasure seeking behaviour, cutting on precious time, turning family and romantic relationships unappealing and work life unproductive. Above all, addiction to technology is adversely affecting mental wellbeing, killing human sensitivity, finer emotions, aesthetic sense, soft skills and respect for relationships. On the other hand, good business relationships and improved productivity also requires limiting nonsensical interaction with technology.

Ironically, the treatment for the technology user's addictive behaviour is often digital too. For example, for the treatment of excessive users of social media particularly the smart phone user's habitual behaviours like scrolling and swiping through messages, memes, and innumerable pointless videos, could be some 'digital de-toxing' App. There are Apps for 'digital detox' with different names (i.e., Moment, Flipd, Good Night Chrome, Anti Social and Forest, etc.), that claim to help the affected users limit their screen time and spend their time more productively. These Apps are well publicised in Western countries. One of the main players of internet business, China has hundreds of internet 'detox centres' that try to help 'web junkies' turn away from their screens. In fact, a film by the name 'Web junkie' focuses on the Chinese government's classification of internet addiction as a clinical disorder and focuses on the treatment used in Chinese rehabilitation centres. Similarly, people may become OTT (media service offered directly to viewers via the internet bypassing cable, broadcast, satellite television platforms) 'addicts' spending massive chunks of time viewing all kinds of stuff.

However, there is the positive side of App base treatment and information too. For instance, one can access plentiful knowledge from the Apps and learn about mental health issues and techniques to get self-help. In that sense, digital technology, i.e., websites, Apps, and teleconferencing, offer plentiful resources for Indian clinical psychologists and psychotherapists for educating themselves. At the same time, psychotherapists must be able to assess the future of digital technology based psychotherapy and carefully judge whether such App based therapies have cultural applicability. Moreover, it is also important to address to the logistical concerns like cost and accessibility to internet and computer literacy, etc. especially in rural India when contemplating digital technology based psychotherapy and counselling.

2. Studying changes in personal characteristics and behaviour of technology over users

The facilities and pace with which digital technology gives results is amazing and often welcome. Nevertheless, psychologists would feel concerned about changes in technology users' personality and behaviour. Clinical Professor Aboujaoude (2017), also a Doctor of Medicine, makes detailed observation on the internet's potentially negative effects on personality and apprehends extension of these on the society at large. He also considers internet's potentially negative effect on personality to be investigated further because it is a fundamental part of online psychology. Accordingly, some of the personality traits nurtured by the internet are impulsivity, narcissism, and aggression ([Aboujaoude & Starcevic, 2016](#)).

[Aboujaoude \(2016\)](#) adds that impulsivity has been recognized as a risk factor for suicide across diagnoses. Moreover, rise in suicide rates has been linked to an internet effect that makes self harm impulses irresistible via providing an "encouraging" environment that weakens the offline deterrents. Similarly, there is empirical evidence to suggest that online shopping can turn into compulsive buying behaviour in some people whose motivation to buy on line has links to the immediate gratification following an internet purchase, and the ability to shop unobserved and without company ([Kukar-Kinney, Ridgway, & Monroe, 2009](#); [Duroy, Gorse, & Lejoyeux, 2014](#)).

Social media gadgets are loved because they hardly object to their commands and do not mind the user turning individualist or even narcissistic. Narcissism is a trait often featured as online behaviour. People look eagerly for their daily doses of 'likes' and 'thumbs up' but are hardly interested in genuine sharing and learning from others. In this context, the term 'cultural criticism' ([Aboujaoude, 2011](#)) would indeed attract psychologists as it concentrates on websites as vehicles for self-promotion and social networks that imply popularity by the number of 'friends' and 'followers', and emphasis on "I" in naming sites and internet-powered gadgets. The speaker is reminded of a high profile psychiatrist with obvious narcissistic trait. Each of his Whats App messages (though hardly forwarded) were self promotional statements loaded with cleverly camouflaged mention of his achievements, acquaintances with important people, his international educational background, writings and scholarly pursuits and general knowledge. Apparently, internet can act as a magnet and a magnifier when it comes to narcissistic traits.

[Aboujaoude \(2011\)](#) also has reasons to say that internet users can demonstrate more unwarranted aggression. This is a prominently noticeable in the expressions of anonymous blogging bulletin and chat room. Moreover, online interactions often ignore the standards of ethics and civility and are driven by a base instinct

trapped mode of behaviour. Examples of this tendency are evident in online shaming and name-calling, cyber bullying, racist voicing and ideologically radical opinions. On the other hand, social media is cable of instigating communal violence, and blood shedding is well known to terrorism ridden India. Results of a cross cultural study (Anderson, et al., 2010) suggests that exposure to gaming violence was a causal risk factor for offline aggression, aggressive thoughts and emotions, decreased empathy and pro-social behaviour. The point is that violent online discourse may lead to a more hostile and a less cohesive society.

Furthermore, remaining in constant company of technology has done its bit in alienating people and heightened the demand for ‘personal space’ to be shared preferably with one’s gadget. Moreover, spending long hours with different sources of social media is erasing closeness between people and nature, and making people emotionally unavailable to others. This disconnection weakens the possibility of undertaking socially responsible behaviour in real life (individually or with team of close friends) and robs the possibility of having self gratifying experiences and inner contentment. All such changes have implications for ‘who we are’, ‘where are we heading’ and ‘who do we want to become.’ These are also the questions for clinical and social psychologists to take up.

In sum, it seems that internet users feel deceptively immune to the psychological effects of new technologies. However, the global technological societies cannot ignore the subtle effects of the internet on personality or subscribe to the addiction model implying severe pathology. Moreover, at no cost, the global technological societies should limit their understanding of the resulting big cultural shifts that are happening.

3. Making insightful psychological observations for linking digital technology and the economic growth of emerging economies

Social and cross-cultural psychologists can play a constructive role by sharing their understanding of cultural orientation, cultural beliefs, values and preferences especially if they belong to a country known as ‘emerging economies.’ Their psychological insights could be useful when considering linking digital technology and the economic growth of the said economies. For instance, a global investor, Ruchir Sharma (2020) argues that though digital technology may not generate substantial economic growth for the emerging economies (due to no added boost for export); but they can largely impact the domestic growth of these economies. His observations carry psychological insights and are culturally informed suggesting that being less attached to a “legacy infrastructure” of brick stores and landlines, developing economies are inclined to adopt wireless technology faster than the developed economies. He gives example of China which despite having trouble in its old state run industries, is growing at a faster pace than the United States and catching up in average income because of its fast emerging cashless “new economy.”

Similarly, new internet companies are also rising in Russia, Poland, Argentina and Kenya because “With deep knowledge of local tastes and languages, they are expanding access to a wide variety of services such as banking and back office operations, making it easy for start-ups to get going. On average digital revenue is rising and the cost of starting a business is falling, faster in countries with emerging economies than in the countries with developed ones” (Sharma, p.16).

Another observation comes from none other than Ratna Tata (2020). Tata touches upon the core concerns that are important for making things happen. Tata writes, “Technology is transforming the way we eat, live learn and play-let us be brave enough to embrace it and find solutions collectively through collaboration.” He suggests that it is important “to have ideas that are creative and relevant coupled with the ability to transform them into opportunities backed by the right investment and passion.” These words are of a very successful Indian business icon who has made business flourish in one of the ‘emerging economies’ namely, his own country. Here Tata is talking about embracing technology and (a) ‘finding solutions collectively through collaboration,’ (b) taking note of creative and relevant ideas,’ (c) having ability to transform such ideas into opportunities and (d) supporting ‘right investment and passion.’ What better inputs could a psychologist give for making ideas operational and things happen?

4. Psychological insights and technology backed world of marketing and advertisement

It goes without saying that people in the field of advertising and marketing use knowledge and insights of psychology cleverly and in abundance. They learn from psychology as to, 'what attracts people and what is the average span of their attention,'; 'how to capture and hold people's attention' and 'whether Indians are receptive to an emotional or a rational argument' made in favour of a product, etc. On the other hand, the creative heads of the technology driven world of marketing and advertisement are experts in exploiting people's sentimental world plus their cultural preferences and globalization inspired standards and preferences. They produce, promote, present and sell products and Apps (cars, houses, educational Apps, home service Apps, mobiles, grocery, cosmetics, and countless items) with the means of sophisticated digital gadgets capable of effectively reaching people's hearts and minds astutely. Psychologists and social psychologists with a creative bend and some business sense can make a niche in this field.

5. The educational field, psychologists and digital technology

In the field of education, digital technology has entered in a big way with the help of supportive infrastructure. Educational Apps for teaching children of different grades are a reality and a money making business. The success of these Apps has to do with the principles of effective teaching and learning and the insights of educational and developmental psychology. On the other hand, professional psychologists can, and have been uploading lectures and teaching material online, teach on-line, hold interdisciplinary webinars, etc. for the benefit of their students and colleagues and keep updating the theoretical and methodological advancements in their field of expertise. There are countless internet journals, publications and libraries that can be accessed on-line. Thinking of India, the main beneficiaries of these facilities are often those who can use technology, have net facilities and gadgets to access them. However, at the front of education, there is endless scope for technologically savvy psychologists to be of practical help to the learners in schools, colleges and Universities and for using technology innovatively, for teaching in village based schools of India. Psychologists, educationists, policy makers and technology innovators, interested in making technology a helpful aid for school education in rural India can associate themselves with this field.

6. Technology backed global village and globalization, a new inviting area for psychology

Another inviting subject for psychologists could be the subject of 'global village' a term coined by a media and communication theorist, Marshall McLuhan in early 1960s. According to the *Merriam-Webster.com Dictionary*, 'global village' is a world viewed as a community in which distance and isolation have been dramatically reduced by electronic media such as television and the internet. Interestingly, global village describes the phenomenon of the world's cultures shrinking and expanding at the same time due to pervasive technological advances that allow for instantaneous sharing of cultures (Johnson 2007, p. 192). It goes without saying that 'cultural globalization' has entered our everyday life making the world a 'global village.' Internet and instant messengers (i.e., Facebook, Myspace and various online forums) have exploded with a bang making it possible for people from all over the world to connect and communicate instantly.

Dixon (2009) is a good reference for 'Understanding the implications of global village' who thinks that cultural globalization is likely to lead to prospective marketplace where countries of all economic opportunities would be represented and the economically weaker ones stand the chance of being aided by the more fortunate ones on humanitarian ground. At the same time however, "The idea of the world's cultures drawn together in a global village raises questions about equal representation, reciprocal sharing, enriched diversity, and mutual understanding" (Johnson, 2007, p.192). This becomes a vital question because technology has changed the way people communicate across physical and cultural boundaries at a considerable and accelerated rate. Moreover, often the technologically advanced countries have an advantage over others. For instance, they can leave an over arching influence on others much faster, excel in income generating activities, can readily establish and run research and development facilities, exceed others in manufacturing and selling war weapons and can digitally control and monitor activities of those who could be a threat to their power. These concerns have to be addressed collectively by social sciences.

Nevertheless, social and cross-cultural psychologists and those interested in occidental and oriental cultural values, cultural beliefs and preferences of economically advantaged (may be individualist), and

economically disadvantaged societies would like to test these assumptions. Further, they may like to understand the prototype behind the process which decides who is powerful in a thoroughly interconnected world. A related question is what makes the technologically advanced countries capable of enhancing conflicts between cultures, causing fragmentation of cultures, or leading to cultural domination and perhaps creating hybrid cultures (Johnson, 2007, p.191-96).

In this context something equally important ought to draw the attention of social scientists. It has been observed that economically affluent and technologically advanced powerful countries are eventually likely to control the cultural standards by which the rest of the world will have to live because; their influence creates the milieu for 'culture pollution.' It is also seen, that the standard choices of the global world are often adopted and copied senselessly. In our own country, part of Delhi is said to have become 'mini America' and the youth, a copy of American culture whatever it may mean. This is not only about behaviour change but is often about giving away one's own cultural values without a need, rhyme or a reason. Indian youth like youth all over the world, is drawn towards music and the global entertainment companies have successfully begun to shape the understandings and dreams of ordinary citizens, irrespective of where they may be located. For example MTV, a pervasive American company is consciously endorsing a global diffusion of diverse music media. MTV is not only a huge player in the technological expansion of cultural boundaries but its permeation of the music market globally supersedes the alleged diffusion of cultures that it claims to inspire.

Similar is the case of the American food chains that have become the 'taste' of the global village in a big way even if it means buying costly and processed fast food and having the possibility of falling victim to a global "consumer" culture. In sum, internet, satellites, and cable TV have swept away the old national cultural boundaries and perhaps Indians have to think about saving their own indigenous cultural identity keeping a safe distance from the overwhelming consumer values that could overshadow Indians' sense of community and social solidarity. However, the optimistic way of looking at things would be to expect that a common culture would pave the way to greater shared values and political unity.

Since the discussion is being made in reference to the technologically global societies, the fascinating area of 'culture sharing' waits to be studied by the psychologists. Besides taking note of the good things of 'culture sharing,' psychologists should be able to address how, whether and in whom "cultural contact is creating uniformity, standardization, homogenizational global monoculture that is sterile, dull, and artificial" (Johnson, 2007, p.193), and what kind of cultures can handle the unstoppable storm brought about by the process of globalization without getting uprooted. This is indeed an attractive area for investigation for the psychologists.

Furthermore, language loss is a significant issue in the context of loss of cultural boundaries in global village. Dixon (2009) refers to an online language database namely, "Languages of the World" which cautions that the world faces massive challenges in maintaining language diversity as out of more than 6,912 languages, half may be in danger of disappearing in the next several decades. As smaller cultures are nested in their respective languages, losing them is a serious cultural risk. In fact, with the extinction of language, it becomes very difficult to articulate the beliefs and knowledge of some small culture and it is almost like losing that culture. On the other hand, internet is also a major tool for preserving languages that are the repositories of world knowledge. Professor Harrison of linguistics (Swarthmore College, USA), has created a talking dictionary and videos giving global voice to one of the indigenous tribal languages (Karo Aka) of Arunachal Pradesh of India (see Times of India, January, 23, 2021, Patna Daily, p. 13). These are very challenging subjects for investigation and dedicated linguists, historians, social and cultural psychologists and anthropologists, etc. have to come together to address these concerns.

Dixon (2007) is correct when she observes that in view of all the changes that have come and shall continue to come, hope lies solely with human beings who must take responsibility to look at the implications of the shifting realities like the one of the new global technological societies. Perhaps social scientists can take the lead in defining the 'global village' where cultural boundaries with regards to language, economy, and basic means are acknowledged respectfully.

A Look at the Interdisciplinary and Multidisciplinary Approaches for Studying Concerns of Technological Global Societies

A researcher with good understanding of methodology is likely to choose the most suitable method for pursuing the subject of his/her research. The value of interdisciplinary and multidisciplinary approaches has become a matter of interest and need for psychology for obvious reasons. It may be said that despite the fact that different disciplines have their own special way of looking at a certain phenomenon, they may not always be able to answer the research questions in isolation.

Inter-disciplinarity is best seen as bringing together distinctive components of two or more disciplines. In academic discourse, this typically applies to the realms of knowledge, research, education, and theory. An interdisciplinary study/research would draw knowledge from several other fields like sociology, anthropology, psychology, economics, etc. and combine their understanding, into one activity. Though there are more instances of prevalent isolation, examples like Keyes's 'Social well-being theory (1998)' is based on both psychological theories and classical sociological theory and refers to concepts like 'anomie' and 'class consciousness.'

Saraswati and Kaur (1993) consider going beyond singular notions of causality in the context of theory construction and refinement as important. As reality is too complex to be captured by the limited tools available in a single discipline, creating reasonable multi-dimensional causality models are likely to help studying a complex subject like 'global technological societies' too. Going beyond singular notions of causality suggests use of multi-variate techniques in analyzing data and adopting an inter-disciplinary approach.

Later Saraswati (2003) reiterated the need for interdisciplinary and multidisciplinary approaches and recommended communicating with peers from allied disciplines along with the practitioners in one's own discipline. She contends that the peers "should be able to create easily accessible landscape of disciplinary knowledge without the frills of the usual jargon that often obscures rather than enlightens" (p.6). Saraswati laments that we have failed in establishing such interdisciplinary nets like seen in disciplines of science (i.e., physics, chemistry, biology and genetics). For instance, biotechnology, genetics and nutrition, have made great stride in knowledge construction by transcending the disciplinary barriers.

Unfortunately, social and behavioural sciences such as psychology, economics and sociology have remained predominantly insular. Especially in India, we find increasing specialization and compartmentalization even within the social sciences disciplines. Saraswati (2003) outlines the following positive outcomes of concerted efforts of interdisciplinary teams: (a) Broaden perspective of all participants, (b) convergence of expertise leading to meaningful problem solving, (c) a conscious avoidance of ritualistic re-discovering and acceptance of the already available necessary know how in other disciplines and (d) reduction in idiosyncratic, discipline specific jargon in order to facilitate disciplinary communication.

Today, one can find examples of interdisciplinary approach in management and leadership literature with 'spirituality' being acknowledged as a helpful resource for the purpose (Chakraborty, 1993). This was not the case a few years back because due to strong anti-philosophical stance. Similarly, psychology preferred to rely on its own standardized research paradigms in defining its concepts rather than consulting the neighbouring discipline in defining their central ideas. Happily, however, the emerging trend in methodology of social psychological research was ignited after realising the shortcomings of the empiricist approach (which was the preferred way of doing research in psychology). The now 'catching up' post modernist thinking and research in social psychology is inspired by sociologists from west who believed in de-individualizing' and 're-socializing' of social psychology.

In case of a multidisciplinary approach the researcher draws from multiple academic disciplines for redefining problems across normal boundaries, reaching for solutions based on a new understanding of the complex situations. Multidisciplinary approach is an integrated team approach which is well exemplified in the profession of healthcare. The team in this case is a group of medical and allied health care workers from different professions (e.g. psychiatrists, social workers, etc.), each providing specific services to the patient.

The benefits of multidisciplinary teams include improved health outcome for the patients, and more efficient use of resources, plus job satisfaction for the team members.

The caution is that multidisciplinary approach needs to be used wisely as others may just theorize upon or their inputs may not always make sense.

Certain sub-fields of psychology, such as 'environmental psychology' is interdisciplinary as it focuses on the interplay between individuals and their surroundings. It encircles natural environments, social settings, built environments, learning environments, and informational environments. Moreover, the field is committed to give importance to researches aimed at solving complex environmental problems in the pursuit of individual well-being within a larger society and developing the discipline because, both are value oriented and problem oriented,

As technology impinges upon human life at numerous levels, addressing, understanding and explaining the impact, dangers and benefits of global technological societies also invites attention of multiple disciplines. At the personal front, technology touches the social life and personal well being of the individuals and has implication for the maintenance of the required equilibrium in people's mental health and use of technology, and also between their personal and work life. At the social level, digital technology influences the way individuals communicate, learn and think, and decide to go about their family and interpersonal relationships. Technology also vastly affects the relationship between human beings and nature. For instance, on the one hand, it has made possible to play outdoor games indoors, and get nonstop entertainment with digital aids within the four walls of one's home and work online, on the other, it has held back the joy derived from the beauty and healing powers of nature and the desire to live close to nature.

Here let us remember that technology acquires the power to influence individuals and societies by innovations in fields like biotechnology, genetic engineering, communication, information technology, social entrepreneurship, biomedical engineering, health, and product development, etc. However, the new sophisticated technological products cannot become profit making business without the efforts of multidisciplinary teams of software experts, technocrats and marketing and consumer behaviour experts. Similarly, economists and social workers have a role as a team in levelling the apparent socio-economic and the digital divide in societies. Moreover, as technology is indispensable for learning and information and information processing organizations, its proper utilization needs guidance and help from different disciplines that have a stake in it and who can make technology people friendly and safe. If not, digital life will continue to outweigh the negative aspects of global technological societies with substantial costs.

The author is not capable enough of detailing how exactly the multiple domains and disciplines would be realistically helpful in making the global technological societies free of its dangers and happy with its achievements. However, she likes to say something on the 'human and technology interaction' which is an inevitable aspect of the global technological societies. At this instance, she envisages different disciplines coming together to arrive at a 'model of human nature' which could predict the limits of human-technology interaction beyond which the interaction is likely to become physically, mentally, emotionally and socially harmful for the individual.

Such a 'model of human nature' can help (a) in designing technology that outlines conditions under which technology can provide efficient and convenient services and (b) facilitate inventing and creating technology for diagnosing problem situations and predicting the consequences when the appropriate conditions are not met. The 'model of human nature' should hopefully be able to envision technology which can outline conditions for managing, protecting, and restoring human wellbeing and assuring reasonable human behaviour in the human-technology interaction situation. Perhaps arriving at a 'model of human nature' shall not be possible in absence of a broad and inherently multidisciplinary focus.

Furthermore, global technological societies are characterized by loads of easily accessible information which continues to add up. At the same time, people keep competing for acquiring and utilising information as business rivals and aspirants of knowledge power. Furthermore, constant hunt and run for exploiting technology for meeting personal needs and entertainment, etc. also goes on. Thus, the global technological

societies seem to be totally preoccupied and rather impatient in their interaction with technology oblivious of the optimal level of technology consumption or having time for enjoying small things of life. This matter needs to be dealt by a multidisciplinary team comprising of technology innovators, psychologists, mental health professionals, developmental specialists, spiritual leaders, parents of young and adolescent children and may be physicians too.

There is also concern regarding the absence of social sciences in matters related to technology development and ethics in technology utilization. Recently, in an interview (Times of India, Patna Daily 2021, Tuesday, p.16), Abhishek Gupta (Founder of the Montreal AI Ethics Institute and a machine learning engineer at Microsoft) and Ameen (Vidhi Centre for Legal Policy) were being asked questions on Artificial Intelligence (AI) ethics. In this context, Gupta shared that when discussions were happening last year on AI ethics, all the discussants were sourced from IITs and IIMs with hardly anyone from the background of anthropology or sociology. Similarly, Mr. Ameen emphasized the need to rope in social sciences research for bringing up how technology will interact with people and communities it is deployed for.

Gupta also pointed out that AI falls apart while discussing labour impacts. He argued that labour impact has to be discussed with a proper understanding of the context of labour markets and structure, how people go through the skilling process and the social safety nets. He was trying to say that it is important to consult social scientists while discussing utilization of technology for something like labour impacts. Otherwise, it is like thinking of worker condition sitting in an AC office.

Ameen cited an example from 2008 when the Government of Andhra Pradesh had entered into an agreement with Microsoft to create an algorithm that was going to predict dropout rates for students. He cautioned that though sounding good, predictive tools have their problems, especially regarding the datasets being put into the programming. For instance, how correct it would be to put a child from a lower income background at a higher dropout risk because, historically the data is askew? Perhaps, social scientists can point out or question the automation bias which was coming into play. AI innovation depends on large database, therefore, the question of 'privacy concerns' could be taken into account too. Ameen observes that though privacy perception differs, if questions are being asked about more personal matters like caste and religion it should be questioned. In fact, they were trying to say that experiences and insights from social sciences could be an aid in attending to matters related to technology ethics.

Conclusion

It may be concluded that social sciences have much scope for attending and investigating some common concerns of the new global technological societies. Focusing on the discipline of psychology, the scope begins right from asking conceptual questions like what is the lay understanding of the global technological societies, what are the social psychological factors that can pronounce or reduce the effects of technology dependent societies, and how such societies have affected the bonding between human beings and their association with the nature, etc. There is no dearth of concerns of applied nature for clinical psychologists, developmental psychologists, psychotherapists and psychiatrists that refer to human and technology interaction i.e., overuse of technology and its consequences on individual personality and demeanour. Other applied issues would include how to use technology innovatively in the fields of education, health and business, etc. A very fascinating field of investigation waits for psychologists in the domain of culture sharing, saving culture identifying features, culture pollution and cultural shifts happening in the era of global village. It is envisaged that interdisciplinary and multidisciplinary approaches could be a methodological option for understanding and explaining the dimensions and complexities of the global technological societies.

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PART III

THEMATIC PANELS' CHAIRPERSONS'
ADDRESSES

ON

NEW GLOBAL TECHNOLOGICAL
SOCIETY

PART III

THEMATIC PANEL' CHAIRPERSONS' ADDRESS

02. DEMOCRACY AND HUMAN RIGHTS

**0302026 KUMAR, SHASHI (Department of Human Rights, B.B.Ambedkar University, Lucknow).
UNDEMOCRATIC TRENDS IN INDIAN DEMOCRACY**

Democracy is most acceptable norms and established system of governance in the world today. Many countries in the world have adopted the democratic form of governance in their countries and made commitments for protection of civil liberties and democratic rights of their citizens. Democracy and human rights have symbiotic relationship in the sense that both are complementary to each other. The existence of both depends upon each other. In other words, protection of human rights cannot be possible without having strong democratic governance and on the other hand, the democratic form governance cannot be legitimized if the human rights of citizens are not protected.

India claims to be a largest democracy in the world. By conducting regular elections for electing people's representatives to the parliamentary and legislative assemblies in the states, providing universal franchises to all its citizens, independent judiciary, functioning of democratic administrative institutions, and existence of free media are the hall mark for the success of Indian democracy. This success of Indian democracy relates to procedural form of democracy that talks about success of institutional democracy. The other form of democracy, the Substantive democracy, depends upon three ways , i.e disseminating democratic values, facilitating political participation of people and ensuring democratic means of assertion like protest and peaceful demonstration.

Over the last few decades, one can notice the emergence of undemocratic trends in the political trajectory of Indian democracy. The resilience of democracy and the institutional capacity of the state to diagnose and manage the political and social conflicts got totally disturbed, which is reflected in its failure to deal with increasing disorder, lawlessness, poverty and corruption. In recent period, we witnessed several kinds of political and social tension in democratic space of the country, for example the minorities' dissatisfaction and demonstration over the issue of CAA or NRC, abolition of special status of Jammu and Kashmir under Art.370, long farmers stir for repeal of farmers law which was enacted surpassing parliamentary legislative procedure. Silencing of human rights activists for raising voice against Indian state against infringement of rights of people become common incidence now. Such undemocratic trends in harmful to the functioning of Indian democracy.

The paper aims to discuss some of the above intriguing issues that have emerged out in Indian democracy in present.

08. LABOUR IN ORGANIZED AND UNORGANIZED SECTOR

0208027 MANN, JEET SINGH (National Law School, New Delhi). A CRITICAL STUDY OF REFORMS IN LABOUR LAWS IN INDIA

In order to facilitate “ease of doing business” endeavours in India, most of the labour laws have been relaxed or amended across the nation. It is also witnessed that some fundamental or legal rights of workers have also been diluted in the name of facilitating trade and business in the era of globalisation, liberalisation and privatization.

It is also evident from prevalent practices that contractualization of employment of workers is being facilitated to minimize cost of production and prevent long term benefits to workers, by the State. The research question that is required to be examined is that “whether the sustainable development or any industrial development can happen at the cost of workers or by compromising human rights of workers?”

The Ministry of Labour and Employment has introduced many changes in the existing labour laws in the form of consolidation of 30 Labour Laws into Four Labour Codes.

It is also observed that these four Codes have just combined the existing laws on Industrial Relations, Remuneration, Social Security and working conditions and other aspects. It is also noticed that proposed Codes, which have not been brought into force yet, have also ignored the mandate of effective integration and simplification of such Laws.

Further, it is also pertinent to mention that there is no dearth of labour laws to protect workers and facilitate trade and business, however there is dearth of quality enforcement of labour laws due to lack of personal accountability of all labour law enforcement agencies at State as well as Central Government levels.

This research paper is an endeavor to critically examine the issues arising out of functional integrity of various schemes covered under the Labour Codes for effective operations and protection of workers interests in India.

This research paper will also delve into the nature and scope of personal accountability of labour enforcement authorities that have been created under the Specified Labour Codes, for meticulous compliance of the said Labour Codes across the nation.

0208028 RAY, SOUMEN (Socio-Cultural Activist and National Coordination, National Platform for Small Scales Fish Workers, 757/10 “MAITREE” Raghunathpur, Jhargram, West Bengal). NEW GLOBAL TECHNOLOGICAL SOCIETY AND THE INDIAN LABOUR IN ORGANIZED & UNORGANIZED SECTORS

Till the sixth decade of the last century India was basically the agrarian society dependent on manual skill. Industries also were mostly dependent on manual labour. Jute, Cotton, Small & Medium Engineering, Chemical, Mining, Tea and Construction industries etc. were mostly manually operated, providing employment to a large number of workers.

However, the employment in industries and engagement in traditional occupation in India could not fulfill the basic needs of all the citizens; food production was also not at par with the needs of the country.

With an aim to uplift the people, the then Prime minister and the Planning Commission of India introduced modern technologies in both, industrial and agricultural, sectors. That was the first step of our country towards the present Global Technological Society, where technological skill in both the organised and unorganised sector became inevitable.

Labour in India refers to employment in the economy of India. There were around 501 million workers in India, the second largest after China. In 2008, the organised sector employed only 27.5 million

workers of which 17.3 million worked for government or government owned entities. Declination of the employment in organised sector is a new trend both in government and private entities in India.

Effects of the Global Technological Society:

Technology plays a huge role in the society and impacts our day-to-day life. When societies learn more about the development in a technology, they are able to take advantage of it. When an innovation achieves a certain degree of success after it has been presented and promoted it is absorbed by the society. The workers in both organised and unorganised sector tried to adopt the skill to handle the improved innovation of the Science and technology. The use of technology in education empowers students with basic knowledge of the technology, information literacy, capacity for more learning, and other skills necessary for the present century workplaces. Digital technology has entered every sphere of life and the social system. In fact, it constructed worldwide communication system in addition to its origin. Thus a Global technological Society was developed with an intensive manner.

The level of technology is important to determine the level of economic growth but it is also the technological process which keeps the economy moving.

In the modern world, superior technologies and resources combined to give rise to robust economies; and in a well-functioning, robust economy, economic excess naturally flows into greater use of technology. As the technology is such an inseparable part of human society, especially in its economic aspects, funding sources for (new) technological endeavors are virtually limitless.

In the beginning, technological investment involved little more than the time, efforts, and skills of one or a few men; today, such investment may involve the collective labour and skills of many millions.

Society has become too dependent on technology. The more advanced technology becomes, the more it seems to be gaining control over our lives. Even though technology is offering society many beneficial qualities; it also is causing many negative effects to occur.

Technology has produced advanced economies, such as the modern global economy, and has led to the rise of a leisure class. Many technological processes produce by-products some of which are dangerous to the nature and society like pollution, environmental hazards, etc. The greed of the modern society introduced random use of natural resources to the detriment of Earth's environment. Innovations influence the values of society and raise new questions of the ethics of technology. Examples include the rise of the notion of efficiency in terms of human productivity, and the challenges of bioethics.

Impact on employment and livelihood of the people:

Development of technology caused a severe encroachment of the labour input causing maximum unemployment. So in the countries like India a majority of the human beings are forced to depend on mercy of the others.

Impact on Environment:

Carbon emission and other environmental damages due to technological aggressiveness are the root cause of present natural disasters.

Social impact:

Modern Technological Society changed the traditional social structure. It alienated the people from their age-old culture of joint living, fellow fillings, etc, to individualistic lifestyle, disturbing joint family system of inter dependent livelihood. In search of job workers forced to migrate to different states of the country as well as in different developed and developing countries even for lesser wages and inappropriate working condition. Details to be examined properly and to work accordingly to strengthen the ethos of New Global Technological Society.

12. PEASANTS, LIVELIHOOD AND LAND-USE

0212029 PRASAD, A V S DURGA (Acharya N G Ranga Agricultural University, Regional Agricultural Research Station, Maruteru- 534 122). PEASANTS, LAND USE AND LIVELIHOOD

Farm output of India occupies second place in the world, though peasant finds vagaries in his career. There has been decline in the share of agriculture in total gross domestic product (GDP) due to economic growth in its counter parts. On one side, farmer suicides appear and on the other, the need of development of agriculture is to be taken place. Under changed conditions of globalization, farmer has to play a crucial role as entrepreneur and worker during pre and post cultivation activities. Though Indian farming is way of life for ages, modern technology has changed the structure of cultivation across India as well as in world. The state of the peasant is to be reckoned to accomplish successfully food security to nation. Livelihood diversification is essential for poverty reduction, food security, rural livelihood security and improved income for rural farming community.

Livelihood diversification and non-farm employment are important levers for rural economic growth. Across developing countries, the success of the Green Revolution led to the idea of a “unimodal” agrarian structure. It was believed that agricultural growth through productivity-enhancing strategies could generate economy-wide growth multipliers, leading to across-the-board income growth and employment generation. While agricultural growth did propel growth and structural transformation in many countries, demographic pressure, preponderance of small farms, declining share of household income from agriculture and commercialization have changed the role of agriculture in future economic growth. At present, in our country, the share of agricultural households in rural households is 53% only.

The enhancement of land-based livelihoods for the rural poor requires much more substantial investments in the redistribution of land to alleviate the shortage of land amongst the poor and those farmers who are willing and able to engage in agricultural production for the market. The land redistribution programme as a whole has not provided adequate quantities of land to meet the needs of the poorest residents or the small-scale market-oriented farmers living in the communal areas. Perhaps this is because the authorities do not recognise the importance of land-based livelihood strategies amongst the rural poor, or have little faith in the potential for these livelihoods to be enhanced. The land redistribution programme is necessary but not a sufficient condition for the enhancement of rural livelihoods and rural development. Many but not all rural people need greater access to land. However, most rural residents need enhanced security of tenure and better access to markets and support services to enhance their land-based livelihoods. Very few land reform projects, except those initiated by NGOs or the private sector or in partnership with the private sector, facilitate the integration of beneficiary groups into commercial agricultural markets or provide opportunities for rural households to generate small amounts of income from their agricultural produce or natural resource products. Relying on the private sector or NGOs to meet these needs is obviously not working and cannot meet the scale of the demand for such services. While the role of these sectors should be encouraged, there is a critical need for much greater direct state support in the development and expansion of markets and support services for small-scale and emergent producers. There exists the potential to create a network of national, regional and local institutions which can stimulate and support the development of the full range of rural enterprises, including the production and sale of agricultural produce and the harvesting, processing and sale of natural resources. It would also need to provide opportunities for producers to access non-local markets for agricultural and natural resource produce. In the absence of direct contracts between producers and large agri-corporations, the large number of scattered small-scale producers need someone or some institution that can buy their produce, store it, transport it and sell it to the wholesalers, agri-corporations or retailers in urban centres.

Out of total geographical area (≈ 329 mha), only fewer area (139.51 mha) is reported under net sown. Hence there is an urgent need to implement the National Land Utilisation Policy draft (2013) to achieve improvement of livelihood, food and water security, and best possible realization of various developmental targets so as to ensure sustainable development of India. To ensure optimal utilisation of the limited land resources in India for achieving sustainable development, addressing social, economic and environmental

considerations and to provide a framework for the States to formulate their respective land utilisation policies incorporating state specific concerns and priorities.

The Government of India has launched a flagship schemes that favors the farmers and agricultural sectors. The main aim of the government is to promote farming sector to help improve their economic conditions. Under the new initiative the government has also introduced a number of beneficiary schemes including e-NAM (National Agricultural Market), PMKSY (Pradhan Mantri Krishi Sinchayee Yojana), PKVY(Paramparagat Krishi Vikas Yojana), Interest Subvention scheme and PMFBY([Pradhan Mantri Fasal Bima Yojana](#)).

Soil Health Card Scheme :

- The scheme was introduced in 2015 and aimed at providing farmers with health cards for soil. The farmers under this scheme could upload the soil quality and nutrients.
- This information could be used by them for improving the soil condition for better quality crop fertility. Under this scheme government had collected soil samples from 253 lakh farm locations. Till date over 76 percent health cards have already been distributed by the authorities.

NCU (Neem Coated Urea)

- The scheme was launched by the government to promote use of organic urea to preserve soil health and yield better crop. The urea was made rich in nitrogen source for crops. Under this scheme farmers are only making use of Neem coated organic urea to cut down savings by around 10 percent.

PKVY (Paramparagat Krishi Vikas Yojana)

- The government had implemented this scheme within the country to help promote the ideal of organic farming amongst the farmers. This would further help the farmers to earn better profits from farm lands.
- The government aims at covering over 5 lakh acres of farm land by the year 2015 – 2018 under this scheme in clusters of 50 acres land each.

PMKSY (Pradhan Mantri Krishi Sinchaye Yojna)

- The scheme was introduced by the government on 2015 July 1st. under this scheme the government aims at providing with each farm land with irrigation water supply.
- To better implement the scheme the government aimed at reducing the wastage of water during irrigation by making use of rain water harvest techniques.
- The government also implemented the idea of micro irrigation facility for farmers to help reduce the overall cost. The government has also managed to cover 8.39 lakh ha under this scheme so far.

e-NAM (National Agriculture Market)

- Under this scheme the government took the initiative of creating e-market places for regulating market prices. The platform offer farmers with controlled price for their produce and other agricultural farm equipments.
- The government has also managed to integrate over 400 markets under this scheme till 2017. Present it aims at linking over 47.95 lakh farmers and 91500 traders to share the common platform.

Apart from this the government has always ensured that it helps in implementing new developments in the agricultural sector. It aims at developing this sector to make it income centric for farmers rather than being production centric.

PMFBY (Pradhan Mantri Fasal Bima Yojana)

Launched on 18 February 2016 by Hon'ble Prime Minister Narendra Modi, it is an insurance service for farmers for their yields. It was formulated in line with One Nation–One Scheme theme by replacing earlier

two schemes [National Agricultural Insurance Scheme \(NAIS\)](#) and Modified National Agricultural Insurance Scheme (MNAIS) by incorporating their best features and removing their inherent drawbacks (shortcomings). It aims to reduce the premium burden on farmers and ensure early settlement of crop assurance claim for the full insured sum.

PMFBY aims to provide a comprehensive insurance cover against failure of the crop thus helping in stabilising the income of the farmers. The Scheme covers all Food & Oilseeds crops and Annual Commercial/Horticultural Crops for which past yield data is available and for which requisite number of Crop Cutting Experiments (CCEs) are being conducted under General Crop Estimation Survey (GCES). The scheme is implemented by empanelled general insurance companies. Selection of Implementing Agency (IA) is done by the concerned State Government through bidding. The scheme is compulsory for loanee farmers availing Crop Loan /KCC account for notified crops and voluntary for other others. The scheme is being administered by Ministry of Agriculture.

PMFBY aims at supporting sustainable production in agriculture sector by way

- Providing financial support to farmers suffering crop loss/damage arising out of unforeseen events
- Stabilizing the income of farmers to ensure their continuance in farming
- Encouraging farmers to adopt innovative and modern agricultural practices
- Ensuring flow of credit to the agriculture sector which will contribute to food security, crop diversification and enhancing growth and competitiveness of agriculture sector besides protecting farmers from production risks.

The Way Forward: Institutional Interventions to Address Production Challenges and Reducing Regional Disparity. The ability of smallholder production to adapt to changing demand and the opportunities for growth depend on increasing marketable surplus and diversifying. As production challenges vary according to regions, addressing regional disparities is needed to reduce yield gaps and improve livelihoods in poorer states that did not benefit from the Green Revolution. Firstly, look at the scope of institutional interventions such as aggregation models and land reforms in addressing the issue of scale. Secondly, assess the potential of bringing the Green Revolution to the eastern states of India. the pace of household income growth and economic development has been determined by the structural transformation strategy chosen by the state for its development. The success of these strategies in enabling state-wise economic transformation has depended upon resource endowments of the states, global and local demand as well as their political priorities. Stark differences in regional development patterns have arisen in part due to differences in comparative advantages across states that have been based on access to agro-ecological zones, natural resource endowments, differences in institutional capacity and preferences for certain types of development strategies. These differences have mediated the speed of economic transformation across states.

The Economic Survey Report 2020 emphasised the importance of sustainable agricultural practices to support small and marginal farmers, who constitute 87 per cent of India's peasants. It sought a combination of resource efficient methods including dynamic cropping patterns, judicious use of chemical fertilisers and efficient irrigation systems. Agricultural productivity was impacted by inefficient irrigation systems and degradation of soils due to improper use of chemical fertilisers, it said. Farmers should be incentivised to adopt water-efficient practices in order to avert a looming water crisis, the Survey said. It called for shifting the focus in agriculture to 'irrigation water productivity' from 'land productivity'.

Recently, three farm laws were enacted in the parliament for transformation of the agriculture sector and to empower farmers viz., Farmers Produce Trade and Commerce (Promotion and Facilitation) Act, 2020 - permits intra and inter-state trade of farmers' produce beyond the physical premises of Agricultural Produce Market Committee (APMC) markets and other markets notified under the state APMC Acts; Farmers (Empowerment and Protection) Agreement on Price Assurance and Farm Services Act, 2020 - creates a national framework for contract farming through an agreement between a farmer and a buyer before the production or rearing of any farm produces; and Essential Commodities (Amendment) Act, 2020 - an act of Indian Parliament which was enacted in 1955 to ensure the delivery of certain commodities or products, the

supply of which if obstructed owing to hoarding or black-marketing would affect the normal life of the people. This includes foodstuff, drugs, fuel (petroleum products) *etc.* However, some of the farmers are fearing that they might lose more than they could gain after the new Farms Laws 2020 and began to protest. The Hon'ble supreme Court of India put hold on farm laws-2020 and constituted a expert committee.



PART IV

RESEARCH COMMITTEE'S PAPERS

ON

**NEW GLOBAL TECHNOLOGICAL
SOCIETY**

IV. ABSTRACTS OF PAPERS

OF

RESEARCH COMMITTEES

01. AGRICULTURAL SCIENCE

0401030 ARUNACHALAM, A; HANDA, A K AND BHATT, B P (ICAR-Central Agroforestry Research Institute, Jhansi 284003). AGROFORESTRY RESEARCH IN INDIA

Agroforestry has a tremendous potential to contribute significantly towards livelihood security and rural development through employment generation. During last four decades' significant agroforestry technologies have been developed for enhancing the productivity and income generation. The selection of suitable agroforestry technology for a specific agro-ecological region is very important particularly in reference to small and marginal farmers. Screening and evaluation of selected multipurpose trees for higher returns and better compatibility with intercrops is essential to increase dry land productivity. Standardization, refinement and dissemination of agroforestry based amelioration technologies for problem soils, development, standardization and adoption of agroforestry models linked with market for enhancing productivity and profitability of small holding farmers is one of the important solutions to meet the future challenges. In the current scenario, the role of agroforestry towards environmental protection is much more than economical contribution. Agroforestry is one of the viable solutions contributing towards enhanced tree cover in the country and restoration of degraded lands. Appropriate marketing interventions and capacity-building programmes provide better economic returns and will be instrumental to check the migration of rural youth towards urban areas. With the adoption of National Agroforestry Policy and implementation of Agroforestry Mission and national Bamboo Mission, agroforestry adoption is bound to get an impetus in the coming years.

Keywords: Agroforestry, carbon sequestration, Livelihood security, Agroforestry Policy

0401031 NAWAS, O S MOHAMED; THANGAMANI, D AND LALITHA, S (Forest Genetic Resource Management Division, Institute of Forest Genetics and Tree Breeding, Forest Campus, RS Puram Coimbatore – 641002). NATURAL DYE EXTRACTION FROM *MELIA DUBIA* USING PULP AND PAPER INDUSTRY WASTE AND ITS APPLICATION ON DIFFERENT FABRICS

Pulp and paper industry in India are one of the huge natural sources holding industry it provides nature derived raw materials. At the same time, the management of the harvested leaves after wood extraction has not yet been maximal other than incineration. By managing the left-out waste leaves, natural dyes from *Melia dubia* plantations has been successfully extracted and used in textile industry. This raw material has prizable value in textile industry. Natural dyes replace synthetic dyes in this present era, due to environmental hazardous and eco-friendliest. Taking the field against paper manufacture into account, it is possible to manage the waste and produce dyes. The present study executes ways to utilize and get benefit out of forestry industrial wastes as natural dye for textile industry. This cheap resource material has been taken to perform to support small scale dyeing industrial units. *Melia* plantations are short duration money yielding trees. Even if planted as a single row along the field bunds, about 60 trees can be planted per acre, which will fetch an income of about Rs. 2 lakhs in the sixth year of planting. That means plenty of wastages in rotations sustainable resource for dye production. The different shades of colors were obtained from the leaves increases the aesthetics value of the textile fiber, and also it gives antimicrobial protection and gives adorable aroma because of the active components of flavonoids, viz., Quercetin and rutin etc. Natural dye extracted from *Melia dubia* leaves was dyed using wool fabric by conventional method. Copper sulphate, Alum, Ferrous sulphate, Potassium dichromate, Nickle sulphate, Tartaric acid, Tannic acid, NaCl and Vinegar were used as mordants. The dyeing was carried out with and without mordants by post mordanting. The colour of each dyed material was investigated in terms of CIELAB (L*, a*, b*) and K/S values by premier colour scan. The colour fastness to washing, rubbing (dry & wet), light and perspiration were tested according to ISO standards. The results showed that wool dyed fabrics without mordant showed a shade of yellowish brown, while other

mordants light to brown shades. The Copper sulphate mordanted shows greenish shades. The colour fastness to washing and dry rubbing were excellent whereas wet rubbing shows was good expect unmordanted fabric which showed moderate to good fastness. The light fastness and perspiration were good for all fabrics expect unmordanted fabric which showed moderate to good fastness. Day to day awareness about the environment protection and health care across the globe gained attention and develops interest of consumers towards natural dyes, as they are environmentally friendly, non-allergic, anti-cancerous and also available with elegant shades. This is one of the ways, which proves that the natural resources from agro-forestry wastes can be utilized for value addition.

Keywords: Forestry industrial wastes, Natural dyes, Mordants, *Melia dubia*, flavonoids.

**0401032 SAIKIA, JOGAMAYA K K (Saikia Bhawan, R. K. Road, Itachali, Nagaon 782001).
AGRICULTURE AND SOCIO-CULTURAL IMPACT ON ITS DIFFERENT TRIBES OF
NAGALAND**

Nagaland is located towards the North East border of India and geographically is on lower eastern Himalayas. It is the 16th State of our land. Population wise-a tribal state consists of Angamis, Ao, Chang, Konyak, Rengma, Sema, Sangtam, Rongmei, Kachari etc which have ethnic cultural living pattern. They have district and tribes wise customs, laws and rules.

The main livelihood pattern of the entire land and this population is agriculture with the paddy land and other respective vegetables and fruits of different varieties according to the climate conditions of elevated land.

These common agricultural practices though seem similar but due to the different geographical contours of the hill land differ from each other plot. These various changes of Climate conditions give the adoption of cultural, festival, merriments along with songs, dance of different tribal ethnic background will be discussed verbally on which the topics will be presented.

Life-style, residence pattern in village and towns brings the changes in both rural and urban areas accompanied with marriage pattern and mate-selection process. With education up liftment living pattern also change with modern scientific gadgets, tools and communication. Moving out for educative service exercise etc. helps the Naga tribes with modernization and excursion outlook, Innovational change acceptance also make them advance and with broader outlook.

03. ARCHAECOLOGY, HISTORY AND CULTURE

0403033 BHARTEY, SATYAMEV (Department of History, Babasaheb Bhimrao Ambedkar University Lucknow 503000). CULTURAL VIEW OF ANCIENT INDIA AS ECOLOGY

This paper discusses the importance of cultural and ecological issues of ancient India. In the early periods of human history environment strongly determined the lives and activities of the people. The ecological issue in the world developed with social, economic, anthropological and cultural dimensions. Each geographical region in the world constitutes a special ecosystem, an interrelated habitat for plants and animals shaped by climate and terrain. These ecological factors have a strong effect on humans. A number of empirical studies confirm that culture is an important mechanism that explores the roots of ecological aspects of history. Culture reflects our history traditions and our beliefs. As part of nature our society arises out of an ecological basis that we cannot ignore. Perhaps no other culture can provide such a profound variety of cultural practices and ecological sound relationship with nature as the Indian. It is well known fact that the main civilizations of ancient India (Indus Valley) were only possible because of the great rivers system around which they developed. Ecologically speaking, north India was the ideal place in the world for the development of a river civilization via agriculture with specific geographical region and ecosystem. Kautilya's *Arthashastra* helps in understanding the ecological sustainability in Mauryan period. According to Kautilya it is the duty of the king to conserve environment, ecology and other natural resources. The main point of this paper is that if we really want to understand the development of civilization in ancient India we cannot ignore such cultural and ecological factors. In our study we try to highlight some text and archeological evidences of ancient India which can eminently reflect the perspectives of culture and ecology of our forefathers. This paper describes the above mentioned aspects of cultural view in the context of ecology and Indian society historically over the past.

Keywords: History, Environment, Ecology, Culture, Nature

0403034 GHOSH, SOUMYA (Department of Ancient Indian History and Culture, University of Calcutta). UNDERSTANDING SOCIAL DIMENSIONS OF *SĀRTHA*: AN EARLY HISTORIC PERSPECTIVE

Literally the term '*sārtha*' means something which has a meaning or purport but in Sanskrit the term in masculine gender means a caravan or a group of itinerant traders who travelled with the carts loaded with commodities. The term is also used to indicate the mobile community of mendicants, beggars, refugees, labourers who are in search of work, and even to the herds (2nd *Kāṇḍa*, *Simhādivargaḥ*, Verse 105). In the present research paper we would like to use the term *Sārtha* in the sense of a caravan. It is worth mentioning here that, in Pali lexicons use the term *sattā*, which is derived from the Sanskrit *sārtha* to denote the same meaning. *Sāthavāha* literally means the one who carries *sārtha* or in other words the one who leads or guides the *sārtha*. So, he is the leader of the itinerant traders and necessarily is a trader himself. In some context, the term is also used to indicate a trader in general. Buddha is also mentioned as a *sāthavāha* in Buddhist literature.

Sārtha travelled across the boundaries of the countries and communicated with important trade centres of the subcontinent and even beyond it along with their merchandises. As far as the inland network is concerned, the caravan traders acted as major link and acted as facilitators for long distance trade. *Sārthas* thus played a vital role in this phase of second urbanization and became a bone of contention between the cities and the exchange centers located in the hinterland.

Though the traders were seminal in the preparation and organization of *sārtha*, in the making of the caravan and also the successful accomplishment of a journey one can trace several other factors and individuals involved in the process. The purpose of the present research is to explore the diverse social elements (other than the traders) which resided in *sārtha*, their role, their relation to the *sārtha* and the broader society and to situate this in the early historic (Pre-Gupta) socio-economic context of the lower and middle Gangetic valley.

Keywords: Sārtha, Sārvavāhas, sārthagaṇavāsi, Social elements, Arthaśāstra, Jātaka, vaidehakas.

0403035 GOGOI, AMBESWAR AND KALITA, MAHESHWAR (Department of Assamese, Cotton University, Guwahati, Assam). AN ANALYTICAL STUDY ON THE SPRING FESTIVAL OF MOHAN, DEODHAI AND BAILUNGS OF SIVASAGAR, ASSAM

The Ahoms entered the present day Assam at 13th century AD; carrying their own culture, religion, language and conventions and ruled it for almost 600 years. The Ahoms assimilated within the indigenous culture of various tribes and built a greater Assamese community through harmony and peace. The Tai Ahoms left their own religion and accepted Hinduism in the process of assimilation. Though most Tai Ahom people accepted Hinduism but the priestly class of Mohan, Deodhai, and Bailung carried forward their own rituals, religious beliefs, customs etc. In this regard, the priestly class of Tai Ahom residing near Sivasagar region of Assam are mention worthy. They are even upholding their own culture and religious beliefs since then.

They celebrate spring festivals like Bihu maintaining their heritage and tradition by remembering their ancestors. In this research paper we shall make an attempt to analyse and systematically study the above mentioned topic.

For the discussion titled ‘An analytical study on the Spring Festival of Mohan, Deodhai and Bailungs of Sivasagar, Assam’ has undertaken field study at many places of Sivasagar, Assam to understand the rituals, rites, tradition and relevance of spring festivals. We shall also study how the songs, folklore, local beliefs have played significant role during the celebration of festivals of priestly class of Tai Ahom in Sivasagar, Assam.

To discuss how the priestly class observes the spring festivals traditionally.

To discuss the importance of spring festivals.

To discuss about the religious rituals reflected at spring festivals.

To discuss the songs, folklore, folk beliefs that associated with spring festivals.

We have undertaken descriptive method to discuss the said topic and also we took help from the priestly class, local people in Sivasagar region of Assam to collect data. We collect data from primary and secondary source and from various books and websites relating to the topic.

0403036 SAIKIA, RANA (Department of History, Delhi University, Delhi). THE NATION AND ITS ‘TRIBALS’: HISTORY, MEMORY AND POLITICS OF REPRESENTATION IN A STATE MEMORY-SPACE - A STUDY OF REPRESENTATION OF ‘TRIBALS’ IN THE NATIONAL MUSEUM OF INDIA

The aim of this paper is to examine the nature and meaning of representation of Tribal communities in the National Museum of India located in New Delhi. It would argue that as a state sponsored site of public memory the National Museum’s representation of Tribal communities is not an innocent, unproblematic process. It involves an elaborate politics of memory as well as forgetting leading to the emergence of a schema of hegemonic ordering of representation. From the perspective of ‘memory study’ this paper seeks to show how in its attempt at producing a master narrative for itself in the National museum the Indian nation state has produced a prescriptive image and identity of the ‘tribal other’. Through the study of the peculiar representation of tribal life-style and traditional artifacts in particular galleries of the Museum as well as the politics of spatial positing of represented elements and images within the Museum itself, this paper analyzes the mode and methods through which an essentialised, ahistoricised and marginalised identity of the tribal communities of India has been produced in the National Museum. In order to explain the reason and rationale behind creation of the ‘tribal other’ this paper connects the colonial and post colonial history of the Museum with Indian nation state’s exigencies of power and rule vis-à-vis India’s tribal communities.

0403037 SWAROOP, ARVIND (Department of History, Babasaheb Bhimrao Ambedkar University, Lucknow). GREEN HISTORY OF DALITS: ECOLOGY AND DALITS IN UNITED PROVINCES, 1900-1950

This paper explores discourse, practice and strategies of Dalit movement in United Provinces which encompasses the modern state of Uttar Pradesh from the perspective of ecology. Attempt has been made to explore the way Dalit movement besides its core objectives, engaged in gaining access to natural/ecological resources in United Provinces. Being one of the regions with large number of Dalit communities United Provinces offers a fascinating example of how Dalit movement engaged in its demand for empowerment of Dalits. The main objective of this paper is to underscore the fact that Dalit movement in United Provinces did had a fascinating ecological dimension which provides a case study for Dalit environmentalism.

This paper has been organized into four sections: the first section presents a brief picture on geo-ecological conditions of United Provinces, the second section narrates the ethnic-occupational profile of Dalits of United Provinces, the third section focuses on socio-economic and cultural conditions of Dalits in United Provinces, the fourth section explores the political movements of Dalits in United Provinces and the fifth section illustrates the ecological dimension of Dalit movement in United Provinces.

0403038 VERMA, SANDEEP KUMAR (Department of History, Satyawati College, University of Delhi, Delhi). TECHNOLOGICAL CHALLENGES AND IMITATING *INDIENNES*: ANCIEN REGIME, THE FRENCH EAST INDIA COMPANY AND TEXTILE INDUSTRY OF PONDICHERRY DURING THE 17TH AND 18TH CENTURY

The city of Pondicherry, on the Coromandel coast, harbours a rich history of maritime commerce via the Indian Ocean, which dates back to the Indo-Roman trading relationship in the first millennium. By and large, the city's history found reference in the context of Arikamedu being an ancient trading centre, and even more so in the historical framework of the French East India Company, which made its presence strongly felt in the subcontinent. However, since the French Company has been studied at par with the English East India Company, and the former had not been very successful in carving a niche for itself in the sub-continent, Pondicherry was also regarded as having been less than prosperous. In essence, it projected an image of the coastal city which was identical to that of the company. Cognizance of the burgeoning commercial past of the port town has taken a back-seat and its history has been largely undermined in major historical works of economic, commercial, social and political nature, particularly in comparison with other cities during the early modern period, such as Madras, Bombay, Calcutta, Surat and so on. The role of the city, in the context of the Indian oceanic trade and the development of mercantilism and textile production in France, too, have been pretermitted. Historical discussions of global commercial ties have primarily concentrated on Western India and Bengal, overshadowing Pondicherry's ties with Europe, West Africa and Asian countries. Pondicherry was a coastal region and, therefore, its economy was largely based on trade and commerce of a variety of textiles – mostly cotton. It was linked to the wider hinterland of the subcontinent through land routes and more importantly, sea routes. Non-agrarian activities—manufacturing of textile and commerce—primarily constituted the foundation of the city's economy, which made the city a hub of commercial and political activity.

With the beginning of the 17th century, the issue of sea trade with Asia triggered the ministry of France, particularly after the establishment of the English and Dutch commercial companies in India and their growth in oceanic trade, to establish 'direct' trading relations. Indian textiles were, by far, the largest category of goods exported not only to France but to all other European countries in the 17th and 18th centuries. The textiles that found their way to France from India (Orient) towards the last quarter of the 17th and 18th century were referred to as *Indiennes* or *Toiles de Jouy* or *Toile de Pintes*. It was *recherché* in terms of quality. The use of such material for dresses triggered a fresh phase in the fashion industry and thus, experienced pervasive popularity. *Toiles de Pintes* were in high demand in France. They began to be seen as a new symbol of social status in terms of luxury, and were not limited to a particular stratum of the society. The proposed paper is an attempt to comprehend and shed light on the influence of cotton textiles in the political economy of Pondicherry during the regime of the French East India Company, and how it fostered an alliance between India and France during the early modern period. It deliberates Pondicherry as a key urban commercial site—globally connected and commercially dynamic entity—more so than most had envisaged. On the other hand, the paper shows that since in all the commercial voyages, a large part of the cargo consisted of textiles and thus, the consequences of such large-scale import of painted or white cotton canvases into France became the root of a formidable competition with the French factories. Textile producers of Nantes, Marsailles, Levant

and several other regions of France were displeased with the flow of *Indiennes* in their territories, since the over-stream of textile had a negative impact on intra-national production. The agitation of domestic manufacturers soon became a cause of concern for the ministry of France. In the 17th and 18th century, a number of rulings and decrees were issued by the French state in order to regularise and restrict the import of such textiles into France. Between 1686 and 1759, the import of Indian textiles was banned. Moreover, the production of any such textiles that might be considered a replica of *Indiennes* was abolished within France. The ban on counterfeiting the cloth was done so that the state could suppress the appetency of such textiles amongst the domestic consumers. However, the flow of Indian cotton fabrics was not stopped, if not in a legitimate way; they flowing in from other channels. In this context, the essay would try to shed light on two particular issues that how the techniques of manufacturing painted/printed textiles transferred to France and what role state played in this entire venture. Besides, the essay would also focus on the issue of what kind of technological challenges were faced by the French manufacturer in imitating *Indiennes* and how this process of making replica was perceived in the intellectual discourse of the France in terms of looking India as a site of learning.

The proposed paper would be based on a careful historical scrutiny of archival source material and private papers. Most of these sources are written in French and some in English.

05. BIOTECHNOLOGY

0405039 GANDI, PUNEET (Department of Research & Training, Bhopal memorial Hospital & Research Centre, Bhopal). WHY BIOMARKER RESEARCH IS LOST IN TRANSLATION: ISSUES AND SOLUTIONS

Biomarker or biological marker is an indicator of a biological process in the body that can be measured, accurately and reproducibly. For thousands of known human diseases, approximately 500 have a treatment approved by the regulatory agencies. Even when a new treatment is shown to be effective, it can take several years to identify and use for all patients who could benefit. In this scenario, biomarker profiling can play an important role in the diagnosis and prognosis of a disease, specifically, the blood-based non-invasive molecular markers. The crisis involving the 'translation' of scientific findings in biomarker research, from a laboratory setting to human application is widely recognized both in academia and industry, and can only be addressed by a multi-disciplinary, multi-institutional approach. This rift between basic research (bench) and clinical research is widening and needs to be addressed, more so with the use of biomarkers becoming significantly widespread in the era of personalized medical care.

Translational discordance has to be understood with a specific focus on the number of 'culprits' in biomarker research including poor hypothesis, irreproducible data, ambiguous preclinical models, statistical errors, the clinical relevance of basic research, insufficient transparency, lack of data sharing in research and finally the task of seeking a regulatory approval. The problem with reproducibility and translatability of preclinical findings to human applications still remains a fact and the return on the investment is limited in terms of clinical impact.

To improve outcomes of translational research, it may be prudent to first improve the quality of hypotheses before testing. The next approach can be the use of less complex biological systems instead of cell lines or primary human cells that are the workhorse of research and development. Better phenotyping of volunteers in clinical studies using molecular profiling, imaging, and clinical data collected longitudinally to define the human disease is another step. Clinical relevance is the other area that deserves discussion, as there is a value of even 'negative' results and this is rarely documented when clinical studies are completed. The high risk of attrition of successful translation of findings to human subjects and funding challenges in the public-research sector also need to be dealt with.

In nutshell, the success of translational biomarker research from bench to bedside depends on the adoption of multidisciplinary team-science and inter-organizational collaborative model that synchronizes efforts and actions of all.

0405040 GUPTA, YAMAL (Department of Botany, Kirori Mal College, University of Delhi, Delhi 110007). SILVER NANOPARTICLES FROM LABORATORIES TO HOUSEHOLDS

The concept of Nanotechnology dates back to 9th century, and precious metal NPs were used by Mesopotamian artisans to generate a glittering effect to pots. But, the first scientific report unfolding the production of gold colloids came in 1857 when Michael Faraday discovered that the "beautiful ruby fluid" formed by aqueous reduction of gold chloride by phosphorus are "fine particles". Nobel laureate Richard P. Feynman in his very famous lecture "There's Plenty of Room at the Bottom" where he talked about improving the Electron Microscopes 100 times to facilitate the visualization of individual atoms. Since then, there have been various ground breaking developments in the field of nanotechnology.

Nanoparticles is derived from Greek word nanos meaning "dwarf". The particles which have at least one dimension in the range of 1-100 nm are considered as nanoparticles (NPs). Nanotechnology applications depend on the fact that it is possible to manipulate the structures of materials at extremely small scales (below 100 nm range) to achieve specific properties. Due to large surface area to volume ratio, nanoparticles offer novel properties leading to widespread use in different field of applications.

NPs are widespread in the environment and are formed via a variety of inorganic, biological pathways and through anthropogenic activities. But the visualization of these became possible only with improved microscopy. The potential of microorganisms to synthesize Ag nanoparticles was demonstrated for the first time by Klaus and co workers (1999) by culturing *Pseudomonas stutzeri* in Lennox L agar substrate supplemented with AgNO₃.

Properties of bulk silver (soft, white, lustrous high electrical and thermal conductivity) are different from the silver nanoparticles. Silver nanoparticles possess various physical, chemical, and biological properties that find applications in nanobiotechnological research due to its catalytic activity, optical properties and antimicrobial effects. They are used in diagnostics, conductive inks, optical spectroscopies and in wound dressings, as topical creams, in filters, washing machines, shoe insoles, socks, garments, etc. In fact, nanomaterials find a role in daily life especially in cosmetics, food, detergents, water purification systems besides electronics.

Owing to the importance of silver nanoparticles there has been a massive increase in their production across the globe. There are two approaches for nanoparticle synthesis : (i) top down approach and (ii) bottom up approach.

Top down approach encompasses techniques like mechanical milling, lithography, chemical etching, laser ablation sputtering to break down the larger pieces of metal (bulk silver) to nanoparticles. These methods form NPs with high purity and desirable properties, but require sophisticated instruments, with high power consumption and high operating cost.

Bottom up approach include building up larger and more complex systems with precise control starting at the molecular level itself. Physico-chemical methods under bottom up approach include vapor deposition, sol gel processes, spray pyrolysis, aerosol processes, chemical/electrochemical precipitation etc. The bottom up approach involves the reduction of metal ions to form atoms, which in turn nucleate to form seeds (nanoparticle) and subsequently the nanocrystals. The reduction of metal ions can also be done by reductants originating from the biological sources such as various plant extracts, micro-organisms, biomolecules etc. This biological method for synthesis inexpensive, easily scaled-up, and environmentally benign.

Silver nanoparticles show anti-microbial properties against gram positive and gram-negative bacteria. Nano silver which possesses antimicrobial properties is used in soaps, toothpastes, wet into toothpastes and shampoos as preservatives. Anti-acne creams, wipes, deodorants, lip products, as well as face and body foams. Even in the home appliances such as washing machines the specialized drums are present that release silver nanoparticles during washing that penetrate the fabrics with silver and provide protection for a maximum of 99.99% disinfection and an added antibacterial effect of up to 30 days after washing.

Organic Basics claim “For protective underwear, Organic Basics added polyester fibers with a chemically bonded coating of silver into their organic cotton boxer briefs. The threads can kill off 99.9 percent of microbes”. These are the claims of Samsung WM1245A Washing Machine. Manufacturers such as Nivea produce underarm deodorants with claims that the silver in the product will provide up to 24-hour antibacterial protection. Nanosilver, is claimed to be highly effective in disinfecting the bacteria in the mouth and has also been added to toothpastes, in handwashes such as Lifebuoy sold with Activ silver formula. The filters used in air conditioners, can become a home for harmful bacteria. To combat this the air conditioners and air cleansers installed in cars or buildings, have filters coated with silver nanoparticles.

The silver nanoparticles have penetrated deep into our lives, knowingly or unknowingly we use them. However, the dark side of excessive use of these in the consumer products is of great concern not only for the environmentalists but also for all of us. These anthropogenic nanoparticles inevitably get introduced in the environment and have been shown to have toxic effects.

0405041 KIRAN, JYOTI (Barkatullah University, Bhopal). CHASING DIABETES: CAN INCREASING INCIDENCE IN INDIA REFLECT ON THE BURDEN OF PANCREATIC AILMENTS?

Pancreatic health is an important aspect in one's well being, as it plays a major role in maintaining blood sugar levels. The current lifestyle practices have led us to develop several non-communicable health disorders such as diabetes and cancer. Smoking, alcohol consumption, diet, inherited/ non- inherited genetic mutations are known to contribute as risk factors to lifestyle diseases and often manifest as gall stones, chronic pancreatitis or even pancreatic cancer. This is a major concern in the public health domain as India is the world's capital for diabetes and the incidence of pancreatic cancer is on the rise. Understanding the role of contributory factors in chronic pancreatitis and the underlying mechanisms could aid in designing a non-invasive blood-biomarker screen for risk assessment, thereby reducing the burden of pancreatic ailments in future.

0405042 MUKHERJEE, SITABJA (KIIT School of Biotechnology, KIIT deemed to be University, Bhubaneswar-751024). NF KAPPA B INHIBITORS OF NATURAL ORIGIN CAN ABROGATE SEVERE INFLAMMATION INDUCED LUNG PATHOLOGY IN COVID 19 PATIENTS

Bats are reservoir hosts of several high-impact viruses that cause significant human diseases, including Nipah virus, Marburg virus and rabies virus. They also harbor many other viruses that are thought to have caused disease in humans after spillover into intermediate hosts, including SARS and MERS coronaviruses. It is interesting that though bats act as reservoirs of potentially threatening viruses that cause diseases in humans, most of them cause little pathology in the bats themselves. However, the factors that determine the outcome of the infection depend on the complex dynamics of the host virus relationship which have not yet been extensively investigated.

In a study aimed at understanding the pathological features responsible for disease severity in Severe Acute Respiratory Syndrome (SARS) caused by SARS-CoV in humans, the authors observed that infecting mice with a strain of SARS CoV adapted for infection in mice results in 80% mortality of the infected mice by 10 days. The mortality in the mice is associated with lung pathology that results from severe inflammation. Infection of mice with the wild type virus, increases the expression of TNF, CCL2, CCL5, CXCL1, CXCL2, and CXCL10, and IL-6, that leads to chemotactic migration of neutrophils to infected lungs. The study demonstrated that the viral E protein contributes directly to the extent of the inflammatory response, independent of its role in virus replication in SARS CoV infection in mice. The study also demonstrated that the activation of NF Kappa B in infected mice induces the upregulation of pro-inflammatory cytokines that lead to the neutrophil influx resulting in lung pathology and is markedly reduced in infected mice that are treated with NF kappa B inhibitors.

SARS CoV2 shares 100% sequence similarity with SARS CoVZC45 (a group of bat derived, SARS like coronavirus), in the nsp7 and E proteins. It is therefore likely that NF kappa B activation induced severe inflammatory responses are associated with the clinical illness in COVID 19 and compounds that can prevent NF Kappa B activation may reduce pathology by reducing an undesirably heightened inflammatory response and thereby improve disease outcome. Over the years, a great number of natural products, especially from plants, have been reported to exhibit obvious anti-inflammatory effects both *in vitro* and *in vivo*. Therefore a multi-targeted approach to control the viral infection by use of some of these natural products like Curcumin, Resveratrol, Quercetin, Andrographolide, Gingerol and Ursolic acid that can prevent virus survival in the host by inactivating important viral enzymes that are crucial for the maintenance and formation of new virus particles, and also being powerful NFκB inhibitors; can prevent inflammation induced severe disease pathology. *In silico* studies have shown that Gingerol and Curcumin bind to ACE2 cell surface receptor and therefore can prevent S protein on the SARS-CoV2 virus to interact with ACE2 receptor, preventing virus entry into the target cells. Similar analysis has shown that Andrographolide can inactivate the serine protease activity of TMPRSS2 of SARS-2-S protein (SARS-CoV-2 main protease) and therefore can prevent the virus to infect the cell. Preliminary studies involving docking of Curcumin onto the Main Protease (Mpro) of the SARS-CoV-2 virus using Autodoc-v.2.0 program demonstrates that curcumin binds to the ligand- 3WL ligand

(Onysilin Compound)- binding site on Mpro and that by doing so, curcumin inhibits Mpro activity and thus viral replication. Andrographolide, Gingerol and Curcumin are very powerful inhibitors of NFkB and therefore would prevent the cytokine storm which is responsible for ARDS lethal syndrome which is responsible for pneumonia, sepsis and death of COVID19 patients.

In an open-label nonrandomized clinical trial in Iran, efficacy of nano-micellar-curcumin oral formulation has been evaluated in hospitalized patients with mild-moderate COVID-19. Most of symptoms including fever and chills, tachypnea, myalgia, and cough resolved significantly faster in curcumin group and duration of supplemental O₂ use and hospitalization was also meaningfully shorter. We have observed the effect of nano curcumin, and nanoandrographolide to successfully be able to prevent murine cerebral malaria pathology arising out of a dys-regulated, hyper-inflammatory Th1 skewed immune response that leads to cytokine storm, much like that in SARS CoV2 infection.. Our Nanocurcumin will be effective in treating patients recovered from COVID 19 infection as an adjunct drug.

0405043 PATAIT, VIPIN; SHARMA, PRAMOD AND JAIN, SANJAY (Department of Biomedical Engineering, Samrat Ashok Technological Institute, Vidisha 464001). ARTIFICIAL INTELLIGENCE AND IT'S IMPACT IN INDIAN PERSPECTIVE

Artificial Intelligence (AI) as has become the world leading technology now a day. Governments across the word from the highly developed countries to under developed countries have now realised the benefits and impact of this modern technology. Countries like India are moving with pace to extract most out of it and have made national strategies to proliferate it to the last man of the countries. This paper aims at highlighting the key areas of the social life in India where the AI can bring the change. The problems and their possible solution with the adoption of AI in 5 key areas Healthcare, Agriculture, and Education, Smart city infrastructure and smart mobility and transportation have been discussed in this paper.

0405044 SAMARTH, RAVINDRA M (Faculty, Department of Research, Bhopal Memorial Hospital & Research Centre, Raisen Road, Karond, Bhopal- 462038). POPULAR CYTOGENETIC BIOMONITORING TOOLS FOR ACCIDENTAL AND OCCUPATIONAL EXPOSURES TO POTENTIAL ENVIRONMENTAL CONTAMINANTS: CURRENT PERCEPTIONS

Recent development and progress in industrial growth has greatly contributed to intense increase in environmental pollution and impacted human health. However, the effect of exposure on an individual depends on the nature and degree of toxicant/pollutant as well as genetically determined differences among individuals. To check the genotoxicity, several simple methods have been developed and are utilized for monitoring the alterations in genetic material i.e. chromosomes or DNA damage that may have resulted from exposure to genotoxic compounds. The various available cytogenetic test methods employed for biomonitoring in human population are chromosomal aberration analysis, micronuclei assay, sister chromatid exchange assay, comet assay etc. Some of these like cytokinesis-block (CBMN) assay and dicentric chromosomal assay (DCA) are recommended in human biomonitoring and risk assessment studies as per standard national guidelines. The physical toxicants such as gamma rays and X-rays affect the individuals working with radioactives like x-ray technicians, pharmacists and nurses, while chemical toxicants like PAH, pesticides, cytotoxic drugs, industry based toxicants, such as asbestos, paints, heavy metals etc., affect municipal waste handlers, farmers, workers of pavement (road) construction, petrol pump staff and mining industry workers. These are well documented cases which exhibit adverse effects of environmental and occupational hazards. Recent advancements in technology have reflected on the evolution of these cytogenetic tools too. Both DCA and CBMN assays have now been tried for automated detection and scoring. High resolution cell imaging has been found to have potential for complete automation for scoring of CBMN cytome assay. Thus, biomonitoring of genetic risks using cytogenetic tools will be helpful for early identification or diagnosis and prevention of health hazards or associated diseases including cancers.

Key words: Micronuclei (MN) assay, dicentric chromosomal assay (DCA), environmental pollution, biomonitoring, genotoxicity, occupational hazards, human health.

0405045 SHRIVASTAVA, PARKHI (Barkatullah University, Bhopal). THE GROWING PERIL OF DRUG RESISTANT SUPERBUGS IN HEALTHCARE DELIVERY

Superbugs are microorganisms, most often bacteria that have become resistant to multiple drugs/antibiotics that were developed to kill them. Therefore, common infectious diseases like pneumonia, urinary tract infections (UTI), and even tuberculosis, caused by these resistant microorganisms are becoming very difficult to treat and often a cause of morbidity. The involvement of these superbugs in causing hospital-acquired infections (HAI) is becoming a major factor contributing to fatality in patients with chronic ailments. Patients admitted in the hospitals with any pre-existing infection, longer stays in the hospital or post-operative patients in ICU often acquire HAIs caused by superbugs, leading to bloodstream infections like sepsis and septic shock that eventually leads to death. HAIs can be treated with antibiotics, however the efficacy of antibiotics is fading with the increase of different resistance mechanisms in bacteria. To overcome this hitch, a suitable approach is the use of naturally occurring botanicals that have the potential to complement antibiotic action. Plant metabolites; majorly polyphenols, terpenoids, flavonoids, saponins, alkaloids, tannins, etc. exhibit a multi-target mode of action against superbugs via inhibition of cell wall synthesis of bacteria, DNA damage, membrane disruption, inhibition of various efflux pumps, etc. that can aid in controlling the fast developing resistance against antibiotics. This area therefore needs more focused research to control the growing peril of drug resistant superbugs in healthcare.

06. CHEMICLE SCIENCE

0406046 AGRAWAL, SHELLY (Department of Chemistry, Saket MGM, Vidisha). EMERGING CORONA VIRUS LIKE NEWER THREATS TO LIFE ON PLANET EARTH

Emergence of corona virus during 2019 is one of the major threat that our life has faced on this planet earth. Day to day health reports are the evidence which proves that how this pandemic has taken a number of life on earth till now. According to statistical report the outbreak of the corona virus (COVID-19) has spread 6 continents till now. And almost 2.5 people had died after coming in contact with this respiratory virus. The crisis is not over yet. The virus is still circulating at very high rates. Although the symptoms of COVID-19 like dry cough , fever leading to shortness of breath are just like symptoms of common cold and flu are more likely to spread in cold months but there is no conclusive evidence which suggest that temperature impacts the spread of SARS-CoV-2 Virus. The reason behind the severity of the virus is its ability to cause death. Usually a virus being without cell wall normally infects our body by entering the healthy cells where it further make copies of itself and multiplies throughout the body. On the contrary the new coronavirus latches its spiky surface protein to receptors on healthy cells, especially those in your lungs through ACE2 receptors. Once inside, the coronavirus hijacks healthy cells and takes command eventually, it kills some of the healthy cells. Since our lower airways have more ACE2 receptors than the rest of any other tract COVID-19 is more likely to go deeper than viruses like the common cold. As a result of this different action lungs might become inflamed, making it tough for anyone to breathe. Acute respiratory distress syndrome (ARDS) begins a few days later. It damages the tissues and blood vessels in your alveoli, causing debris to collect inside them. As fluid collects in your lungs, they carry less oxygen to your blood. That means your blood may not supply your organs with enough oxygen to survive. This can cause your kidneys, lungs, and liver to shut down and stop working. The crisis is not over yet. During our path to discover vaccine for this corona virus we found a highly contagious new variant of the Coronavirus named 'VUI – 202012/01'. According to reports, the new variant of the SARS-CoV-2 could be up to 70% more transmissible than the old variant. Thus if the virus continued its journey like this only then the day is not far where a person will strive for life on earth.

Keywords: COVID-19, SARS-CoV-2, pandemic, coronavirus

0406047 NANDKUMAR, PREETI AND SHUKLA, R N (Department of Applied Chemistry Christian College of Engineering & Technology, Bhilai). NANOCCELLULOSE –A FUTURISTIC ECOFRIENDLY APPROACH

In paper industry nano technological advances are of great importance in targeting high quality, efficiency and market potential. Nanocellulose is a word dealing with nanostructured cellulose. Lignocellulosic biomass is a natural biopolymer with cellulose fibrils in a matrix of lignin and hemicellulose. One of the most relevant nano materials of our paper industry is nano crystalline cellulose, a renewable, recyclable and abundant nano material obtained from lignocellulosic biomass. Currently the paper industry uses nanotechnology in two ways: to enhance current products and create new ones, and to discover ways that cellulose fibers can be used for products outside the industry. In this paper, we have discussed the molecular structure for biomass recalcitrance, reengineering process of lignocellulosic biomass into nanocellulose via chemical approaches.

Keywords:-Nanocellulose, Lignocellulosic fibers, cellulose Nano crystal, cellulose Nano fiber

0406048 SEMIL, PRADEEP; RAJPUT, D P S AND MODHERA, BHARAT KUMAR (Petrochemical Engineering Department, Samrat Ashok Technological Institute, Vidisha, Madhya Pradesh, 464001). TANNERY WASTEWATER AND THEIR REMOVAL STRATEGIES

Tannery industries are one of the major sources of environmental pollution as the wastewater discharged from industries contain high concentration of organic pollutants, organic matter, phenolics, tannins and heavy metals mainly chromium as environmental pollutants. The organic pollutants present in tannery wastewater are not completely degraded even after the secondary treatment process and support the growth of pathogenic microbes, which goes into the aquatic environment along with tannery wastewater and cause

serious health hazards to living organisms. Therefore, it is very essential to treat the tannery wastewater adequately for the complete removal of organic pollutants and pathogenic microbes for the safety of aquatic resources and human as well as animal health. Thus, this book chapter provides the detailed information on the various types of organic pollutants and pathogenic bacteria that remained even after the secondary treatment process as well as various types of environmental problems and health hazards contributed by these organic pollutants and pathogenic bacteria. In addition, this chapter also covers the recent advancements, merits and demerits of various treatment methods used for the treatment of tannery wastewaters to remove organic pollutants and pathogenic bacteria at common effluent treatment plant of tannery industries.

Keywords: Tannery wastewater, Pollutants, Pathogenic bacteria, Environmental pollution, Treatment approaches

0406049 SHARMA, MEKHALA AND SHUKLA, R N (Chemical laboratory P G Department OF Applied Chemistry, Samrat Ashok Tecnological Institute Vidisha 464001). MORPHOLOGICAL ANALYSIS OF FIBER OF LEUCAENA LEUCOCEPHALA FOR PAPER MAKING

Hardwood pulps are used in printing and writing papers contributing to improved printability, sheet bulk, opacity and surface smoothness. Their applications usually comprise fine papers, printing papers and art papers. Pulp into a marketable product depends on the original fiber characteristics and the response of fibers to processing variables. The properties of the raw wood material and the process of fiber separation have a significant influence on the properties of the produced fibers. The physical properties of paper sheets made from cellulosic fibers are dependent on fiber morphology. *L. leucocephala* is a member of the genus related to the other species within the *Mimosoideae* sub-family, its sub species and other related genera. *L. leucocephala* has three growth forms that are commonly found in tropics (Sabharwal).

During the course of this study it was found that the average fiber length of *Leucaena* species 0.800 mm (Diaz et al while that observed in our study was 0.949 mm. Furthermore Runkel ratio is one of the most important parameter in qualifying the fiber for paper industry. The Runkel ratio of the *Leucaena leucocephala* fiber was calculated as 0.55 which is less than 1. Higher Runkel ratio renders unwanted paper properties. The Flexibility ratio of the fiber was about 63.2. If the flexibility ratio was between 50 and 70, this kind of fibers easily can be flat and give good paper with high strength properties. The tensile strength continuously increased from the unbeaten pulp to highly beaten one in both pulp categories (kraft pulp and low sulphidity). It is also clear that the tensile index is increased by the addition of catalyst. In a similar work (Silva et al)¹⁹ found that demonstrate that sulfidity reduction and AQ addition increased pulp refinability, requiring less energy.

Keywords: Kraft pulping, Fiber morphology. Runkel ratio, Slenderness Ratio, Flexibility Ratio.

08. COMMUNICATION AND JOURNALISM

0408050 SAHI, SHASHI PRATAP (Department of Political Science, A. N. College, Patna). UNDERSTANDING MEDIA IN POST- COLONIAL INDIA

Rousseau along with Voltaire, in their strife against feudalism and despotism, effectively used the media to help transform a feudal society into a modern one. In underdeveloped countries like India the media has a great responsibility to fight backward ideas such as communalism and support the population in their struggle against poverty and other social evils. With market forces at play and public investment in private companies, journalists found it sometimes lucrative to write only partially absolute stories of companies waiting to list on the stock exchanges. The need of ethical practices is important and of utmost urgency since the ever growing, ever evolving media of India will of no value to India's 1.2 billion people who may have more infotainment, sensationalism and political spin at their disposal but who will remain ignorant of the facts and analysis of events around them. In this paper, in the first section we will discuss the present state of affairs of Indian media, and in second section we will examine three inter-related aspects, freedom of speech and censorship, the press as a part of free trade and the role of press in a bourgeoisie democratic society, which Karl Marx, during his stint as a journalist dealt with in his writing, and which have a contemporary resonance in post-colonial India.

0408051 SHAMEER, SHAIK MOHAMMAD (Potti Sreeramulu Telugu University, Hyderabad). SIGNIFICANCE OF DRONES IN JOURNALISM- CHALLENGES AND OPPORTUNITIES

Technology makes you more comfortable and secure with every area in life. It facilitates free flow of information, data transfer, to access, categorize and process the data and by many ways. Media industry utilising new technology to improve performance to make a best out of it. Many technologies used by media industry to capture the news or events, for taking footages and pictures of a breaking news. Recently drone usage has become more common for reporting and capturing news by the media. Camera drones present unique visual perspective and establish new scale to storytelling and accountability in journalism. With drone journalism it is possible to acquire aerial pictures in conditions that are not easy to cover, with perspective, swiftness, mobility, greater safety for journalists, and at a lower cost. The new models are fitted with high-definition technology that enables them to provide incredible footage of national celebrations, political protests, natural disasters and conflicts. It is hypothesized that apart from conventional practices, usage of drones in journalism may be advantageous to access information from remote far flung areas. The documents related to drone journalism searched on Google search engine using key words and available documents analysed.

This research is a bibliographic and documentary analysis of books and papers on academic and science popularization in order to trace the roots of the word, definition, and technical design of drones and their applications in the media. This analysis has helped us to recognize the key possibilities that this technology can offer for the media industry and the obstacles it must face in order to be completely integrated into news production processes. Therefore, newspaper archives and statistical studies on the media industry and the use of drones were added to the bibliographic analysis here. For the purpose of this study, in-depth interviews conducted with industry expert & production companies that provide these services to television channels. Finally, we reviewed the drone legislation to examine the legal structure regulating their skilled use in India, including the latest rules laid down by India's Directorate General of Civil Aviation.

Keywords: Drones, journalism, Media, Reporting, New technologies, Footage

09. COMPUTER SCIENCE

0409052 CHUGH, SHAILA; GOYAL, SACHIN; JOSHI, SUNIL; PANDEY, ANJANA; AZAD, MUKESH AND DHILLON, SUMIT (CSE Department, Samrat Ashok Technological Institute, Vidisha 464001). DENSITY-WISE MAMMOGRAM CLASSIFICATION USING EFFICIENT FEATURES AND DEEP LEARNING ALGORITHM

Fully automatic CAD system for complete mammogram examination is still challenging problem. Generally, full mammogram based CAD system consists of following stages; Mammogram image pre-processing, image enhancement, suspicious area detection, 2 - stage mass classification (normal mass-abnormal mass then abnormal mass is classified as benign /malignant case). Automatic CAD systems have not achieved desired accuracy for BI-RADS classification. Breast Density is also play important role for Mass detection and classification. The main Objective of this research is to accurate mass classification using proposed framework of fully automatic CAD system focused on breast density. Breast density is measured by performing texture quantification of the full mammogram images. Proposed Fully automatic CAD system frame work based on elaborated literature survey.

0409053 DHILLON, SUMEET; MISHRA, NISCHOL; SHAKYA, D K; JAIN, PRANITA AND CHUGH, SHAILA (Samrat Ashok Technological Institute, Vidisha 464001). ATTACKS ON NETWORK AND ITS POSSIBLE COUNTERMEASURES

Security is the foremost requirement of any network. Network Security deals with security of the network as well as data. With the growth of Internet, network security became a major issue. The primary goal of network security is to provide Authentication, Confidentiality, Integrity and Availability of the data. As we know that there are different types of attacks on data when it is sent over network. There are various techniques to safeguard data on the network through firewalls and Intrusion prevention system. In this paper we will present various attacks and techniques to protect the data.

0409054 GOUR, RAGINI AND AHIRWAL, RAMRATAN (Department of CSE, Samrat Ashok Technological Institute, Vidisha 464001). SURVEY ON IMBALANCE DATA CLASSIFICATION TECHNIQUE AND ALGORITHM

Data imbalance is one of the main challenges faced across many domains such as data mining and machine learning. Imbalance data typically refers to a classification problem where the number of observations per class is not equally distributed; often you will have a large amount of data/observation for one class referred to as the majority class and much fewer observation for one or more other classes referred to as the minority classes. Imbalance data occurs in many real world domains like medical domain, manufacturing domain, finance domain etc. There are many techniques and algorithms for imbalance data problem which are based on different parameters and conditions. This paper comprises all such algorithms with their merits and demerits and also a comparative study of these algorithms.

Keywords: Imbalance data, random over sampling, random under sampling, synthetic minority over sampling technique.

0409055 KAMLEY, SACHIN AND VERMA, SUSHIL KUMAR ((Department of Computer Applications, Samrat Ashok Technological Institute, Vidisha 464001). SHORT TERM PERFORMANCE PREDICTION OF BOMBAY STOCK EXCHANGE OF INDIA INDEX USING BPN MODEL

Stock market has gained as so much attention in these days, which is also related to the economic wealth of our country. The movements in stock prices can impact on the economy as well as the lives of millions of people. The rising in the markets will always boost the confidence of investors and falling in markets has been always an opposite effect on society. In stock market people always invest money based on some observation and they used some tools and techniques for knowing the trends of the market, read

newspaper, watch TV etc. Most of the people are interested in short term prediction because it has less risk than investing money for the longest period of time. This paper mainly highlights the back propagation network method for analyzing the stock market conditions and day wise short term prediction are applied on stock data. This research study would help stock users and investors to select the right share and earn maximum profit.

Keywords: Stock Market, Data Mining, Back Propagation Network, MatlabR2010a, BSE.

0409056 SAGAR, POONAM LATA; JOSHI, SUNIL AND SINGH, VINEETA (Samrat Ashok Technological Institute, Vidisha – 464001). CLASSIFICATION MODEL FOR COVID TEST DATA OF SPECIFIC CITY

Administered Machine Learning (ML) is the quest for algorithms that reason from remotely provided occurrences to deliver general hypothesis, which at that point make forecasts about future examples. In other words, the goal of supervised learning is to build a concise model of the distribution of class labels in terms of predictor features. The subsequent classifier is then used to appoint class marks to the testing occasions where the estimations of the indicator highlights are known, yet the estimation of the class name is obscure. This paper depicts different directed machine learning classification procedures utilized in example of the trial of Coronavirus for particular city. Obviously, a solitary article can't be a finished survey of all managed machine learning classification algorithms, yet we trust that the references referred to will cover the major hypothetical issues, guiding the researcher in interesting research directions and suggesting possible bias combinations that have yet to be explored.

Keywords: Machine Learning, supervised, Classification, hypothesis, Prediction.

0409057 SHARMA, AMAN; KUSHWAHA, SHUBHAM AND OGALE, JYOTSNA V (Department of Electronics and Communication Engineering, Samrat Ashok Technological Institute, Vidisha – 464001). HIGH SECURITY DIGITAL WATERMARKING SCHEME BASED ON SVD-DWT TECHNIQUE WITH NOISE ATTACKS

All nations all through the globe are a lot of worry about the medicinal services. Some portion of the issue is that the two medicos and patients have to be genuinely present simultaneously at a similar spot. This isn't simple and consistently conceivable. Because of appearance of telemedicine this issue has been corrected to extraordinary degree because of simple entry of these information. New advancements in the field of Computer Science and Information Innovation, Computer Network and Image Processing, have helped the ongoing world to move towards compelling access of information and security of information.

Remembering the over two security area, for example confirmation what's more, exacting security for clinical pictures, we have worked toward the path of two security techniques. The principal strategy is confirmation, which is for every single clinical picture before being utilized. This instrument must be quick in any case verification deferral would make the instrument futile. Right now, novel sound watermarking based calculation is proposed utilizing DWT.

Moreover, the Arnold change and blunder rectification system are used to improve the execution of proposed calculation. The presentation is estimated utilizing PSNR and MSE between the extricated watermark and unique watermark.

0409058 TIGGA, USHA KIRAN (Computer Science and Engineering Department, Samrat Ashok Technological Institute, Vidisha 464001). A COMPREHENSIVE SURVEY ON INTERNET OF THINGS (IOT): FUTURE INTERNET

Internet today is the backbone of virtual communication worldwide. The subsequent forthcoming form of communication that utilizes Internet as the underlying technology is The Internet of Things (IoT). Currently, IoT has gained considerable significance and concern, consequently, and in particular with widespread usage and adoption of the IoT applications and projects in various industries, the consideration of

IoT Security has increased dramatically too. Today, because of its potential that is yet to be extracted by industry, academia, and government, the IoT is gaining a great deal of attention. Growing methodologies link the real world and the virtual world perfectly using approximately physical objects and intelligent sensors. One such methodology is IoT. IoT provides a future in which, using similar information and communication technology, digital-physical entities can be linked or connected to enable a whole new class of applications and services. A fair survey of technologies, applications, and a potential path for IoT is addressed in this research paper. Therefore, this paper presents a concise and precise review of the current state of IoT applications and frameworks. The paper also highlights the most useful innovations that use IoT to work these days. Besides, the IoT applications and characteristics are listed in the paper. Finally, the problems and issues are briefly addressed in the implementation of the IoT.

Keywords: Internet of Things (IoT), Challenges, applications, IoT Security, Smart devices and technologies used in IoT.

0409059 VERMA, SUSHIL KUMAR AND KAMLEY, SACHIN (Department of Computer Applications, Samrat Ashok Technological Institute, Vidisha 464001). DATA MINING TECHNIQUES IN EDUCATION SYSTEM

Now a days data growth is very fast. So analysis of such type of data is difficult by traditional analysis technique. Data mining is used for this. Data mining is used to extract meaningful information from large data. We can use the Data mining in education system. With the help of data mining in education system, we can generate various type of knowledge regarding teachers, students as well as management body of institute. In this paper, we emphasis on benefits of data mining in education system, components and applications of educational data mining .

Keywords- Data Mining, Educational Data Mining, Clustering, Classification, Prediction

10. EARTH SCIENCE (Ocean Sc, Marine Sc., Atmospheric Science etc.) AND PLANETARY SCIENCE

0410060 CHAUHAN, PRAKASH AND SWAROOP, PUNEET (Indian Institute of Remote Sensing (ISRO), 4 Kalidas Road, Dehradun-248001). ROLE OF IIRS IN CAPACITY BUILDING CURRENT TRENDS & PRACTICES

Indian Institute of Remote Sensing (IIRS) is a constituent Unit of Indian Space Research Organisation (ISRO), Department of Space (DoS), Govt. of India (GoI). Since its establishment in 1966, IIRS has been imparting knowledge and is a key global player for capacity building in the field of geospatial technology and its applications through training, education and research. The Institute also hosts and provides support to the Centre for Space Science and Technology Education in Asia and the Pacific (CSSTEAP), affiliated to the United Nations. The training and education programmes of the Institute are designed to meet the requirements of various target / user groups, i.e., for professionals at working, middle and supervisory levels, fresh graduates, researchers, academia, and decision makers.

The widening applications of geospatial technology in several disciplines has increased the demand for skilled workforce in this field. The training and education programmes of the Institute are designed to meet the requirements of professionals at various working levels, fresh graduates, researchers, academia, and decision makers. IIRS is also conducting specially designed courses for the officials of Central and State government ministries and stakeholder departments for the effective utilisation of Earth Observation (EO) data. The duration of courses ranges from one week to two years.

The Institute has a strong, multi-disciplinary and solution-oriented research agenda that focuses on developing improved methods/ techniques for processing, visualization and dissemination of EO data & geo-information for various societal applications and better understanding of the Earth's system processes. The processing and applications of microwave, hyperspectral and high-resolution EO data are the main research focus, presently. The state-of-the-art laboratory and field-based instrumentation and observatories network help meeting the research goals and objectives.

With the advent of online learning in Geoinformatics, individuals are looking out for courses that are flexible and convenient to suit their needs. To widen its outreach, IIRS has started live and interactive distance learning programme (DLP) since 2007. Additionally, the recent COVID-19 pandemic outbreak has challenged traditional face-to face university education and in India, most of the universities have shifted to online platforms or blended learning. Currently, a number of institutes/ universities teach concepts in geospatial technology through traditional on-campus courses, or through Online courses (for instance, Massive Open Online courses (MOOCS) or by employing blend of both on-campus and online courses.

IIRS courses have impacted the society at large and number of students are able to secure a decent career path as well go for higher education and have equipped the learners with marketable skills and knowledge.

0410061 GAHALAUT, VINEET K (CSIR-National Geophysical Research Institute, Hyderabad 500007). CONTINENT DEFORMATION DUE TO EARTHQUAKE CYCLE AND LANDSCAPE EVOLUTION

Surface topography (whether subaerial or submarine) is a product of plate tectonic, geological, climate and surface processes. Plate tectonic processes, predominantly operated through earthquake cycle, dominate, at least in the seismically active regions, and are responsible for a significant amount of topography build up. On shorter time scale they appear to cause devastation but on longer time scale they lead to the development of diverse landscape which not only make it look beautiful, but inhabitable. The topography build-up, due to deformation caused by earthquake processes, depends upon the mechanism of deformation and earthquake occurrence. The earthquake occurrence mechanism is distinctly different in the plate boundary regions as compared to that in the plate interior regions. Here I discuss the nuances of crustal deformation in the interplate and intraplate regions in the context of India and India plate.

0410062 GANGULY, SOHINI; SANTOSH, M AND MANIKYAMBA, C (School of Earth Ocean and Atmospheric Sciences, Goa University, Taleigao Plateau, Goa – 403206). SUBDUCTION-CONTROLLED ARCHEAN MANTLE HYDRATION AND REFERTILIZATION EVIDENCE FROM GEOCHEMICAL ATTRIBUTES OF KOMATIITES FROM THE GREENSTONE BELTS OF DHARWAR CRATON, INDIA

Archean ultramafic-mafic magmatism associated with dynamic mantle melting processes represents an integral part of crustal evolution and continental growth. Archean mantle plumes and their high temperature derivatives in komatiitic magmas provide a cornerstone in understanding the thermal and chemical evolution of the early earth and its mantle. In this study, we evaluate the geochemical characteristics of the temporally distinct Sargur Group and Dharwar Supergroup greenstone belts of Dharwar Craton in southern India. The komatiites associated with these greenstone belts are characterized by Al-depleted and Al-undepleted compositions. Their MgO, Ni, Co, Cr concentrations reflect primitive, undifferentiated nature of precursor melts, whereas the HFSE and REE chemistry corroborates high degree (30%-50%) partial melting of mantle with prominent role of majorite garnet and perovskite in the generation of komatiitic melts. Both majorite and perovskite were stable residual phases in the mantle restite and also entered into the melt structure during partial melting. The Meso-Neoproterozoic Dharwar komatiites provide evidence for heterogeneous, hydrated Archean upper mantle trapped by ascending mantle plumes. The non-plume, arc-related signatures invoke contributions from (i) sub-cratonic lithospheric mantle influenced by ancient subduction events and (ii) hydrated Archean upper mantle. The Sargur Group and Dharwar Supergroup komatiites record a distinct temporal transition and geochemical heterogeneity in the Archean mantle beneath the Dharwar Craton and can be attributed to Archean upper mantle hydration by flat slab subduction of >3.3 Ga oceanic crust at shallow level with vestiges of primordial oceanic crust forming deep cratonic mantle roots beneath the Dharwar Craton. The temporal transition towards mantle hydration beneath Dharwar Craton during Mesoproterozoic can be correlated with the onset of subduction driven plate tectonics and ocean-crust-mantle interactions.

Keywords: Dharwar Craton, Komatiite, Geochemical heterogeneity, Mantle refertilization, Archean subduction tectonics

0410063 JAT, SUNIL (Department of Physics, Madhyaanchal Professional University, Bhopal). SYNTHESIS OF BISMUTH TELLURITE GLASS FOR GAINING HIGH REFRACTIVE INDEX

Synthesize bismuth tellurite glasses by melt quench technique. For the study of refractive index, uv-vis. Spectroscopy is done and hence forbidden energy gap is calculated. XRD of synthesized glasses is for the confirmation of amorphous nature. Density of synthesized glasses is calculated by Archimedes principle

Keywords: bismuth tellurite glasses, refractive index,

0410064 SAHA, ABHISHEK (CSIR-National Institute of Oceanography, Dona Paula, Goa 403004). GEOCHEMICAL HETEROGENEITY BENEATH THE INDIAN OCEAN RIDGE SYSTEM

The thermo-tectonic evolution of global mid oceanic ridge rift systems squares with the geochemical changes in the mantle over the geological history in terms of periodic melt extraction, refertilization, fluid-melt infiltration and crustal recycling. Mid-oceanic ridges of intermediate, slow and very-slow spreading rates across the world's oceans are characterized by different crustal configurations portraying the compositional diversity of the upper mantle. The two viable processes that attribute to chemical and isotopic heterogeneity of the mantle include (i) multiple episodes of melt replenishment and melt-rock interaction in open magma systems and (ii) recycling of oceanic and continental crustal materials and components of sub-continental lithospheric mantle. Oceanic crust and mantle sections exposed at intermediate, slow and ultraslow spreading centres provide maximum proximal observations of ambient conditions at crust-mantle interfaces and melt generation-migration-differentiation processes that can be translated towards understanding of the mantle heterogeneity. Geochemical data for Carlsberg Ridge Basalts (CRB) and Central Indian Ridge Basalts (CIRB) yield crucial insights into their petrogenetic aspects in the context of the geochemical and tectonic evolution of the Indian Ocean mantle. The CRB and CIRB samples exhibit tholeiitic to transitional composition of

precursor melts derived by high degree, shallow level partial melting of a spinel peridotite mantle source. They show E-MORB affinity with selective enrichment in incompatible trace elements. Higher values of Zr/Hf and Zr/Sm in conjunction with lower Nb/Ta ratio corroborate their origin from an enriched mantle source. Negative Nb anomalies with lower Nb/Y and Zr/Y for majority of the samples conform to a non-plume origin of these basalts. Higher Zr/Nb and Th/Nb compared to OIB substantiate contributions from recycled subduction-processed components in the source mantle. Lower Nb/U values with higher Ba/Nb, and Ba/Th, Zr/Nb and Th/Nb compared to OIB and N-MORB attest to role of a metasomatized oceanic lithosphere that recycled into the depleted upper mantle attributing to the source heterogeneity. Sr-Nd isotopic signatures ($^{87}\text{Sr}/^{86}\text{Sr}$: 0.702668 to 0.702841 and $^{143}\text{Nd}/^{144}\text{Nd}$: 0.512972 to 0.513068) of CRB suggest a HIMU source component preserved in the northwest Indian Ocean Mid Oceanic Ridge mantle. In conjunction with this, geochemical and Zircon U-Pb geochronology data for the lower oceanic crust gabbros from Central Indian Ridge (CIR) suggest episodic recycling of ancient metasomatized continental lithosphere of Madagascan and Gondwana origin towards the Indian Ocean MOR mantle heterogeneity. The geochemical attributes of CIR gabbros depict a marked deviation from typical depleted N-MORB compositions and conform to an E-MORB affinity. This E-MORB affinity for the CIR gabbros is ascribed to enriched lithospheric input into the depleted melt extraction by shallow level melting of a chemically heterogeneous upper mantle carrying depleted asthenospheric and recycled lithospheric components. The compositional diversity of the Indian Ocean MOR mantle can be translated in terms of periodic refertilization of depleted N-MORB type mantle through delamination and recycling of oceanic (HIMU component) and continental lithosphere (EM I component) concurrent with Neoproterozoic-Palaeozoic amalgamation and Jurassic dispersal of Gondwana Supercontinent respectively. This complies with the derivation of CRB from a geochemically heterogeneous Indian Ocean mantle that experienced a protracted residence beneath the Gondwana Supercontinent prior to the opening of Indian Ocean and trapped recycled metasomatized oceanic lithosphere genetically linked with multiple stages of paleo-ocean closure and continental convergence during Gondwana assembly. The preservation of 3.0 Ga - 250 Ma zircon grains of continental origin within oceanic gabbros of CIR can be correlated with (i) subduction-driven delamination, convective downwelling and recycling of older continental margin lithosphere into the mantle during the Mozambique ocean closure and Gondwana amalgamation at around 750 Ma, and (ii) delamination, convective removal and incorporation of older continental fragments into the upwelling mantle asthenosphere in response to the dispersal of Gondwanaland at ~167 Ma ensued by opening of the Indian Ocean.

0410065 SAIKIA, BHASKAR J; PARTHASARATHY, G AND BORAH, RASHMI R (Department of Physics, Anandaram Dhekial Phookan College, Nagaon 782002). ESTIMATION OF HAZARDOUS MINERALS AND DISTRIBUTION OF TOXIC METAL CONTAMINATIONS IN SEDIMENTS OF BRAHMAPUTRA RIVER USING RAMAN AND FTIR SPECTROSCOPY

Our present studies demonstrate the compositional and structural analysis of suspended and surface sediments in natural depositional environment of one of the world's highest sediment carrying river Brahmaputra using X-ray fluorescence, Micro-Raman spectroscopic and Fourier transform infrared spectroscopic techniques. In total, the river Brahmaputra carries over 73 million tons of dissolved material annually, which accounts for approximately 4% of the total dissolved flux to the oceans [1]. Geochemical studies of sediments are helpful in understanding the different sediment sources, element distribution pattern and evaluating the environmental conditions existing in an area. The mineralogical properties of sediments reflect the geological history of transport and sorting process. The dissolved chemical load and sediment flux of the river Brahmaputra has significantly higher rates of physical and chemical weathering than other large Himalayan catchments [1-2]. As river sediments act as both source and sink for heavy metals therefore contaminants may eventually pass through the food chain and result in a wide range of adverse environmental effects. The estimation of silicate distribution in sediments is important because the total CO₂ consumption by silicate weathering can be approximated by the total molar charge equivalents of all cations generated by silicate weathering. In many weathering environment, the chemical weathering of silicate minerals results in the formation of secondary clays.

The Raman and infrared spectra of Brahmaputra river sediments reflect Al-OH, Al-O and Si-O functional groups in high frequency stretching and low frequency bending modes. The Raman and infrared

spectra reveals the nature of clay (kaolinite) associated with quartz and feldspar. The infrared spectra indicate the weathered metamorphic origin of the silicate minerals. The metal contaminations in the sediments are investigated by calculating the enrichment factor (EF), contamination factor (CF), geo-accumulation index (I_{geo}) and pollution load index (PLI). The plagioclase index of alteration (PIA), chemical index of alteration (CIA) and index of compositional variation (ICV) are investigated for evaluating the weathering nature in the sediment. The relative distributions of the contaminations in the sediment are: $Si > Al > Fe > Mg > Ca > K > Ti > Mn > Cr > Ni > Zn > Cu > Co$. The relative distributions of the heavy metals contamination among the samples are: $Cu > Si > Mn > Mg > Ni > Cr > Ti > Al > Co > Pb > K > Ca > Zn$. The mean concentrations of heavy metals in the sediments were found to be below the geochemical background level of world's surface rock average [3-6]. The investigating factors suggest the significant contamination in the sediment is due to Cu. The strong positive correlation among Al, Fe, Mg and K suggests association of sediments with clay minerals. The elemental correlation is indicative to the metamorphosed pyrophanite ($MnTiO_3$) deposition. The index of compositional variation indicates the presence of less clay minerals and more rock forming minerals such as plagioclase and alkali-feldspar. The obtained results exhibit the area belongs to the intermediate silicate weathering. The focus on the concentration of clay minerals and metals due to the natural and anthropogenic activities of the river Brahmaputra will help to assess the Eco-toxic hazard potential of the river sediments.

Keywords: Brahmaputra, sediment, Raman, infrared, x-ray fluorescence

0410066 SAIN, KALACHAND (Wadia Institute of Himalayan Geology, 33 GMS Road, Dehradun – 248001). ADVANCED SEISMIC TOOLS FOR SUBSURFACE IMAGING: APPLICATIONS FOR HYDROCARBON EXPLORATIONS AND UNDERSTANDING GEO-TECTONICS

Due to the advent of high performance computers and acquisition of high-resolution digital data, there has been phenomenal growth in subsurface imaging from surface seismic data. We would like to present some 'state-of-the-art' seismic tools and their applications for delineating subsurface geologic features with reference to the exploration of hydrocarbons and understanding geo-tectonics. The tools are 2D traveltime tomography, 1D & 2D full waveform inversion, prestack depth migration, attenuation and seismic meta-attributes, rock physics modeling, etc.

More than 50% of global oil is found in Mesozoic sediments. However, a vast part of western-central India is covered by Deccan volcanic rocks below which such sediments are anticipated. Mapping of sub-volcanic sediments has been elusive by conventional geophysical methods and near-vertical seismic reflection profiling due to inherent limitations. This problem can be alleviated by wide-angle seismic experiments. We have successfully delineated large-scale Mesozoic sediments in onshore Saurashtra, Kutch and Tapti, offshore Kerala-Konkan basins below the Deccan volcanic rocks by 2D traveltime tomography to wide-angle seismic data. The fine scale structures of such sediments has been delineated later by computationally-intensive advanced 2D full waveform tomography (FWT) of wide-angle seismic data.

The FWT has also been employed for the delineating fine-scale velocity-structures of gas-hydrate bearing sediments in the Krishna-Godavari and Mahanadi basins, the samples of which were later recovered by drilling and coring. Gas-hydrates are considered as the major future fuels of India. We have computed seismic attenuation and demonstrated how this attribute can be used in characterizing gas-hydrates reservoir. We have utilized the Rock physics modelling for resource evaluation of gas-hydrates,

We shall present a new approach - common reflection surface stack over the conventional stack for delineating enhanced images of subsurface from the vintage data in the Delhi-Aravalli fold belt, Central Indian Tectonic Zone and Vindhyan basin. This shows our improved understanding on the geotectonics that were not evident earlier. We shall also present the application of 'advanced processing 'pre-stack depth migration' to seismic data utilizing the tomographic velocity model for delineating improved subsurface images.

Lastly, we shall demonstrate how the Machine Learning tool can be used for delimitation of 3D architectures of subsurface geologic features such as faults, dykes & sills, volcanic plugs, gas-plumes, mass

transport deposit, channels & levees etc. that help in semi-automatic interpretation of 3D seismic data with a much reduced human intervention.

0410067 SHARMA, RATNESH KUMAR (Department of Physics, Madhyanchal Professional University, Bhopal). STUDIES OF VISIBLE AND NEAR INFRARED OPTICAL PROPERTIES OF RARE EARTH ION DOPED TELLURIDE GLASSES FOR OPTICAL COMMUNICATION

The rare earth doped glass was the most suitable commodity in optical communication, has gaining a great deal of medical and technological attention. In this analysis the glasses, with rare earth ions is very important. The optical properties of tellurite glass and rare earth doped glasses were discussed.

0410068 SREEDHAR, B (Senior Principal Scientist, Analytical and Structural Chemistry Division CSIR-Indian Institute of Chemical Technology, Hyderabad). COMBATING GLOBAL WARMING: THE POTENTIAL OF PHOTOCATALYSIS FOR RENEWABLE H₂ PRODUCTION AND CO₂ REDUCTION UTILIZING SOLAR ENERGY

The fast progress in science and technology along with the increase in population across the globe has led to drastic environmental changes along with the energy crunch scenario. A large amount of carbon dioxide is emitted due to increase in use of fossil fuels resulting in global warming and climate change. There is a need for the conversion of CO₂ into valued chemicals like hydrocarbons which serve in both environmental and energy related issues. Conversion of CO₂ into fuel (energy) not only reduces CO₂ but also recover as a fuel feedstock. In the past decades, regardless of which approach is used, a sustainable renewable energy has dawned as renaissance. In this search, scientists have begun extensive research on semiconductor photocatalysts. Global warming has led to major efforts to establish stable photocatalytic, photocatalytic hydrogen processing materials for splitting water through the reduction of fossil fuels and environmental problems. Sunlight is an ideal method to generate renewable hydrogen fuel by photocatalytic splitting of water. As photocatalysts for H₂ evolution, numerous semi-conductor materials have been synthesized to date, but most of them are less photocatalytic. Progress in science and technology in photocatalysis, as well as in industrial applications, illustrates the ability of photocatalytic treatment to minimize greenhouse gas (GHG) levels in the atmosphere with positive effects on climate change. For the abating of greenhouse gasses concentrating on the disposal of nitrous oxide (N₂O) and methane (CH₄) and the conversion of CO₂ into useful fuel (CH₃COOH) can be achieved by photocatalysis. Research in photo-reduction of carbon dioxide into useful chemicals with the help of photon energy is very important area. It serves in two ways by using alternative energy and reduction of concentration of CO₂ in atmosphere. At present, non-renewable technology is the major source of hydrogen production, and hence, new and renewable energy technologies are in great demand. Our focus is on photocatalytic applications at room temperature to reduce CO₂ to methanol and H₂ production from water splitting. We have carried out various photocatalytic applications with a modified hydrothermal synthesis of p-type CuO/n-type ZnO nano-heterojunctions photocatalysts and MoS₂@CdIn₂S₄ composite via two step facile hydrothermal method with MoS₂ variations onto the surface of CdIn₂S₄. The photocatalytic hydrogen production is performed in the presence of Na₂S and Na₂SO₃ and CO₂ reduction to methanol in triethanolamine (TEOA) and Acetonitrile (ACN) as the sacrificial reagents under visible light irradiation.

0410069 SREENIVAS, BULUSU (CSIR-National Geophysical Research Institute, Hyderabad 500007). THE DILEMMA OF LIMITED NATURAL RESOURCES AND INFINITE HUMAN EXPANSION

One of the significant predicaments posed to the human race on planet Earth is our spatial limitation, i.e., restriction to our host planet. We, along with all other life forms, are bound to Earth. We survive here mainly as part of the surficial processes of the Earth. As a human race, we have started drawing heavily from the Earth's resources, at least in the last couple of centuries. As a consequence, we are growing in population exponentially. One of the biggest concerns expressed is the limited natural resources available to humankind and the entire biosphere. The biological forms have innovated and explored the various environments at the Earth's surface for their sustenance. They continually have fed on Earth's inorganic resources and, in the

process, have recycled material vigorously, affecting various reservoirs of the surface. The surface of the Earth, for example, remained no longer the same compared to that of a few centuries back by the action of the human race alone. We have impacted the ecology of the surface in several ways. Humanity is facing its biggest challenge ever since its origin, considering the dependence on natural resources and limited availability. Although one school predicts that human ingenuity shall win over this situation, the other predicts that the time has come for humans to explore space as an extension to draw the resources.

It is evident that the more we draw natural resources, our population growth will be ever-increasing. It is possible to compute the time until the presently available resources, especially minerals and hydrocarbons, can serve human needs considering the population growth models. It is also possible to compute how much we will affect the environment in the process. Climate change is one of the most significant concerns in this regard. Time is ripe for human innovation to take over and to decide the course of future evolution. In particular, it is imperative to arrive at models of better resource management. One of the crucial considerations in this regard is the recycling of material. We require innovations in the field of technologies required for efficient recycling enabling access for human usage. Innovations in mapping and estimating the available resources more precisely are yet another facet to build realistic models for the future. Alleviation of humanity's restrictions regarding limited resources is the most fundamental challenge posed so far in Earth history; it is in a way to the whole biosphere itself.

0410070 TRIPATHI, SATISH C (Geological Survey of India & General Secretary, The Society of Earth Scientists, C-207, Indira Nagar, Lucknow). SIGNIFICANCE OF GEOHERITAGE CONSERVATION FOR SCIENCE AND SOCIETY

'Geoheritage' or 'Geological Heritage' are sites or areas of geological features with significant scientific, educational, cultural, or aesthetic value of national or international level. The Indian subcontinent has been one of the most dynamic landmasses in the world. It shifted its position in time and space from northern hemisphere to the southern and back to the northern, ultimately colliding with the Eurasian plate resulting into the mighty Himalayas during the various geological periods. As such country has a mosaic of geologically the world's oldest and youngest terrains. However, despite its extremely diverse geological features of some of the world's most significant geological events, India does not have a devoted policy and law to conserve most spectacular geoheritage sites.

The geoheritage conservation is most important for protecting science and educating our society. It is to note that geoheritage sites are non-renewable and once destroyed can not be restored. As such their conservation as '*Earth's Natural Laboratory*' is very significant for future generation. Geosites record various Earth processes operative at different span of time during the evolution of the planet and have great educational value for the people at large. India has a great potential for geotourism which is still untapped in absence proper policy and legal framework. Unfortunately, India is far behind in global context where as small countries like Thailand and Vietnam have developed UNESCO recognized Global Geoparks. The social significance of geoheritage conservation needs to be properly understood by the policymakers. There is urgent need to prepare a policy and law to conserve our geoheritage as a large number of them have already at the verge of extinction.

11. ECOLOGICAL AND ENVIRONMENTAL SCIENCE

0411071 BEHERA, ARAKHITA AND BEHERA, KIRANBALA (Deen Dayal Upadhyaya College, University of Delhi, Delhi). A STUDY OF WASTE MANAGEMENT PRACTICES OF SMALL HOTELS IN THE CAPITAL CITY OF UTTARAKHAND

Waste created by hotels appears to have harmful environmental effects. Therefore, there is a fear that the increasing of small hotels in Dehradun which is the capital city of Uttarakhand state may have a negative effect on the environment as it has been found that small hotels have taken no steps to resolve their environmental effects. In light of the Waste Management Hierarchy (WMH) model, this study explores waste management activities of small hotels in the city. Using the simple random sampling method, a survey was carried out of 121 managers of small lodgings in different areas of Dehradun. This paper's findings demonstrate that small hotels' waste management activities didn't carefully stick to the WMH model. The most widely used methods included waste disposal, reduction and prevention while reuse, recycling, and recovery were less widely carried out. It is suggested that the sufficiency strategies should be used by small hotels to favorably prompting staffs and visitors' perception toward waste reduction and prevention.

Keywords: WMH model, small hotel, Capital City, Uttarakhand

0411072 NAGARAJU, N (Department of Political Science, Davangere University). DR. K. KASTURIRANGAN REPORT ON WESTERN GHATS AND NEXUS BETWEEN PEOPLE, POLICIES AND GOVERNMENT A SPECIAL REFERENCE WITH KARNATAKA STATE

The Western Ghats is a mountain range that covers an area of 1600 kilometers parallel to western coast of the Indian peninsula. It include the states are Gujarat, Maharashtra, Goa, Karnataka, Kerala and Tamil Nadu. The Western Ghats is an extensive region spreading six States, 44 District and 142 Talks. It is the home of many endangered Plants, Animals, Birds and Insects. Western Ghats host India richest wildness in 13 National Park and several Sanctuaries. Recognized by UNESCO as one of the World eight most important Biodiversity hotspot, these Forestry hill are also sourcing of numerous Rivers include the Godavari, Krishna, Mahadayi, Ghataprabha, Malaprabha, Tunga, Bhadra, Cauvery and Kabini. The Western Ghats act as a huge water tank, supplying water to six states. Now there are many leakages and there is water shortage. All the rivers are running dry now and if there is water it is highly polluted.

It is UNESCO World heritage site and is one of eight hot spot of biodiversity in the world. It contains a very large proportion of the Flora and Fauna, many of which are only found in Western Ghats and nowhere in the world, According to UNESCO, the western Ghats are older than Himalayan, it has 7402 species of flowering plants, 1814 species of non flowering plant, 137 Mammals species, 508 bird species, 179 amphibians species, 6000 insects species, 290 fresh water fish species, it has many undiscovered species live in the western Ghats. At least 325 globally threaten species occur in the Western Ghats.

Such a globally recognized heritage spot today, it sink with many dispute around it, the Madhava Gadgil and Dr Kasturirangan had submitted their study report and they recommended which are the initiative measures would have to taken by the union government and state government in respect of preservation of Western Ghats. It had suggested minimizing development activities, commercial activities and residential space should restricted to 37% but local natives oppose both the report because it will not ensuring of our safety it had recommended to shifting and evacuation of those who illegally encroach the forest land but the people who get their livelihood not ready to move some other place on the other hand government and local authority had undertaken development activities it causes to degradation of forest. The elected representatives are not agree with expert report they play a political game for their wasted interest in this brad preview in this paper discussing the people demand, government stand and expert committee recommendation .

0411073 SINGH, RANA PRATAP (Department of Environmental Science, Babasaheb Bhimrao Ambedkar (Central) University, Rae Bareilly Road, Lucknow-226025). TOXICITY OF AGRO-ECOSYSTEMS AND DESIGNING NOVEL MICROBIAL RHIZOENGINEERING FOR SUSTAINABLE AGRICULTURE AND REJUVENATION OF AGRO-ECOSYSTEMS

High external input based green revolution package introduced in sixties of the last century though could increase the yield of wheat and rice very significantly, it caused a severe degradation in agro-ecosystem and contamination of food, soil, water and air toxic agrochemicals and its residues. It caused a lot of leaching, runoff and emission losses of chemical nutrients especial reactive nitrogen species, increased our export load and yielded a net economic loss in form of subsidy to urea. The water depletion, water pollution, decrease in soil organic carbon and below ground and above ground biodiversity have consequently caused loss of the precious genetic pool.

The concepts and principles of ecological agriculture based on the organic inputs and green technological innovations can provide a way out to obtain food security, de-poisoning of agro-ecosystems, rejuvenation of agro-ecology higher export potentials and jobs as well as income security in agriculture. The beneficial soil microbes have a huge potential to revive our agro-ecology and can help nutritional diversity and high yield for the mounting population of the countries like India, if exploited properly. The Indian agriculture need a paradigm shift in agricultural policies and the practices for fulfilling the objectives assigned for the sustainable development goals by the United Nation in 2018.

Keywords: Food toxicity, agro-ecology, bio-inoculants, designer ecosystems, soil organic carbon.

12. ECONOMICS

0412074 DAS, DAISY AND AHMED, MASUM (Department of Economics, Cotton University, Panbazar Guwahati 781001). UNDERSTANDING SUBSISTENCE FARMING, A MULTI DIMENSIONAL APPROACH

Poor households have to spent a large portion of their disposable income on food. The agricultural revolution in the form of use of HYV seeds and improved mechanisation of agriculture has not touched every farmer in the world. In the past rural households were mostly self sufficient in the production of food items but the new studies show that food expenditure vary from 60-80% of the total disposable income of the household. subsistence farming is one of the ways to increase the food supply and hence reduce the cost of food purchase from the market from the perspective o a low income earning households. Besides that majority of the people in the developing countries are still engaged in agriculture and especially subsistence farming and are smallholder farmers with 72% farmers of the world have less than 1 hectare land. This is an exploratory study and based on the traditional literature review. Our study focuses on the nature and social relations that occurs due to the subsistence farming technique mostly adopted by the tribal population of North East India in particular and the world in general. We recommend that increased involvement of service cooperatives, checking the migration of labours and crop intensifications as the keys to improve the productivity in subsistence agriculture.

Keywords: subsistence farming, households, agro-food market, food security

0412075 DAS, DAISY AND SINGH KAMALJIT K (Department of Economics, Cotton University, Panbazar Guwahati – 781001). SHIFTING CULTIVATION AND WOMEN: AN EXAMPLE FROM NORTH EAST INDIA

The practice of shifting cultivation, although not encouraged from environmental point of view continues to remain a source of livelihood among the people living in the hills of Meghalaya. Shifting cultivation is locally known as *jhum* cultivation. People practice this method for subsistence on the basis of traditional knowledge. This paper tries to explore how shifting cultivation is practiced in the hills of Nongtrai area which is situated in the north eastern states of Meghalaya. The society of Meghalaya practices the custom of matrilineal society which is rare to find in other parts of the world. Therefore, our main objective is to find the contribution of khasi women in this cultivation which provide them food and cash.

We carry out a field study to collect primary data. We find from the study that shifting cultivation is practised for subsistence and women contribute at par with men besides doing other domestic chores but they lack decision making power. Khasi society knows that shifting cultivation is harmful to environment but they are not ready to give up it because it is integrated with their customs. We recommend application of scientific knowledge in the field of subsistence farming to encourage organic farming of high valued crops.

0412076 IMRAN, MOHDAMMAD (Government of Madhya Pradesh, Vidisha – 464001). RURAL ELECTRIFICATION IN INDIA AND ITS IMPACT ON ECONOMY

Rural Electricity (“RE”) is the key to accelerating rural development. Electricity is one of the most important needs in agriculture and other important industries including small, medium and micro enterprises (SMEs) and large industries, card and home industries, cold chains, health care, education and information technology.

Currently electricity is an essential need in all aspects of human life and is considered a basic need. It is the key to accelerating economic growth, job creation and wealth, poverty eradication and human development, especially in rural areas.

India's National Energy Policy states that electrification in rural areas is essential for the development of the country, in accordance with the Indian Electricity Act 2003 (No. 36 of 2003) section 6 obliged central and national governments to collectively strive to achieve this goal early. . In April 2005, the Central

Government introduced the Rajiv Gandhi Grameen Vidhyutikaran Yojana (RGGVY) 's ambitious campaign with the aim of electrifying all powerless households / villages without electricity and providing electricity to all households over the next five years in fulfillment of the NCMP.

India is endowed with a wealth of natural resources and a variety of energy sources. India's energy sources are fossil fuels such as gas, coal, oil, wood etc., nuclear, hydel and, unusual energy sources such as solar, wind, hybrid, biomass, low hydro, geo-thermal, tidal etc. resources can be used efficiently and effectively to make reliable and sustainable electricity supply available to every home. The provision of electricity at competitive prices can also make the country's economic activity more competitive in global markets. Consumers, especially those who are willing to pay a fair price, are entitled to continuous quality energy.

Keywords : Rural Electrification, RGGVY, Saubhagya , Power, Discom,Employment

0412077 JILANI, SYED ATIF AND ISLAM, KAZI HAMIDUL (Department of Business Administration, AMU Centre Jangipur, Murshidabad, West Bengal). DETERMINANTS OF FINANCIAL INCLUSION IN RURAL MURSHIDABAD, WEST BENGAL

Financial inclusion implies access to financial services at affordable cost to the marginalized and underprivileged sections of the society. This empirical research examines the factors that influence the degree of financial inclusion in rural Murshidabad, West Bengal. Data for the research was collected through a closed-ended structured questionnaire from 600 households of selected 20 villages of the study area. Using Probit Regression analysis, we found that the basic determinants of financial inclusion: formal account, formal saving and formal credit are influenced by gender, age, income and occupation of respondents. The barriers to financial inclusion include distance, lack of trust and lack of money. Saving motivations, loan taking motivations, sources of informal credit and awareness about various financial services is also determined vis-à-vis factors influencing financial inclusion.

Keywords: Financial Inclusion, Rural Murshidabad, Probit Regression, Economic Policy

0412078 MISHRA, BISWAMBHAR AND HASSAN, SAMIR UL (Department of Economics, North-Eastern Hill University, Shillong-793022). MANAGING PUBLIC DEBT AND PUBLIC SPENDING IN INDIA IN POST COVID 19

This study examined the effect of India's public debt on public spending from 1985-2018. ARDL Auto-regressive Distributed lag models was used to test the effect of the various public debt instruments on the public spending in India. The cointegration test found the existence of long-run relationship among the investigated variables. The study found that the increase in **public spending**, in response to Covid-19, and the **fall in tax revenue and economic activity**, will make the public debt ratio jump substantially. The short run result shows that public debt has insignificant effect on public spending in India especially for health and infrastructure. The study therefore recommends among others that central government should be fiscal responsible by channeling borrowed funds to investments that will bring growth in the economy. Government should tackle waste and corruption by making sure that funds borrowed and allocated for spending should be transparently and judiciously utilized in the provision of infrastructure. Debts should be taken only when necessary and should be for investment and not for payment of salaries.

0412079 RAJPOOT, SONIYA (Department of Humanities and Management, Smarat Ashok Technological Institute, Vidisha 464001). A STUDY ANALYZE PROFITABILITY POSITION OF SMALL SCALE INDUSTRIES

The study has covered all the categorized industrial units operating and evenly spread throughout the Vidisha. Small scale industries are highly heterogeneous in character so far as nature of production is concerned. Therefore, selective industries were classified in 8 homogeneous groups for drawing samples for the present study. The present investigation a total of 32 small scale units belonging to 8 major groups based on their production and services were selected by stratified purposive sampling method. The primary data of

selective SSIs regarding financial performance of three consecutive years in the form of their balance sheets, profit & loss accounts were collected. A structured questionnaire was also administered in individual units in order to know other important and relevant facts. This was also supplemented with interviews of unit managers and/or owners, Manager of DIC, Lead Bank Officers, Managers, and Field officers of Financial Institutions and/or banks and observations of the units at their site. The Primary objective of a business undertaking is to earn profits. Profit earning is considered essential for the survival of the business. In the words of Lord Keynes, "Profit is the engine that drives the business enterprise". The Primary objective of a business undertaking is to earn profits. Profit earning is considered essential for the survival of the business. In the words of Lord Keynes, "Profit is the engine that drives the business enterprise". A business needs profits not only for its existence but also for expansion and diversification. The investors want an adequate return on their investments, workers want higher wages, creditors want higher security for their interest and loan and so on. A business enterprise can discharge its obligations to the various segments of the society only through earning of profits. Profits are, thus, a useful measure of overall efficiency of a business; Profits to the management are the test of efficiency and a measurement of control; to owners, a measure of worth of their investment ; to the creditors, the margin of safety ; to employees, a source of fringe benefits; to Government, a measure of tax-paying capacity and the basis of legislative action ; to customers, a hint to demand for better quality and price cuts ; to an enterprise, less cumbersome source of finance for growth and existence and finally to the country, profits are an index of economic progress profitability ratios are calculated to measure the overall efficiency of the business. Generally, profitability ratios are calculated either in relation to sales or in relation to investment. The various profitability ratios are discussed below: Gross Profit Ratio of various industries that measures the profit relation to sales.

Keywords: Vidisha, Small scale sector, Gross Domestic Product, Socio-economic development, Ratio.

0412080 SINGH, KISHLAY AND KOSHTI, HIMANSHU (Samrat Ashok Technological Institute, Vidisha 464001). INDIA IN A DECADE

13. EDUCATION

0413081 GOSIKONDA, SREERAMULU (Department of Agricultural Science & Rural Development, Loyola Academy Degree & PG College, Hyderabad, Telangana). ISSUES AND CHALLENGES OF ONLINE EDUCATION DURING PANDEMIC: EVIDENCES FROM GOVERNMENT SCHOOLS OF TELANGANA STATE

The lockdown that was imposed by the Government of India and the continuous closure of schools till today have negative impact on school education in general and school children in particular. Until and unless the present uncertainty situation that arisen due to the dangerous virus disappear, schools will not function physically. Whenever the number of Corona cases should be decreased drastically or the vaccine should be available in the market, then only the schools will be opened for students. However, there is no clarity on this issue so far. Hence, all the state governments and central government issued guidelines to respective bodies to start online classes to the students. Telangana is one of the states of Indian Union and it has not exempted from this and implementing the online education in all schools. However, all the students who are attending government schools are more vulnerable in accessing online education. The present paper examines various issues and challenges that faced by students, parents and teachers in coping with online teaching in all types of state government schools. The study is based on both primary and secondary resources. Around 50 government school teachers were interviewed through phone. The paper finds that government school children are facing multiple disadvantages as they come from low socio-economic background families. The study concludes that government school children are witnessing digital divide due to pandemic that hindered their teaching learning process a lot. The study suggests the government should start schools physically by taking COVID-19 pre-cautions as smart phones have negative impact on school children.

Keywords: Pandemic, Telangana, government school children, parents and teachers

0413082 GOSWAMI, DEBAJIT AND SEN, SHRABANTI (Department of Public Administration, School of Social Sciences, Netaji Subhas Open University Kolkata). NEP 2020: A STEP FORWARD TO INCLUSION

The Government of India drafted the New Education Policy (NEP) 2020 which aims to provide an equitable and vibrant environment for the generation, development, growth of knowledge and its larger access to the Indian society, by providing high-quality education to all and thereby making India a global knowledge superpower. Amongst the multi-dimensional aims of NEP 2020, it must be acknowledged that equitable access and inclusion lies at the heart of it. The NEP 2020 has been formulated after having considered over 2 lakh suggestions from different stakeholders to provide a holistic overview for building an equitable, inclusive and pluralistic society.

The fundamental theories of the policy include ancient practices like the Takshashila and Nalanda vis-à-vis the theories of Behaviourism, Cognitivism and Constructivist approaches, recognizing, identifying and fostering the unique capabilities of each student to provide a holistic development, flexibility in the curriculum, emphasis on conceptual understanding, creativity and critical thinking, life-skills, etc. The policy was drafted keeping in mind the diverse needs among students from different backgrounds and needs to address the issues of exclusion in education. Similar aims are reflected under National Policy on Education 1986 along with suggestions to adapt the curriculum and teaching methods according to diverse needs. However, NEP 2020 is a way forward and has included socio-economically disadvantaged groups, known as SEDG for the first time. This includes remotely disadvantaged groups like gender identities, socio-cultural, socio-economic identities, persons with disabilities, geographical identities. The policy includes sanctions of Special Education Zones (SEZs) for the large populations of educationally backward groups. The policy refers to the Rights of Persons with Disabilities Act 2016 for equitable access, curriculum development and inclusion of Persons with Disabilities (PwD) in education.

Despite multiple legislative responses by the Government of India to address PWD inclusion in academics. Unfortunately, children with special needs are known to be excluded from the public (and private) school at large, public spaces, libraries, knowledge centers and this discrimination leads to a negative impact on people with special needs, inadvertently coming from the academia and society at large. Lack of

accessibility, ignorance of educators and the school, lack of special educators, lack of teachers training programmes, lack of infrastructure facilities, dearth of empathetic skills, deficiency of theory-driven practices and awareness of teachers, parents and peer-group alike, are some of the major barriers in the journey toward an inclusive Indian education environment.

While NEP is designed to address many shortcomings of the previous education policies it is also a reflection of the RPWD Act 2016 and RTE 2009 in terms of PwD inclusion. What is important is to understand whether the literature used in the policy meets the discrimination and addresses the widening gap through congruent public policy that finds the delicate balance between education policies with social, economic and health programmes and approaches.

It is crucial that the concept of inclusive education evolves beyond a principle on paper, so that substantive tools, processes, learning environments, public policies, economic considerations may be appraised and implemented with intent, sensitive to an inclusive and equitable approach. To this end, the careful consideration and mindful context specific applications of certain approaches may be utilized for better results. This paper examines the literature of the NEP 2020 in relation to PwD and critiques the stratagems which may be considered to make a substantial actual difference in lives of the learner's vis-a-vis a compatible, emphatic and responsive education system.

Keywords: NEP 2020, Inclusion, Public Policy, Theoretical Approaches, Special Needs, Behaviourism, Constructivism, Cognitivism, RTE 2009, RPwD Act 2016, NPE 1986.

0413083 KUMAR, AVANISH AND JHA, ARVIND KUMAR (Department of Education, Babasaheb Bhimrao Ambedkar University, Lucknow). शिक्षा और बहिष्करण मुसहर समुदाय के विशेष सन्दर्भ में

0413084 LAL, MANOHAR AND SRIDHAR, MEENAKSHI (SOCIS, IGNOU, New Delhi-110068). TECHNOLOGY FOR UNIVERSAL ACCESS TO EDUCATION IN 21ST CENTURY: PROSPECTUS AND CHALLENGES

Education is not delivered merely for development of cognitive and professional skills needed for survival in today's technological world, but also for its civilizing role, as H.G. Wells aptly said '*Civilization is in a race between education and catastrophe*. ...' Education helps in developing core values of compassion, enlightenment, mutual understanding and tolerance, leading to dialogues [Tehrani, 2002] instead of clashes [Huntington, 1996] between Civilisations.

Universal access to education is essential for making the Earth free from adversity, for peaceful co-existence, and for developing finer aesthetic human values. Here *Universal access to education* means the ability of all people to have equal opportunity in education, regardless of their social class, race, gender, sexuality, ethnicity, background or physical and mental disabilities.

0413085 SHANKAR, G (West of G. D. College, Pipra Road, Begusarai – 851117). A STEAM CURRICULUM PERSPECTIVE: CRUCIAL TO THE 21ST CENTURY SCHOOL CURRICULUM

STEAM is an educational approach to learning that includes Science, Technology, Engineering, the Arts and Mathematics as access points for guiding students' inquiry, dialogue, creativity and critical thinking along with communication and collaboration. It is considered a powerful driver of national economic growth and it lies at the heart of calls worldwide for educational reform. In the global context, its educators are being urged to produce graduates with creative and innovative abilities required of an increasingly high-tech workforce. They are being challenged to design curricula and pedagogies to develop students' disciplinary

knowledge and skills, as well as their abilities as critical consumers, creative and ethically astute citizens, innovative designers, good communicators and collaborative decision makers. With a view to meeting the challenges of the 21st century, internationally STEAM educators are endeavouring to enrich it in order to produce a multi-literate citizenry and workforce. In this study I will outline how it is important to develop interdisciplinary STEAM curricula.

In this study I outline reasons why integrating the arts with science, technology, engineering and mathematics is not just another curriculum fad but an important response to the pressing need to prepare young people with higher-order abilities to deal positively and productively with the 21st century global challenges that are impacting the economy, natural environment and diverse cultural heritage.

Keywords: STEAM, Creativity, Critical Thinking, Higher-order abilities, Interdisciplinary curricula

0413086 SHARMA, SEEMA (Ravindra Nath Tagore University, Bhopal). SCOPE OF TECHNOLOGICAL INNOVATIONS IN GLOBAL EDUCATION SYSTEMS

Education is a central priority for every country, and global education systems urgently need technological innovations, as quoted by Rachel Wolf, Founding Partner at Public First **“I think one of the things that most tech companies realize very early on is that you cannot introduce tech successfully by disrupting the relationship between the teacher and the student.”** Supporting this fact that Education is one of the most imperative arenas of public policy, and technology has striking potential to deliver positive change for learners and teachers as well as the ecosystem of education. The education system is developed to support learners. Technological innovations not only enable but also augment teaching and learning. Technological innovations surely enhance the exposure, excellence and transparency of education systems. Undoubtedly, this will improve the level of outcomes and improve teaching learning process as a whole on the basis of the report of Global Market Insights (2018), 6 billion is the amount that Artificial Intelligence (AI) in the education market is set to be worth globally by 2024. Scope of Technological innovations in Global Education Systems is as follows:-

Traditional learning resources can be augmented- by using technology the pressure on Traditional learning resources like books can be eased, a new collaborative learning in which there should be a collaboration between digital material and traditional resources of learning will be proven as revolutionise education system.

Promote global educational citizenship- By the use of technology teachers, schools and communities across the world can be linked together this will add a new dimension in the field of education. Hence the technology will promote a new world which introduce new collaborative learning opportunities, and facilitate the connection of teachers as well as students of different cultures. **The phase of change in the classroom is determined with use of technology the education system can determine a new face of learning.** Like US-based Mind Tap support teachers to plan lessons, interaction with students and monitor attainment. Schools are looking for more ways to incorporate emerging technologies into learning in the classroom. On the basis of the report of Tractica (2018) **“By 2022, it is estimated that, per month, there could be 2 billion mobile augmented reality users worldwide.”** As truly said and suggested by Ashu Kumar, an instructor of Information Sciences and Technology at Penn State University, **that a voice-enabled Artificial Intelligence (AI) classroom assistant that can take attendance and track class participation. This will construct a new phase of teaching and learning.**

Will amplify teaching and cannot be a straight substitute for teachers. As teachers are more and more seen as **‘agents of change’**, schools are looking for ways to help to prompt them and focus on professional development, rather than spending time on administrative tasks. Technology is being employed to streamline the routine, so teachers can focus on their classrooms and teaching methods. Technology can also be instrumental in saving teachers’ resources by creating time through fostering communities of collaboration. The whole world is concern about it as according to a survey done in Mexico the main advantages of technology is that it allows them to search for, edit and create lesson content with more ease is said by **83%** in

Mexico. Meanwhile, **60% of teachers in Mexico** respectively say technology allows for collaborative work between teachers.

Technology is to focus on teaching and to amplify it- This is far more effective than replacing teaching with technology alone. As well said by **Dr Hanna Dumont, Educational Psychologist and Researcher in International Education** “**I don’t think that technologies, per se, are going to change classrooms if they’re not addressing the deep level of learning. If it’s just superficial and if it’s just having some digital device in front of you but actually doing the exact same thing as doing without this device, then it’s not changing anything.**” there is a need to ensure teachers, and other school officials, are trained and supported to convey new ways of teaching.

Education is evolving to nurture students to be more connected in their lives, engaged in class and equipped for their future. This is a space where technology and pedagogy can work hand in hand to facilitate change - be that by providing teachers with tools to enhance their lessons, creating more fluid learning ecosystems, or transforming classrooms into innovative learning spaces of the future. Technological innovations in the education is a landscape need and there is a lot of scope of Technological innovations in Global Education Systems to shift in responsive manner.

14. ENGINEERING SCIENCE

0414087 CHAUHAN, RUCHI; YADAV, RANJANA AND RAJPUT, DINESH PRATAP Singh (Department of PetroChemical Engg., Samrat Ashok Technological Institute, Vidisha 464001). A RESEARCH STUDY ON : FLUID MECHANICS

Fluid mechanics spans many fields of science and engineering and plays an integral role in many broader societal issues including energy, health, and the environment. Fluid mechanics is an active field of research with many unsolved or partially solved problems in science and engineering. Fluid mechanics can be mathematically complex. Fluids have the ability to transport matter and its properties as well as transmit force; therefore fluid mechanics is a subject that is particularly open to cross-fertilization with other sciences and disciplines of engineering. The subject of fluid mechanics is highly relevant in such domains as mechanical, chemical, petrochemical, civil, metallurgical, biological, and ecological engineering. The breadth is reflected in research topics that range over eight orders of magnitude in Reynolds numbers: from cells to submarines. Theoretical, experimental, and numerical tools are used to reveal the underlying physics. Heat transfer and mass diffusion in nanofluid over a permeable moving surface are investigated. The surface exhibits convective boundary conditions and constant mass diffusion. The breadth is reflected in research topics that range over eight orders of magnitude in Reynolds numbers: from cells to submarines. Theoretical, experimental, and numerical study has been focused in this research paper on turbulent mixing, heat transfer, turbulent wall bounded flows, and wind energy.

0414088 DATAR, SHILPA AND DATAR, ASHUTOSH (Department of Electronics and Instrumentation Engineering, Samrat Ashok Technological Institute, Vidisha – 464001). ROLE OF SIGNAL PROCESSING IN GLOBAL TECHNOLOGICAL SOCIETY

In today's world, the technology has penetrated extensively in our lives. The bulk of this technology is dominated by the electrical/electronics/computer science engineering. The human beings are becoming more and more dependent on the electronic gadgets and computing machines. There is a rapid research and growth in the areas of artificial intelligence, machine learning, internet of things, health care equipments etc.. The signal processing is one of the major pillars of electronics engineering which has made this growth possible. It is the heart of the technological revolution taking place in the current scenario. The digital lives that we are living today owe its existence largely to signal processing. The major application areas of signal processing include audio, speech and image processing, signal and image compression, communication engineering, health care sector, digital transactions, mobile communication, seismology, energy and transportation sector and myriad other areas. This paper presents a review of signal processing in context with its significance in the global technological society.

0414089 GUPTA, VIPUL AND SINGH, BHUPENDRA (Department of Electrical Engineering, UIT RGPV, Bhopal). TECHNIQUE TO ENHANCE CHARGING POWER QUALITY OF ELECTRIC VEHICLES

This Electric vehicle (EV) charging may lead to power quality problems for chargers work as electric-electronic converters. It is necessary to get to know the influence to the power system caused by chargers before EVs operating in scale. In the interaction between electric vehicle and power grid, its bidirectional AC/DC transform control is mostly pulse width modulation control; large amplitude fluctuations will cause damage to AC/DC converters and electric vehicle batteries when electric vehicles are connected to these intermittent new energy sources (such as wind, tidal energy etc.). In order to solve these problems, from the system point of view, in this paper we combine the theory of instantaneous reactive power and introduce a virtual coordinate system, reduced the impact of volatile energy and improve the power quality of electric vehicle charging; finally, the feasibility of the method is verified by simulation.

Keywords: AC/DC converters, bidirectional AC/DC transform control

0414090 JAIN, DEEPTI; GUPTA, SUSHMA AND JAIN, MONIKA (Department of Electrical Engineering, Samrat Ashok Technological Institute, Vidisha 464001). PRESENT SCENARIO AND COMPARATIVE ANALYSIS OF DIFFERENT MOTORS IN ELECTRIC VEHICLE

The deployment of Electric Vehicle can be considered as a resolution and promising approach towards the electrification of transportation system. The major scenarios in the transport system which arise the need to utilize the alternative resources of energy are: sudden change in climate, fossil fuel depletion and rising prices of crude oil. Several benefits can be achieved from EVs in relation to environmental, economic and power grid impacts. Motor being the heart of EV plays an important role in such system. This Chapter inspects the present status, latest deployment, challenging issues and different types of motor involve in Electric Vehicle.

The imminent environmental issues and growing concerns for global energy crises are driving the need for new opportunities and technologies that can meet significantly higher demand for cleaner and sustainable energy systems. This necessitates the development of transportation and power generation systems. The electrification of the transportation system is a promising approach to green the transportation systems and to reduce the issues of climate change.

There are many electric motor used in electric vehicle some of them are DC, induction, permanent magnet synchronous, switched reluctance, brushless DC motors and synchronous reluctance motor are discussed. It is concluded that although the induction motors technology is more mature than others, for the EV applications the brushless DC and permanent magnet motors are more suitable than others. The use of these motors will result in less pollution, less fuel consumption and higher power to volume ratio. The reducing prices of the permanent magnet materials and the trend of increasing efficiency in the permanent magnet and brushless DC motors make them more and more attractive for the EV applications. The SRM has high starting torque, high torque-inertia ratio and has good fault tolerant capability. The rotor of SRM is extremely simple as there is no winding or permanent magnet (PM). Therefore, SRM has very fast acceleration and operates at very high speed. The SRM gets cool rapidly and is insensitive to rise in temperature, due to the absence of windings or PM on the rotor. The use of SRM makes the EV cheaper as well, in comparison with the other motors used for EV. The SRM suffers from high torque ripple and noise. Now a days synchronous Reluctance Motor (synRM) is achieving more popularity as compare to other motors due to its singly excitation and possess good structural integrity of its rotor without any windings or permanent magnets. Rotor currents are absent in SyRM, which makes core losses zero in the rotor. It makes the drive control intelligible in comparison to an induction motor and permanent magnet motors. This SyRM is relatively simple, low-cost configuration compared with other types of motors.

0414091 JAIN, MONIKA AND JAIN DEEPTI (Department of Electrical Engineering, Samrat Ashok Technological Institute, Vidisha 464001). PERFORMANCE ANALYSIS OF SEIG BASED AUTONOMOUS MICRO-GRID WITH REDUCED VSC RATING

The main purpose of micro-grid is that it can provide uninterrupted power supply to the consumers. The consumer load may consist of single-phase load or three-phase load or three-phase-four wire load. Such types of loads are usually unbalanced in nature and generate neutral current, flowing through neutral wire. One possible, but expensive, solution is to oversize the neutral wire, to avoid the excessive neutral current. Recently the another topology is used to mitigate the effect of neutral current by using transformer, which neutralized the neutral current and provides the neutral point to load when connected to the three-phase-3-wire system. In the proposed system a micro grid is formed which consist of SEIG driven by pico hydro turbine with star connected fixed capacitor bank, power electronic device, zig-zag/star transformer, storage system and load. The main aim of zig-zag/star transformer is to provide isolation, to create a neutral terminal and to achieve an optimized DC bus voltage to the required level and thus reduced the size and rating of the device. Micro grid is modeled with MATLAB Sim power tool and simulation results are produced considering balanced/unbalanced load.

Keywords: Micro grid, Proportional Integral, Zig-zag transformer, Synchronization, DC link optimization.

0414092 KHATRI, SHUBHA AND JAIN, RAJEEV (Department of Civil Engineering, Samrat Ashok Technological Institute, Vidisha 464001). IMPROVEMENT OF INDEX & ENGINEERING PROPERTIES OF BLACK COTTON SOIL BY USING RHA & WHA INCLUDING LIME

In India, one-fifth of our land area is covered by Black Cotton Soil which is also known as expansive soil. These soils are mostly found in arid and semi-arid regions. These soils are found to be highly problematic in constructional activities. It causes severe damages to the structure because of its alternate swelling and shrinkage nature. This happens due to alternate drying and wetting of soil. To avoid these circumstances, soil must be stabilized and strength is to be increased. . In present investigation the type of solid wastage materials namely RICE HUSK ASH (RHA), WHEAT HUSK ASH (WHA) is selected to study the effects of the index and engineering characteristics of problematic soil LIKE BLACK COTTON SOILS. In order to utilize the rice husk ash & wheat husk ash for the improvement of problematic clay a detailed programmed studies have been formulated. In the longer term, LIME STABILIZATION provides performance benefits that reduce maintenance costs. In addition to stabilization of new materials, lime is an excellent choice for the reclamation of road bases. In this project work black cotton soil has been used for which soil stabilization has been done using Rice Husk Ash & Wheat Husk Ash with some percentage of lime content mixed in the soil to impart durability. Here, Index properties and Engineering properties of soil has been found out by using these above agricultural waste materials.

Keywords: Soil Stabilization, Black Cotton Soil, Index & Engineering Properties of Soil, Rice Husk Ash, Wheat Husk Ash, Lime Stabilization

0414093 KORI, KALPNA RAJEEV (Department of Civil Engineering, Samrat Ashok Technological Institute, Vidisha 464001). A CASE STUDY ON A PROJECT TIME MANAGEMENT INVOLVES THE PROCESSES REQUIRED TO ENSURE TIMELY COMPLETION OF A PROJECT

Project time management involves the process required to ensure timely completion of a project. One of the problems in the planning stage is that everything has be making it difficult to ensure an exact requirement. However past experience and knowledge of similar projects by the project manager should aid here. A point to note is that most projects fall down in the planning stage. Seven main processes are involved in project time management i.e. planning schedule management, defining activities, sequencing activities, estimating activity resources, developing the schedule, controlling the schedule. Time management is the another key aspect of managing a project. As such, it is considered to be a core knowledge area, and is closely knit to scope and cost areas. The main purpose of this knowledge area, as it name suggests, is to build processes and outputs into the project that assist the manager and team to complete the project in a timely manner. During the planning process, outputs are created to illustrate how project in a timely manner.

0414094 RAO, KOMMINENI VENKATESHWARA AND BARTARIA, VISHVENDRA NATH (LNCT University, Bhopal). EFFECTIVE PASSIVE VENTILATION TECHNIQUE WITH SOLAR CHIMNEY: A REVIEW

The ventilation in residential spaces becomes to be inevitable for improving the thermal environment. Conventional means of residential ventilation requires huge amount of energy normally obtained from the combustion of fossil fuels. With the increasing rate of air pollution due to combustion and limitation of the availability of fossil fuels, the talk of the time is on the use of sustainable energies. Passive ventilation including the strategy of natural ventilation is an attractive and effective way to exchange the room air with outside air. Solar chimneys as passive ventilation systems are being developed and used for the effective circulation of air in the building spaces by natural ventilation. Research work on the solar chimney is substantially increasing since last few decades due to its application in natural ventilation which is driven by the energy of the Sun. This article focuses on the passive ventilation strategy and solar chimney. The reviewed research outcomes are presented on the effective use of solar chimney in ventilation and its ventilation

performance. In many research works, the experimental and numerical modeling techniques are being applied for the determination of effectiveness and performance of solar chimney. Some studies are focused on the small sized experimental setup while applications of solar chimney in real buildings are also studied. This review found that although the passive ventilation by solar chimney is a promising technique of ventilation in buildings but it needs more studies for precise prediction of ventilation performance and its effectiveness.

Keywords: Solar chimney, natural ventilation, numerical simulation, thermal environment.

0414095 SEMIL, PRADEEP AND KUSHWAH, ANAMIKA (Petrochemical Engineering Department, Samrat Ashok Technological Institute, Vidisha, Madhya Pradesh, 464001). BIO ENERGY: A SUSTAINABLE ENERGY OPTION FOR MADHYA PRADESH

Energy is indispensable for economic and social development of a region. Dependence on fossil fuels has posed a serious threat due to greenhouse gas (GHG) emissions, dwindling stock of the fuel resource base. Among daily activities, about 80% of the mechanical work requires electrical energy. Dependence on the conventional energy resources for electricity generation is eroding the resources at faster rate. The process of electricity generation causes significant adverse effect on ecology by producing enormous quantity of by-products including nuclear waste and carbon dioxide. Improving energy efficiency, switch over to renewable sources of energy and de-linking economic development from energy consumption (particularly of fossil fuels) is essential for sustainable development of a region. Green energy technologies have gained importance so that they are reliable and environmental friendly. Bio-energy resources are renewable in nature and combustion would not produce poisonous gases and ash with sufficient oxygen supply. A village level study on the present scenario of domestic energy consumption will help to assess the demand and supply of bio-energy in the country.

Rural population of India depends on bio-energy for cooking, space and water heating. Though Biomass has always been an important energy source for the country considering the benefits and promises it offers. It is a carbon neutral fuel source for the generation of electricity; and apart from providing the much needed relief from power shortages, biomass power projects could generate employment in rural areas.

About 32% of the total primary energy use in the country is derived from biomass and more than 70% of the country's population depends upon it for their energy needs. In this paper we were assessing the potential of biomass in Madhya Pradesh and conversion of biomass to energy and future prospects and its various applications including power generation through gasification, It includes low, medium and large-scale power generation and various applications were discussed.

Keywords: Total Primary Energy Supply (TPES); Bio-energy; Bioenergy Technologies (BETs); Sustainable Rural Energy Supply, Renewable energy, Madhya Pradesh, India.

0414096 SHARMA, KAMLESH KUMAR; KATAREY, SANJAY AND SINGH, PRADEEP (Department of Mechanical Engineering, Samrat Ashok Technological Institute, Vidisha-464001). SIMULATION OF AIR CONDITIONING SYSTEM FOR REPLACEMENT OF REFRIGERANT R-22 BY USING REFRIGERANT R407C AND R410A

Energy demand has gradually augmented through all sectors, i.e. industry, residential, commercial, and agriculture from the previous few decades, and it is anticipated to carry on to grow. India's per capita power consumption stands at 30% of the average of the world. The energy system of India is mainly based on the consumption of coal for energy generation, oil for industry and transport, and biomass for heating and cooking for housing. Any optimization of energy use, apart from cost saving, will have positive impact on degrading environment.

Refrigerant R22, R407C, and R410A have been simulated by CoolPack software to find the alternative refrigerant in place of R22 because Refrigerant R22 has ozone-depleting potential. Refrigerant R407C and R410A have zero ozone-depleting potential and mostly similar performance characteristics like R22. Firstly simulation is done with CoolPack software using constant condensing temperature 50 °C and

variation of evaporator temperature from -15°C to 10°C It is found by simulation, refrigerant R407C has higher COP and lower power consumption compared with refrigerant R410A. Hence R407C is the better alternative refrigerant for R22 compared with refrigerant R410A.

Keywords: Coefficient of performance, Energy saving, ozone depleting potential, global warming potential, Air Conditioning System.

0414097 SHARMA, SUDHIR; SINGH, BHUPENDRA; DATAR, ASHUTOSH AND KARKARE, PRAVEEN (Department of Electrical Engineering, Samrat Ashok Technological Institute, Vidisha-464001). CONTROL STRATEGIES FOR THREE PHASE INDUCTION MOTOR DRIVE FOR EV APPLICATIONS- A REVIEW

Electric motor is an integral part of electric propulsion system in electrified vehicles. Choice of an appropriate electric motor and its speed and torque control strategy play an utmost significant step so as to get the required operational characteristics from the electric drive train. The aim of this paper is to review on different kinds of control strategies of three phase induction motors for electric vehicles (EVs) applications. , this paper aims at highlighting various control strategies. Various speed control techniques are presented through the use of conventional controllers and Intelligent Controllers

Keywords-Electric Vehicle, Direct Torque Control, Space Vector Modulation.

0414098 TOMAR, SHILPI AND KUMAR YOGENDRA (Department of Electrical Engineering, Samrat Ashok Technological Institute, Vidisha-464001). OPTIMAL BLOCK BIDDING STRATEGIC ANALYSIS OF GENERATORS FOR ELECTRICITY MARKET IN EMISSIVE ENVIRONMENT

In oligopolistic electricity market, the maximization of profit for generators is mainly dealt with the recent bidding strategies. For selling of electricity with maximum profit of power, companies required a suitable bidding model that includes power operating constraints and price uncertainty within the market. In this paper, Block-bid model is presented to determine bid prices and bid quantities by using Particle Swarm Optimization (PSO) approach, under the rules of a competitive power market considering carbon emission. In this paper the potential impacts of emissions on power industries and electricity markets are elaborated. Increasing environmental issues and regulations have forced, Generation companies (GENCOs) to consider the emission used for long term planning. Constraints on CO₂ emission have restricted the GENCOs to adopt the green technologies.

Keywords: Block Bid model, Bid Price, Market Clearing Price, Carbon Emission, PSO.

15. GEOGRAPHY

0415099 GUCHHAIT, SANAT KUMAR (Department of Geography, The University of Burdwan, Burdwan – 713104). GROWING ENLIGHTENMENT AND GRADUAL MAINSTREAMING OF THE KHARIA SABARAS IN PURULIA DISTRICT, WEST BENGAL

Sabararas are identified as PVTG1 among the Primitive Tribal Groups of India, concentrated mainly in Andhra, Odisha, Jharkhand, Chhattisgarh Bihar and West Bengal. Primitivism as defined by the Govt. of India is expressive in the life and livelihood of this tribal group. They normally prefer a forest based habitat and are adapted with a forest base livelihood to a considerable extent even at the end of the first quarter of the 21st century. Within the last thirty years, especially after the introduction of LPG economy in India from the beginning of 1990s livelihoods of different PVTGs are experiencing diverse contour- some groups are gradually coming in the mainstream of culture. Kharia Sabararas of Purulia and Bankura district of West Bengal belong to this group. A considerable change in life and livelihood of the Kharia Sabararas in the Purulia district is gradually being established with growing enlightenment and gradual mainstreaming from the middle of the 1990s which has been accelerated due to increasing school education among the children and more specifically livelihood development through gainful employment- an opportunity availed with the growth of LPG economy that was not possible earlier due to social isolation and exploitation.

Problems of the Kharia Sabararas are different from other tribal communities of Purulia. High incidence of poverty, low literacy, lack of skill needed for modern economic system, alleged stigma of criminality forced them to be isolated from main stream economy. But this gloomy picture of Sabararas' life got the initial change by the unification of Sabararas in West Bengal by the establishment of *Paschimbanga Kharia Sabar Samity* under the leadership of G B Sing Deo and Mahasweta Devi. Their planning for educational development sparked by Gayatri Chakraborty Speevak and also awareness and livelihood development were achieved to some extent starting from the beginning of 1980s. But introduction of LPG economy from the beginning of 1990s opened up the opportunity of gainful employment for the adult through rock quarrying, sand mining, brick kiln industry and also migration towards large urban centres from 2003-2004 onwards. This economic support to the families and growing involvement of the young adults with the main stream people has significantly reduced the isolation. Through this growing enlightenment they are now gradually adapted with the mainstream civilization within a span of 20-30 years. This scenario of recent change has been investigated deeply through narratives, biography, focused group discussion and simple statistical techniques.

Keywords: Kharia Sabararas, Primitive Tribal Group, Growing enlightenment, Gradual mainstreaming, Social Isolation

0415100 MONDAL, MANISHREE; GUCHHAIT, RAMU; AND BHATTACHARYA, SANCHITA (Department of Geography, Midnapore College, West Bengal). THE DIFFERENTIAL IMPACTS OF SELF-HELP-GROUPS ON THE LIVELIHOOD OF RURAL WOMEN IN PASCHIM AND PURBA MEDINIPUR DISTRICTS OF WEST BENGAL, INDIA

Self Help Groups (SHGs) are the micro financing self governed informal associations of poor and marginalised people, particularly women with the notion of mutual support, come together to address their common problems and to find ways of improving their living conditions. It is one of the best schemes for financing in small scale to the rural poor, backward and illiterate women with a right belief that the women, the best manager of family can handle the financial matter better than men. These groups are indeed a boon to give oxygen to the poor rural women in West Bengal to raise their economic as well as social empowerment.

The main objectives of this study are i) to examine the activities and functions of SHGs ii) to analyse the role of SHGs for empowering the women both economically and socially iii) to explore the problems faced by the SHG members along with the probable strategies to overcome the same.

The survey has been executed among 200 poor marginalised rural women members of 40 SHGs selected through Stratified Random Sampling method of Paschim and Purba Medinipur Districts of West Bengal. It is completely based on primary data collected through door to door perception survey with the help

of structured questionnaire survey schedule, whereas the required secondary data have been collected from government offices, websites, publications, records etc. The collected data have been tabulated, organised and analysed using various cartographic and statistical techniques.

The notable outcomes of this study are of both positive and negative. Increasing in the income level of both the individual and family, mainly through livestock farming and handicrafts making etc., enhancing the skill, self respect, self confidence, understanding the necessity of education and health, communicating collectively among members to know the rights and wrongs, and the most important, starting to take actions against those families who mistreat their daughter-in-laws, etc. are the positive sides of the survey.

The main problems faced by the members are delay in sanctioning loan, inadequate loan amount and limited number of instalments of loan repayment. Proper guidance, regular visits, frequent awareness camps, strict monitoring of the activities of SHGs as well as financing institutions at government level are the major requisites in order to overcome their problems.

Due to the engagement in SHGs, women are now more or less able to transform their choices into desired actions which result in the enhancement of decision making power, commitment and capacity of poor women folk in the study areas. These have empowered them not only as individuals but also as members of the family, community and the society as a whole.

Keywords: Self-Help Groups, poor rural women, empowerment, stratified random sampling, perception survey,

0415101 THAKUR, DEENANATH AND SINGH, PRADEEP KUMAR (Department of Geography, Vinoba Bhave University, Hazaribagh) शहरी फैलाव का कृषि भूमि उपयोग पर प्रभाव

प्रस्तुत शोध कार्य भूमि उपयोग परिवर्तन के संदर्भ में शहरी फैलाव का कृषि भूमि उपयोग पर प्रभाव का अध्ययन किया गया है। इसमें शहरी फैलाव के प्रमुख कारक जैसे— जनसंख्या वृद्धि, नगरीकरण, परिवहन, आवास, शहर कि आंतरिक समस्या, तकनीकी नवाचार, सार्वजनिक सुविधाएं और अवसंरचना। इस शोध कार्य के माध्यम से कृषि भूमि में प्रभाव के साथ-साथ उनके भावी विकास हेतु सुझाव प्रस्तुत किए गए। इस अध्ययन में शहरी फैलाव का कृषि भूमि उपयोग पर प्रभाव स्पष्ट रूप से इंगित होता है। झारखंड राज्य बनने के उपरांत शहरी फैलाव का कृषि भूमि पर अत्यधिक प्रभाव दृष्टिगत होती है। यह अध्ययन क्षेत्र हजारीबाग जिले के अन्तर्गत $23^{\circ}57'49''$ उत्तरी आक्षांश — $24^{\circ}1'46''$ उत्तरी आक्षांश और $85^{\circ}20'0''$ पूर्वी देशांतर — $85^{\circ}27'26''$ पूर्वी देशांतर (हजारीबाग सामुदायिक विकास प्रखंड) में अवस्थित है। इनका क्षेत्रफल 312.43 वर्ग किमी है। इस षोड पत्र में विप्लेषणात्मक सह वर्णनात्मक विधि का उपयोग किया गया है। साथ ही इसमें द्वितियक आँकड़ों का समावेश किया गया। इस शोध को वैज्ञानिक बनाने के लिए दो काल (2001, 2020) के सैटेलाइट इमेजरी का प्रयोग किया गया। साथ ही भौगोलिक सुचना प्रणाली और गूगल अर्थ इमेजरी का प्रयोग किया गया। इनके अलावा मल्टी टेम्पोरल लैंडसैट इमेजरी का प्रयोग किया गया। हमारे अध्ययन में शहरी फैलाव और कृषि भूमि के बीच संबंधों पर समाजिक-आर्थिक प्रभाव पर प्रकाश डाला गया है। मुख्य बिंदु — कृषि भूमि उपयोग, जनसंख्या वृद्धि, नगरीकरण, शहरी फैलाव, कृषि उत्पादकता, अवसंरचना।

16. HOME SCIENCE

0416102 PATEL, KIRTI AND SHRIVASTAVA, REKHA (Department of Home Science, Govt. Girls P G College, Vidisha). NUTRITIONAL STATUS AND CHALLENGES OF SAHARIYA ADOLESCENT GIRLS

Tribal population constitutes about 8% of the total population in India. They are particularly vulnerable to undernutrition, because of their geographical isolation. Socio-economic disadvantage and inadequate health facilities. Recognizing the problem. Government of India launched different programmes for their welfare. Adolescence is a significant period of growth and maturation. The nutritional status of adolescent girls, the future mothers, contributes significantly to the nutritional status of the community. Therefore an attempt was made to assess the diet and nutritional status of adolescent population from the different tribal areas of India. In the present study we have done assessment of nutritional status of adolescent girls in the Sahariya tribe in Vidisha district. As they are future mothers, improvement of nutritional status should be the primary objective. A significant association between undernutrition and socio-economic parameters like type of family, size of land holding and occupation of head of household was observed. Therefore, there is a need to evolve comprehensive programmes for the overall development of tribal population with special focus on adolescents. Anthropometric measurement was taken among adolescent girls in the rural area of different tehsils (Kurbani, Pathari, Lateri, Gyaspur, Shamsabad) of Vidisha district, Madhya Pradesh.

The study will be a questionnaire based prospective study. The pattern of dietary intake among adolescents was also studied. Sample size will be 200. The statistical analysis was done using SPSS 20.

17. INTERNATIONAL RELATIONS STUDIES & DEFENCE STRATEGIC STUDIES

0417103 GONDYALA, K CHAKRAVARTI AND NAIDU, S GOVARDHANA (Department of Political Science, PVKN Govt College, Chittoor A.P.) EMERGING CHALLENGES TO INDIA'S FOREIGN POLICY IN AN UNCERTAIN GLOBAL ORDER

India's foreign policy has shown a remarkable resilience throughout the years. From the initial Nehruvian idealism, Indian foreign policy has undergone tremendous change and had successfully made its mark on global arena. The continuity and changes in foreign policy made India a globally stable power that is reliable and a power to reckon with. India took lead in Non-Alignment Movement and showed immense potentiality as an emerging power on international scale. The 1962 Chinese invasion did dent India's image. But the later developments including its decisive win over Pakistan in 1965 and the monumental role it played in the liberation of Bangladesh(1971) have raised the stature of India. The manner in which India conducted itself after the end of cold war or the manner in which Indo-U.S nuclear deal took shape shows the potentiality and pragmatism of India's foreign policy. Today, the world is at cross roads in the post-covid situation. New power equations are taking shape and India is too much a big player that can be ignored in the new power equation. The emerging new challenges in the post covid situation provide India an ample opportunity to enhance its capability to maneuver its space in world politics. This paper tries to analyse the opportunities that lie ahead for India's foreign policy in the post-covid situation. Descriptive and analytical methods were used in understanding India's foreign policy.

0417104 GOSWAMI, DEBAJIT AND DAS, AYAN (Department of Public Administration, School of Social Sciences, Netaji Subhas Open University, DD-26, Sector – I, Salt lake City, Kolkata – 700064). INTERCEPTING GLOBAL TERROR IN THE 21ST CENTURY: TERRITORIAL CONFLICTS, GOVERNING STATE SECURITY AND COUNTERING VIOLENT EXTREMISM

The landscape of global security has undergone a catalytic shift from hard power politics centred around physical manifestations, nuclear strategies, violent wars, to an emerging escalation of epic proportions in the present century with a focus on global terror that involves multiple dimensions of ideological radicalization, hegemonic bio-expansion, cyber warfare, geo-economic and geo-political strategies of hard and soft, physical and non-physical violence of an unprecedented scale.

After the fall of the Berlin Wall, global order was predominantly dominated by the US but presently multiple poles of power, even beyond the developed North, have emerged as contenders for hegemonic influence and global dominance. Ominously, not all of these are nation-states, and are non-state actors and organizations that are expanding beyond territorial boundaries, engaging in serpentine, inconspicuous ideological radicalization on one hand, while also expanding on more blatant, gruesome acts of violence and terror, on the other.

Among nation-state actors, India, Pakistan, China, Russia are only a few who are competing for influence over regional domains and sometimes over vast areas of the globe. Regional powers are also becoming more assertive in their neighbourhoods, such as Iran and Saudi Arabia, series of proxy wars in Syria, Yemen and Iraq, Indo-China-Pakistani competitions among others, which fuels broader disputes across North and East Africa, the Middle East, South and Central Asia While non-state organizations like ISIS, Al Qaeda, Lashkar-e-Taiba are also covertly, and many a times explicitly, competing to spread their cause across regional and global boundaries. With the advent of next generation weapons, the dependency and vulnerability of cyberspace and digital diplomacy and intel networking through quantum computing and AI, the emerging vectors for direct and indirect violence are assuming a new shape. These actors, with their mystique like functioning and global emergence, act as a force multiplier to threats and their countermeasures, which is becoming an increasingly tall order to address, both for nation states as well as international and intergovernmental organizations.

In this increasingly fragmented Global Order where insecurity and security is purveyed by state and non-state actors alike, the volatility of the balance of power increases. This paper analyses this volatility, especially with respect to terror in multiple forms. Thus, two important dimensions have been addressed

through case studies of different nations. In the context of 'Governance of State Security', the case study of Australia has been undertaken, analysing its various agencies, regulatory frameworks and programs to maintain territorial sovereignty and tackle terror within its soil. A final study has been undertaken on programs and policies of 'CVE or Countering Violent Extremism', which on one hand focuses on the constructive community strengthening to ideologically and socially counter terror hegemonizing, and on the other hand works with institutions and agencies to counter extremist radicalization and violent actions by building resilience and for this purpose a case study of the Diminishing Opportunities for Violent Extremism, or DOVE model is undertaken for better understanding of CVE.

Keywords: Terror, Ideological Radicalization, State Security, Countering Violent Extremism, Governance – Models.

18. JURIDICAL SCIENCE

0418105 BHATIA, HONEY (VSLLS). CORPORATE SOCIAL RESPONSIBILITY THROUGH THE LENS OF NEW TECHNOLOGICAL SOCIETY

We are in an era of positive change in all areas of human existence: business, education, government and politics, philanthropy, faith, society and more. It is essential to revamp many of the instruments we use in business and the social environment to meet the needs of citizens of the modern world. It has always been said that business is for profit. But Businesses are not just designed to maximize profits but they also have human rights responsibilities. In view of this responsibility, the concept of Corporate Social Responsibility (CSR) was introduced which was adopted by India through Companies Act, 2013. In addition to other resources of a business houses, technology is an another commercial resource.

Corporate Social Responsibility has the potential to become one of the bridges between business and society. In this the role of technology for enhancing the effectiveness of Corporate Social Responsibility is very important. This will ensure not only a sustainable business model but one which will increasingly prove to be the way forward as the best business model. Corporate Social Responsibility itself can be harnessed to develop appropriate technological paradigms which will become the technologies for the future. This may take the form of investments into smart technologies, startups, environmental projects etc. which can be increasingly utilized to provide the business entities competitive advantage in the future. In fact utilizing this model will not only provide superior value to the shareholders but also provide solutions to the existing problems bedeviling the society. There is a thin line today between CSR towards societal problems and thinking for the future incubators which will become the bluechip companies of tomorrow. In this paper Researcher will try to throw some light on How the present technologies can be used as a future business prospects if used as CSR today.

0418106 GUPTA, GAURI (VSLLS, Vivekananda Institute of Professional Studies, New Delhi). DIGITAL MARKETS AND COMPETITION REGULATION – A WAY FORWARD FOR INDIA

Digital markets involve the trade of goods and services on the internet. These markets have led to the emergence of several firms based on business models involving the collection and commercial use of data. The Organisation for Economic Cooperation and Development described the digital economy as “The digital economy comprises markets based on digital technologies that facilitate the trade of goods and services through e-commerce.” In recent times, this sector has grown at a fast pace and keeping in mind the present scenario, will be on a high growth trajectory in the coming years. In India, the sector has generated 200 million USD of economic value which is expected to increase five folds by 2025.

Digital markets are different from traditional markets. As compared to traditional markets, they have certain characteristics such as data-driven network effect, a high rate of investment, switching cost, faced paced innovation which is not associated with the traditional markets. Due to these distinct characteristics, issues in competition regulation in digital markets are different as compared to traditional markets. Some of the concerns regarding competition regulation in the digital economy are barriers to entry, relevant market, combinations, algorithm pricing, and privacy.

Keeping in mind the present trend and expected growth rate, it is therefore important to understand the implications of growth in technology on competition and to analyse whether competition law is ready to address the concerns regarding competition regulation which are unique to the digital economy.

The paper aims to analyse whether competition law in India is ready to address the regulation issues particularly associated with the ever-growing digital markets given the fact that consumer welfare standard is the dominant approach in the country and merger regulation is based on notification criteria.

**0418107 SANDHU, RAVNEET (Vivekananda Institute of Professional Studies, GGSIPU, New Delhi).
INDIGENOUS PEOPLE AND TECHNOLOGY: ISSUES AND CHALLENGES**

The World Intellectual Property Organization defines traditional Knowledge as knowledge, know-how, skills and practices that are developed, sustained and passed on from generation to generation within a community. This traditional knowledge often forms part of the communities' cultural or spiritual identity. The traditional knowledge is not just important for the communities' survival but is very important for the protection of the local eco system area that is generally a biodiversity rich area. New technological developments in the pharmaceutical and cosmetic industries have often focused upon the usefulness of traditional knowledge for the development of new product of commercial importance. The protection of traditional knowledge of local and indigenous communities has been one of the most contentious and complicated issue, especially after the introduction of the Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPs) of the World Trade Organisation (WTO). This paper deals with the issues and challenges faced by the local and indigenous communities owing to the technological advancements. It further delves into the protection provided to them by both national and international legal spheres. It also takes into account the importance of Environmental Impact Assessment before undertaking developmental projects in biodiversity rich areas.

0418108 SUDESH, V (University Law College & Dept.of Studies in Law, Bangalore University, Bangalore). THE FICTION OF LAW AND THE REALITY OF SCIENCE: STRAY THOUGHTS

Beginners in legal study are told that law is a normative science. But since science itself as a subject of study is more factually connected with objects/materials or phenomena, a question would arise as to how law being more abstract in nature and not necessarily connected with objects or phenomena be a *normative science*? Furthermore, science fiction itself is based on illusions or is speculative, how then we may understand science as a fiction? Since the purpose of law is administration of justice, one needs to develop it scientifically, to make it a study having scientific features in resolving the conflicts arising in society. One among the several schools of law, like the Natural School of law, the ideas of which has had universal influence especially in developing Human rights jurisprudence, is based on '*ought principles*'. The *ought principles* adopted to develop and understand law fails the test of scientific principles. The Natural School of law and many other schools of thought in law needs to be looked into from scientific principles in order to overcome the challenges posed by science fiction. The earliest idea of law as proposed by the Greek Natural theorist is dependent upon the nature or laws of nature. Despite its different versions and interpretation from the ancient era to the modern era, the central notion of the idea of law according to the naturalists remains that, man is endowed with reason to discover the laws from the nature and it essentially contains moral judgements. Over the past several decades, at various points of history, the Natural law theorists have used the central idea of law and the connection with nature and human reason to propose the universality, meaning and purpose of law. The Universal Declaration of Human rights (UDHR 1948) for all is an expression of the faith in universality of law and common rights for all human beings irrespective of race, caste, sex, nationality and region. However, with the advent of industrial revolution and the development of science and technology, the universality, meaning and purpose of law has been enjoined with objectivity and specificity. The Benthamite and Austinian proposition on law being a clear positive rule of order has developed alongside more materialistic approach to human existence helped by the developments in science and technology. Notwithstanding the sociological theory of law, as to law being an agent for social change, we find that the advancement in technology has helped law being more scientific not only in its purpose but also being used as an instrument for delivering justice. Artificial intelligence in the area of justice dispensation intends to revolutionise the legal profession in a big manner having far reaching consequences. The paper is an attempt to understand the dynamics of interaction of law and technology.

Keywrds: Law, science and technology, artificial intelligence, theories of law.

19. LINGUISTICS

0419109 LENKA, SANJAYA KUMAR AND SAHOO, KALYANAMALINI (Indian Institute of Technology, Banaras Hindu University, Varanasi). THE SYNTAX OF RELATIVIZATION

This paper studies relativization in Odia as a syntactic process in which a noun-clause behaving as a subordinate clause modifies and quantifies the noun phrase of the main clause. This process is followed in relative and co-relative constructions. In Odia a relative clause occurs in three positions, namely, in the external argument position of the main verb (as in example 1), in the right adjunct position (see ex.(2)), and in the left adjunct position of main clause (as in ex.(3)).

- (1) *sei lokamaananku [jeunmanku daakicha] aaga basaaa .*
 those people-ACC [whom-PL invite-pres.perf.] first-sit-CAUS
 'First (you) make those people sit, whom you have invited.'
- (2) *sei lokamaananku aaga basaaa [jeunmaananku daakicha].*
 those people-ACC first-sit-CAUS [whom-PL invite-pres.perf.]
 'First (you) make those people sit, whom you have invited.'
- (3) *[jeunmaananku daakicha], sei lokamaananku aaga basaaa.*
 [whom-PL invite-pres.perf.] those people-ACC first-sit-CAUS
 'First (you) make those people sit, whom you have invited.'

In sentence (1), relativization is seen between right adjunct and main clause; and in (2), it occurs in the external argument position of the main verb; and in (3), it occurs in the left adjunct position of the main clause. Now this data generates some common questions: how an adjectival clause occurring in different place modifies the noun phrase of main clause? Where is this relative clause originated? What structural differences these sentences have? Above all, what common properties these relativizations have?

In this study, we argue that the relativization in these three different places in a clause can be theorized by a hypothesis based on the functions of the operator which can be explained in the formula generated in the structure of relativization. It can be formulated as follows:

1. $(Au,v)=(u,A v)$ for all $u \in U, v \in V$

In the above formula we assume that, let U be a Hilbert space in the vector space of noun clause and V is also a Hilbert space within the vector space of a sentence, and let $A: U \rightarrow V$ is a linear operator. The linear operator A^* has some base properties (number, gender and person) that match with the properties of head noun of vector space. The relativization in three places of a underlined sentence does not change the meaning of the underlined sentence but the structure of the derived sentences is changed by the process of syntactic movement. This can be represented as follows:

Figure:1

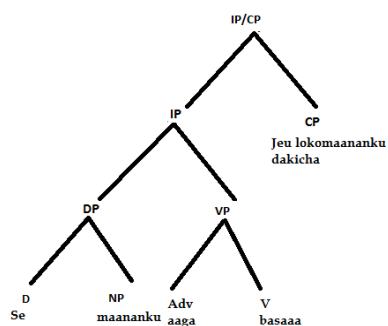
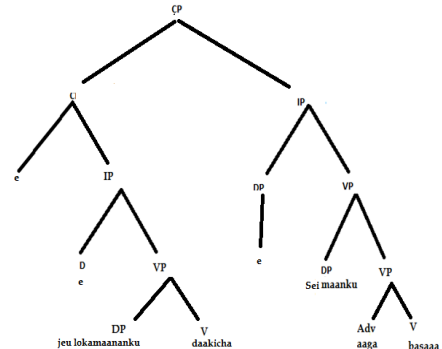


Figure:2



20. MANAGEMENT SCIENCE

0420110 ACHARYA, ANUMA (.....). NEGOTIATIONS WITH FOREIGN VENODRS PROFESSIONAL AND SOCIO-CULTURAL ASPECTS

0420111 GOEL, RIYA AND PANDEY BOBBY B (Department of management studies, Guru Ghasidas Central University, Koni, Bilaspur- 495001). A BRIEF STUDY ON THE DEVELOPMENT OF SOCIETY UNDER SCIENCE AND MODERN TECHNOLOGY

The main objective of this paper is to analyze the relationship between modern technology and global society where we emphasize the process of development in society under various perspectives of modern technology and science. With the advancement of technology, the transformation has been taken place in every sphere of life and it has transformed methods of communication, literature, art, business, communication, and many more. Due to the advancement of modern techniques nowadays we can check the requirements for the development of our society with a single click over the internet. With the help of modern technology, it makes it possible to differentiate the development process of various sections of society to maintain the optimum development process to achieve a modern global society. Technology plays a vital role in bringing close the society where many initiatives have been taken to resolve any social issue and it may become a matter of concern and attempts have been made to solve them easily by sitting in our homes using audio or video conferencing. This paper tries to elaborate and explain the development process of society under various shades of modern technology and science.

0420112 THAKUR, KANCHAN AND PANDEY, BOBBY B (Department of management studies, Guru Ghasidas Central University, Koni, Bilaspur - 495001). A STUDY ON GLOBAL TECHNOLOGICAL CHALLENGE IN SUSTAINABLE GROWTH OF SOCIETY

World is growing fast with science and technology. Sapiens has turned the world into wonderland. Things which were near to impossible has become possible now by human effort and with the help of science and technology. As we are moving towards the era of science and technology, we are getting overwhelming experience from technology. But with enjoying the perks of living in a technological society, we are also facing some dangerous challenges like pollution, global warming, unemployment, extraction of resources etc. this paper is suggesting sustainable development for society. There is nothing wrong in technological development and advancement but it should be done in such a way that it should not harm our planet, our society and our existence.

21. MATHEMATICAL AND STATISTICAL SCIENCE

0421113 BANERJEE, SNIGDHA (School of Statistics, Vigyan Bhawan, Takshshila Campus, DAVV, Khandwa Road, Indore). NEW TECHNOLOGICAL ADVANCES AND SOCIETY A SHORT STORY THROUGH DATA AND FORECASTING

Data related to technological developments in India and some of the developed/ developing countries, as also the world data, when compared, elicit the disparities as well as commonalities in the global community. For a single country, data analysis leads to useful decision support systems. Forecasting, using the available data is a strong statistical analysis tool, often used at different levels of complexity, depending upon the type of data. In this presentation, we wish to undertake a short tour of the impact of technology on the society through data presentation, analysis and forecasting.

0421114 GAUTAM, PRERNA AND JAGGI, CHANDRA K (CSIR-National Institute of Science, Technology & Development Studies (NISTADS), Pusa Gate, K.S. Krishnan Marg, New Delhi-110012). SUPPLY CHAIN MODEL WITH PRODUCT RECOVERY MANAGEMENT TOWARDS A SUSTAINABLE AND CLEANER SYSTEM

In today's omnichannel environment, sustainability has become a requisite for doing clean and good business. The present paper studies a sustainable supply chain with a single vendor and a single buyer. The vendor administers the production process and delivers the demanded lot to the buyer as per the single setup and multiple delivery policy. The buyer performs the first-hand inspection to separate the defectives from the received lot and return these secluded defectives to the vendor. Further, the vendor and buyer initiate a sustainable drive to make sure that less waste is dispatched in the environment. Thereby, the end customers can return the used products through a proper channel. The vendor categorizes the defective and used products into different categories through an efficient inspection process. The model also explores the effect of shortages, energy usage in production, and carbon-emissions while producing, transporting, and disposing of the products. The order quantity, number of shipments, and size of shipments are optimized to maximize the total turnover. The paradigm of sustainability is highlighted through mathematical analysis concerning economic and environmental aspects. Findings elucidate the positive effect of product recovery management techniques on the well-being of the environment and business.

Keywords: Strategic inventory; Optimization; Imperfect production; Product recovery; Carbon-emissions; Sustainability.

0421115 JAIN, VINITA; GOYAL, ANIL AND JALOREE, SHAILESH (Department of Pure & Applied Mathematics, S. S. L. Jain P. G. College, Vidisha). INTEGRATION OF I-FUNCTION OF TWO VARIABLES WITH RESPECT TO THEIR PARAMETERS

The object of the present paper is to establish four integrals associated with I-function of two variables due to Goyal Anil and Agrawal R.D [3]. The integration is performed with respect to a parameter. Such integral are useful in the study of certain boundary value problems.

0421116 KUMAR, VENKATESH V; RAO, M SAMBASIVA AND VALI, S KALESHA (Department of Mathematics, Aditya Engineering College (A) Surampalem, Andhra Pradesh, India-533437). S-FILTERS OF COMMUTATIVE BE-ALGEBRAS

The concept of S-filter is introduced in commutative BE-algebras and studied some properties of S-filters. It is proved that the set of all S-filters of commutative BE-algebras X is isomorphic to set of all filters of S , where S is sub algebra of X . The concepts of conjunctively S-regular BE-algebras and S-normal BE-algebras are introduced and also derived an equivalent condition for every conjunctively S-regular is S-normal.

Keywords: Commutative BE-algebra; filter; S-filter; conjunctively S-regular; S-normal

**0421117 PARMAL, VARUN AND BANERJEE, SNIGDHA (School of Statistics, DAVV, Indore).
INVENTORY MODELS WITH DISCOUNTED ADVANCE PAYMENT, SEGMENTED
MARKET AND DEMAND DEPENDING UPON FRESHNESS OF AGRICULTURAL
PRODUCT**

Demand for products in supply chains are often dependent on the product quality. As a result, the products generally are sold in segmented markets, with differential quality dependent price tags. In particular, for agricultural, horticultural and many types of forest produce, the product quality is perceived in terms of tangible measures of freshness of the items, and is a major determinant of demand. A practical factor rarely considered in theoretical inventory models is the requirement of advance payment for the supplier, especially in the current COVID -19 pandemic economic scenario. Often, as a means of co-operation between supply chain players the supplier offers option of partial advance payment to the buyer at a discounted price for the advance. This paper incorporates this emerging factor in inventory models of products with freshness dependent demand, where freshness declines with time and market is segmented in terms of quality and price where a random proportion of units are initially of inferior freshness condition. Numerical examples are presented and managerial insights are obtained.

**0421118 PRABHAKAR, M BALA; VALI S KALESHA AND RAO M SAMBASIVA (Department of
Mathematics, Aditya Engineering College, Surampalem, AP, India-533 437). M - IDEALS OF
BE-ALGEBRAS**

In this paper we propounded the notions of some special types of ideals in BE-algebras namely, M-ideals and absolute M-ideals. Some significant results are obtained on these concepts. Some conditions are derived for the relationship between these notions.

**0421119 SACHAN, DHEERANDRA SHANKER AND JALOREE, SHAILESH (Department of Applied
Maths & Computer Science, Samrat Ashok Technological Institute, Vidisha – 464001).
FRACTIONAL CALCULUS OF PRODUCT OF M-SERIES AND I-FUNCTION OF TWO
VARIABLES**

The object of this paper is to develop the generalized fractional calculus formulas for the product of generalized M-series and I-function of two variables which is based on generalized fractional integration and differentiation operators of arbitrary complex order involving Appell hypergeometric function F_3 as a kernel due to Saigo and Maeda. On account of general nature of the Saigo-Maeda operators, a large number of results involving Saigo and Riemann-Liouville operators are found as corollaries. Again due to general nature of I-function of two variables and M-series, some special cases also have been considered.

AMS Mathematics subject classification 2010 :26A33, 33C60, 33C70

Keywords: Generalized fractional calculus operators, Generalized M-series, Appell function, Fractional calculus, I-function of two variables, Mellin-Barnes type integrals.

22. MEDICAL AND HEALTH SCIENCE

0422120 AZAD, MUKESH (Department of Cse, Samrat Ashok Technological Institute, Vidisha – 464001). COMPREHENSIVE ANALYSIS OF PUBLICLY AVAILABLE DATA-SETS OF MAMMOGRAM

In the modern era, breast cancer has become the second highest risk factor of casualty in women. The best possible solution to reduce the risk of casualty is the detection of cancer at an early stage and best possible treatment at that stage can save lives. The breast masses or calcification region can be screened with the help of mammography so mammography has a vital role in finding the cancerous cells possibility. Most of the researchers of this area work on public datasets like DDSM, INbreast, BreakHis and some researchers use private dataset collected from Hospitals and research institutes. So in this paper we analyse salient features of the datasets available publicly for research purpose in breast cancer domain.

0422121 DANGI, HEMANT AND DATAR, ASHUTOSH (Department of Biomedical Engineering, SAMRAT ASHOK TECHNOLOGICAL INSTITUTE, VIDISHA – 464001). ECG BASELINE WANDER ELIMINATION USING EMPIRICAL MODE DECOMPOSITION

An Electrocardiogram (ECG) signal is the representation of electrical activity of cardiac muscles. It indicates the polarization and depolarization process. The waveform has significant information regarding cardiac vector conduction. Any abnormality or deviation from normal ECG waveform indicates some cardiac problem. Abnormality like myocardial ischemia and infarction etc can be detected by observing ECG waveform. Similarly various drug studies include ECG analysis. The ECG consist four main prominent wave complexes namely P-wave, QRS complex, T-wave and U-wave. The ECG waveforms are analyzed for ailment diagnosis purpose using these wave shapes, timings and intervals. It is common to experience electrical noise and corruption in recorded ECG. These may be baseline wander (BW), powerline interference (PI), motion artifacts and physiological condition etc. Out of their Baseline Wander (BW) is the most common cause of ECG noise. The baseline wander (BW) is a low frequency noise, arising mainly due to patient movement or disturbance of electrodes. The baseline wander (BW) removal is a very essential step in the pre-processing stage of ECG. Several approaches have been developed for BW correction.

In this paper, an approach for elimination of the baseline wander (BW) in ECG using Empirical Mode Decomposition (EMD) is proposed. The Empirical Mode Decomposition decomposes the noisy ECG signal into its intrinsic mode functions (IMF). The Intrinsic Mode Functions (IMF) represents zero-mean amplitude and frequency modulated components. The EMD represents fully data-driven, unsupervised signal decomposition. It does not require any defined basis system in advance. The EMD has perfect reconstruction property. The original signal without any loss of information can be constructed using all IMFs and corresponding residuals. In this study the EMD is used on ECG waveform obtained from MIT-BIH database. The results shows promising performance with accurate removal of baseline wander (BW) component from ECG. This facilitates ease in diagnosis.

Keywords: Electrocardiogram (ECG), Baseline Wander (BW), Powerline Interference (PI), Intrinsic Mode Function (IMF), Massachusetts Institute of Technology/Beth Israel Hospital (MIT/BIH).

0422122 KIRAR, K G (Samrat Ashok Technological Institute, Vidisha – 464001). ANALYSIS OF SEIZURE AND NON SEIZURE EEG SIGNALS USING EMPIRICAL WAVELET TRANSFORM

Epilepsy is one of the most typical neurological disorders distinguished by transient and sudden electrical disturbances of the brain. The electroencephalogram (EEG) is a helpful measurement for the purpose of assessing brain activities, including information relating to the different physiological states of the brain. It is a very helpful tool for observing the complex dynamical behavior of the brain. This paper presents the application of empirical wavelet transform (EWT) for the analysis of EEG signals. EWT method presents an approach to building adaptive wavelets. The main idea is to take out the different modes of a signal by designing an appropriate adaptive filter bank. This construction is equivalent to building a set of bandpass

filters. Perform the Empirical Wavelet Transform on the respective signal that gives EWT (containing first the low-frequency component and then the successive frequency sub-bands), MFB (Mayer filter bank), and boundaries (containing the set of boundaries corresponding to the Fourier line segmentation normalized between 0 and π). Hilbert transform extracts the instantaneous amplitude and phase of each EWT component. We calculate the mean of Amplitude and Frequencies of each EWT component for both seizure and non-seizure EEG signals and compare them. Experimental results on the EEG database available by the University of Bonn, Germany, are used to illustrate the effectiveness of the given method.

Keywords: EEG signal analysis, Empirical Wavelet Transform, Epilepsy, Seizure, and non Seizure EEG signals, Bandpass Filters.

0422123 MAHAWAR, NARENDRA AND DATAR, ASHUTOSH (Department of Biomedical Engineering, Samrat Ashok Technological Institute, Vidisha 464001). 2D IMPLEMENTATION OF DIGITAL GABOR FILTER DESIGN WITH KERNEL DECOMPOSITION

In recent time computer vision and image analysis have attracted attention of many reseasech. One of key areas are pattern recognition and biometric identification. The Gabor filters have shown tremendous potential and promises in this area. The Gabor feature based approaches have offerded computing performances in biometrics and pattern recognition. This is due to the fact that Gabor filter have strong resemblance with receptive field neurons of visual cortex region. The Gabor features can be derived both in spatial and frequency domain. The texture perception involves stages like convolution textures, boundary detection etc. The Gabor filter bank are applied for obtaining power spectrum of the region. The sparseness is used to obtain multi-resolution texture descriptions. It is also needed to compute 2D complex Gabor filter bank generating output at various orientation and frequency. In this paper, we have generated 2D complex Gabor filter bank with multiple orientation and frequencies. These generated kernels are applied on radiological medical image. The results show that the output images have strongly accentuated the visual region in specification direction. This application helps in better diagnosis on radiological image.

Keywords: Digital Gabor filter, Kernel Coefficient, Mat lab.

0422124 NAGDEVE, DEWARAM A AND DONGARDIVE, PRASHANT B (International Institute for Population Sciences, Mumbai). FERTILITY AND FAMILY PLANNING DIFFERENTIALS AMONG SOCIAL GROUPS IN INDIA

India has almost achieved replacement level fertility but considerable fertility and family planning use differentials that exist among social groups. Therefore, we aimed to examine the fertility and family planning differentials among social groups in India. The data has been analyzed from the fourth National Family Health Survey (NFHS 4) conducted during 2015-2016 in India. The analysis of data has done by using bi-variate, logistic regression, and multiple classification analyses to observe the association between each of the dependent and independent variables. The analysis reveals that fertility and family planning differentials exist among social groups in India. The scheduled caste, scheduled tribe, and other backward class women have exhibited higher fertility and lower contraceptive use than other castes women have. Multivariate analyses on cumulative fertility and contraceptive use show that differentials exist between the social groups even after controlling for the other socioeconomic and demographic variables. The rural areas are lagging behind urban areas but the gap is narrowing at higher levels of socioeconomic status. There is a negative relationship between education and fertility. The use of the family planning method significantly increases with the age of the women, marital duration, and household wealth index.

Keywords: Fertility, Family planning, Differentials, Social groups, India

0422125 NEMA, RAJEEV AND KUMAR, ASHOK (Department of Biochemistry, All India Institute of Medical Sciences (AIIMS) Bhopal, Saket Nagar, Bhopal 462020). EXPRESSION OF SPHINGOSINE-1-PHOSPHATE PHOSPHATASE 1 CORRELATES WITH BETTER PROGNOSIS AND TUMOR-INFILTRATING IMMUNE CELLS IN TRIPLE-NEGATIVE BREAST CANCER PATIENTS

Triple-negative breast cancer (TNBC) refers to the breast cancer phenotype, where the estrogen and progesterone receptors are negative and are associated with a poor prognosis. TNBC is a highly heterogeneous cancer type, thus require prognostic and predictive biomarkers. Sphingosine-1-phosphate (S1P), a potent sphingolipid metabolite, has been implicated in many processes important for breast cancer. In this study, using computational tools, we show that expression of S1P phosphatase 1 (*SGPP1*) and *LPP3* (*PLPP3*) is decreased in the breast tumors and positively correlates with relapse-free-survival (RFS) and overall survival. Basal-like or TNBC patients with lower expression of *SGPP1* or *PLPP3* exhibit much shorter RFS than the patients with the higher expression of these genes. We further show that expression of *SGPP1* and *PLPP3* show a strong positive correlation with tumor-infiltrating dendritic cells (DCs), CD4+ and CD8+ T cells, neutrophils, macrophages in the basal subtypes. Among the S1P receptors, S1PR4 showed a strong positive correlation with DCs, CD4+ and CD8+ T cells and neutrophils in TNBC. We conclude that low expression of *SGPP1* and *PLPP3* may hinder the recruitment of immune cells to the tumor environment, resulting in the blockage of cancer cell clearance, leading to poor prognosis of the patients.

Keywords: Sphingosine-1-phosphate, *SGPP1*, S1PR4, Tumor-infiltrating immune cells

0422126 PANDEY, RITU; NEMA, RAJEEV AND KUMAR, ASHOK (Department of Biochemistry, All India Institute of Medical Sciences (AIIMS) Bhopal, Saket Nagar, Bhopal – 462020). CERAMIDE METABOLIZING ENZYMES ASSOCIATE WITH THE PROGNOSIS OF NON-SMALL CELL LUNG CANCER: AN IN-SILICO ANALYSIS

Lung cancer is the leading cause of cancer-related deaths worldwide. Incidence and mortality due to lung cancer are escalating. Non-small cell lung cancer (NSCLC) constitutes 85% of all the lung cancer cases and has an average five-year survival rate of ~24%. Most of the lung cancer patients are diagnosed in the advanced stage, and there is a heterogeneous response to chemotherapeutic and targeted therapies. Therefore, there is a need to identify diagnostic and prognostic markers for lung cancer. Sphingolipids are gaining attention as a bioeffector molecule due to their involvement in cell fate determination, cancer initiation and progression, and sensitivity towards drugs. Ceramide is a metabolically active sphingolipid, and it regulates several biological processes, including cell proliferation, survival, and cell cycle arrest. Intracellular levels of ceramide are regulated by various enzymes that synthesize and catabolize it. Therefore, screening sphingolipids metabolic networks can provide regulatory nodes for preventing cancer growth. In the present study, we have determined the prognostic role of ceramide metabolizing enzymes with the survival outcome of NSCLC patients using Kaplan-Meier Plotter. Our *in-silico* analysis show, that the high expression of ceramide metabolizing enzymes glucosyl synthase (GCS (HR=1.19)), N-acylsphingosine amidohydrolase (ASAH1 (HR=1.32)), Alkaline Ceramidase 1 (ACER1 (HR=1.3)) and low expression of enzymes such as serine palmitoyl transferase long chain base subunit 1 (SPTLC1 (HR=0.77)), Serine palmitoyl transferase long chain base subunit 2 (SPTLC2 (HR=0.66)), serine palmitoyl transferase long chain base subunit 3 (SPTLC3 (HR=0.5)), ketodihydrosphingosine Reductase (KDSR (HR=0.55)), Ceramide Synthase 2 (CERS2 (HR=0.73)), phosphatidylcholine: Ceramide choline phosphotransferase 1 (MOB (HR=0.5)), Alkaline Ceramidase 3 (ACER3 (HR=0.46)), Sphingomyelin phosphodiesterase2 (SMPD2 (HR=0.77)) were associated with poor overall survival of NSCLC. We further observed hypomethylation in the promoter of DEGS, SMPD1, CERS6 and ACER1. Among all the genes, Cers2, ASAH1 and CersS4 were mutated in 9%, 5% and 3% respectively of NSCLC patients. Our study show strong association between ceramide metabolic enzymes with the prognosis of cancer patients and suggest ceramide metabolizing pathway may regulate lung carcinogenesis and/or response to chemo-adjuvant therapy.

Keywords: Lung cancer, non-small cell lung cancer, ceramide, prognosis, Kaplan-Meier curve

0422127 PATEL, PRITI; NEMA, RAJEEV AND KUMAR, ASHOK (Department of Biochemistry, All India Institute of Medical Sciences (AIIMS) Bhopal, Saket Nagar, Bhopal 462020). PROGNOSTIC ROLE OF RECEPTOR TYROSINE KINASE–LIKE ORPHAN RECEPTORS IN GASTRIC CANCER

Gastric cancer (GC) is diagnosed at advanced stages and has high mortality rates. Surgical resection and adjuvant chemotherapy are the main therapeutic approaches for GC. Despite of curative resection, recurrence and metastasis contribute to a high mortality rate in patients with GC. The receptor-tyrosine-kinase-like orphan receptors 1/2 (*ROR1/2*) are trans membrane proteins belonging to the receptor tyrosine kinase (RTK) family. *ROR1* and *ROR2* are known to over express in the tumor tissues from several types of cancer patients. However, the role of RORs in the prognosis has not been understood. This study aimed to determine the association of mRNA expression of *ROR1*, *ROR2*, and their signaling components *hWNT5A*, *NKX2-1*, and *FOXF1*, with the survival outcome of GC patients. We performed Kaplan-Meier survival analysis on publicly available The Cancer Genome Atlas (TCGA) data sets using 'Kaplan-Meier Plotter'. High mRNA expression of *ROR1/2*, *NKX2-1*, and *FOXF1*, was found to be significantly correlated with worse overall survival (OS) of GC patients, while surprisingly the *hWNT5A*, did not show any significant association with the survival outcome of GC patients. Our results suggest that the expression of *ROR1*, *ROR2*, and their associated genes could be used to predict the prognosis of GC patients more accurately.

Keywords: *ROR1*, *ROR2*, *hWNT5A*, *NKX2-1*, *FOXF1*, Prognosis, KM Plotter

0422128 SARAVANAN, KAVINKUMAR (GMC Nagpur). HEALTH TECHNOLOGY ASSESSMENT: A PROMISING PATH TO UNIVERSAL HEALTH COVERAGE IN INDIA

Health care innovation are booming everywhere in the world. With technological innovations skyrocketing, it demands a huge price to utilise those healthcare innovations. In LMICs like India, where already there is huge proportion of out-of-pocket payments, these innovations are potential threats than benefits that it pushes the people into poverty. In this scenario, universal health coverage will be distant goal to achieve. Government of India with a strong political commitment is focussing more to achieve UHC, by increased health care spending which is even reflected in the Union Budget 2021. But utilising these funds effectively mandates an informed decision-making process to set high priority areas for spending to reap maximum benefits. Health technology assessment is the tool which creates evidences to inform such policy decision.

All the literatures related to health technology assessment in India were reviewed in the databases such as PubMed, google scholar, and relevant websites.

The Government of India under Department of Health Research (DHR) had established a three-tiered institutional arrangement to facilitate the process of transparent and evidence informed decision making in India. They are Health Technology Assessment in India (HTAIn) – an apex body, technical appraisal committee (TAC) and HTAIn secretariat. By utilising the health economic principles, HTAIn generates and collates the evidence related to clinical effectiveness, cost-effectiveness, safety of medicines, devices and health programs. TAC prioritises the research topic and forwards them to the HTAIn secretariat which then order the Technical Partners (TP) to undertake HTA projects. Technical Partners have the capacity to do HTA studies, which are network of organisations such as NIRT, IIPH Gandhinagar, IIPH Shillong, Kalam Institute, NIE, JIPMER to name a few. Though HTA seems a promising tool towards UHC, there are various challenges to implement these mechanisms in India. First, there is a huge deficit in capacity to undertake such studies. Second challenge is to have a country-wide methodological process that is robust, uniform and transparent. Third, quality of availability of the data for studies. Resistance from clinicians, vast and complex Indian health care system are other challenges.

Government of India is focussing to decrease the out-of-pocket payments by increasing the public spending on healthcare sector and providing healthcare insurance coverage under the ambit of National Health Protection Scheme. With increased spending, health insurance, HTAIn in place, and strong commitment that address the bottle-necks for HTA, will provide an edge that the UHC can be achieved in India in near future.

0422129 SHARMA, AKASH (University College of Medical Sciences and GTB Hospital, Dilshad Garden, New Delhi). USE OF DIGITAL TECHNOLOGY AND COVID-19 IN INDIA- DESK REVIEW

During the pandemic, when there are no effective medicines and vaccines for preventing the outbreak, primary prevention becomes the main strategy for pandemic control. India, with its diversity, has many challenges in implementing various preventive measures. However, India was successful in awakening its citizens. Digital applications play a vital role in this. Digital health technology can facilitate pandemic strategy and response in ways that are difficult to achieve manually. Also, it helps us to analyze trends and forecasting future events based on data. Policymakers take its help in directing the resources. On April 2nd, India released *AarogyaSetu* a government-backed, centralized COVID-19 contact tracing app. Using GPS and Bluetooth technologies helped in the tracking of COVID-19 patients. The government responding with a central app is a step in the right direction because more people will participate, but it also allows better mapping of COVID-19 and notifies people of sick contacts and allows the government better control over quarantine.

We conducted a systematic search in using 4 databases to include studies that reported the use of digital technology in health setting during in Covid-19. We limited our search to India only. 2 reviewers independently screened the article for its suitability. Conferences papers, non-human studies, abstract only articles were excluded. We limited our search from 2019.

India has used various technologies to mitigate the pandemic, there are many concerns with technology use. One of the problems was privacy. For-example, the *AarogyaSetu* app had a serious concern regarding users' privacy, and because of this, it was updated many times. All the digital instruments are absolute. There are predefined values that decide determine the positive and negative outcomes. Even a sick person but has predefined determinants; the apps will declare it harmful; this lack of subjectivity raises concern about their validity and creditability. Like the *Aarogya setu* app, its positive outcome depends on mobile phone exposure to Covid area or person but not of the person; though it for many people phone and person's exposure are congruent, it is not always accurate, and this causes high false-positive rates with this.

Though digital technology is useful in some areas for the fighting pandemic, some severe concerns dissolve its credibility.

Keywords – Digital technology; Covid-19; Aarogya Setu app

**0422130 SINGH, HIMADRI; KHURANA, ALKESH; KUMAR, ASHOK AND SALUJA, ROHIT
(Department of Biochemistry, All India Institute of Medical Sciences, Saket Nagar, Bhopal).
STUDY OF THE POTENTIAL ROLE OF INTERLEUKIN-33 IN ASTHMATIC PATIENTS**

Asthma is a complex disease, characterized by reversible airflow obstruction, increased immunoglobulin(Ig) E production, infiltration of eosinophils to the lungs and lower Force Expiratory Volume in 1 s (FEV₁). Various cells and cytokines play a critical role in perpetuating and amplifying the inflammatory response in asthma. Interleukin-33 (IL-33) is a recently discovered cytokine that plays a major role in various inflammatory, infectious, and autoimmune diseases. IL-33 signals via a heterodimer composed of ST2 and IL-1 receptor accessory protein (IL-1RAcP). Role of IL-33 in asthma is not yet precisely explored. The aim of our study is to analyze the serum level of IL-33, its receptor soluble ST2 and IgE in asthmatic patients and healthy subjects and further explore its correlation with clinical parameters such as Absolute Eosinophil Count (AEC) and FEV₁. The study population consists of total 65 subjects (35 asthmatic patients and 30 healthy subjects). They were recruited after ethical clearance. Informed consent was taken from all the participants. Measures of spirometry (FEV₁) were evaluated. IL-33, sST2 and IgE were detected in serum of asthmatic patients and healthy control by using commercially available ELISA kits. AEC were estimated by flow cytometry. We have found significantly elevated serum concentration of IL-33 and IgE in asthmatic patients as compared to healthy control. There is no change was observed in sST2 level of asthmatic patients and healthy control. Negative correlation was found between serum level of IL-33 and AEC. We have found no correlation between serum level of IL-33 and FEV₁. We demonstrated that IL-33 is involved in pathogenesis of asthma. This study helps to understand the biological function of IL-33 in asthma. IL-33 may be a novel inflammatory marker for severity of asthma. It could serve as a new therapeutic target for asthma. Further investigations need to be done in large sample size for better understanding.

Keywords-Interleukin-33, Immunoglobulin E, Soluble ST2, Absolute Eosinophil Count

0422131 TRIPATHI, NALINI; KISHORE, JUGAL AND KUMAR, NEETA (VMMC & Safdarjung Hospital, New Delhi). SCREENING OF DIABETES & HYPERTENSION AND ITS ASSOCIATED RISK FACTORS BY INNOVATIVE MOBILE LAB CUM LABIKE TECHNOLOGY

Diabetes mellitus and Hypertension are the major pandemic disease globally with both high morbidity and mortality and a high health cost, especially in developing countries. Prevention of risk factors and management of these non-communicable diseases are possible and their complications can be prevented by early diagnosis but due to unavailability of diagnostic facilities at cheaper rates most of the patients remains undiagnosed in rural setting. **Objective:** To find out the prevalence of diabetes and hypertension and to determine its associated risk factors among the rural population using the innovative mobile lab cum Labike technology. **Material and Methods:** A cross-sectional study was conducted among 859 adults at Rural Health Training Centre (R.H.T.C) Nazafgarh, Delhi. The World Health Organization STEPS approach was employed which includes three sequential phases: Collection of information on socio-demographic variables and behavioral risk factors (STEP 1), obtaining physical measurements (STEP 2), and acquiring biochemical measurements (STEP 3). The blood test were performed on the innovative mobile lab cum Labike using the semi-automated biochemistry analyzer. It is the Compact Portable Mobile Lab, manufactured by Accuster Technologies Pvt. Ltd. Delhi and is the first product in medical diagnostic field where conception of technology to final product is designed keeping in mind the needs and suitability in India. It is a compact lab in a suitcase with Solar and Battery power backup. It has been designed to perform 23 vital biochemistry tests for assessing the functions of Kidney, Liver, Heart and Diabetes accurately, cost-effectively and timely. It includes different components as, blood analyser, centrifuge, micropipettes, incubator, Laptop with Patient Data Management Software and consumables. Key advantage of Mobile Lab is in its design i.e. rugged Analyzer, portability and cost effectiveness. Whereas, the Labike model is a mini mobile lab which is installed on a bike and could test additional parameters like, Serology, Hematology, ECG, BP, BMI etc. It has a proper place for reagents and other consumables. It is so rugged that it can be easily carried to the far flung and remotest locations. **Statistical Analysis:** Data were analyzed using the SPSS version 16. $P < 0.05$ was considered to be statistically significant. **Results:** Among the study subjects, the prevalence of smoking, smokeless tobacco use, alcohol use, and absence of physical activity was 16.7%, 7.5%, 11.8%, and 46.7%, respectively, in males and 2.2%, 0.4%, 0.2%, and 50.6%, respectively, in females. The prevalence of hypertension and diabetes was 17.0% and 5.2% respectively among males and 13.7% and 3.6% respectively among females. Among known hypertensive, 15.7% were males and 14.6% were female whereas 8.5% males and 8.3% females were known cases of diabetes. Hypercholesterolemia and Hypertriglyceridemia were observed in 23.9% men and 23.9% women and 36.6% men and 32.2% women, respectively. Abnormal serum HDL levels were significantly found in 42.5% males and 61.1% females. **Conclusions:** The study reveals high burden of hypertension and diabetes among the rural population. The mobile lab cum Labike using semi-automated biochemistry analyser is an innovative and cost-effective technology and has the capacity of as a point of care device used for the diagnostic services in the remote and rural areas.

Keywords: Diabetes, Hypertension, Innovative technology, Mobile lab cum Labike, semi-automated analyzer.

0422132 VALLEPALLI, CHANDRASEKHAR (SVIMS Sri Padmavathi Medical College for Women, Tirupati). HUB AND SPOKE MODEL OF DIGITAL TECHNOLOGY IN PUBLIC HEALTH CARE

Hub and spoke model (HSM) is an organizational model that arranges service delivery resources in an organization with one primary (hub) establishment and multiple secondary establishments (spokes). The goal is to offer healthcare at all the spokes by providing the comprehensive health care which is easily accessible from the hub. The hub and spoke model efficiently creates a hierarchical model Organization with authority that extends from the Outward hub to the spokes. Telehealth and telemedicine were chief among those technology domains. Born out of this need, telemedicine has the capacity to reach remote regions and provide every person in the community with basic healthcare. Models range from fully online to hybrid models within telemedicine. Improving access to health care services and addressing the public health needs are the essential

principles of HSM in health care. A well designed network of hub and spoke satisfies Patient care needs fully, and it does so in a way that Promotes conservation of resources with operational excellence.

HSM with digital technology is a very useful blend in healthcare service delivery, especially, in resource limited settings where it can help to reduce the deficiencies in the peripheral facilities (spokes) by linking them to a resourceful central (hub) facility. Many organisations have developed networks of primary, secondary and tertiary care environments to provide better health care to their community. The treatment flow was intended to take care of patients from the outpatient settings of lower acuity to the wider, more comprehensive tertiary centre. Innovation driven by technology through diagnosis, process, and delivery may lead to improving access and affordability. It will also allow the change of healthcare from the hospital to clinics, from clinics to the home, with access to experts round the clock, a journey that has already begun. Benefits associated with HSM includes consistency across operations, increases efficiencies, enhanced quality and improved agility. Although the hub and spoke model indeed carries risks, which can generally be minimized or eliminated altogether with proper planning, attention, and action. The HSM is also helpful in disseminating health awareness information, immunizations and precautionary measures to be taken during epidemics.

HSM, combined with digital technology, not only enables medical conditions to be treated, but also reduces costs, increases accessibility and quality, making health care available and affordable for the country. HSM with digital technology provides integrated model of comprehensive primary, secondary and tertiary care hospitals, digital dispensaries and technology. In fact, the hub and spoke model has been receiving increasing late attention as a possible solution to many health challenges for the population in the community.

Keywords: Hub and spoke model, Digital technology, Organisation, Health care, Public health

0422133 VENKATESH, U (Department of Community Medicine, VMMC & Safdarjung Hospital, New Delhi). PREDICTION OF COVID-19 OUTBREAKS USING GOOGLE TRENDS IN INDIA: A RETROSPECTIVE ANALYSIS

Digital technologies are being harnessed to support the public-health, including population surveillance, case identification, contact tracing and evaluation of interventions on the basis of mobility data and communication with the public. These rapid responses leverage billions of mobile phones, large online datasets, connected devices, relatively low-cost computing resources and advances in machine learning and natural language processing. This session aims to capture the breadth of digital innovations for the public-health. The future of public health is likely to become increasingly digital, and we review the need for the alignment of international strategies for the regulation, evaluation and use of digital technologies to strengthen pandemic management.

Considering the rising menace of coronavirus disease 2019 (COVID-19), it is essential to explore the methods and resources that might predict the case numbers expected and identify the locations of outbreaks. Hence, we have done the following study to explore the potential use of Google Trends (GT) in predicting the COVID-19 outbreak in India.

The Google search terms used for the analysis were “coronavirus”, “COVID”, “COVID 19”, “corona”, and “virus”. GTs for these terms in Google Web, News, and YouTube, and the data on COVID-19 case numbers were obtained. Spearman correlation and lag correlation were used to determine the correlation between COVID-19 cases and the Google search terms.

“Coronavirus” and “corona” were the terms most commonly used by Internet surfers in India. Correlation for the GTs of the search terms “coronavirus” and “corona” was high ($r > 0.7$) with the daily cumulative and new COVID-19 cases for a lag period ranging from 9 to 21 days. The maximum lag period for predicting COVID-19 cases was found to be with the News search for the term “coronavirus”, with 21 days, i.e., the search volume for “coronavirus” peaked 21 days before the peak number of cases reported by the disease surveillance system.

Our study revealed that GTs may predict outbreaks of COVID-19, 2 to 3 weeks earlier than the routine disease surveillance, in India. Google search data may be considered as a supplementary tool in COVID-19 monitoring and planning in India.

Keywords: Public Health Surveillance, Information Technology, COVID-19, Trends, Severe Acute Respiratory Syndrome

0422134 VISHWAKARMA, SUPRIYA; NEMA, RAJEEV; PANDEY, RITU; PATEL, PRITI; SINGH, RENU; SINGH, AJAY PAL AND KUMAR, ASHOK (Department of Biochemistry, All India Institute of Medical Sciences (AIIMS), Saket Nagar, Bhopal 462020). ASSOCIATION OF SINGLE NUCLEOTIDE POLYMORPHISMS (SNPS) WITH THE SUSCEPTIBILITY TO ORAL CANCER

In India, oral cancer is the most common cancer in men. It accounts for one sixth of all the cancers. Single nucleotide polymorphisms (SNPs) are a type of polymorphism which involves variation of a single base pair. There are several SNPs of cytokine genes which have been reported to be associated with the development and severity of inflammatory diseases and cancer predisposition. Therefore, in this study, we have determined the association of 32 SNPs in various cytokine genes with the susceptibility to oral cancer using a high throughput method. For this, we have recruited 150 healthy subjects and 168 oral cancer patients from central India. DNA was isolated using phenol: chloroform method and quantitated with a nano-spectrophotometer. Thirty two SNPs in various cytokine genes were selected from DbSNP database. Agena MassARRAY, a high throughput, sensitive and advanced technology was used for genotyping. Distribution and allele frequencies were analysed by chi-square test using SPSS (ver.21.0). The odds ratios (OR) with 95 per cent confidence interval (CI) were calculated to determine the strength of association between various cytokine SNPs and oral cancer. Through this study, we have found significant association of six out of thirty-two SNP's with the risk of oral cancer. Here, genotypic frequencies of IL-1 β -3953 AG, OR=0.450 (p=0.004), IL-1 β -3953 G, OR=1.77 (p=0.021), TNF-863 C>A, A vs C, OR= 1.613 (p=0.039), TNF-863 C>A, CA vs C, OR= 1.613 (p=0.041), C and IL-6-174 G>C GC, OR=0.55 (p=0.029) are found to be significant. In conclusion, IL-1 β -3953 and TNF-863 C>A may pre-dispose to oral carcinogenesis.

Keywords: Oral Cancer, Agena MassARRAY; IL-1 β ; TNF; SNP

23. PHILOSOPHY

**0423135 KALOTRA, GAUTAM (Department of Philosophy, University of Delhi, Delhi-110007).
ĀNVĪKṢIKĪ: AN INVESTIGATION INTO INDIAN LOGIC**

Ancient logic was called *Ānvīkṣikī* or the science of debate. It is also known as the science of the self (*Atmavīdyā*), the science of supreme (*Brahmavīdyā*), the science of reasoning and investigation etc, but with the introduction of syllogism or proper reasoning it came to be called *Nyāya* from the 1st century A.D. Indian logic has been differently defined in different ages but the definition generally accepted is the science which ascertains valid knowledge either by means of six senses or by means of the five members of the syllogism; in other words, perception & inference is the subject matter of logic. There are four schools of Indian logic namely: - *Nyāya*, *Vaiśeṣika*, Buddhist and Jaina. As concerning to the present synopsis, the topic dealt with the problem that how *Ānvīkṣikī* become the science of reasoning and investigation. Why there is need of symbolic Indian logic. There are two categories: a) Investigation of words and b) Investigation of category of words. Indian logic helps us out to understand linguistic as well as linguistic psychology with the reasoning. It also develops the language into the symbolic language and in other words we can say the language become symbolic Indian logic. The syllogism did not actually evolve in Indian logic out of inference, and that the Indian logician owed the idea of syllogism to the influence of Aristotle. To meet it is one of the most important enquiries in the history of Indian logic to ascertain at what stage the doctrine of inference, which was an indigenous growth was happily amalgamated with the borrowed art of syllogism into a common structure of logical thought.

Keywords: Ānvīkṣikī, Atmavīdyā, Brahmavīdyā, Nyāya, Vaiśeṣika

**0423136 MAYA, S (Department of Philosophy, Sree Keralavarma College, Thrissur, Kerala).
DISEASE, POWER AND TECHNOLOGY: FOUCAULDIAN PERSPECTIVE**

This paper is an analysis on the concepts of disease, power and technology. An inquiry into the philosophical implications on these terms, and the interconnectedness of them would be socially beneficiary too at the time of COVID19, and the technologically bound new world order due to the pandemic. In this attempt the basic ideas around the terms of technology, power and disease, are dissected with reference to the mid-twentieth century French philosopher Michel Foucault. In his books *The Order of Things: An Archaeology of the Human Sciences*, and *Discipline and Punish: The Birth of the Prison*, he elaborates the technology of the self, body, power and knowledge. How the knowledge doctor with clinical gaze developed by medical sciences constructs disease and power is being investigated in his book named *The Birth of the Clinic: An Archaeology of Medical Perception*. Foucault's works would prove himself as the main philosopher who took disease, clinic, discipline, punishment, prison and their related power-institutions in detail, as part of the social science theorization and philosophical contemplation. Especially about disease and body related theorizations are prominent in his research. Foucault opines that the so-called institutions of disease, discipline and others are not necessarily acceptable. He thought these are truth games which are based on concrete techniques (Nilson, 1998). In his first book *Madness and Civilizations* which was published in 1961, Foucault goes into the analysis of historical phases where the mental disease gets institutionalized in the Western world. After that he discusses the disease and power through detecting the technologies of such institutionalizing in his later works cited above. He uses the term technology in a different mode from the present-day affiliation of it being simply with computer science and information networks. His writings on power and knowledge would enhance the present research paper to understand the concepts in-depth and explore the relation between disease, power and epistemological technology through the historiography.

It becomes very crucial to revisit the existing knowledge systems of medical and technological sciences, and related institutions of power and practices, especially at the time of COVID 19. The educational institutions and communication functions are under the power of Information Technology, due to the emergency situations, and the world is becoming more and more a global village even at the time of social distancing. In this paper, there is an attempt to read these aspects of social realities too in the light of Foucauldian philosophical perspectives. There are arguments that Foucault could be considered as a philosopher of technology (Gerrie, 2003) and Foucault's epistemological works are near to a philosophy of

technology, though the term technology as such doesn't come in his book many times (Hacking 2002). Anyhow, there are numerous instances where Foucault uses technological terminologies such as machinery, procedure, system, schema, framework, structure, technique, formulas, institution etc. Knowledge making on and through the technology, around the system of disease is being analysed in this paper with reference to Foucault's historiography and archaeology of knowledge.

0423137 ROY, KAMALIKA (Department of Philosophy & Comp. Religion, Viswa-Bharati, Santiniketan). POST COVID SOCIETY: ROLE OF PHILOSOPHY

All of us have been going through a pandemic situation since more than one year. This situation has tremendously affected all spheres of our life, be it our economy, our education, our transportation & tourism, or our society at large. Our normal life has come to a stall. However, technology can, and is already becoming a very helpful instrument in dealing with the situation. The whole world is facing the horrendous effects of the pandemic, and as such humanity as a whole is in stake. In this age of globalisation, just as the entire human world is facing this global threat, the whole world as a single global society, not as fragmented regions of the earth, can handle this situation also, and technology is particularly beneficial in this regard to constitute the foundations of such a newly emerging global society. However, nothing is perfect and our envisioned technology based global society, too, is facing various challenges. As a student of philosophy, I think philosophy can contribute in this regard. After all, philosophy is not only an academic discipline, but also a theory or attitude that acts as a guiding principle for behaviour. In this paper I shall try to explore whether & how philosophy can provide us any useful way to deal with the challenges of the technology based neo global society; whether the branches of philosophy dealing with practical application of philosophy, like--pragmatism or applied ethics can play any role in this regard; whether with the rise of the new global society, there will be any newly emergent philosophy too, and if it does, what role will it play in leading the society. I shall try to deliberate upon these questions in this paper.

0423138 SINGH, KAJOL (Department of Philosophy & Comp. Religion, Viswa-Bharati, Santiniketan). TECHNOLOGY BASED EDUCATION AND ETHICS

"If future generations are to remember us more with gratitude than sorrow, we must achieve more than just the miracles of technology. We must also leave them a glimpse of the world as it was created, not just as it looked when we got through with it."

- Lyndon B. Johnson, Former President of the United States of America

There was time when we say nature is the inseparable part of human life, but now along with the nature, technology has become the most important part of human existence. Every moment we are surrounded with the tools created by different technologies. And education is no exception. Technology has profoundly changed education. It has greatly expanded access to education, it has also changed the methods of education. In the last few months The COVID-19 pandemic has affected educational systems worldwide. As a result technology has become a main mode of education. Students have to depend upon online learning modes to continue their studies. This sudden change in the sector of education has created multiple problems. In a country like India online education is not affordable for many students, there are many rural areas where students are facing network issues. On the other hand students are losing their interest in education or we can say they become very much reluctant about their studies. If the students don't have interest in studies, it would be difficult for them to continue it in a proper way. In this situation as a student of philosophy, who believes that philosophy should not be kept within the boundaries of academic & erudite debates and discussions only, but also should be utilised in our daily life, I think that ethics, which teaches us what is right & what is wrong, what virtues should be cultivated within us, being such a discipline, ethics can help us to deal with the challenges fruitfully. That is why I, in this paper, would like to deliberate on the scope of ethics in resolving the problems.

0423139 SINGHAL, ANIL (Department of English, Tripura Institute of Technology Agartala). THE TECHNOLOGICAL REVOLUTION AND THE HUMAN LIBERATION: PERSPECTIVISING J. KRISHNAMURTI FOR IMAGINING THE FUTURE HUMAN

Will technology defeat humans or liberate them? Can it help mankind reach their ultimate potential, i.e. realizing their self/nature or it will prove to be the greatest ever distraction against achieving the purpose of life? If technology can be called the new religion, will technology obstruct the path of spirituality like the organized religion did? Or can the technology revolution assist the inner transformation in unprecedented ways? The research aims to contemplate these questions contextualizing J. Krishnamurti's philosophical positions on the choicelessly aware and unconditioned mind, the psychological revolution, the language and the human consciousness, and the individual versus the society.

24. PHYSICS

0424140 BAIRAGI, S; ANSARI, GHIZAL F AND BARTWAL, K S (Department of Physics, Madhyanchal Professional University, Bhopal 462044). SYNTHESIS OF BaAl_2O_4 DOPED WITH Eu^{2+} GREEN PHOSPHOR BY SOLID- STATE REACTION METHOD

Aluminates doped with rare earth ions have advantages of being highly stable, bright and versatile in industrial processes. These aluminates are very good and appropriate for lighting and display devices. Some of these phosphors are in use for quite some time. The main issue is to enhance the decay time, which will make them more competitive and commercially viable. The phosphor of $\text{BaAl}_2\text{O}_4:\text{Eu}^{2+}$ was synthesized by solid-state reaction method. High purity carbonates and oxides of Ca, B, and Eu were used as starting salts for the preparation. The phosphor material was synthesized with 1mol % Eu^{2+} . The phase and crystallinity was monitored using powder X-ray diffraction (XRD) technique. The desired phase was observed with good crystalline quality. The work related to other characterizations and PL measurements are under progress.

Keyword: Luminescence, Phosphors, Barium aluminate, solid-state reaction, Rare earth

0424141 MISHRA, ASHISH KUMAR AND KUMAR D (Centre for Applied Physics, Central University of Jharkhand, Ranchi). SOME INTERESTING CASES OF WAVE PROPAGATION IN CYLINDRICAL TAPE HELIX CLADED STEP-INDEX OPTICAL FIBER

In the present work, an attempt is made to present an unconventional and more practically feasible waveguide structure in which conducting helical wires of finite width have been introduced between the core-cladding boundary. The field components in the tape helix cladding region are expanded with the help of Floquet's theorem and the characteristic dispersion relation of such a helically cladded step-index optical fiber is derived using tape helix boundary conditions. The presence of tape helix windings at the core-cladding boundary splits the dispersion relation into real and imaginary parts which is quite unusual from conventional and sheath helix cladded dielectric optical fiber. The periodicity arising due to the presence of helical windings at the core-cladding interface is introduced through helix pitch angle. The modal dispersion curves are drawn for different modal index and for different winding pitch angles. It is observed that the dispersion characteristics of lower order modes at higher pitch angles are largely affected which might be due to the modifications in longitudinal propagation constant. Compared to conventional dielectric optical waveguide, the single mode operation of tape helix cladded optical waveguide can be retained up to higher normalized cutoff frequency at higher values of pitch angle. With the advancement in fiber fabrication technology, we expect that the modeling of such type of waveguide structure may be very promising as a monomode or few mode waveguide in near future.

Keywords- Modal dispersion, pitch angle, tape helix boundary conditions, periodic structure

0424142 PATIDAR, MAMTA AND JAIN, VIKRANT (Department of Applied Science, Madhyanchal Professional University, Bhopal). CHARACTERIZATION OF 3,6 DIBROMO CARBAZOLE DERIVATIVES AND ITS ANTI-FUNGAL AND ANTI-BACTERIAL ACTIVITY

Carbazole can be easily functionalize at N-position and then covalently linked with other compounds. Carbazole compounds are drawn attention because of their versatility in functionalize, good chemical and environmental stability. N^9 -[{(Benzylideno-Hydrazino) acetyl} 3,6-dibromo carbazole, and 2-substituted aryl 3- N^9 (acetylamino)1,3-thiazolidin-4-ones] 3,6-dibromo carbazole have been synthesized and tested for Anti-Microbial activity. Rf value were determined by TLC on silica gel coated plates using iodine as a developer.

Keywords: The infrared spectra of the representative compounds were recorded in KBR pallets on acculab-10 spectrophotometer and $^1\text{H-NMR}$ spectra of the representative compounds were recorded on Bruker DRX-300 spectrometer 200MHz, using TMS as internal standard.

0424143 RAJPUT, SUNEETI AND JAIN, VIKRANT (Department of Applied Science, Madhyanchal Professional University, Bhopal). CHARACTERIZATION OF FLUOROMETHYL DERIVATIVES OF PHENOTHIAZINE

Fluoromethyl derivatives of phenothiazine such as 2-substituted aryl-3-N¹⁰ [(acetylamino) 1,3-thiazolidine 4-ones] 8-trifluoro methyl 1-carboxylic acid 10H phenothiazine and 5 arylidene 2-substituted aryl-3-N¹⁰ [(acetylamino) 1,3- thiazolidine 4-ones] 8-trifluoro-methyl 1-carboxylic acid 10-H phenothiazine have been synthesized and tested for their anti-bacterial and anti-fungal activities. Structured of the synthesized compound have been elucidated on the basis of their elemental analysis and spectral data.

Keywords: Spectral analysis based on an Rat Paw Oedema method was employed for the evaluation of anti-inflammatory activity of the synthesized compound

0424144 RATHORE, SHWETA (Department of Applied Science, Madhyanchal Professional University, Bhopal). A STUDY OF FEATURE EXTRACTION TECHNOQUES FOR ASR

Voice recognition is one of the key evolution of biometric identification system which not only have identification capability but this technology can be used to create more sophisticated applications. This paper reviews the methodology for extracting features from speech signal. In this paper we have discussed the Mel Frequency Cepstral Coefficient MFCC, Feature Vector and distance measurement techniques in contrast with Automatic Speech Recognition System.

0424145 SAXENA, SWATI AND JAIN, RAVI (Department of Applied Physics, Samrat Ashok Technological Institute, Vidisha – 464001). CHARGED PARTICLE ACCELERATION BY SURFACE PLASMA WAVE

A laser propagating through an optical fiber coated with a metal, get mode converted into a surface plasma wave (SPW) if the fiber – metal interface has a small ripple of appropriate wave number. The SPW acquires large amplitude and can be employed for charged particle acceleration.

0424146 SONI, MONIKA (Madhyanchal Professional University, Bhopal). COORDINATES BASED KEYING SCHEME FOR WSN SECURITY

Wireless sensor networks (WSN) are capable of work in a vast range of communication/sensing application while it uses radio frequencies to communicate with each other. Data is shared using public radio communication channel from which one can steal information. For protecting data in WSN cryptography is the key methodology that almost every WSN incorporate in Network. The paper here presents a conceptual approach for cryptographic key distribution scheme that depends on physical location of WSN node of network. Presented keying scheme is a pre distributed key scheme while node calculate the encryption key based on public identifier that are stored in node internal memory.

Key Words: WSN, Network Security, Cryptography, Key Distribution Scheme, Global Positioning System (GPS).

0424147 YADAV, NAVNEET AND YADAV, R R (Department of Physics, University of Allahabad, Allahabad, 211002). MICROWAVE ASSISTED GREEN SYNTHESIS OF MULTIMETALLIC NANOFLUIDS

In the present study, we have synthesized monometallic, bimetallic and trimetallic nanoparticles based nanofluid by chemical route method using microwave irradiation. The synthesized monometallic, bimetallic and trimetallic nanoparticles have been characterized by UV-Vis spectroscopy, X-ray diffraction (XRD), Dynamic light scattering (DLS) and transmission electron microscope (TEM). UV-Vis and XRD confirm the formation of monometallic, bimetallic and trimetallic nanoparticles. TEM shows that sizes of nanoparticles are in the range 20-25 nm. DLS analysis reveals hydrodynamic size of the nanoparticles which is greater than actual size of nanoparticles. In the present synthesis procedure we have used the microwave

irradiation which is environment friendly and time reducing in the comparison to chemical route reduction method. Microwave assisted synthesized monometallic, bimetallic and trimetallic nanoparticles have superior stability.

Keywords: Nanofluid; monometallic; Bimetallic; trimetallic.

25. POLITICAL SCIENCE

0425148 CHAKRABORTY, CHAYON AND MONDAL, MANISHREE (Department of Geography, Midnapore College, Midnapore). PARTICIPATION AND REPRESENTATION OF WOMEN IN ACTIVE POLITICS: GROUND TRUTHS OF WEST BENGAL, INDIA

“For me, a better democracy is a democracy where women do not only have the right to vote and to elect but to be elected” - Michele Bachelet. Many feminists focus on this issue that not only women participation in politics is satisfactory but also their representation in administrative body is anticipated. Without representation, participation may be affected because representation in Parliament, Assembly or in local bodies inspires women to participate in numbers. In the past decades women’s participation in active politics was like salt in the flour, though India had a glorious history of women participation in freedom fighting. In democracy we generally mean ‘political participation’ as just ‘right to vote’ while actually the term ‘political participation’ has a wide meaning. It has not only relation with ‘right to vote’ but also participation in decision making process, political activism etc. Women travelled a long way from just voters to leaders. Presently, India is well known for women leadership. Leadership is not management or directing. Leadership is the ability to inspire or influence others towards the leader’s goal. Leaders are people who do the right thing; managers are people who do things right (Bennis, 1985).

Women have historically been severely under-represented in ‘political arena’ (Karp and Banducci, 2008). Women’s presence in political decision-making has never been equalled with men. Recognizing that this underrepresentation poses a threat to democracy, political equality, and justice, more and more people—including male politicians and opinion leaders – have endorsed measures to increase women’s presence in power (Htun and Jones, 2002). Gender inequality and disparity is commonly seen in the case of political representation. Males are far ahead from female in political arena. Several studies show that women are not free to participate in politics at her own decision. They are oppressed in society and always dependent on husband or any male family member to become a participator in politics. Thus, family members especially male members play a determining role behind women’s political participation.

According to 2011 census female population is almost 49% but their representation in Parliament and Assemblies is not in the level as expected. Gender gap in political representation is too wide. One positive dimension is that the situation is gradually changing. Women participation and representation is gradually increasing day by day. The revolutionary 73rd Constitutional Amendment Act introduced in 1992 to accelerate the process of women’s political empowerment through participating and representing in Indian politics. This act ensured the reservation of one third of total seats for women including schedule categories in three tier election system of Panchayati Raj. This three-tier system consist Gram Panchayat (G.P) at bottom, Panchayat Samity (P.S) at middle and Zilla Parisad (Z.P) at top. Reservation of seats for women in municipality is also truly preserved under 73rd Amendment Act. Through this three-tier system women participation in politics has dramatically increases in grass root governance. The women representation has been very encouraging in states like West Bengal, Haryana, Maharashtra and Rajasthan (Hazra, 2017).

Panchayati Raj system brings women in political arena successfully all over the country. But there is a question on the nature of participation of women in grass root governance. Apparently, it depicted that women have highly participated in politics through Panchayati Raj but are they actually in power? Or they are just used as dummy of males? Several studies try to investigate the proxy participation of women in local self-government. In general, what we think about the political participation? Casting votes and contesting election? No. Political participation does not end with in these two words. Political participation and engagement widely mean to be involved in politics in dynamic roles as party organiser, meetings organiser, acting as counting agents in election, party member etc. Thus, this study mainly focuses on participation of women in active politics not only as contesting candidate in election but also as party organiser, election campaigner, polling agent or counting agent and member or leader in women cell of any political party.

0425149 CHAKRABORTY, CHAYON AND MONDAL, MANISHREE (Department of Geography, Midnapore College, Midnapore). PARTICIPATION AND REPRESENTATION OF WOMEN IN ACTIVE POLITICS: GROUND TRUTHS OF WEST BENGAL, INDIA

A better democracy is, where women not only have the voting rights and to elect but also to be elected. The active participation of women who constituted half of the total citizens at all levels of political decision making processes and inclusions is essential to achieve a quality and sound democracy. In 1992, 73rd Constitutional Amendment Act was introduced in India to accelerate the process of women empowerment and to increase women's participation in decision making process at the grass root level politics of three tier electoral process of local bodies' formation.

The main objectives of this study are i) to focus on women's participation in 'active politics' at the bottom level electoral processes highlighting the nature of their representation ii) to extract the ground truths about the proxy participation of women at the lower most tier political arena of West Bengal because it has been alleged that women are acting as the dummy set at the Panchayat or Municipal level administration where all the activities are handled mainly by her family members.

This research is based on exploratory analysis. The micro level door to door survey has been done in Purba Medinipur and Purulia Districts of West Bengal. Total number of sample respondents is 1800 as selected by Stratified Random Sampling procedure. Samples are stratified into three categories based on the research questions and main objectives of the study consisting equal sample size in each stratum. These are- (i) elected women candidates in Panchayati Raj and Municipal bodies (300) (ii) non candidate women villagers and urban dwellers (300) (iii) male villagers and urban citizens (300). The research continues through the phases of data tabulation, organization and analysis.

Finally, this study reveals that women participation as voters has increased from 1972 to 2016 in West Bengal through participating in assembly elections as well as Panchayat or Municipal elections but an extreme gender disparity has been found among the contesting candidates in assembly elections. A good number of active women participants in PRIs and municipal elections are found just because of reservation of seats for women in local administrations. The alarming thing is that, a high proportion of proxy participation is also noticed in this grass root governance in West Bengal.

Key Words: Democracy, Constitutional Amendment Act, women empowerment, political participation, grass root politics, proxy participation.

0425150 GOSWAMI, DEBAJIT AND DAS, AYAN (Department of Political Science, University of Gour Banga, Malda). FIRST AMENDMENT AND THE PARADOX OF CONSTITUTIONAL JUSTICE

"We shall have to find a remedy, even though this might involve a change in the Constitution." So went then Prime Minister Jawaharlal Nehru's written note to Congress Chief Ministers in 1951, which signalled the opening of the flood gates of constitutional amendments, albeit for less constitutional and more political reasons. Paradoxically the constitutional amendment in question, The First Constitution Amendment Act 1951, passed by a Congress majoritarian Nehru led parliament, was far from democratically sound and paved the way for suppression of rights through grey, interpretivist restrictions upon fundamental rights such as freedom of speech (*Romesh Thappar vs The State of Madras*), freedom to hold property (*I.C. Golaknath and Ors. vs State of Punjab and Anrs*), questions on Equality (*State of Madras v. Champakam Dorairajan*) among others. However, the most effective attack on democratic nature of the state and constitution was delivered by the First Amendment's creation of the provisions of Ninth Schedule by virtue of which 'legal' encroachments on fundamental rights would be made constitutionally possible, and more dangerously keeping it beyond the purview of judicial scrutiny (Art 31A and B inserted by the amendment in 1951). Reputed legal scholar A.G.Noorani in his seminar paper *Ninth Schedule and the Supreme Court* had observed the 'incongruity introduced as a result of sheer neglect, became an obscenity created by wilful resolve', as has been proved correct by numerous controversies that emerged around the Ninth Schedule. However, with the propounding of the Basic Structure doctrine (*Kesavananda Bharati Sripadagalvaru & Ors. v. State of Kerala & Anr*), the Judiciary moved forward in the right direction towards the restoration of balance and it led to the late but rightful imposition of Judiciary's claim to review all encroachments on fundamental rights and laws

(even those in the Ninth Schedule) if they violated the basic structure of Indian constitution. (*I. R. Coelho Vs. State of Tamil Nadu*).

This paper traces the origin and evolution of the cloak of legislative invincibility that was drawn from the First Amendment Act and the Ninth Schedule and examines a few selected cases to understand its implications in the introduction of a paradigmatic shift in the constitutional history and democratic ethos of the constitution and the state. It also celebrates the role of Indian Judiciary to maintain the integrity of the Constitution while remaining critical of the Indian position of the principle of separation of powers à la constitution vis-à-vis reality.

Keywords- First Constitutional Amendment, Ninth Schedule, Constitutional Justice, Equality, Basic Structure.

0425151 JENA, SUDHIRA CHANDRA (Political Science, BJB Govt. Auto. College, Utkal University, Bhubaneswar). TECHNOLOGY: A THREAT TO QUALITY (HUMAN) LIFE TODAY

Technological breakthrough in many fields after industrial revolution has immensely contributed towards the physical development of the society and provided a modern (very comfortable) life-style to the Mankind but at the same time, it has made the human beings more dependable on machine. It has brought a change in the thinking process of Mankind also where we see the tilt more and more towards materialism, thereby making a man selfish, myopic, self-centred and assertive. Possession of physical things-power and wealth- has become the ultimate goal of Mankind, where rich as well as poor are in the same race. As a result, voluntarism is gradually disappearing. Here we see certain doubts on our thinking.

- I. Can we think of welfare of society?
- II. Can we think of the benefit of others?
- III. Can we think of the protection of Environment?
- IV. Can we think of challenging industrialisation? And so on.

In this paper, an attempt has been made to

- I. Define technology and goal of human life: The definition of technology is science or knowledge put into practical use to solve problems or invent useful tools. As per Indian tradition, four goals of human life are: righteousness, prosperity, pleasure and liberation.
- II. Discuss the baneful effects of technology: Due to technological advances in the field of production, telecommunication, IT and infrastructure the economic system has become more inhuman due to pollution and ecological imbalance.
- III. Analyze the degraded quality of our life today: Technology has posed threat to our survival and security through rise in inflation, environmental degradation, making people inactive and lazy, under utilisation of one's capacity, unemployment, change in the direction of human life and so on.
- IV. Rethink Gandhi's ideas on Machine: To Gandhi, that machine is to be rejected if in the place of helping the hand it takes away the work from hand thereby creating more and more unemployed.
- V. Ponder on the indigenous way of life: The indigenous way of life is based on a holistic world view that sees everything – the land, the people and all living beings / things- as vitally connected.
- VI. Examine the feasibility of naturopathy today: In the tradition of India human body consists of Earth, Water, Fire, Air and Aakash. So these five elements are key to human health. It implies right mode of living, restraint and well-regulated life. Disease is seen as a breach of the law of Nature.

In the concluding part, we can say that technology is creating a dual society like e-literate and e-illiterate and so on. Technology is helpful to society but not to human beings who are constituents of society. So any development must be man-centred / humancentric as well as ecofriendly. Now we are in the last phase where everybody is dependent on technology, so it is difficult to change ourselves still we have to think over it seriously in every forum. If it is not possible at a grand scale, still we must work at individual level as time is passing by.

**0425152 JHA, BINOD KUMAR (P.G. Department of Political Science, A.N. College, Patna -800013).
AN ENQUIRY INTO SUBALTERN/DALIT QUESTION FROM GRAMSCIAN
PERSPECTIVE**

This paper is an attempt to suggest ways to recover and put to good use a Gramscian methodology that recognizes the presence of the subaltern in new contexts and at times different from those analyzed by Gramsci himself, especially in the context of India. During the past few years a major change has been taking place: the emphasis seems to have shifted from Dalits' mere awareness of their "oppression", towards the mobilization of consciousness as a "transforming agents" of subalternity, and hence toward a new path taking them from "desperate cries" to liberating action. In this paper, we have tried to shed some lights on the questions; 1) Why are Dalits a proto-type of Gramscian Subalterns, 2) Whether with Gramscian methodology, is it possible to recover those "traces" present in the fragmented history of these groups so as to detect the vital elements that will assist them in overcoming their subalternity.

0425153 NEOG, PRIYANKA (Centre for Political Studies, Jawaharlal Nehru University, New Delhi-110067). CONCEPTUALISING CHILD RIGHTS IN INDIA: ISSUES AND CHALLENGES

India has by and large evolved a wide range of laws seeking to protect and promote the rights of child. It recognises that children should be entitled to special care, assistance and essential needs of the children should be given priority in allocation of resources. The future well-being of a nation depends on how its children grow and develop. There are around 380 million children below the age of fourteen years in India and percentage of population in the age group of 0-14 years to total population is 29.5 %. This should imply that India's future development is in safer hands with a large percentage of child and youth population. But is it so? It is an undisputed fact that children all over the world are economically exploited and physically ill-treated, sexually abused, etc. Statistics shows how crime against children has been perpetuated. India is plagued with the largest number of child workers.

Despite the plethora of laws that are in existent for the welfare of children, the implementation on the part of the state has failed miserably. The discourse on child rights in India gives a very dissatisfactory picture with statistics on child abuse, violence, malnutrition, illiteracy, poverty, along with the plight of the worst effected disabled children and of the deprived communities like the migrant labour families, refugees, the war affected children etc. The national and international initiatives have made little difference to the lives of millions of suffering children and have achieved practically very little in terms of their welfare.

The proposed paper deals with some of the concerns pertaining to realisation of the rights of child in India and presents an overview of the conditions of children in our country.

Keywords: Children, Rights, vulnerable, protection.

**0425154 SARANGI, SURESH PRASAD (P.S. Degre Mahavidyalaya, Deogaon, Bolangir). FIFTY
YEARS OF INDO-BANGLADESH RELATIONS: AN INTROSPECTION**

India and Bangladesh had a very historical, social and cultural relationship. From the inception of the country, India has contributed a lot for the development of Bangladesh. Smt. Indira Gandhi had to bear a lot of pain for the nation-building work of Bangladesh. No nation came whole heartedly to support the cause of the liberation of Bangladesh. India played a very significant role in the creation of Bangladesh in 1971 during the struggle for independence from the yoke of Pakistan. It was the first country to recognize its sovereignty and territorial integrity and started its diplomatic relations immediately after its independence under the leadership of the then Prime Minister of India Mrs. Indira Gandhi. Viswa Kabi Rabindranath Tagore composed the national song of Bangladesh which is very popular and respectful for its people. Both the countries have a shared largest boundary and some common traditional, linguistic and cultural similarities. Bangladesh-India relations is multi-dimensional and it always turns into a different shape by the changing leadership of both the country. India and Bangladesh entered into a "The Treaty of Friendship, Cooperation and Peace" for a term of twenty-five years based on mutual respect for each other's independence, sovereignty and territorial integrity while "refraining from interfering in each other's internal affairs. The relationship between both the countries

came to the height of glory during the Congress regime in power in Delhi led by Indira Gandhi and Awami League in power in Dhaka led by Sheikh Mujibur Rahman. India-Bangladesh relations experienced ups and downs throughout history that has often been defined as an “enigma”. The issues like border problem, cross-border smuggling, terrorist activities, border fencing, human trafficking, illegal immigration and the grave issues like water sharing dispute are the most vital issues which more prominently determines the Indo-Bangladesh relations. It has been observed that recently China-Bangladesh relation is going forward gradually for domestic politics and day by day China is becoming a very reliable friend of Bangladesh expanding economic, military and diplomacy which is also a great cause of concern for India. Bangladesh and China celebrated the 40th anniversary of the establishment of their diplomatic relations in October, 2015. The last five decades witnessed robust political, economic and cultural relations between these two countries. In 2011, they declared to establish a “closer comprehensive partnership”. Since then, many new agreements and MoUs have been signed in various fields including infrastructural development. It is well known that China did not support Bangladesh during the liberation war in 1971 as it did not want the breakup of the former United Pakistan, and asked the military rulers of Pakistan to try to reach a political solution on East Pakistan issue. China also urged Pakistan not to wage brutal torture on East Pakistani people. The Pakistani rulers expected that China would intervene in the war in favour of them against India. But China did not, as India and the former USSR had a 25-year friendship treaty and China was reluctant to go into any confrontation with the former USSR. After the independence, China did not recognize Bangladesh. It even blocked the new country’s entry into the United Nations ((UN). The two countries had no relations up to 1975. However, in October 1975, China recognized Bangladesh and thus ended its opposition. Since then, Sino-Bangladesh relations have been going very well. It was only in 1976 the formal diplomatic relations were established and since then, Sino-Bangladesh relations have been going very well. In 2016, Bangladesh and China became strategic partners.

China is enthusiastic for increasing Bangladesh’s share in her global trade and investment massively for infrastructural development in Bangladesh. Through his neighbourhood policy, China wants to strengthen economic cooperation with neighbouring countries including Bangladesh. Thus, being a neighbour and close partner of today’s largest economy, Bangladesh always welcome the Chinese huge investments in her country and tries its level best to negotiate further to increase her export to the vast Chinese market.

However, all these prospects are not without challenges. From one angle, Chinese geo-political interests in the Indian Ocean and the Bay of Bengal have been a concerned for other regional and extra-regional powers like, India, Japan and the US. They apprehend that Chinese increasing sphere of influence in the Bay of Bengal jeopardize their security and strategic interests and vice versa. Particularly, India is increasingly worried about the rising economic and strategic profile of China as it has begun to emerge as one of the largest trading partners of its neighbours including India. Thus, as a whole, China’s increasing engagement in this region is indeed worrying for India, Japan and the US who are concerned for the so-called “String of Pearls”. China’s plan to build ports and, other maritime infrastructures in the Bay of Bengal, from Gawadar in Pakistan to Hambantota in Sri Lanka to Sittwe in Burma and Chittagong in Bangladesh has rung alarm bells in New Delhi. According to an Indian political scientist Mr. Sood, who argued that “China with her massive economic capacity has effectively been able to exploit India’s poor relations with its immediate neighbours by establishing economic ties with them—creating what he terms “reverse entrapment” of India, a strategy of trying to restrict India’s power to the Asian Sub-continent”. So looking into all this future effect India must be more cautious while dealing with Bangladesh to avoid future adversity and to pay a heavy price for this.

But, it is a matter of great regret that despite India’s great sacrifice for the liberation of Bangladesh from the clutches of Pakistan and having contributed a lot on the ground of economic, social and military, Bangladesh is always in favour of China’s influence. Its support is more on China than to India. The Indian policy makers and the social scientists must look into the matter very seriously.

0425155 SRIVASTAVA, VARUN (Jawaharlal Nehru University, New Delhi). COOPERATIVE FEDERALISM AND RIGHT TO FOOD: A LESSON IN SOCIAL SECURITY

India is seen as a contender for being the next superpower of the world and is already an important player in Asian geopolitics. Although it has a huge young work force at its disposal, they will only become a useful asset if they are healthy and well fed so that they can effectively contribute to the country's growth. In this context National Food Security Act, 2013 assumed significance as it gave legal right of subsidized food grains to a large part of the country's population. It was mentioned as a directive principle to the state in our Constitution of India, "Duty of the State to raise the level of nutrition and the standard of living and to improve public health.—The State shall regard the raising of the level of nutrition and the standard of living of its people and the improvement of public health as among its primary duties and, in particular, the State shall endeavor to bring about prohibition of the consumption except for medicinal purposes of intoxicating drinks and of drugs which are injurious to health", but after the apex court's decision in *PUCL v. UOI and Ors*, this right became part of the fundamental rights under Right to life under Article 21 of the constitution. It is one of the most important steps taken towards social security in post liberalization era of modern India and therefore is a great area of interest to study and research. But with every major reform that takes place there are multiple hurdles that are faced in its implementation, like we are seeing with the current farm laws reforms in India. Taking National Food Security as an example this paper aims to find out the performance of the scheme since its inception vis-à-vis the hurdles that it faced in its implementation due to the federal nature of our governments. In our system of governance the states have sufficient political weight of their own through a pluralized party system enabling them to challenge the Central government and gives negotiating character to our federalism. Political calculations have forced constitutional relations and their sanctity to take a back seat but for the welfare of the people it is important that the centre and the state should work together and rise above party politics to achieve welfare goals set by each other for the benefit of the nation otherwise howsoever good in intention, no welfare scheme or law will never achieve its intended goals. In our experience since the independence we have seen that in every centre-state and in every inter-state dispute, at its heart are political disputes which are the root cause of the problematic nature of federalism in India. Such disputes sooner or later start affecting the social and welfare schemes as bad politics leads to bad economics. Therefore unless stagnation in the economic field and unbalanced regional development are not addressed, integration and solidarity in the federal cannot be achieved. This is where this paper aims to show whether cooperative federalism can open doors to social security by analyzing the achievements and failures of food security in India. The methodology of this paper relies on secondary sources like government data and data collected by various organization working in this field as well as views of various authors and experts of this field. Judgments and rulings of concerned authorities as well as various International treaties and conventions are also used to lay down India's international obligations and the role cooperative federalism plays in fulfilling such local and International commitments.

Keywords: Food Security, Federalism, Constitution, Cooperative Federalism, Politics

26. PSYCHOLOGY

0426156 FARHEEN, SABA AND SHANKAR UDAY (Patna University, Patna). DATE MOLESTATION: A STUDY OF SEXUAL HARASSMENT BY FRIENDS

In the changing social scenario, the friendship between boys and girls has been very common in India. Because of this, the cases of date rape, date molestation or sexual harassment has been increased. Most of the girls do not seek advantage of the Indian law system. They do not even report the crime happened against them. Perhaps this is because girls fear about losing their social reputation and exemption from education.

The present research was intended to study about the facts of date rape/molestation among females. In this study, survey method has been used on a sample of 150 college/ coaching going girls in the age group of 18- 25 years. They have been individually asked about their experience about date molestation. A self-made questionnaire was used for the data collection.

The results revealed that date molestation by boyfriends among girls is very common. Students from Low SES and Middle SES have more cases than high SES. On the factors of caste and religion, it has been found that dissimilarity of caste and religion is more prominent for this date molestation.

Keywords: Date Molestation; Friendship; SES; Religion; Caste

0426157 JAIN, ANAMIKA AND MOHAPATRA AISHANI (Department of CSE, Samrat Ashok Technological Institute, Vidisha – 464001). PSYCHOLOGICAL IMPACT OF COVID-19 ON STUDENTS LIFE

Covid-19 arrived with many problems. Among those critical issues one is increasing psychological impact on students life during covid-19 pandemic.

Motive of our study is to find effects of the covid-19 pandemic on the psychological health on students.

We conducted a survey with 1915 students with our college to acknowledge the psychological impact of covid-19 due to lockdown.

Out of 195 students , 138(71%) indicated increase stress and anxiety due to covid-19 pandemic. Multiple reasons were identify that contributed to the increased level of stress , anxiety and depression. These included frustration, change in behaviour and decrease in patience level. 177/195(91%) reported negative impacts of the pandemic. Decrease social interactions due to physical distancing 167/195(86%) and increase concerns on academic performs 169/195(82%).

There are negative impacts on higher education because of covid19 . The findings of our study highlights the need to develop strategies to address the mental health of students.

0426158 KUMAR, SANJAY (Department of Psychology, Doctor Harisingh Gour University, Sagar, 470003). ANOTHER CHANCE TO LIFE: A QUALITATIVE INQUIRY TO EXPLORE SUICIDE RISK FACTORS AMONG EMERGING ADULTS IN INDIA

The current worldwide pandemic arose against an already dire mental health landscape that saw mental health conditions on the rise across the globe. Mental health issues have remained a prime concern even before the COVID-19 pandemic as one person in every four is affected by a mental disorder at some stage of their lives. WHO (2018) states that every 40 seconds, someone dies by suicide. Annually, this represents over 800 000 people that die by suicide, which is more than people dying by war and homicide put together. Suicide is the second leading cause of death among 15 to 29-year-olds, while 79% of global suicides occur in low and middle-income countries, including India. Suicide is preventable for sure, but timely identification of suicide risk factors matter the most.

This study's foremost objective is to identify the suicide risk factor among emerging (17-25 years) adults who are highly vulnerable than any other population.

This study was conducted employing a qualitative design where semi structured interviews were conducted to identify the significant reasons behind suicide.

110 participants (50 female and 60 males) were selected to participate in this study through convenient sampling methods.

The interviews were transcribed to make it compatible with the analysis using thematic analysis methods. Five major themes and approximately ten sub-themes were identified. Major suicide risk factors i. e., depressive tendencies, physical and mental illnesses, the pressure of parents/families, poverty/unemployment, failure in the goal achievement, high competitiveness, relationship difficulties, physical-emotional abuse, and blind religious practices/other addictive behaviors were identified as the major themes.

In a country with a pluralistic culture like India, various reasons may increase the risk of suicide. Hence, various vigilant measures need to be taken simultaneously to reduce the risk of suicide, particularly in Indian conditions.

**0426159 KUMAR, PURNIMA (University of Florida Health, Jacksonville, Florida, USA).
TELEMEDICINE IN THE ERA OF COVID-19: A PROFESSIONAL JOURNEY**

The year 2020 has been unprecedented with the advent of COVID-19. This pandemic has changed the ways medicine is practiced. According to Center for Disease Control and Prevention, telemedicine is the use of electronic information and telecommunication technology to get the health care you need while practicing social distancing. All you need is a phone or device with the internet to continue your medical care while protecting yourself and your healthcare provider from COVID-19. Although telehealth has been available since the mid-1990s, the healthcare industry would never have embraced it so fully without a status quo-ending event like a pandemic. In April 2020, American Psychological Association scored a major victory for psychologists and their patients by helping expand access to, and reimbursement for, Medicare telehealth services. Specifically, the Centers for Medicare & Medicaid Services temporarily lifting restrictions so patients can receive these services in any geographic location and setting, including their homes. In addition, providing audio-only telephone services were granted too. Soon other commercial insurances started providing telehealth services and waiving their copay during the pandemic for virtual visits.

I am a licensed psychologist in the state of Florida. Although I work for the department of Psychiatry, my office is situated in a primary care setting where I work with primary care physicians. I was trained to do telemedicine in 2018 only, but I never had to utilize it until last year. In March 2020, we had a refresher course in telemedicine and we started this journey immediately. All the kinks were ironed out in a hurry and all the necessary regulations were in place like Health Insurance Portability and Accountability Act of 1996 (HIPPA) was modified so providers may use Face Time, Zoom, and Skype to provide telemedicine which were not HIPPA compliant before the pandemic. A great deal of effort and time was devoted to train the patients and providers to use the technology and the Information Technology department of the hospital was overwhelmed the first month or so. In April 2020, APA (American Psychological Association) scored a major victory for psychologists and their patients by helping expand access to, and reimbursement for Medicare telehealth services. Specially the Centers for Medicare & Medicaid Services (CMS) temporarily lifting restrictions so patients can receive their services in any geographic location and setting, including their homes. In addition, CMS expanded coverage of certain telehealth mental health services and temporarily waved certain requirements so that during the pandemic psychologists can provide most of their typical services via audio-only telephones (Deangelis, 2021). According to Connie Galietti, JD, director of legal and professional affairs in APA's Office of Legal and Regulatory Affairs, most commercial insurers appear to be supportive of the explosion in telepsychology services prompted by COVID-19.

Several studies have already proven the effectiveness of telepsychology. In her article on online therapy, Calkins (2021) talked about Jeanine Turner, Ph.D., a professor of communication, culture, and

technology at Georgetown University who has followed telehealth's growth over the past two decades, has shown that both patients and providers who use telehealth generally view it favorably. Although this pandemic has forced psychologists to deliver their services online, they have unique challenges. For instance, how might technology impact the therapeutic alliance? Can emotional dimension of mental health be honored online? It appears that it can, according to Ashley Batastini, Ph.D. And her colleagues (2020) who recently published a large meta-analytic study that compared clinical interventions and assessments delivered via video conferencing with those delivered in-person. Overall, they found that in-person and virtual interventions produced similar outcomes. Batastini says, "We wanted to see how much physical presence in the same room mattered." The result was not a surprise to them and the conclusions were in line with the existing literature on telepsychology including a 2016 meta-analysis by the same team that focused on correctional and forensic telepsychology. There was one interesting surprise in the new study: Women appear to have better outcomes following virtual interventions than in-person interventions, something that merits further research, she says.

What is telemedicine?

According to the CDC (Centers for Disease Control and Prevention), Telemedicine is the use of electronic information and telecommunication technology to get the health care you need while practicing social distance (CDC, 2020). All you need is a phone or device with the internet to continue your medical care while protecting yourself and your healthcare provider from COVID-19. You can contact your healthcare provider about the management of your health generally or about management of an existing health condition during the COVID-19 outbreak.

Types of care you can get using telemedicine:

- .Screening for COVID-19, testing recommendations, and guidance on isolation or quarantine
- .General healthcare (i.e. wellness visits, blood pressure control, advice about certain non-emergency illnesses, like common rashes)
- .Prescription for medication
- .Nutrition counseling
- .Mental Health counseling

As I said earlier that I work in a primary care clinical outpatient setting. We were already using electronic charts. The providers were documenting the patients' treatment progress in their electronic charts and the patients could also see their appointments, lab work etc. including exchanging messages with their providers/clinics. Using the telehealth, the appointments were scheduled either online or by calling the call center. The patients were asked to go in their electronic chart (MyChart) and start the video chat with the scheduled provider. The front desk clerk would link the patient with the provider after screening them for COVID-19 exposure. They are asked to check their blood pressure if they have a device and also to weigh themselves or check their sugar if they are seeing their physician. If the patient did not have internet/computer then we have the option of making a video call by I-phone through an App called **Doximity** or also by using **zoom**. You can also make phone calls using this app while protecting your personal caller ID and using the clinic phone number instead. This way the clients would know who is calling. This is a free app which has to be linked under a medical provider and has been a lifesaver during the pandemic since most of us have been working from home. To maintain social distance from their providers, the patients were put in another room with an I-pad on zoom if they showed up at the clinic.

The above mentioned method was for one-on-one counseling but for the group meetings we have to use **zoom**. The patient was given a link in their email or given the provider's Zoom ID and passcode so they can check in at the time of the group. They were on the schedule though so it was helpful to check them in and do notes on them later. Both therapy and psychoeducation groups like smoking cessation were conducted this way. After the patients were seen they were given follow ups by coordinating with the front desk staff. If the patients were seen through MyChart they showed up in the system but patients seen by Doximity or zoom had to be reported at the end of the day or in between to be checked in. The rules were also relaxed for the physicians for prescribing narcotics. They could prescribe it through telemedicine and did not have to see the

patients in person. Also they could get refills on those medications too online. In addition to seeing patients in the state of Florida, rules were relaxed so patients in nearby state like Georgia could be seen online too.

Advantages of using telemedicine:

A May 2020 survey of Medicare Advantage beneficiaries found that 91% of those who had used telemedicine had a good experience and 78% would use it again.

Advantages for patients:

1. Protection from the disease by providing social distance, particularly beneficial for people with chronic underlying conditions or elderly.
2. Saving time by no hassle of transportation and change of setting, thus patients were seen from all over the State of Florida and Georgia. In one analysis, patients spent an average of 2 hours at a doctor's appointment, yet only 20 minutes with the provider. The remaining time was spent in travel and waiting at the clinic (Ray et al., 2015). Removing the need for transportation is a huge advantage for high-risk populations, such as seniors and those with chronic medical conditions, says Hollander. Access for elderly, people from remote geographical areas including people in prison are also facilitated by telemedicine. People have better access to specialists too.
3. Patients were seen more frequently with less no show rates. According to Hollander, "Our patient satisfaction for virtual visits is through the roof...In fact, patients are 30% more likely to show up for a telemedicine visit than an in-person one."
4. No problem of childcare or eldercare.
5. Be able to see patients in their homes therefore learning about their challenges in their physical environment

Advantages for providers:

6. Also for providers who worked from home or office virtually the advantages are: safety from violent patients, protection from body odors of depressed clients, be able to share psychoeducation in groups through technology, be able to attend meeting virtually thus saving time/money. Providers can attend self-help groups/yoga/meditation online to deal with anxiety created by the pandemic.
7. Reduced overhead expenses, less front desk support or fewer exam rooms needed.
8. Additional revenue stream: Providers may be able to provide care to more patients.
9. No need for PPE. Both providers and patients were able to see each other's face without masks/shields etc. Providers do not have to worry about exposure to any pathogens the patient may carry.
10. Saving of paper while exchanging information thus creating a green climate
11. A great medium for privacy as the patients are not identified in the clinic waiting room, especially for employees as there is a new mental health need for people working from home which can make it difficult for supervisors to detect mental health strain. Paying more attention to employee mental health is becoming a bigger part of the conversation in today's workplaces (Huff, 2021).
12. Another major advantage of telemedicine is cost. A 2016 survey found that 93% of telemedicine users reported lower health care cost. Not only can telemedicine prevent patients who may not want to be seen in a clinic, but it also affords family members scattered across the globe the opportunity to participate in their loved one's care.

Disadvantages:

However, telemedicine may not suit every person or situation. There are some potential disadvantages when using telemedicine over traditional care methods.

Disadvantages for patients:

1. not able to control privacy at the client's end, risk of data breach
2. not able to tell patients' hygiene (odor),
3. Not a suitable medium for elderly/technically challenged population and also for people needing translators.
4. Care delays: When a person need emergency care, accessing telemedicine first may delay treatment, particularly a doctor cannot provide life-saving care or laboratory tests digitally.

Disadvantages for providers:

1. Licensing issues: State laws vary, and clinicians may not be able to practice medicine across state lines.
2. Technological concerns: A weak internet connection may make the visit difficult. Also providers have to make sure that the telemedicine program they use is secure and fully compliant with privacy laws.
3. Unreliable tool for examine patients efficiently: Providers have to rely on the patients' version and they may leave out some important detail.
4. An isolating experience: Providers have no access to consult with other providers as frequently as they would do face-to-face.
5. Blurring of boundaries: It is hard to separate home and professional life while working from home. Often they end up working long hours at home.
6. Difficult to call for help in emergency for clients.

As we can see the advantages of using telemedicine outweigh the disadvantages. Several methods of telecommunications are being used, zoom, Facetime, Doximity, Skype etc. "The COVID-19 pandemic has essentially accelerated U.S. digital health by about 10 years," says Bart Demaerschalk, medical director of synchronous services at Mayo's Center for Connected Care. As the pandemic slows, many are wondering what will happen to telemedicine. According to Batastini (2020), telepsychology is here to stay, and it's important for us to adapt, not resist. As technology continues to advance at lower costs, telemedicine will enrich education and research and improve access to care. Certainly, it is a strong alternative to "face-to-face" consultations but not a replacement.

0426160 NAMRATA AND RANI, MAMTA (Department of Psychology, Magadh Mahila College, Patna University, Patna). A STUDY OF OCCUPATIONAL STRESS AMONG NEWLY MARRIED FEMALE POLICE CONSTABLES OF BIHAR IN RELATION TO THEIR FAMILY NVIRONMENT

The present study aimed to know the occupational stress among newly married female Police Constables with reference to their family environment. For this, 100 female constables were selected from different areas of Patna. Two research tools were used in the study. One was Occupational Stress Index by A.K. Srivastava and A.P. Singh and the other was Family environment scale by Harpreet Bhatia and N.K.Chadha. Results have revealed that female constables who have healthy family environment showed low occupational stress while female constables with negative family environment are suffering from high level of Occupational stress. It can be concluded that the family environment of the female Police constables directly affect their level of Occupational stress.

Keywords- Marital Adjustment; Family Environment; Female Police Constables; Bihar

0426161 SINGH, AJIT KUMAR (Department of Psychology, Dr. Harish Singh Gour Vishwavidyalaya, Sagar). GENDER, PERSONALITY, EMOTIONAL AROUSAL AND EYEWITNESS MEMORY: A REVIEW

An eyewitness is a person who saw the act, fact or transaction to which he/she testifies or someone who has seen something such as a [crime](#) happen, and is [able](#) to [describe](#) it afterwards. Eyewitness memory is a person's [episodic memory](#) for a [crime](#) or other dramatic event that he or she has [witnessed](#). This is a review work which attempts to explicate the role of gender, personality and emotional arousal in shaping the accuracy of recall of the witnessed details. The review indicated contradictions regarding the role of gender in affecting

the accuracy of recall of witnessed details. Some studies showed that females perform better on eyewitness tasks as compared to their male counterparts whereas some other reported males to be better eyewitness as compared to females. While some other studies reported no gender differences in eyewitness memory. It has been reported that personality significantly affects the accuracy of eyewitness memory. Some studies have shown that extraverts are better eyewitness whereas some other say introverts to be better performer on the same. Emotional arousal has also been observed to significantly shape the accuracy of eyewitness. The review of literature revealed that the conceptualizations of gender have been neglected while assessing its role in shaping the accuracy of eyewitness memory. Likewise, many personality attributes have not been included to assess its role in affecting the accuracy of eyewitness memory. In the same manner, the role of emotional arousal has not been well conceptualized and the previous studies have neglected the concomitant physiological correlates to understand its role in the accuracy of eyewitness memory. It may be concluded that there is sufficient scope for future researchers to conceptualize gender and personality to understand their actual significance in shaping the accuracy of eyewitness memory. The role of emotional arousal in understanding its role in eyewitness memory needs a fresh look in the light of recent technological theoretical, empirical and developments.

Keywords: eyewitness memory, gender, personality, emotional arousal.

27. SOCIAL WORK

0427162 MIR, LATEEF AHMAD AND DAS, SUKANYA (School of Humanities, Lovely Professional University, Punjab) IMPACT OF TOURISM IN TRANSITION OF CULINARY PATTERN: AN ENTHOGRAPHIC STUDY FROM KASHMIR

Little community possess unique culinary pattern developed in their daily life which in turn reflect their socio-cultural practices and evolves into an identity. This identity is dynamic in nature and transit by internal and external factors with passing time. Individuals in Kashmir being hospitable and joyful in social life along with mutual entertainment lead development of special culinary pattern of the region inspired by the cuisines of different rulers and visitors, who came in the past from Persia, Afghanistan and far Europe, solidify its place for a long time. However, the natural beauty and rich socio-cultural fabric of the region attract lakhs of visitors every year from different corners of the worlds possessing diverse culinary art. The inter cultural interaction and mixing of diverse cultures lead transition in the prevailing culinary which has been investigated in the present study. The study has been conducted in Gulmarg, Nishat and Shalimar area of Kashmir division using scheduled interview guide following qualitative approach. The results reveal a remarkable transition in the culinary pattern creating a new phase of social life and cultural identity.

28. SOCIOLOGY

0428163 KUMAR, ADITYA (Department of Sociological Studies, Central university of South Bihar, Gaya). MAPPING THE LIVELIHOOD STRATEGY OF LAND-DEPENDENTS: GEOGRAPHICAL LORE AND DIVERSIFICATION

The paper shall reflect upon the livelihood strategy of land-dependent communities with the special focus on geographical lore and diversification in livelihood. The present study assumes that the variation in land-use will have impact on the diversification of livelihoods ranging from resource based to amenity based. In this way, geographical lore/speciality act as deterministic factor and it is interesting to see in different contexts. Here, the emphasis will be on the analysis of land-use scenario around the productive spaces of Central university of South Bihar, Gaya which is basically arid region and contrasting it with the land use and livelihood scenario in son-canal area of adjacent district of Aurangabad which is irrigated area. With varying political capital, it will have implication upon human and social capital.

Keywords: livelihood diversification, geographical lore, land-use

0428164 RAJAK, DINESH (Department of Sociology, Jawaharlal Nehru University, New Delhi). CHANGING PATTERN OF AGRARIAN CHANGE IN MADHYA PRADESH

Rural society is not stagnant, but quite the unconflictual and its changing dynamics has led to implications in the social organisation and performance of agriculture. The agrarian improvement experiment gradually approaching in the Asian country is not merely the agrarian alone but at the same it is very dynamic, complicated and theoretically instable practice of rural diversification and rural social change. To view it empirically it requires one perspective to understand it. The notion of rural transformation is one of that perspective which essentially talks about the fundamental change in setting of rural economy and social structural changes (Koppel and Zurick 1987). These changes are linked with bigger difficulty and influential relationships with non-rural economy and social lifecycle. These changes in rural setting have important implications on natural rural resources such as land and water. Agriculture plays a significant role in India's economy and GDP. Farming is the major occupation among the rural population in India (Agricultural Economic Survey: 2016). This occupation is not solely a matter of agriculture or economic being a key household income but it has to be located in existing caste structure, kinship networks, and socio-cultural capital in village societies.

This paper aims to understand the nature of agrarian social structure in Madhya Pradesh and to explore various empirical factors responsible for the process of depeasantization. What are the social forces that emerged in post-colonial agrarian social system in India? What are the empirical socio-economic farming conditions in neo-liberal economy? Methodology for this paper was primarily based on secondary data which includes research papers, books, social studies, various government reports and documents, newspapers. And for primary data, observation and semi-structured interview have been taken to this study. A village of Madhya Pradesh has been selected on the basis of research objective, three months field has been conducted.

0428165 SARKAR, PUBALI (Centre for Studies in Social Sciences, Calcutta). CLASS, CASTE AND CUISINE: FOOD HABITS AND SOCIAL STRUCTURE IN COLONIAL BENGAL

The nineteenth century Bengal witnessed the emergence of English educated *Bhadralok* class in the public sphere. *Bhadralok* tried to establish themselves as culturally superior through their writings and cultural works, while otherizing lower class people. It is imperative to look at these works to develop a better understanding of *Bhadralok* narrative around the society. However, at the same time, it is important to notice the silences and erasures of voices in these works. This paper is going to look at the food practices in colonial Bengal with a specific focus on the lower strata of the society. The timeframe of this work expanded from late nineteenth century to the early twentieth century.

To develop a better understanding of a society, it is important to look at their food habits and practices. It is not only helpful to understand the social structure based on the food habits but also throws light

upon the economic aspect and politics of food. The discussion around food habits often revolved around the upper strata of the society. Along with contemporary literary works, most of the scholarly works also focused on the concepts like 'national cuisine', religion and food and food habits and practices among middle class people. This paper is going to delve into the discussion of food practices among lower strata of the society in late nineteenth and early twentieth century Bengal. First section of this essay is dealing with the caste-based 2 divisions around food, followed by the development of 'Bengali' cuisine in colonial time period. The last section of this essay is focusing on food habits and practices among different sections of lower strata of the society. The primary sources for this essay are O'Malley's district gazetteer reports, Bramley's report on river crime and J.C.K Peterson's Bengal District Gazetteers. I have also consulted literary works of contemporary writers like Bibhutibhushan Bandopadhyay, Sharatchandra Chattopadhyay, contemporary magazines and Prajnasundari Debi's cookbook *Amish o Niramish Ahar* for this work. I will be drawing upon these sources to look at the silences and erasures of food habits and practices of lower strata of the society in popular narrative.

Keywords: Class, Caste, Cuisine, Bengal, Exclusion



PART V

THEMATIC PANEL'S PAPERS

ON

**NEW GLOBAL TECHNOLOGICAL
SOCIETY**

PART V

THEMATIC PANELS

01. CONFLICT, WAR PEACE AND SOCIAL SECURITY

0501166 DEKA, BHASKAR JYOTI (Department of Political Science, Cotton University, Assam-781001). TRANSBOUNDARY WATERS POLITICS: A COMPARATIVE ANALYSIS OF THE MEKONG AND THE BRAHMAPUTRA RIVER BASIN

It is imperative to analyse the Chinese hydro-political behaviour to reflect the downstream concerns so that the riparian nations manage and prevent the adverse impacts of development occurring in the upstream. This proposed study argues that a rhetoric of cooperation characterises the Indo-Chinese relationship concerning the Brahmaputra River. It argues that China is a real threat concerning the Brahmaputra River and India acts as a 'reluctant negotiator' in terms of sharing the Brahmaputra bilaterally. Therefore, broader basin-level diplomatic engagements are needed to mitigate regional differences and ensure security for the downstream dwellers. It argues that India, being the emerging global power, needs to take this responsibility to establish a multilateral agreement in managing the Brahmaputra waters. This study also analyses the transboundary cooperation in the Mekong River basin. It makes a comparative analysis of the Brahmaputra and the Mekong rivers basins. It, thereby, highlights the urgency of initiating similar basin-wide cooperation in the Brahmaputra basin, to bring China, the so-called 'hydro-hegemon' to the negotiating table.

Keywords: Brahmaputra River, China, India, Mekong Basin, Cooperation, Security.

0501167 KHAN, BILAL AHMAD (Nelson Mandela Centre For Peace and Conflict Resolution, Jamia Millia Islamia, New Delhi 110025). TERRITORIAL CONTIGUITY, WAR AND ARMS RACE: CONTOURS OF KASHMIR CONFLICT AND REGIONAL INSECURITY

This paper examines the India-Pakistan arms race and territorial contiguity of Kashmir conflict as a dilemma for regional insecurity in South Asia. This write up does not attempt to narrate the entire political history of the conflict, instead of that it is largely concerned about the culture of violence, militarization of dispute and nuclearization of society in the region. To understand the discourse the paper proposes the "regional complex theory" and "inductive approach" to come up with a theoretical explanation by co-relating facts with some of the burning questions of the modern global system in which territorial contiguity is considered as a source of conflict more prone to violence. Such burning questions remain as; why does warfare occur? Why do some wars expand to encompass the entire system? Over what issues are wars fought? Are some issues more war prone than others? If so, what is it about the issues that makes them war-prone? It has been seen that issues involving territorial contiguity where there lies a dispute over land adjacent to states are most likely to end in war. This article argues that the revolution in technology, security dilemma and sense of capitulation had pushed both India and Pakistan towards arms race and war like diplomacy which in turn has become an instrument of national policy for both the countries. Being out of Non-proliferation Treaty both countries continue to manufacture weapons of mass destruction. This paper will also try to make it understand that until the time countries possessing nuclear arms has good political relations these weapons can work as a deterrent and if the political relations are hostile there are chances of imminent war. The paper also focuses on, how the principles of realism and neo-realism has shaped the behavior and norms in both countries in relation to Kashmir conflict that has lead to alliance formation, crisis diplomacy and military buildups. In what ways such a type of behavior produces discernible effects which intensify hostility and produces discernible effects where Kashmir is at a tipping point due to the magnitude and severity of the conflict that better prepares the two nuclear armed countries for confrontation. This write up will also demonstrate the ramifications on the domestic political system where the leadership of the states operates. To see the domestic consequences of crisis diplomacy that increases the influence of hard-liners and helps them to convince and mobilize their respective public for war. And the concluding section will present the summary of ideas and recommendations for peaceful co-existence of all humans in the region.

0501168 LONE, AJAZ AHMAD (Government Degree College Sopore Kashmir, Iqbal Colony old Town Baramulla, Kashmir). DIGITIZATION AND EMERGENCE OF NEO-MILITANCY IN KASHMIR: A SOCIOLOGICAL PERSPECTIVE

Kashmir has remained a very hot and absorbing subject for many years. In the past when it was not identified with a knotty political problems, its reputation rested on its incomparable natural beauty and its highly refined arts and crafts. For the last one hundred years, however, it has been known for the political imbroglio with which it has now become much more synonymous. The armed insurgency has been started in Kashmir from 1990's. the sudden changes had witnessed in Kashmir Diaspora of which Kashmir pundits are the inevitable part and parcel, both Kashmiri Muslims and Kashmiri pundits are living in an utmost love and sympathy from centuries together, but a catastrophe struck Kashmir in early 90's with an unfortunate mass exodus of Kashmiri Pandits, the Islamic phobia and extreme conservative Ideologies erupted in Kashmir and the youth of Kashmir were the most direct target of these extreme ideologies, The paper will focus on the new Generation of Rage in Kashmir and the phenomenon of changing old into new militancy as a continuum and provides key insights about the rise of new militancy in Kashmir. The technological advancements and digital boom played a key role in the emergence of new militant ranks in Kashmir and generational shift and technological advancement have given rise to new ways of strategizing militancy in Kashmir. The paper will focus on the primary factors responsible for the emergence of the new militancy and the policies of Indian government which did not recognize or encourage the aspirations of the new generations in Kashmir who wanted to settle down peacefully and seek economic opportunities. The paper will also ponder on deep sense of alienation and rage, which common Kashmiri educated youth are facing which pushes them to the brink of new militancy in Kashmir. The paper will embark on the Social media, including Facebook, Twitter, Watsapp, Instagram, You tube as how they are becoming big headache for Indian intelligence and armed forces as these social media Apps played a great role in recruiting, indoctrination and motivation of new and highly qualified youth of Kashmir in new age of militancy.

Keywords: Digitization, Militancy, Diaspora, Advancement, technology, Modernization.

0501169 SRIVASTAVA, VARUN (Jawaharlal Nehru University, New Delhi). COOPERATIVE FEDERALISM AND RIGHT TO FOOD: A LESSON IN SOCIAL SECURITY

India is seen as a contender for being the next superpower of the world and is already a important player in Asian geopolitics. Although it has a huge young work force at its disposal, they will only become a useful asset if they are healthy and well fed so that they can effectively contribute to the country's growth. In this context National Food Security Act, 2013 assumed significance as it gave legal right of subsidized food grains to a large part of the country's population. It was mentioned as a directive principle to the state in our Constitution of India, "Duty of the State to raise the level of nutrition and the standard of living and to improve public health.—The State shall regard the raising of the level of nutrition and the standard of living of its people and the improvement of public health as among its primary duties and, in particular, the State shall endeavor to bring about prohibition of the consumption except for medicinal purposes of intoxicating drinks and of drugs which are injurious to health", but after the apex court's decision in PUCL v. UOI and Ors, this right became part of the fundamental rights under Right to life under Article 21 of the constitution. It is one of the most important steps taken towards social security in post liberalization era of modern India and therefore is a great area of interest to study and research. But with every major reform that takes place there are multiple hurdles that are faced in its implementation, like we are seeing with the current farm laws reforms in India. Taking National Food Security as an example this paper aims to find out the performance of the scheme since its inception vis-à-vis the hurdles that it faced in its implementation due to the federal nature of our governments. In our system of governance the states have sufficient political weight of their own through a pluralized party system enabling them to challenge the Central government and gives negotiating character to our federalism. Political calculations have forced constitutional relations and their sanctity to take a back seat but for the welfare of the people it is important that the centre and the state should work together and rise above party politics to achieve welfare goals set by each other for the benefit of the nation otherwise howsoever good in intention, no welfare scheme or law will never achieve its intended goals. In our experience since the independence we have seen that in every centre-state and in every inter-state dispute, at its heart are political disputes which are the root cause of the problematic nature of federalism in India. Such disputes

sooner or later start affecting the social and welfare schemes as bad politics leads to bad economics. Therefore unless stagnation in the economic field and unbalanced regional development are not addressed, integration and solidarity in the federal cannot be achieved. This is where this paper aims to show whether cooperative federalism can open doors to social security by analyzing the achievements and failures of food security in India. The methodology of this paper relies on secondary sources like government data and data collected by various organization working in this field as well as views of various authors and experts of this field. Judgments and rulings of concerned authorities as well as various International treaties and conventions are also used to lay down India's international obligations and the role cooperative federalism plays in fulfilling such local and International commitments.

Keywords: Food Security, Federalism, Constitution, Cooperative Federalism, Politics.

02. DEMOCRACY AND HUMAN RIGHTS

0502170 BALA, INDU AND KUMAR, SHASHI (Department of Human Right, School of Legal Studies, Babasaheb Bhimrao Ambedkar University, Lucknow). THE HUMAN RIGHT TO SANITATION AND DEMOCRATIC SYSTEM IN INDIA

The main challenge in realizing the human right to sanitation is its implementation at the domestic and local levels. Implementing the human right to sanitation depends on a regime that also ensures and enforces other fundamental human rights affected by poor sanitation, without discrimination. It can only be possible in a country whose governance system respects the democratic process. Providing access to sanitation for all people reflects the planned

investment in infrastructure such as toilets or latrine, sewerage system, drainage system, etc. Sanitation includes the entire system for collecting, transport, treatment, and disposal or reuse of human emissions and related sanitation. If democracy is to be made real, the country should have a rational, planned economic system that can strengthen its infrastructure and ensure the fundamental human right to sanitation for all people. The government must start elections on issues like sanitation, toilets, waste disposal, etc. If leaders and voters both start giving priority to these issues (in making and implementing laws/policies related to sanitation), then the world's biggest democracy can also be called a clean democracy.

Keywords: Sanitation, Human Right, Democracy, India.

0502171 KEER, RENU (Department of Political Science, Atma Ram Sanatan Dharama (ARSD) College, University of Delhi, Dhaula Kuan, Delhi- 110021). DECODING THE POLICY OF RESERVATION IN INDIAN DEMOCRACY

Indian society is dominated by caste hierarchy, which leads to the discrimination of the lowest strata of society- the untouchables and depressed classes- who were later called Scheduled Castes under the India Act 1935 and later Indian Constitution of 1950. The long history of caste-based inequity and oppression of most disadvantaged society sections prompted Dr. Bhim Ramji Ambedkar to struggle for equal rights for depressed communities. He challenged the Hindu social order and demanded a separate electorate for untouchables in Round Table Conference. Consequently, Mr. Gandhi and Congress reached an agreement to offer reservations to depressed caste out of the general electorate as per their proportions to population. Thus, the Poona Pact was signed between Dr. Ambedkar and Pundit Madan Mohan Malviya on 24 September 1932 and agreed that adequate representation would be given to depressed classes in civil services and provincial legislatures. After India's independence in 1947, India's constitution undertook affirmative action by reserving access to seats in the legislature and government jobs for the depressed and marginalized sections. Moreover, it aimed to provide enrollment in higher educational institutions for castes and tribes recognized in the list of scheduled caste and scheduled tribes recognized by the Government of India to address the historic oppression, inequality, and discrimination faced by the Dalit community members and establish an egalitarian society. Over the years, there has been massive criticism and debates against the reservation policy for Dalits. Most recently, the Jats' violent movement in Haryana, Patel's agitation in Gujarat, and the Marathas' mourn revolution in Maharashtra have again fuelled the debate over the policy of reservation. Against this background, it is crucial to examine the theoretical and historical understanding of reservation and its relevance in contemporary Indian democracy, which guarantees equal human rights for depressed classes. Thus, this paper aims to study the objective and theoretical aspects of reservation policy in Indian democracy. Also, it aims to highlight the changing narratives and socio-psychological impact of reservation policy.

Keywords: Reservation, Representation, and Dalit.

0502172 KUMAR, ASHOK (Department of Human Rights, SLS, Babasaheb Bhimrao Ambedkar University, Lucknow). STATUS OF SEX WORKERS IN COVID-19 PANDEMIC: A HUMAN RIGHTS APPROACH

The Indian Constitution provides fundamental rights to every individual and citizens of the nation. These rights basically protect the basic necessities of human beings. Article 21 of the Constitution provides the

right to life and personal liberty to every individual. On 25th March, 2020 when complete lockdown was announced by the Hon'ble Prime Minister Narendra Modi to prevent the people from social gathering to minimize the transmission of Corona virus. First time in the history the entire nation came to halt due to lockdown. Economic activities were ceased and transportation was completely restricted. During the period of lockdown people lost their shelter, livelihood and lives in the pandemic that created a situation of panic in the entire nation. The poor and vulnerable people started struggle for bread, shelter and livelihood. Sex Workers also constitutes a vulnerable community those were left by the society and the government to face hardships for their survival. These sex workers had already been facing a social stigma in the society and in this pandemic their life became hell. The livelihoods of these sex workers are based on physical contact that thus far involved risk of sexually transmitted diseases (STDs) but as of now this practise has widened the risk of transmission of corona virus that has created a chaos and fear in the entire community. Over the years, the entire community of sex workers have been raising demands both independently and collectively that they shall also lead a dignified life thus, enjoying rights and privileges. But the government intervention is at minimal promoting and protecting the human rights of sex workers. This paper examines the socio-economic conditions of sex workers during pandemic. Further the paper exclusively and extensively deals with the human rights and survival of the sex workers in the pandemic Covid-19.

Keyword: Constitution, Fundamental rights, Covid-19, Human Rights, Vulnerable, Sex Workers.

**0502173 KUMAR, SHASHI (Department of Human Rights, B.B.Ambedkar University, Lucknow).
UNDEMOCRATIC TRENDS IN INDIAN DEMOCRACY**

Democracy is most acceptable norm and established system of governance in the world today. Many countries in the world have adopted the democratic form of governance in their countries and made commitments for protection of civil liberties and democratic rights of their citizens. Democracy and human rights have symbiotic relationship in the sense that both are complementary to each other. The existence of both depends upon each other. In other words, protection of human rights cannot be possible without having strong democratic governance and on the other hand, the democratic form governance cannot be legitimized if the human rights of citizens are not protected.

India claims to be a largest democracy in the world. By conducting regular elections for electing people's representatives to the parliamentary and legislative assemblies in the states, providing universal franchises to all its citizens, independent judiciary, functioning of democratic administrative institutions, and existence of free media are the hall mark for the success of Indian democracy. This success of Indian democracy relates to procedural form of democracy that talks about success of institutional democracy. The other form of democracy, the substantive democracy, depends upon three ways, i.e disseminating democratic values, facilitating political participation of people and ensuring democratic means of assertion like protest and peaceful demonstration.

Over the last few decades, one can notice the emergence of undemocratic trends in the political trajectory of Indian democracy. The resilience of democracy and the institutional capacity of the state to diagnose and manage the political and social conflicts got totally disturbed, which is reflected in its failure to deal with increasing disorder, lawlessness, poverty and corruption. In recent period, we witnessed several kinds of political and social tension in democratic space of the country, for example, the minorities' dissatisfaction and demonstration over the issue of CAA or NRC, abolition of special status of Jammu and Kashmir under Art.370, long farmers stir for repeal of farm laws which was enacted surpassing parliamentary legislative procedure. Silencing of human rights activists for raising voice against Indian state against infringement of rights of people become common incidence now. Such undemocratic trends in harmful to the functioning of Indian democracy.

The paper aims to discuss some of the above intriguing issues that have emerged out in Indian democracy in present.

0502174 KUMAR, SHIV (Department of Human Rights, Babasaheb Bhimrao Ambedkar (Central) University, Lucknow). PRIVACY, SOCIAL MEDIA AND DEMOCRACY

Privacy is a basic human right being natural right of individual and has been recognized as constitutional right by many democratic states of world. Ubiquitous presence of social media has intruded in

private life of people. Proliferation of personal information by social media users has become a good source of income of social media platforms. Social Media although claim to respect privacy of users but through their coercive, deceptive privacy policies social media platform gather personal information of users and sell users information to third parties which is further utilized for advertisements, Big Data and developing artificial intelligence. Social Media model based on political and economic has posed great challenges to the democratic nations. A major factor of the privacy problems is the absence of legislation and organized rules ensuring privacy, confidentiality and due process to the subject of sharing personal information over social media. There is need of spreading awareness about privacy issues among social media users, framing laws regarding social media platforms by the government.

0502175 KATIYAR, ARCHANA; SHANKAR, UDAY AND RAY, NISHA KUMARI (Department of Psychology, Magadh Mahila College, Patna University, Patna). A STUDY OF HUMAN RIGHTS AWARENESS AMONG STUDENT LEADERS OF PATNA UNIVERSITY

Human Rights are based on the belief that all human beings are born free with equal dignity, esteem and honour. With **The Protection of Human Rights Act, 1993**, India has accepted the human rights. These rights are a political means of recognizing human dignity in a legally binding way. This legal codification involves granting all people with equal rights of freedom. They enlarge the scope of individual freedom, while guiding the relationship between the individual, the community and the state.

The present research was aimed to study the human rights awareness among male and female student leaders belonging to Patna University. Awareness towards human rights has been treated as dependent variable while gender of the student leaders and type of media services they used have been treated as independent variables. 200 student leaders from different colleges and university departments of Patna University have been selected as the sample. Human Rights Awareness Scale by Hossain, Farheen and Shankar has been used in the study. Results have shown that male subjects have high level of human rights awareness than the female subjects. On the other side, subjects using social media have demonstrated more awareness as compared to the subjects using print media.

Keywords- Human Rights awareness; Student Leaders; Patna University

0502176 SHIVPRIYA (Department of Human Rights, School for Legal Studies, Babasaheb Bhimrao Ambedkar University, Lucknow). IMPACT OF CLIMATE CHANGE ON WOMEN'S HEALTH: STUDY OF POLICIES, PRACTICES AND LEGAL FRAMEWORK FOR GENDER-JUST ADAPTATION

Climate change is one of our time's major threats. It poses a grave concern because of its ability to impede well-being of nature and development/progress of human life. All population are affected by climate change, but certain marginalized and poor section have higher susceptibility to climate-sensitive health impacts and one of such group is women. Women are historically, socially, and economically underdeveloped and marginalized in the society. Women are affected differently and more severely by climate change due to their social roles, gender and health inequality, discriminations, and poverty. Women are not only victims but also powerful agents of change and possess specific knowledge and skills to effectively contribute to climate change adaptation and mitigation, yet they are largely under-represented in decision and policy-making processes at all levels. The aim of this article is to identify and establish linkages between women and Climate Change, mainly focusing on women's health. Only few studies have been done to test the differential impacts of climate change on women's health, and among such studies most have been conducted in developed countries. It is high time to incorporate women's views and perspectives in the policy and decision-making process, and review the national policies and legislation on women, health, and climate change. This will in turn be helpful in tackling global warming, extreme weather conditions and improving the women's health rights. It will not be wrong to say that most of India's responses to climate change and its adaptation policies are "gender blind" or "gender neutral". This paper will also try to study various women's adaptive strategies to climate change together with suggestions on various prospects for strengthening the Governmental policies and laws to address the same. The methodology to be adopted by the researcher for this article will be doctrinal in nature. Doctrinal by analysing and going through existing national and international literatures,

conventions, newspaper articles, journals, recommendations, and resolutions made by international and national committees/conferences, etc accompanying with other e- resources on gender and climate change issues, with various climate change vis-à-vis women's health national and international policies.

Keywords: Women, Climate Change, Health, Policies and law, Adaptation, Mitigation, Environment Protection.

0502177 SINGH, RAGINI (Department of Political Science Gargi College University of Delhi, Delhi). WOMEN IN 21ST CENTURY: LOOKING THROUGH NEW GLASSES

Men and women are an integral part of human civilization. A civil and ideal society cannot function properly, even, survive in the absence of either part. Women play an extremely significant role in the making, preserving, and progress of a family and society too. Disappointingly, the male-dominated society does not recognize the fact that no society would be able to survive without the contribution and sacrifices made by their fellow women. Men always view women as second sex and an object for satisfying their sexual desires. For centuries, violence and discrimination against women have been a very common practice, not only in India but, in the rest of the world as well. The general idea is that that crime and violence against women take place mostly, in a rural and uneducated section of society. The well-accepted perception is that that educated and economically independent women rarely go through any physical abuse and maltreatment from their male counterparts. They are always seen as a liberated entity who are independent and empowered enough to safeguard their rights and individuality. Considering this notion, various social reformists such as M.K. Gandhi, Jyotiba Phule, Savitri Phule, Pundita Rambai, and Dr. B.R. Ambedkar emphasized on women education and economic liberation. Unfortunately, the reality is far different from the expectations of our social activists who could not visualize the long term psychological impacts of this that how it would change the dynamics between males and females. The fact of the matter is that female professionals witness more inequality and discrimination at their homes and workplace in comparison to the female whose boundaries are restricted to their households. In this context, this paper aims to examine the discrimination and exploitation faced by 21st Century working females; as to how they are more vulnerable in comparison to non- working women or the women serving only to their household responsibilities. Besides, the paper seeks to look into the root cause behind the maltreatment and violence faced by females working at different fronts with different responsibilities in 21st Century and its psychological impact on males at home and workplace too.

Keywords: Working Women Professionals, Exploitation, Discrimination.

0502178 SRIVASTAVA, MUKESH (National Law Institute University, Bhopal). THE AESTHETICS AND POLITICS OF CENSORSHIP IN INDIA

This paper seeks to address the issue of how the intellectual field of Censorship is constituted as an object of inquiry in modern India. In this endeavour three larger conceptual categories emerge for critical thinking and elaborations. Firstly, we inquire into the epistemological frameworks --- both colonialist and nationalist -- that shape and define the boundaries of Censorship. Further, in so doing, we also investigate the points of continuity and departure between colonialist and nationalist thought. Secondly, we investigate the role of the First Amendment to the Indian Constitution, particularly of the Article 19, in curtailing free speech and adding new dimension to the conceptual scope of Censorship as originally conceived, prior to the first amendment. Thirdly, We also investigate Censorship as a social and cultural phenomenon, beyond the legal apparatus of the State, examining the role of different kinds of pressure groups and media conglomerates in constituting not only the 'discourse' of censorship, but leading to even more menacing acts of physical violence in many a case.

Keywords: Free Speech First Amendment Obscenity, Blasphemy, Sedition, Mobocracy, Charlie Hebdo, Hate Speech. Reasonable Restrictions, Cognitive Justice

05. GLOBAL WARMING AND CLIMATE CHANGE

0505179 PAUL, SURJAPADA (Department of Geography and Applied Geography, University of North Bengal, Darjeeling). CLIMATE CHANGE AND ITS IMPACT ON BIODIVERSITY IN WEST BENGAL: A SYSTEMATIC REVIEW

Species have evolved over millions of years to adapt to specific climatic conditions as well as to variations in climate, but the current increase in temperature and differing weather patterns has occurred over an extremely short period of time which evolutionary processes are not able to match. Therefore, many species of plants and animals are not able to adapt to changing temperature and weather. Covering just 2.7% of the Indian landmass West Bengal is home to 12.27% of Indian biodiversity known till date. All this are at risk due to change in temperature and precipitation patterns that are occurring at an unprecedented rate.

Climate change, resulting from increase in greenhouse gases such as CO₂ and methane and other anthropogenic emissions into the atmosphere, can be expected to have significant impacts on forest ecology including biodiversity, forest distribution and productivity (Krischbaum et. al. 1996). The projected impacts of climate change on forests also have implications for forest product flows and trade and forest management (Solomon et.al. 1996). In this context, it is important to make assessments of likely impacts of climate change on forests in different countries and regions to allow respective governments and communities to adapt to these impacts. Such assessments are all the more important in tropical countries, in which the local communities depend significantly on forests for their livelihoods, and where rates of deforestation are high. Indeed, the issue of climate change impacts on forests may be less relevant if the anthropogenic impacts can be expected to be of much greater magnitude (Solomon et.al. 1996). As biodiversity underlies all goods and services provided by ecosystems that are crucial for human survival and well-being, this paper synthesizes and discusses observed and anticipated impacts of climate change on biodiversity and biodiversity-based ecosystem service provision and livelihoods, and what strategies might be employed to decrease current and future risks on the well-being of human in West Bengal. The present paper also tries to summarize existing information on forest types and their distribution in West Bengal and concerns of biodiversity and forest due to climate change.

Keywords: Biodiversity, forest distribution, productivity, climate change, greenhouse gases.

07. INFORMATION TECHNOLOGY, MASS MEDIA AND CULTURE

0507180 RAJKUMAR, CHINIMILLI (.....). ROLE OF INFORMATION TECHNOLOGY AND MASS MEDIA IN DEVELOPMENT OF CULTURE

The Information Technology (IT) is the most robust industries in the world with an increased productivity, especially in the developed world. This is a key driver of global economic growth. The world is changing at a rapid pace in the discipline of science and much in the field of Information Technology.

Information Technology is primarily concerned with acquisition, storage, processing and organization of data in electronic form. The processed and organized application data is to be percolated to the people and organizations for effective decision making and to initiate appropriate actions. This accomplishes the storage, transmission and presentation of sound, text, pictures, photos and images in electronic form on solid state devices like pen drives, compact and external portable disks.

Mass media serve the people and play a significant role in spreading ideas, articulates public opinion, brings attitudinal change among its consumers, facilitates change in forms of behavior, provide information about products, services and ideas. Most importantly, the news media is expected to function as fourth arm of democracy by delivering the function of being a watchdog. Mass media do what is demanded of them and while doing that they draw strength and support from society for their survival. In other words the power of media is not 'inherent', but 'acquired'. The struggle for freedom was articulated by media to great extent in India.

There is close relationship between mass communication and culture. The culture industry is an arena in which critical tendencies or potentialities were eliminated, which produce and circulates cultural commodities through mass media, manipulated the population. Popular culture was identified as a reason why people become passive; the easy pleasures available through consumption of popular culture made people docile and content, regardless of their terrible economic circumstances.

Keywords: Information Technology, Mass Media, Society, Culture

08. LABOUR IN ORGANIZED AND UNORGANIZED SECTOR**0508181 KHAN, GHAZALA ALI (9 Idgah Hills, Near All Saints College, Bhopal). A SOCIO-ECONOMIC PRIMARY SURVEY OF THE INFORMAL SECTOR WORKERS ON DECENT WORK PARAMETERS AND QUALITY OF LIFE**

When a country legislates to provide labour protections and decent work conditions for its workers, it is assumed that it has the poorest and most vulnerable workers in mind. Yet, when over 90 percent of its poorest workforce is still found left out of ambit of legal protection, it can only point towards lack of understanding, research and inherent structural problems which make targeting of the informal sector difficult, a problem faced by almost all developing countries. This study has tried to examine the structural problems of the sector, its socio-economic determinants of quality of life and conditions of work, and to look into the factors which are hindering the workers from seeking effective protection under existing labour laws and other beneficial legislation. By comparing the informal workers income, education and work place conditions with their organised sector counterparts of similar income and economic status, it seeks to bring out the factors other than poverty which hamper workers from seeking decent work conditions and enjoying a better quality of life.

Keywords: Informal Sector, decent work, quality of life, labour protection, socio-economic study.

10. NATURAL RESOURCES, BIO-DIVERSITY AND GEOGRAPHIC INFORMATION SYSTEM

0510182 THANGAMANI, D; NAWAS, O.M. MOHAMED; RAJAN, S BOOPATHY; AND LALITHA, S (Forest Genetic Resource Management Division, Institute of Forest Genetics and Tree Breeding, Coimbatore). UTILIZATION OF EUCALYPTUS SPP. BARK WASTE RESIDUES AS BIO-COMPOST AND LIGHT WEIGHT GROWTH MEDIA FOR PLANTS

Surplus bark is currently the most perplexing residue problem facing the wood conversion industries. The volume of bark residue is so great that it must be continually removed from pulp and paper industries. Now utilization of bark is receiving increasing attention. Bark has useful byproducts waiting for the right economic conditions or the development of satisfactory commercial processes. Markets for bark have never been in greater demand. Composting is a long-used technology, though it has some shortcomings that have reduced its extensive usage and efficiency. Efficient bark utilization can create a new industry and boost the economy by making a valuable asset out of a costly waste. Tree cultivation is one of the main objectives of forestry; large amounts of renewable raw material are produced annually. Composting is a fundamental process in agriculture and helps in the recycling of farm wastes. The long duration of composting is a challenge; this is due to the presence of materials that take a longer time to compost, especially during co-composting. Composting can eradicate degradable organic wastes. Degradable organic wastes are otherwise known as biodegradable wastes. Composting is a workable means of transforming organic wastes into products that can be safely used and beneficially employed as bio fertilizers. *Eucalyptus* is fast-growing trees, and can be made available for pulp production within four to five years after planting. The increasing demand for wood partly results from the attractive economic return from *Eucalyptus* plantations. In India, the pulp and paper industry was getting raw material and harvested wastes i.e. bark and leaves from the plantation raised by forest departments or corporations. *Eucalyptus* spp. was introduced in South India as evaluation trials and they received wide acceptance because of their relatively fast growth rate, high productivity/unit area. The average yield is 70-100 mt/ha, during a 5 year rotation which fetches about 1.4 lakhs per ha. *Eucalyptus* spp have been planted in an area of approx. 52,229 ha in pulp and paper mills plantation which 6 mt/ha of leaf litter and bark wastes. In the present study, we have utilized *Eucalyptus* bark waste residues (after extraction of natural dye) for the production of bio-compost and light weight growth media for plants. The Coimbatore method was followed for bio-composting and obtained highest pH evolution and largest variation in water holding capacity was recorded. Red Amaranth seeds were sown in growth media of *Eucalyptus* bark waste residues. After 40 days, the plant obtained highest plant height, number of leaves, fresh weight and dry weight compared to control. The powdered bark residues waste processed accordingly yielded which is used for growth media showed strong water retention properties, while allowing air to pass through. Because of its unique organic compounds, it can support strong root growth, contributing to a longer lifespan for which it can be used as growth media for plants.

Keywords: Bio-compost, Eucalyptus, Pulp and Paper Industry, Bark residue, Tree

11. PATENT LAWS AND INTELLECTUAL PROPERTY RIGHTS

0511183 MITTRA, UDAY KRISHNA AND SHARMA, MALIKA (Department of Commerce, Khalisani Mahavidyalaya, West Bengal). INTELLECTUAL PROPERTY ARCHITECTURE AND ITS RELATIONSHIPS WITH SUSTAINABLE DEVELOPMENT

Talking about the technological progress and innovation, public health, food security, education, trade, industrial policy, traditional knowledge, biodiversity, biotechnology, the internet or entertainment and media industries, Intellectual property (IP) has become a particularly economically and politically contentious issue. As a part of World Trade Organisation (WTO), the agreement on Trade Related Intellectual Property Rights (TRIPS) came into existence in the year 1993 and it is binding now more than half of the nations of the world. Under Art. 27 of the TRIPS agreement for any invention in the field of technology patent may be granted by the member nations. Patent is a monopolistic right of process or products which the inventors acquire. This concept raises a serious controversy over sustainable development and Intellectual Property Rights. This Act encourages the giant multinational companies (MNC) to earn additional profit by making unabated movement of biological resources from developing to developed countries causing loss of biodiversity. It gives rise to ecological vandalism in exchange of dollar. The convention of Biodiversity, 1992 can be referred here. Its aim is to make a balance between the monopolistic rights derived from IPR and substantial development. One of the center purposes of this paper is precisely to consider the main features of the International IP architecture and its relationship with sustainable development as it concerns to access knowledge, health and biodiversity. The data and information relating to IPR and sustainability of environment will be collected from various Acts, journals, books published in this regard, internet, websites, etc. simple statistical tools is to be used in making conclusions. Besides this findings of the study will be presented and policy prescriptions will be offered so as to make IPR more effective for sustainable development of the underdeveloped and developing countries.

Keywords: Architecture; Sustainable; Patent; Biodiversity; Unabated; Monopolistic.

0511184 MITTRA, UDAY KRISHNA (Department of Commerce, Khalisani Mahavidyalaya, West Bengal). HISTORY AND EVOLUTION OF INDIAN PATENT LAWS

From the very beginning the new millennium the Intellectual Property has grown tremendously. With the rapid growth of industrialization and international trade, it has become indispensable for the protection of public interest at large. It is totally dissimilar to that of land and house or other tangible property. It is a property created by human inherited brain and uplifted intellect. In India Patent Act was first enacted during the British rule, in 1856 which granted exclusively privileges to inventors for new inventions for 14 years. In independent India the Patent Acts 1970 has incorporated several new provisions preventing misuse of patents. It has been further amended in 1999, 2005, 2016, 2018 and 2019 respectively. At present courts in India, particularly in Patent and Intellectual Property (IP) matters have perceived the significance of reducing wilful infringement of IP rights and have been generously approving punitive damages to the pioneers. In this it is to be highlighted the object of patent laws, its salient features, procedure for obtaining a patent, rights of patentees, significant changes made by the various patents (Amendment) Acts, legal protection imposed for infringement of patent, impact Trade Related Aspects of Intellectual Property Rights (TRIPS) Agreement of patents in India. The data on various Patent (Amendments) Acts and significant changes made thereon will be collected from the various published secondary sources such as Bare Acts of the amended patent laws published by the Department for Promotion of Industry and Internal Trade, Government of India and the periodicals published in this regard will be taken into consideration. Simple statistical tools is to be used in making conclusions. Policy prescriptions will be offered so as to make patent law more effective in India.

Keywords: Millennium, Perceived; Patentee; Inventor; Infringement.

13. PEOPLES (DALITS, TRIBES, WOMEN, PEASANTS, ETC) STRUGGLES AND MOVEMENTS FOR EQUITABLE DEMOCRATIC SOCIETY

0513185 BABU, V. RAMESH AND RAJASEKHAR, V M (Department of Political Science, Dr. V. S. Krishna Degree College, Visakhapatnam). THE WOMENS' MOVEMENT FOR EQUITABLE DEMOCRATIC SOCIETY IN INDIA

Today women's movement in India is an immensely important for women. This movement emerged out of the feminist philosophy and seeks to get rid of male domination and to get equality in all walks of life on par with men. It is understood that the rise and development of feminism have helped women not only to understand their woes but also in bettering their conditions i.e. social, Economic, Political, Cultural and at domestic level. In post independent India women's problems have been Identified and started movement by obtaining awareness of their life and rights. Today women movement is a big movement to get their due share with the guarantee given by our constitution. Our Constitution is an embodiment of social justice which should be provided equally to women with men without any discrimination from 1970s, women movement got speed and momentum to get social change through which they could obtain their lost life and rights. Especially, in 21st century, this movement has been identified, recognized and understood as movement fighting for equitable Democratic Society. Awareness of constitutional rights and natural Justice led women to take lead in protecting their life the movement is inevitable. Today at central and state level many new acts are made due to women's rigorous movement.

The researchers have followed descriptive and analytical approach to prepare this research paper. The researchers used the primary and secondary sources to pursue their research. The researchers analyzed the concepts and arguments for better presentation of the paper. They reviewed the literature available on the topic.

The women movement is not against the opposite sex but against the male chauvinism and undemocratic attitude of society. This movement is to be free from all social stigmas i.e. higher castes, lower castes. All classes women especially the spearheading class women should have followed the equality amongst them selves. so the social equality should be the base of the movement. That will pave the way to equitable democratic society.

The women's movement and its success is very significant to our society. This movements welcomes the classless, casteless and an egalitarian society. The discussions and deliberations on the research will be useful to policy making. All support from all sides is welcomed. Further research in this regard is invited.

Keywords: Democratic society, egalitarianism, social justice people struggles, social ethics.

0513186 KORI, KALPNA (Department of Civil Engineering, Samrat Ashok Technological Institute, Vidisha – 464001). SC/ST (PREVENTION OF ATROCITIES) ACT 1989: TOOL FOR SOCIAL JUSTICE OR WEAPON OF VENGEANCE

Indian society is a highly caste ridden society. The stratification of the society here is rigid and hereditary in character. Caste system orders the different castes into a hierarchy that is 'inflicted by birth, sanctified by religion and glorified by tradition', and because this hierarchy is an institutionalized part of Indian society. Some groups often referred to as untouchables or Dalits, their preferred name, lie at the very bottom of the theoretical social hierarchy and have long suffered from social stigma. Because Dalits are theoretically ritually impure, they also have traditionally been ostracised. In order to make up for this longstanding deprivation, the Constitution of India enshrined the duty of the state 'to promote with special care the educational and economic interest of the weaker section of the people and, in particular, of the Scheduled Castes and Scheduled Tribes, and to protect them from social injustice and all forms of exploitation'. The groups referred to as 'Scheduled Castes' (SC) or 'Scheduled Tribes' (ST) encompass both the former untouchables and the tribal populations, who although not equivalent to untouchables have also suffered from a similar kind of stigma and ostracism. SC/ST (Prevention of Atrocities) Act, 1989 is devised to deliver social justice to marginalized section. Recently the Supreme Court expressed concern over misuse of the Act and

ruled against automatic arrest of the booking of accused under the law. Though the act aimed at protection of the dalits from further discrimination, recent data shows that there are number of fake cases registered based on revenge. The present article aims at exploring the current relevance and usefulness of the act and whether it has achieved the desired goal for which it was envisaged.

Keywords: Dalits, SC/ST Act, Social Justice, Caste Discrimination.

**0513187 KUMAR, V M RAVI (Babasaheb Bhimrao Ambedkar University, Lucknow).
CONCEPTUALIZATION OF DALIT ENVIRONMENTALISM IN INDIA**

The academic field of Dalit studies acquired considerable recognition in the last three decades in India. It represents a discourse of oppressive and liberation oriented consciousness of Dalit collectivity. This paper proposes that Dalit discourse embedded an interesting ecological perspective which reflects their vision for egalitarian environmentalism. This perspective is useful in conceptualizing differential impact environmental crisis on human social structure. This paper attempts to review the existing conceptual frameworks that are evolved in the India to capture the discourse and politics of Dalits in the domain of environment. These frameworks are potential future paradigms of academic research on Dalit issue from ecological perspective. In short, this paper attempts to present a review of trends on the environmentalism from below focusing on Dalit issues.

Keywords: Dalits, ecology, environmentalism, nature, conceptualization, justice

0513188 MAHATO, OMPRAKASH (Centre for Political Studies, Jawaharlal Nehru University, New Delhi, 110067). SHUDRAS AND SOCIAL JUSTICE: LINGERING CHALLENGES

Inscribed to the memory of Mahatma Jotiba Fule whom Dr. Ambedkar esteems “as the greatest Shudra of Modern India who made the lower classes of Hindus conscious of their slavery to the higher classes and who preached the gospel that for India social democracy was more vital than independence from foreign rule”. Jyotiba and Ranade attacked and exposed the patent hypocrisy of all those who pretended to claim themselves nationalist while proliferating tenets of Brahmanism that acted as opium for the Shudras.

Western and southern parts of the subcontinent have witnessed a sustained movement against the hegemony of Brahminism prior to Independence, the northern Hindi-speaking belt and eastern India have lagged behind. Until the rise of the Bahujan Samaj Party, the Samajwadi Party, the Rashtriya Janata Dal and Janata Dal (United), Dwija dominance was largely undisturbed. In Bihar, there were caste based assertion of dominant backward castes against the atrocities perpetuated by ‘Ranvir Sena’ (an upper caste block formed mostly by Bhumihars). Yadavs, Kurmis and Kushwahas did form ‘Triveni Sangh’ to check the dominance of forward castes in Bihar during 1930s.

Post-Independence, ‘Mandal’ agitation unified different castes and communities across the country. Reservation and representation paved the ground for unifying the fragmented communities that were stratified over more than 3000 castes and sub-castes. While the agitation of these communities were against the forward castes, in northern India, they didn’t challenge the super-structure, the source that contributed for their backwardness as Jeffrelot has argued in his book ‘India’s Silent Revolution’.

Three decades of Mandal Politics, the Shudras have contributed immense to the politics of social justice. However, political parties adhering to the principles of social justice within Shudras have witnessed criticisms from academicians as well as from public sphere. In this paper, I would put forward the contribution of Shudras and explore the lingering challenges that has led to contestations within the Shudra communities and have blocked the path for reconciliation of their interests.

14. PEOPLES HEALTH AND QUALITY OF LIFE

0514189 NATHAN, S SHANMUGA AND ARULCHELVAN, S (Department of Media Sciences, C.E.G, Anna University, Chennai-25). OBESITY INFORMATION ON FACEBOOK: A CONTENT ANALYSIS AND EVALUATION OF USER ENGAGEMENT

Obesity is one of the most common yet neglected health issues in both developed and developing countries. India is a country with the third-most number of people with obesity in the world. Social media is a key source for health communication since it give access to an extensive variety of health information regardless of demographical variance. Facebook is one of the top used social media in India. So the study aimed to examine the Facebook posts from top obesity pages which are managed by people with location, India for a period of three months. A coding framework was developed based on the Extended Parallel Process Model (EPPM) along with variables to understand the user engagement of the posts. A total of 118 sample posts from three Facebook obesity pages managed by people from India and having 10000 and above followers were collected and analysed. The posts were categorised into three types of responses based on EPPM: no response had 28 posts, fear control response had only 6 posts and danger control responses had just one post. The user engagement was high for the post which had high threat and the video type posts got more user engagement than any other type of posts. Informative communication technique was the most commonly used communication techniques which also received more user engagement. The post which comes under the danger control response had less user engagement than the posts under fear control response. The study results will be an insight into the social media health content producer in creating effective health contents.

Keywords: Obesity, Health communication, Social Media, Health Behaviour, Extended Parallel Process Model.

0514190 SHARMA, ANJALI; RAWAT, NEHA AND PINKU (School of Education, Central University of Rajasthan, Ajmer). MENSTRUAL HEALTH AND HYGIENE FOR GIRLS IN SCHOOLS: A QUESTION MARK ON QUALITY OF LIFE

Menstruation is a natural biological and psychological phenomenon that every woman and adolescent girl experience every month. Good menstrual health and hygiene is a crucial issue in women and girls' lives as 355 million women and girls menstruating for 2-7 days per month in India. The women's well-being and dignity depend upon the ability to manage menstrual hygiene and constitute the essential component of basic hygiene, sanitation, and health services. In India, most girls are unaware of menstruation until the first experience and never think of menstrual hygiene practices. Social norms and cultural taboo have crippled their women with chronic diseases. The myths and taboos related to need to break down effectively to make their life better. Awareness, education, and access to menstrual hygiene management infrastructure are still at the preliminary phase, and much effort and researches are required to address this matter holistically.

The study has been undertaken the issues related to menstrual health and hygiene-related to school going girls and its impact on their education being a dropout or absenteeism during that period.

The study addresses the following questions; are adolescent girls aware of menstrual hygiene and are menstrual hygiene mechanisms being adopted by the schools preventing dropouts and absenteeism. The research was focused on exploring access to menstrual hygiene material and supplies, health services, sanitation and washing facilities in the schools, and its impact on girls' education. The study also explores the social norms and cultural taboos related to menstruation in the study area, and is there any agency working on the related issues? The study is conducted through descriptive survey research, and a mixed-method research approach is used. The study revealed that menstrual hygiene management in India is still a long way to go. The sanitary pad distribution is not new, and some critical aspects should be considered before the blind promotion of that. Although there is a significant increase pad using but need to highlight girls and women's unawareness and compare the percentage of using sanitary napkins and cloths and plotting stories of related taboos and struggle faced by them only.

**0514191 THAKUR, VIKAS KUMAR (Institute for Social And Economic Change Bengaluru).
EFFECTIVENESS OF “AAM AADMI MOHALLA CLINIC” IN STRENGTHENING
PRIMARY HEALTH CARE SERVICES**

The “Aam Aadmi Mohalla Clinic” has been conceptualized as a mechanism to provide door step access to free and quality health care services to the un-served and under-served population of not only the inhabitants of Delhi but people migrating from outside states as well. This paper reviews and analyses the policy level intervention in the primary healthcare system, its impact on the lives of people living in marginalized communities like Jhuggi Jhopri Clusters, slums, un-authorized colonies, densely populated regions and rural areas where the inhabitants are vulnerable to quality healthcare services with no or limited access to the primary healthcare services (Health & Family Welfare Department, Govt. NCT of Delhi). Majority of patients visit hospital as OPD patient only and do not require admission. If they would find quality, accessible and free of cost health care within their neighbourhood then the burden from multi specialty hospitals could be mitigated (Sharma 2016). Prior to the introduction of “Aam Aadmi Mohalla Clinics”, there was three-tier model. Majority of patients used to visit multi-specialty hospitals where long queue and waiting time was there. The new healthcare model of the Delhi Government brought four-tier system: “Aam Aadmi Mohalla Clinic” at Primary Level, Multi-specialty Poly Clinics as Secondary Level (OPD) healthcare solution, Multi-specialty Hospitals for Inpatient Department (IPD) and Super-specialty Hospitals as Tertiary Healthcare solution (Raju 2019). Many states in India like Gujarat, Jharkhand, Karnataka, Madhya Pradesh and Maharashtra have started taking interest in this model and developing their own version of community clinic (Saxena 2019). Even though this model has won the hearts of the poor and marginalized communities of Delhi, still there are grey areas that need attention. The unavailability of medicine, flaw in the lab test report at few places, outdated ‘Essential Drug List’, are some of the challenges that needs to be dealt with. Further, many of the local residents are not aware about the location of the clinic; neither there have been any Information, Education and Communication campaign to aware the public. The clinics (both rented as well as porta cabin) are facing infrastructure related issue. There are many places where these clinics have been located at isolated site or near Municipal Corporation garbage dumping site. The paper concludes on the note that how this model can be vital in streamlining health care service delivery along with achieving quality health care for everyone, how it has brought development related issues like health, education, water, et.al on the forefront of electoral agenda.

15. POLITICAL ECONOMY OF INDIA

0515192 DAS, KESHAB AND SAGARA, HASTIMAL (Gujarat Institute of Development Research, Ahmedabad). DIGITAL DIVIDE IN INDIA: WILL THE FOURTH INDUSTRIAL REVOLUTION BE INCLUSIVE?

The world today stands on the brink of a technology-driven revolution (called the Fourth Industrial Revolution or, *Industrie 4.0*) that is largely subjugated by the disruptive digital technologies including the Internet of Things, artificial intelligence, big data and analytics, cloud computing and blockchain. In a fundamental manner, this revolution has begun to alter the way we live, work and engage with one another across continents. The new digital technologies have quite significantly reduced the cost of labour and quantum of investment in machines. The volume and velocity of communication have accelerated manifold. Storage capacity of vital information has turned considerably easier than before. Digital technologies have been profoundly transformed our modes of communication and methods of production. Our lifestyle is increasingly becoming dependent on these technologies and millions of people are hooked on through social media for a large part of their day. On one hand if these technologies have integrated its stakeholders with shared interests on a comprehensive and unprecedented scale but there appears a great digital divide within the civic society on the other. Extent and intensity of participation and contribution of people in the digital revolution and its effect on their lives seem quite unevenly distributed. Access to a new technology in a country, institutional preparedness to deliver it at affordable costs and its adaptability among people are major parameters determining its scope of diffusion. This paper attempts to map the digital divide in India with reference to region, income and gender. The paper attempts to identify ways the Fourth Industrial Revolution may help address challenges of reducing income poverty and inequality in India. The discussion and arguments in the paper are based largely on secondary data sources.

0515193 FRANCIS, SMITHA (Institute for Studies in Industrial Development, New Delhi). INDIA AND THE NEW DIGITAL ECONOMY: WEAVING DATA REGULATION INTO INDUSTRIAL POLICYMAKING

Data and data-based/digital intelligence are becoming the prime drivers of many of the inter-related technology systems, markets and organisational forms in the new digital era. Such “informatisation” or data-based intelligentisation is transforming existing agricultural, manufacturing and service sector value chains into digital value chains. So far, most countries including India have only been “providing” data—to the global tech monopolies who own the global tech platforms, as well as to various other foreign entities who own other proprietary technologies derived from the digital intelligence based on our data. Our extant FDI policy (and competition rules) also means that foreign entities exercise *de facto ownership* over humungous volumes of Indian data, which is being used to build digital intelligence in whichever sector they move into. Against this backdrop, the paper will argue that national data regulatory frameworks are integral to a strategic industrial policy for India in the new digital era. It will also argue that governance of both personal and non-personal data is fundamental to the normative basis for an inclusive and equitable digital development trajectory for India. Some elements of the political economy of data regulation will be examined while analysing the interfaces between data, trade and FDI policies in the context of the evolving global dynamics of cross-border data regulation.

0515194 IYER, CHIDAMBARAN G (Centre for Development Studies, Thiruvananthapuram). PHASE MANUFACTURING POLICY FOR MOBILE MANUFACTURING IN INDIA: A EMPIRICAL AND THEORETICAL EVALUATION

In this paper I attempt to understand the impact of the Phased Manufacturing Policy on manufacture of mobiles in India. Through the macro and micro evidence I find that mobile manufacturers have set up facilities in the country that primarily assemble phones. Most of the components are imported with very little local manufacturing. Available empirical evidence and theoretical literature suggests this as the likely outcome. Relying on the industrial policy literature, I argue that for industrial deepening and upgrading India has to first and foremost lay down an industrial vision and then follow it up with significant institution building. Simultaneously, at the micro level, policy should encourage major lead firms to co-locate their

supply ecosystems in the country; and thereafter encourage local procurement by each of the firms in the supply ecosystems.

0515195 KAMATH, ANANT (Inequality and Human Development Programme, School of Social Sciences, National Institute of Advanced Studies, Bangalore). NEW TECHNOLOGY AND THE SOCIAL DIVIDE

New technologies are assumed to embolden skill-learning and open access to resources and networks, which are expected to translate into tangible improvements in the lives and livelihoods of especially the historically and socially deprived. However, it is established that new technologies are not just science and engineering but also sociology and politics. Access to, or usage of, new technologies is invariably embedded in socio-political contexts, which impinge on the ability of new technologies to deliver reputed positive outcomes. This means that these technologies can also *perpetuate* exclusion and marginalisation. Very little of these complex factors are appreciated in policy debates in India, or in the popular and policy narratives of technology policies. Programmes such as Digital India have a shallow understanding of the political nature of technology in a country where the sociological realities of caste and gender thrive even in metropolitan areas. Unsurprisingly, wider patterns of inequity in India are mirrored in technological inequalities also – whether in terms of artefact ownership or technological experience. Sociological realities continue to be overlooked or oversimplified in academic research around technology, too. This study, demonstrating the complications of the relationship between caste and ICT, joins the call for a much richer documentation of the relationship between the subaltern and technological change in India, and enriches the enquiry around new technologies and social divides.

0515196 PRADHAN, SANJAY KUMAR (International Relations School of Liberal Studies, Pandit Deendayal Energy University, Gandhinagar, Gujarat). SOLAR ENERGY SECTOR IN INDIA: POLICY PERSPECTIVES FOR FUTURE REQUIREMENTS

India in its quest for energy security strives for renewable in its energy basket. Since the renewable is green and sustainable, India is looking for enhancement of renewable to meet growing domestic requirements and international obligations. In this perspective solar energy assumes much significance with regard to its potential contribution in the overall renewable sector. The government has projected 175GW of installed capacity by 2022 and by 1919 it achieved 82GW. Further, a projection of 450 GW of renewable energy capacity by 2030, as announced by the government, implies an ambitious target that the country wants to achieve. Likewise, its production has increased by more than 11 times in the last five years from 2.6 GW in March, 2014 to 30 GW in July, 2019. Yet there is a great gap in installed capacity and production. Problems of Infrastructure facilities such as Grid and solar equipments, over dependency on foreign imports and much of privatisation in the process have not made the infrastructure and facilities available in a large scale. Despite making significant progress in solar power generation, India still relies largely on foreign equipments. On the other count, India still does not have the required infrastructure to produce the imported products. Still the domestic investors are struggling for lower rates of interest in investment. Manufacturing costs such as finance, power, land and other support have not reached to a level so as to compete with the major suppliers in the world. The private sectors have virtually taken the centre stage of solar energy market and thus little role of government in the industrial investment. Still the installation of a rooftop solar system is expensive. Although the subsidy scheme generates a sense of trust within potential clients, availing the subsidy is not an easy task, and of much of time-consuming. Further, there is the problem of getting other financing options. Taking into account all these aspects, the paper will cover problems relating to installation and production capacities, predominance of private sector, and policy perspective which will ensure a booming local market for promotion of solar cell and module capacity, along with other related infrastructures.

0515197 RANI, USHA (ILO, Geneva). PLATFORM BUSINESS MODEL: NEW FORM OF MANAGEMENT

The expansion of broadband connectivity and the availability of high-speed internet has enabled the development of digital infrastructure. This has also led to the development of cloud infrastructure and computing services thus paving the way for the rise in digital economy and growth of digital labour platforms.

The availability of these digital tools has led to the development of innovative business models, such as the platform business model, which create employment opportunities but also pose regulatory challenges as the rules of the game are unilaterally determined by the platform. This article will examine some of the key features of the business model and how they are changing the managerial practices in the contemporary context of neoliberalism. The article will then explore the implications of these management practices on workers by drawing on the survey findings of workers engaged in taxi and delivery sector in India.

0515198 ROY, BROTI (Institute of Environmental Science and Technology, Autonomous University of Barcelona, Spain). AN OVERVIEW OF CONFLICTS AGAINST COAL IN EASTERN INDIA USING CRITICAL ENVIRONMENTAL JUSTICE FRAMEWORK

Coal in India is considered more than a commodity with diverse social, cultural and political implications. It symbolizes a moral endeavor linked with economic development and nation-building in the popular imaginary. Despite this, extraction and use of coal to produce electricity leads to conflicts, involving marginalized, often indigenous communities. At the same time, as the dirtiest fossil fuel, it has large implications for the current climate crisis. The state of Jharkhand in the eastern part of the country contains the highest coal reserves and has many conflictive mines and thermal power plants. In this article, using the lens of critical environmental justice, I analyze ten cases of coal conflicts in Jharkhand to provide an overview about the people mobilizing, the types of mobilizations, the reasons for protests and the outcomes. Looking at the four pillars of critical environmental justice scholarship, I analyze in depth one case study to show the need for critical research to study conflicts involving marginalized communities and for expanding the boundaries of the field. Finally, I situate this within the broader climate justice discourse in India.

0515199 ROY, SATYAKI (Institute for Studies in Industrial Development, New Delhi). CAPITALISM, NEW TECHNOLOGY AND THE EMERGING EMPLOYMENT CHALLENGES

Spurt of new technology particularly the advent of general purpose technology is likely to impact the world of work in a significant way. What has been referred to as 'technology unemployment' or a displacement of human beings by the use of machine is not so one-dimensional as it appears to be. Machines did replace animal power in the course of human civilisation but human beings are amenable to multi-dimensional tasks and therefore use of machines not only replace earlier jobs but also create demand for complementary human skills. The combined effect gives rise to specific outcomes depending on the growth of productivity activated by new technology, the pace of its diffusion and the way it alters relative factor prices. It is also important to note that if the diffusion of technology is fast and wide spread it creates higher demand for goods and services, hence creates the scope of net employment via rise in real income. During the Industrial Revolution use of new machines triggered a deskilling process together with a demand for labour meant to perform simpler tasks attached to machines. The current phase of technological revolution is defined by a drastic decline in computation costs, decline in transaction costs effected by internet and digitisation and a global gush of finance. What is already being evident that artificial intelligence, internet of things and robotics is going to make large number of middle level routine jobs redundant in the coming two decades. It has also widely been acknowledged in the literature that the process of diffusion of these technologies is relatively slow and the resultant productivity growth has not been realised as it was expected. This is referred to as the Solow Paradox indicating the crucial fact that productivity growth has declined in many advanced countries contrary to what had happened in the earlier period with the introduction of general purpose technologies such as, steam power, electricity or combustion engines. This paper argues that the process of diffusion earlier depended on the institution of property right and market and in the current phase where technologies largely depend upon knowledge content, these institutions come in conflict with the use of knowledge which is essentially 'non-rival' in nature. Secondly the paper also argues technological development is supposed to reduce use of direct labour and increase disposable labour time or free time for human beings as civilisation advances, but the gains of technology as expansion of free time can be appropriated in a society only when it is based on collaborative production structure with unfettered sharing and learning space.

0515200 SINGH, RASHMEET AND SUBRAHMANYA, M H BALA (Department of Management Studies, Indian Institute of Science, Bangalore). DO NETWORKS AND INNOVATIONS

CONTRIBUTE TO FIRM PERFORMANCE? AN EMPIRICAL STUDY OF SMES IN BANGALORE

This paper presents an empirical exploration of the relationship between network cooperation (comprising six external network participants), innovation performance and economic performance of Small and Medium Enterprises (SMEs) of engineering goods industry located in Bangalore city, India. Firstly, we found that both the assistance received from network participants and product innovations have a positive influence on the economic performance of SMEs. The network participants which have a significant positive influence are government agencies, industry associations, R&D organizations and customers. Subsequently, a moderation analysis is carried out to ascertain the relationship between network cooperation and product innovation, while measuring their individual direct impact on the economic performance of SMEs. It is found that only product innovation partially moderates the relationship between the assistance received from government agencies and economic performance of SMEs. Overall, the present study substantiated the positive role of networks as well as product innovations on the economic performance of SMEs in the context of Bangalore. These results have significant implications for policy makers and for the CEOs of SMEs to give due attention to nurture network cooperation in order to promote their innovations and cumulatively enhance their economic performance.

0515201 SINGH, SHREYANSH (Centre for WTO Studies, Under Ministry of Commerce and Industry Government of India). TAXING THE DIGITAL ECONOMY: NEW LEGAL DEVELOPMENTS AND ITS IMPLICATIONS

Data can rightly be termed as the currency of the digital age. It has played a crucial role in keeping most of the online services free through the 'free-mium' model which extracts its revenue majorly from advertising and an individual's data. However, all is not well when it comes to digital economy. Recent studies conducted by many international organisations have shown that the traditional businesses have been disrupted by the advent of Artificial Intelligence (AI), Big data analytics etc. which have enabled advanced tracking and profiling of consumers over which concerns have been raised across the world including the United States (U.S.) Congress. Further, the interim report of a market study by Competition Commission of India reveals issues like deep discounting, increasing dependence on digital platforms, etc. which are jeopardizing the competition in the market and disrupting the traditional businesses. The underlying reason given by experts is that India's competition laws are not well equipped to deal with the businesses in the digital arena. However, it is to be noted that such deep discount schemes and related practices are a consequence of the savings accrued due to the very nature of platform economy which allows entities to conduct businesses in a jurisdiction and be fully operational without any presence in that particular jurisdiction for the purposes of taxation. Additionally, countries have also committed themselves to a moratorium on customs duties on 'Electronic Transmissions' (ET) at the World Trade Organisation (WTO) which facilitates further duty evasion with the rise in digitisable goods being facilitated by 3D printing. Therefore, it becomes relevant for countries to discontinue the traditional approaches and perspectives towards taxation but at the same time ensure that any government intervention does not cause a regulatory chill to the digital ecosystem. Countries including both the developing and the developed have recently introduced certain reforms in their legal framework to tax the digital economy but these initiatives face limitations due to the multiple Double Taxation Avoidance Agreements (DTAAs). It therefore becomes imperative at this juncture to examine both the domestic developments in the countries and the multilateral or bilateral framework to tackle the issue.

The paper aims to explore the interface of taxation and the digital economy. Towards this, the paper will briefly explain the issues and analyze the options available to the policy makers under the present legal framework. Additionally, it will also suggest the limitations which such options might face for example DTAAs and the implication of moratorium on customs duties on ET. The paper will also briefly cover the policy developments in India as a case study of its Goods and Services Tax (GST) and the changes in the direct taxes. It is anticipated that the paper will contribute to a new wave of discourse on transformation of the tax regime for the digital economy and would therefore be consistent with the theme of the conference.

Keywords: Free-mium, Taxation, Moratorium, WTO, DTAA

0515202 TRIPATHY, SAMIT; GUPTA ANGAN SEN AND JYOTISHI, AMALENDU (Amrita School of Business, Amrita Viswa Vidyapeetham, Coimbatore). LOOMING MARKET FAILURE IN CLOUD COMPUTING: A NEW INSTITUTIONAL ECONOMICS PERSPECTIVE

There has been an increased demand for the usage of internet-based applications, social networking platforms, collaboration tools, interconnected-intelligent smart devices, leading to enhanced requirement for greater computing capabilities. The prevailing pandemic situation has further accentuated the need for such technological innovation. Organizations are constantly innovating to cater to such needs. In this context, cloud computing services has evolved as one of the most viable solution for such computing needs. Cloud Computing services offers high scalability, availability, elasticity, better usability, enhanced data security and privacy, pay-per-use pricing model. In last two decades there has been a substantial focus on technological and business perspective of cloud computing, in the extant literature.

In this review study we have noticed that studies dealing with technological perspective, have focused on issues around on definition, architecture, performance, data centre management, data management, security and privacy, solution development and management, service management and deployment models. In tandem with the expanding technical understandings, the business perspective has dealt with financial and economic issues, legal, ethical, global standards, regulations, adoption and implementation challenges, operational issues, trust, organizational strategy and change management. However, there seem to be an oversight around issues of property rights, information asymmetry, transaction cost, and agency problems in cloud computing ecosystem. From the perspectives of new institutional economics, this study evaluates the potentials of researches around these aspects. We have attempted to identify several facets of ambiguities in ownership of computing resources or the information being transacted explaining market failure of cloud computing. It discusses the importance of regulations, standards and clarity in agreements between players to avoid any possibilities of market failures. This study also sheds light on the possibilities of information asymmetry leading to adverse selection and moral hazard impacting the smooth market functioning. Though cloud computing offers multiple advantages including cost advantages, the transaction cost involved in the process of adoption and later consumption could outweigh those advantages which might discourage players to adopt cloud. Different consumer segments e.g. large and small enterprises and individuals, have different computing needs and hence cloud adoption and migration strategies need to be tailored based on specific needs. The study, through a set of heuristics/propositions based on review of literature, stresses on the need for clarity in ownership of resources and data, contractual agreements among players, availability of specific standards and regulations, focus on reduction of information asymmetry to ensure the market functions with least friction and does not lead to market failure.

16. POPULATION, POVERTY AND MIGRATION

0516203 SHANKAR, UDAY AND SINGH, PRACHI (Department of Psychology, MagadhMahila College, Patna University, Patna). A STUDY OF PSYCHOSOCIAL CAUSES OF MIGRATION IN BIHAR

Migration is a major problem in India, especially in the context of Bihar. This is one of the deprived states in the country. Biharis are working across the different areas of India for their livelihood. This picture emerges clearly in the period of lockdown in India. The present study was intended to study the level of aspiration and insecurity among the migrants of Bihar. Also, it was attempted to find out the role of aspiration and insecurity in the process of migration. The sample was 400 people in the age group of 25 to 40 years taken from rural areas of Patna district- Fatuha, Masaudhi, Danapur etc. Purposive sampling method was used in the study. There have been two research tools used in the study- One is Maslow's security-insecurity Inventory for measurement of security-insecurity level of subjects and the other was Level of Aspiration scale by Amar Kumar Singh. Results have revealed that Migrants have possessed high level of insecurity and high level of aspiration. Also, Level of aspiration and feeling of insecurity have been found positively correlated among migrants. Conclusively, it can be stated that Level of aspiration and feeling of insecurity are the important determinants of migration.

Keywords- Aspiration; Insecurity; Migration; Bihar

17. RURAL TECHNOLOGY, SOCIAL ORGANISATIONS AND RURAL DEVELOPMENT

0517204 CHATURVEDI, TANU AND GOLIYA S S (Department of Civil Engineering, Samrat Ashok Technological Institute, Vidisha – 464001). SUSTAINABLE BUILDING MATERIALS FOR RURAL DEVELOPMENT

Construction and civil engineering behavior have experienced a bang terrific to hasty improvements in procurement of building materials. the current set-up in the thriving construction industry has posed many challenges due to some weak aspect of the highly polluting and the comprehensive life of building materials. Simultaneously, it has also formed opportunities for innovative and alternative resources to come out due to the widening gap in requirement and supply of building materials, the need for energy efficient and economical methods of construction.

Usage of these innovative materials has significantly minimize the exploitative use of concrete, wood and other material. As this use material are the innovative material effects on the maintaining the sustabinility of our environment in an appropriate manner.

0517205 GWALE, USHMA (Samrat Ashok Technological Institution Degree College, Vidisha). USE OF WASTE AND MARGINAL MATERIAL IN THE CONSTRUCTION OF RURAL ROADS TO ACHIEVE GOAL OF ATMNIRBHAR BHARAT

In present scenario safe disposal of Industrial wastes is a great problem. These waste materials create environmental pollution in the vicinity because many of them are non-biodegradable. Studies reveal that in recent years, industrial wastes were successfully used in road construction in many developed countries. This study explores the possible increased use of more sustainable road construction materials and technologies in rural roads in India. India has a vast network of industries located in different parts of the country and many more are to come in the near future. Rural Connectivity is a critical component in the socio-economic development of rural people, as it provides access to amenities like education, health, marketing etc. The main thrust of rural roads in India under “Prime Ministers Rural Roads Scheme (PMGSY)” is to build a sustainable and environment-friendly road infrastructure. This is a critical requirement in view of the increasing scarcity of traditionally used road construction material, high costs of transporting construction materials over distances as high as 400 km, and rampant environmental degradation, as well as other impacts caused by the mining of sand and aggregates (with climate change impacts) – all of which are unsustainable practices. It addresses the increasingly felt need to make investments “climate-smart” by addressing both climate change mitigation and adaptation aspects of the rural roads constructed. In doing so, it also elaborates on the potential to actually create opportunities for local employment (“green growth”).

Keywords: - Granular soil for use in subgrade , Soil stabilisation – Mechanical and using additives , Naturally occurring softer aggregates like moorum, kankar, gravel, Brick and over burnt brick metal , Stone metal , Industrial waste. Etc

19. SCIENCE, TECHNOLOGY AND SOCIAL DEVELOPMENT

0519206 SUGANYA, S AND VELAYUTHAM, C (Department of Media Sciences, CEGC, Anna University, Chennai). ACCEPTANCE OF SMARTPHONE TECHNOLOGY AMONG INDIAN WOMEN FROM RESETTLEMENT SITE: AN INVESTIGATION APPLYING TECHNOLOGY ACCEPTANCE MODEL

A smartphone is a highly advanced mobile phone with numerous exciting features. Number of people owning a smartphone is increasing day-by-day worldwide because of the availability of smartphones in all ranges of prices and low-cost data plans. India is a developing country with second largest number of smartphone users in the world next to China. However the gender gap in the ownership of mobile devices is regularly being noticed in India every year. A report by Global System for Mobile Communications (GSMA) revealed that by the end of 2019, Indian women were 28% less than men to own a mobile device. When it comes to studies on women in India, the majority of those studies focused either on urban women or rural women. So this study focused on urban poor women. Urban poor are the people who live in an urban area whose income is below the poverty line. Resettlement is the process of relocation of people from their original habitation to another place to live. In India, resettlement is largely triggered by natural disasters and developmental projects. A resettlement site in Perumbakkam, Chennai is one of the largest resettlement sites in India. So this study investigated the acceptance of smartphone technology among urban poor women from Perumbakkam resettlement site. Widely accepted Technology Acceptance Model (TAM) was used to determine the level of acceptance of smartphone technology among those women. Sample data were collected using a digital questionnaire. The findings based on TAM were substantiated statistically using the multiple linear regression analysis. Further the findings of the study also focused on the smartphone usage pattern of those women.

Keywords: Smartphone, Indian Women, Resettlement, Technology Acceptance Model, Urban poor.



PART VI

NATIONAL SYMPOSIA

ON

**NEW GLOBAL TECHNOLOGICAL
SOCIETY**

PART VI

NATIONAL SYMPOSIA

04. PUBLIC EDUCATION SYSTEM UNDER NEW EDUCATION POLICY 2020

0604207 ANJALI, SHOBHA (01, Prerna, Yuvraj Club Road, Civil Line, Vidisha – 464001). *राष्ट्रीय शिक्षा नीति-2020 का विद्यार्थियों के सम्पूर्ण विकास पर पड़ने वाले प्रभाव का अध्ययन*

इस अध्ययन का उद्देश्य यह जानना है कि राष्ट्रीय की नई शिक्षा नीति 2020 का विद्यार्थियों के सम्पूर्ण विकास पर तथा अध्यापकों पर क्या प्रभाव पड़ेगा। यह अध्ययन शोधकर्ता के निवास शहर बरेली में किया गया है। यह अध्ययन 100 विद्यार्थियों, 100 अध्यापकों तथा 50 माता-पिता पर किया गया। जिसमें शोध कर्ता ने विद्यार्थियों तथा अध्यापकों की वर्तमान स्थिति को जान कर नई शिक्षा नीति 2020 की संस्तुतिओं से गुणात्मक विधि द्वारा तुलनात्मक अध्ययन करके नई शिक्षा नीति के प्रभाव को प्राप्त किया है।

शोध कर्ता ने प्री-प्राइमरी, प्राइमरी तथा सेकेण्डरी के विद्यार्थियों, अध्यापकों तथा विद्यार्थियों के माता-पिता का अध्ययन किया है। इस अध्ययन में विद्यार्थियों के विकास के सभी स्तर (शारीरिक, संज्ञानात्मक, सामाजिक, नैतिक तथा संवेगात्मक) का अध्ययन पूर्व संरचित साक्षात्कार विधि द्वारा किया गया ।

इस अध्ययन के परिणाम स्वरूप राष्ट्रीय शिक्षा नीति 2020 का प्रभाव विद्यार्थियों के सम्पूर्ण विकास के साथ-साथ अध्यापक शिक्षा पर भी बहुत सकारात्मक होंगे। यह परिवर्तन देश का एक वृहद परिवर्तन होगा।

0604208 GOSWAMI, DEBAJIT AND SEN, SHRABANTI (Department of Public Administration, School of Social Sciences, Netaji Subhas Open University Kolkata). **NEP 2020: A STEP FORWARD TO INCLUSION**

The Government of India drafted the New Education Policy (NEP) 2020 which aims to provide an equitable and vibrant environment for the generation, development, growth of knowledge and its larger access to the Indian society, by providing high-quality education to all and thereby making India a global knowledge superpower. Amongst the multi-dimensional aims of NEP 2020, it must be acknowledged that equitable access and inclusion lies at the heart of it. The NEP 2020 has been formulated after having considered over 2 lakh suggestions from different stakeholders to provide a holistic overview for building an equitable, inclusive and pluralistic society.

The fundamental theories of the policy include ancient practices like the Takshashila and Nalanda vis-à-vis the theories of Behaviourism, Cognitivism and Constructivist approaches, recognizing, identifying and fostering the unique capabilities of each student to provide a holistic development, flexibility in the curriculum, emphasis on conceptual understanding, creativity and critical thinking, life-skills, etc. The policy was drafted keeping in mind the diverse needs among students from different backgrounds and needs to address the issues of exclusion in education. Similar aims are reflected under National Policy on Education 1986 along with suggestions to adapt the curriculum and teaching methods according to diverse needs. However, NEP 2020 is a way forward and has included socio-economically disadvantaged groups, known as SEDG for the first time. This includes remotely disadvantaged groups like gender identities, socio-cultural, socio-economic identities, persons with disabilities, geographical identities. The policy includes sanctions of Special Education Zones (SEZs) for the large populations of educationally backward groups. The policy refers

to the Rights of Persons with Disabilities Act 2016 for equitable access, curriculum development and inclusion of Persons with Disabilities (PwD) in education.

Despite multiple legislative responses by the Government of India to address PwD inclusion in academics. Unfortunately, children with special needs are known to be excluded from the public (and private) school at large, public spaces, libraries, knowledge centers and this discrimination leads to a negative impact on people with special needs, inadvertently coming from the academia and society at large. Lack of accessibility, ignorance of educators and the school, lack of special educators, lack of teachers training programmes, lack of infrastructure facilities, dearth of empathetic skills, deficiency of theory-driven practices and awareness of teachers, parents and peer-group alike, are some of the major barriers in the journey toward an inclusive Indian education environment.

While NEP is designed to address many shortcomings of the previous education policies it is also a reflection of the RPWD Act 2016 and RTE 2009 in terms of PwD inclusion. What is important is to understand whether the literature used in the policy meets the discrimination and addresses the widening gap through congruent public policy that finds the delicate balance between education policies with social, economic and health programmes and approaches.

It is crucial that the concept of inclusive education evolves beyond a principle on paper, so that substantive tools, processes, learning environments, public policies, and economic considerations may be appraised and implemented with intent, sensitive to an inclusive and equitable approach. To this end, the careful consideration and mindful context specific applications of certain approaches may be utilized for better results. This paper examines the literature of the NEP 2020 in relation to PwD and critiques the stratagems which may be considered to make a substantial actual difference in lives of the learner's vis-a-vis a compatible, emphatic and responsive education system.

Keywords: NEP 2020, Inclusion, Public Policy, Theoretical Approaches, Special Needs, Behaviourism, Constructivism, Cognitivism, RTE 2009, RPwD Act 2016, NPE 1986.

0604209 REKHA, D M AND NANDISHA, H D (Department of Commerce, Bangalore University, Bangalore – 560056). NEW EDUCATION POLICY OF INDIA AND ITS IMPLICATIONS ON ACADEMIC COMMUNITY- A CONCEPTUAL STUDY

India is the fastest growing economy in the world and focusing on the aim of achieving more and more towards developed nation. Though the efforts have been made from the various corners of the nation and also from various sectors and segments of the economy the development is showing a slower growth. One of the reasons behind the slow growth of the nation is system adopted in various sectors of the society. A recent research shows that education is also one of the sector which shows that the present education system is not favoring towards the growth of the nation. India's first education policy was passed and it was implemented in the year 1986 after which July 2020 has made remarkable change in the education system by implementing new education policy into the nation after 34 years because of certain drawbacks of previous system. The overall development of any nation is depended on the quality and quantum of resources existing in the nation especially human resources. So the focus on the new education system has made but need to know how far it is applicable and useful for particular sections of the people.

This study focuses on how the new policy will favour the education system and challenges existed thereon to implement it in the nation for its complete development. For this, the study has been done based on the secondary data sources and based on the objectives framed the focus has been dealt with. The couple of sources of data have been gathered to bring out the facts existed and to highlight the purpose of the new education policy and its implication in the economy. The overall aim is to concentrate on new education policy, system, its implications, challenges and future development of nation.

Keywords: Education System, Academicians, Student community.

13. INDIGENOUS BIO-MEDICAL HEALTH AND TECHNOLOGY FOR CORONA VIRUS

0613210 KAR, SANTOSH KUMAR (School of Biotechnology, Jawaharlal Nehru University, New Delhi-67). ORIGIN OF COVID19 IN CHINA AND OUR EFFORTS TO CONTAIN IT IN INDIA

At the outset before I discuss about the origin of COVID19 in China and our efforts in India to contain it I must mention that we are very lucky in India that the death rate(1.4%) per 100,000 population is low and just by both wearing mask and social distancing we have been able to flatten the death curve in India. But because of our large population our total number of deaths is high and therefore we are grouped with four other countries like USA, Brazil, Mexico and United Kingdom with total deaths of 508K, 251K, 183K and 121K respectively on 25th February, 2021. With India's COVID deaths standing at 156 K this group of five countries account for 1.219 million deaths(48%) out of total death of 2.5 million in the whole world today. We must analyze how many countries like Bhutan (1 death in 0.7 million population), Vietnam (35 deaths in 97 million population) Taiwan (9 deaths in 23 million population) and Singapore (29 deaths in 5 million population) have managed the pandemic so effectively. Several vaccines have been produced in a record time and we must salute the Scientists who have produced and tested them and the manufacturing companies which produced millions of vials in record time for immunization. The vaccines may help in preventing the spread of the virus but we will have to wait for some more time to see their efficacy.

In December 2019 a group of 41 patients with symptoms of pneumonia were identified in Wuhan, China and since pneumonia can be induced by viruses from Zoonotic sources, the sprawling Huanan Seafood whole sale market of Wuhan was suspected to be the source of the virus which might have caused the infection. Investigations by Chinese authorities showed that some of the 41 patients with pneumonia were linked with the seafood market of Wuhan as stall owners, market employees, or regular visitors. But others had no link with the seafood market. This indicated that infection might have originated from multiple sources. Environmental samples from the Wuhan market place were found to be positive for COVID19 and the open meat market was closed on 1st January 2020. But tracing for the source of infection for the other persons was not done. The virus isolated from the patients in December, 2019 was identified in early January to be a new SARS Corona virus and its genetic sequence was shared publicly on 11-12 January, 2020. The full genetic sequence of the viruses from the early human cases from Wuhan showed that COVID19 has originated from Bats. But then how did it jump from Bat to humans. This may be answered by understanding how viruses can enter into human cells?

Like all other viruses, Corona virus is not a living thing and in order to survive it has to enter into a cell. The S protein on the virus surface facilitates the binding of the virus to the target cell by interacting with the ACE-2 (Angiotensin converting enzyme-II) receptor on it. The S protein then gets cleaved into S₁ and S₂ fragments and the virus enters the cell by a complex process that requires the concerted action of receptor binding and proteolytic degradation to promote virus-cell membrane fusion. Since bats and humans are mammals the virus from Bat can survive and multiply inside the human cells. This is how it is believed the COVID19 virus from the bat can enter into human epithelial cells present in the oral and nasal mucosa through the ACE-2 receptor.

In a paper entitled "The proximal origin of SARS-CoV-2 "(Nature Medicine, **26 | April 2020 | 450–455**), the authors have given very persuasive arguments to conclude that SARS-CoV-2 has originated through natural processes. They have argued that if genetic manipulation would have been performed, one of the several reverse-genetic systems available for betacoronaviruses would have been used. But the genetic data shows that COVID19 is not derived from any previously available virus backbone. However, I am not very convinced about the arguments and as Chinese authorities have not provided access to the samples from the humans who were infected during the early stages of the pandemic to any other laboratory for analysis the doubt about the origin of the virus continues to persist.

The first confirmed death due to COVID19 was reported from Wuhan, China on 9 January 2020 and Chinese Government imposed complete lock down in Wuhan at 10 AM on 23rd January, 2020. While no one was allowed to enter or leave Wuhan, Chinese tourists could visit Italy, France and Germany and many other

countries as there were no travel restrictions imposed on them. The first death outside of China occurred on 1 February 2020 in the Philippines, and the first death outside Asia was in France on 14 February 2020.

Alarmed by the outbreak a WHO team headed by the Director General of WHO went to Beijing on 28th January, 2020 to meet the Chinese authorities to discuss about the situation in China. Following this visit, the WHO declared the outbreak of COVID19 as a pandemic on 11th March 2020. But by that time the virus had spread to 114 countries including India and 118,000 humans were infected and there was 4291 deaths. A China - WHO team went to China from 16th to 24th February, and visited Beijing, Guangdong, Sichuan and Wuhan of Hubei province.

The Joint Mission carried out whole gene sequencing in 104 new coronavirus strains isolated from different locations and confirmed that the homology among these strains was 99.9%. Epidemiological analysis showed that the average age of the confirmed cases was 51 years. The hosts of the new coronavirus remained unclear but according to the data available in China, bats may be its host, and pangolin may also be one of the intermediate hosts. It was concluded that the most common routes of transmission are through respiratory droplets and contact with surfaces contaminated with the virus.

The first case of COVID-19 infection in India was reported in Kerala on January 27, 2020. A 20 year old girl who was studying in Wuhan University had returned to India on 23rd January reported to the Emergency Department in General Hospital at Thrissur, Kerala, with a one-day history of dry cough and sore throat

Thrissur in Kerala was put on high alert and the girl who was declared to be positive for COVID19 infection after a test conducted by the National Institute of Virology at Pune was put under isolation.

Prime Minister Modi in an address to the nation on 24th March, 2020 at 8 PM declared a strict lock down of the whole country till April 14th, 2020. This lock down continued for much longer. At that time the total death toll in India was 10 and numbers of infected people were 564. This ruthless lock down did not consider the difficulties of a very large number of our migrant workers who had lost their jobs and had no shelter. They had to walk, cycle down or take any kind of transport that was available to return to their home town. A little consideration of the plight of these tens of millions of migrant workers and providing them the opportunity to return home safely would have avoided so much misery and death and children becoming orphans. The problem of losing the job became so acute that Government had to declare 800 million people to be eligible for free ration till November, 2020. It clearly showed how unequal we are in the society.

Today with more than 156 K total deaths in India we are seeing the death curve has been flattened. Without a vaccine and any effective medicine we have reached this stage. Now two different vaccines are being administered to our front line health workers service providers since January 16th and in the second phase the elderly and persons with co-morbidity will be immunized. All vaccines need not induce herd immunity like the small pox vaccine. But if the present vaccines can hold the death then the scientists will get an opportunity to develop better and more effective vaccines. The immunization that has been carried out in Israel shows that death rate has come down quite a bit in elderly population. That gives us hope but we cannot be absolutely confident and wearing masks and maintaining social distance must continue even post vaccination.

We must give credit to the Doctors and Health Care workers as well as Police and other service providers for their relentless, selfless efforts which has kept us alive. Government must revamp our primary health care system by pumping much more money into it and develop the health care infrastructure. We must make the life of our Doctors and health care workers, Police and other service providers better. But lastly but not the least we must not disturb the animals by intruding into the “Animal World” or else this type of pandemic could come again and again.

**0613211 SAHA, BHASKAR (National Centre for Cell Science, Ganeshkhind, Pune – 411007).
VACCINES AGAINST SARS-CoV-2**

SARS-CoV-2 has emerged almost as a sequel of SARS and MERS viruses. All three belong to the RNA virus family of corona viruses. These two facts air enough skepticism about the anti-SARS-CoV-2 vaccine. SARS and MERS were more aggressive than the SARS-CoV-2 virus. However, unlike SARS and MERS which disappeared rather quickly, SARS-CoV-2 is a rapid spreader and longer lasting. Obviously, lessons were not learnt from the previous two infections and SARS-CoV-2 caught humans unprepared. As a result, there has been rise of irrationality in treatments and handling and cure seems to be more of a probability than surety. People were treated with drugs that would take care of fatal symptoms leading to higher cure rate but the death crossed millions. In contrast to uncertainty of cure, prevention came in the form of simple mask use, hand sanitization and physical distancing. The other preventive method- a prophylactic vaccine- was being made in the meanwhile. Six major vaccines belonging to three classes are now being used for priming people against the virus. The first kind uses mRNA coding for the Spike protein of the virus. It is expected that the mRNA introduced into the vaccinee will be translated to the viral spike protein and will elicit host-protective immune response. The second type of the vaccine uses inactivated virus where the SARS-CoV-2 virus is chemically inactivated but preserves the structure of the virus. The third formulation is cloning the gene encoding for SARS-CoV-2 spike protein in a “harmless” virus and expression of the Spike protein. As claimed, all three formulations seem to be working with 62% - 95% efficacy. Clearly, several issues may be put forth as probable problems. First, the results of Phase 3 clinical trial essentially might vary with the timing of the pandemic: low efficiency at the time of rise of the infection but high efficiency during the waning phase of the infection. Clearly, this needs a very careful interpretation of the “Efficiency” of a vaccine in Phase 3 trial. Second, a vaccine’s main measurable outcome is protection irrespective of the mechanism. However, the mechanism may turn out to be crucial in the post-vaccination phases. The antibody produced may not necessarily be neutralizing only the virus but may also recognize host tissue causing complement-mediated destruction of self tissues in many organs. Similarly, the T cells may also attack self tissues leading to autoimmune disease-like situation. Third, the use of a “harmless” virus such as common adenovirus as a vector for expression of spike protein may meet with early neutralization by the pre-existing antibodies and elimination from the system. In that case, the priming may not be efficient and the low efficiency of the Oxford-AstraZeneca vaccine may reflect this fact. As the neutralizing antibody from the cohort of long-term non-progressors failed to prevent or cure the HIV infection, neutralizing antibody may not necessarily be a protective mechanism in SARS-CoV-2 vaccines. Finally, if the vector is non-integrating, it may be removed from the system of vaccinee soon and in the absence of the antigen, the protective efficacy of the vaccine may not last long. Therefore, only time will tell the success of a SARS-CoV-2 vaccine.

0613212 SAHAL, DINKAR (ICGEB, New Delhi). THE PROBLEM OF EMERGENT INFECTIONS WHERE DISEASES COME FASTER THAN DRUGS TO TREAT THEM

What makes a doctor-patient bonding sacrosanct is the dedication of a doctor to see that the patient gets well soon together with the patient’s desire to not fail the doctor. Hence when a new disease emerges and the doctor has no rule book to go by, it is the training and experience of the doctor that counts the most. In the current COVID-19 pandemic we are passing through, when there were no proven drugs against the virus, our doctors did a great job of saving millions of lives through the distillate of their knowledge about treating according to the clinical condition of each patient. It must be remembered that since our body is its own physician and so the doctor must ensure that the prescribed medicines do not interfere with the body’s ability to cure itself. Indeed medicines must be such that the patient gets the maximum benefit from both the body’s own defence and the defence provided by the medicines taken. My talk will take you through the journey of Hydroxychloroquine, Azithromycin and Remdesivir which in their repurposed forms were considered as suitable to treat the patients of COVID 19. However when there were patients with severe lung infections with none of these medicines working, and when the patient was in a state of high inflammation caused by cytokine storms, the doctors took recourse to Dexamethasone to curb inflammation to enable the patient to breathe. However Dexamethasone given during the early phase of the viral infection might allow increased viral replication and aggravate the disease. Hence a doctor’s judgment of what medicine will do good at what stage of infection is critically important. While some of the repurposed drugs were shown to curb viral growth *in vitro*, most drugs by themselves were unable to inhibit viral growth *in vivo*. Using plasma from recovered patients for plasma therapy has also been tested as drug with mixed results. Likewise monoclonal antibodies that neutralize the virus were also put to test as drugs against COVID. Several medicinal plant extracts were also advocated to protect from COVID or to cure COVID. This includes extract of *Artemisia annua* as also

Patanjali's multiherbal consisting of *Tinospora cordifolia* (Giloy), *Withania somnifera* (Ashwagandha) and *Ocimum sanctum* (Tulsi) marketed as Coronil. Among all these palliative methods, the most important measure to ward off CORONA virus infection seems to have been mask, social distancing and hand hygiene. Steam inhalation, steam bath and hot drinks have been interesting "physical drugs" since they are claimed to kill the virus by heat shock. Inhalation of small amounts of ethanol is claimed to kill the virus by destroying the lipidic envelope of the corona virus. Nitric Oxide inhalation on the other hand offers to kill the virus via nitration of viral proteins. Frankly speaking we are passing through times when a true drug with all the merits of a good drug is trying to emerge in the laboratories across the world where researchers are toiling to identify a magic bullet against the 2019 Corona Virus. India with a wealth of medicinal knowledge and medicinal plants must play a crucial role in this endeavour.

0613213 TRIPATHY, BAISHNAB C (School of Life Sciences, Jawaharlal Nehru University, New Delhi 110067). INSIGHT INTO THE CAUSE OF CORONA DISEASE COVID-19 CAUSED BY SARS-COV-2

A strain of coronavirus known as severe acute respiratory syndrome coronavirus (SARS, or SARS-CoV-1) emerged. It created a scare and caused less than 1000 deaths. However, it disappeared in 5 months. The covid-19 caused by another corona virus, SARS-CoV-2 has created a Himalayan catastrophe that infected nearly one billion people of the world and ended the lives of nearly 3 millions and hitting hard the elderly population. Let us ask the question; what made this version of corona virus more infectious? Coronavirus spike protein is not only responsible for recognizing the host cell, but also takes a very active part in the viral entry to human body by mediating the fusion of the membranes of human beings and that of virus. The gene that encodes the spike protein is the most variable part of the coronavirus genome. This has caused distinct behaviors in various coronaviruses such as SARS-CoV-1 and SARS-CoV-2 as well as different mutant variants of SARS-CoV-2. This is revealed by M Moradi and coworkers at the University of Arkansas, USA who have used the state-of-the-art simulation techniques.

SARS-CoV-1 and 2 spike proteins are not always capable of recognizing and binding to the human cell. They only can do this when they are in their active form. Our results show that the SARS-CoV-2 spike protein has a higher tendency to stay active when it is activated, while the SARS-CoV-1, even when activated, does not stay active long enough to infect the human cell as quickly and effectively as the SARS-CoV-2 can. The part of protein that is directly involved in binding to the human cell, known as the receptor binding domain, has been the focus of much of the studies. However, spike protein needs to be activated and remain active prior to binding to the human cell. The simulation study predicts that there are other parts of the protein far from the receptor binding domain that are involved in the activation and deactivation process of the spike protein. Certain mutations in this remote and unrelated region of the protein, other than receptor binding domain, apparently unrelated parts of the protein could that could potentially alter the activation/deactivation dynamics of the spike protein and perhaps lead to higher or lower levels of infectivity. This provides a new framework for developing vaccines and therapeutics. In addition to receptor binding and other processes that have been targeted so far other means could be applied to reduce the pandemic. If the activation of SARS-CoV-2 spike protein could be inhibited by designing medicine or vaccine that target various hot spots involved in the activation/deactivation process and not only focused around the receptor binding domain it may be an advancement in reducing the spread of the virus.

21. RECENT ADVANCES IN CONTROL STRATEGY AND QUICK CHARGING TECHNOLOGIES OF ELECTRICAL VEHICLE,

0621214 KARKARE, PRAVEEN; SINGH, BHOOPENDRA; SWAMI, PREETI D AND SHARMA, SUDHIR (Department of Electrical Engineering, Samrat Ashok Technological Institute, Vidisha – 464001). ELECTRIC VEHICLE AND ITS CHARGING

Electric Vehicles (EV) are currently gaining more importance in the transportation sector. In near future Electric Vehicle may replace the Internal Combustion Engine (ICE) Vehicle for transportation purpose. Electric Vehicle has many advantages over Internal Combustion Engine Vehicle. Electric Vehicle reduces the greenhouse gas emissions produced by the transportation sector. It does not use any stored energy or cause any emission while idling and due to this frequent start and stop driving is possible. It provides high starting torque and quiet operation. Electric Vehicle may cause significant impacts on environment and power system. Electric Vehicles can cause large instabilities to power system but this vehicle can be turned into a major contributor to the successful implementation of the smart grid concept. The major hurdle in the popularity of Electric Vehicle is its large charging time. Scientists are constantly putting their efforts to reduce this time. Various charging techniques are being used now-a-days. An effort has been made to throw some light on electric vehicles and its charging in this paper.

Keywords: Electric Vehicles, Limitations of EVs, wireless charging

X ALL INDIAN YOUNG SCIENTIST CONVENTION

0707215 CHAUBEY, N P (5, Iswar Saran Ashram Campus, Prayagraj 211004). LEARNING SCIENCE

विज्ञान क्या है?

प्रायः यह सवाल पूछा जाता है: विज्ञान क्या है?

पृथ्वी के ऊपर, भीतर और आस-पास जो कुछ है, उसके ज्ञान को विज्ञान कहते हैं। ज्ञान क्या है? किसी भी सजीव, निर्जीव वस्तु के बारे में प्रायः तीन प्रश्न/सवाल पूछा जाता है:

- (क) यह क्या है?
- (ख) यह कैसे है?
- (ग) यह क्यों है?

उक्त तीनों प्रश्नों का उत्तर ज्ञान है। यदि ये तीनों उत्तर सही हैं तो इस ज्ञान को विज्ञान कहते हैं। यदि इन तीन उत्तर में कोई एक या सभी उत्तर गलत हैं तो उसे विज्ञान नहीं कहते।

ये तीनों प्रश्न (क्या, कैसे, क्यों) उन्हीं वस्तु/चीज पर लागू होते हैं जो वास्तव में हैं। अर्थात् विज्ञान का ज्ञान जो है उसके बारे में है, न कि जो नहीं है। इसीलिए लोग वस्तुनिष्ठ ज्ञान को विज्ञान कहते हैं। वस्तुनिष्ठ का मतलब है जो वस्तु जैसा है या वस्तु में जो गुण हैं। अंग्रेजी में 'Objective' शब्द इस्तेमाल होता है। इसका मतलब यह है कि जो नहीं है उसका ज्ञान विज्ञान नहीं है। या दूसरे शब्दों में कपोल कल्पित ज्ञान या मनगढ़न्त ज्ञान विज्ञान नहीं है।

इस पृथ्वी पर या इसके भीतर या इसके ऊपर, इर्द-गिर्द जो कुछ है वह निरन्तर बदलता रहता है। अर्थात् सभी निर्जीव या सजीव पदार्थ निरन्तर बदलते रहते हैं। अतएव विज्ञान का ज्ञान भी बदलता रहता है। दूसरे शब्दों में किसी भी वस्तु/चीज के बारे में आज जो विज्ञान है कल या परसों उस वस्तु/चीज के बारे में लागू नहीं होगा क्योंकि वह वस्तु/चीज आज जैसी है वैसे कल नहीं रहेगी। इसका अर्थ यह है कि विज्ञान स्थिर या चिर ज्ञान नहीं है। वस्तु में परिवर्तन के साथ इसमें भी निरन्तर परिवर्तन होता रहता है। दूसरे शब्दों में विज्ञान मंत्र या जादू, टोना-टोटका नहीं है। यह स्थिर नहीं है। विज्ञान परिवर्तनशील ज्ञान है। यही कारण है कि विज्ञान में 'हमेशा चिर' जैसे शब्दों का इस्तेमाल नहीं किया जाता है।

यहाँ तीन प्रश्न उठते हैं:

- प्रथम ज्ञान कितने प्रकार का होता है
- द्वितीय विज्ञान का ज्ञान कैसे हासिल होता है
- तृतीय विज्ञान की क्या आवश्यकता है?

प्रथम प्रश्न का उत्तर है: ज्ञान दो प्रकार का होता है:

- (1) विज्ञान (Science)
- (2) मीमांसा या मनोगत ज्ञान (Metaphysics)

जो है उसके बारे में सही ज्ञान को विज्ञान कहते हैं। पृथ्वी है, पृथ्वी पर हवा, पानी, नदी, पहाड़, जंगल, जीव-जन्तु है। पृथ्वी के भीतर अनेक प्रकार के खादान हैं। पृथ्वी के इर्द-गिर्द सूरज, चन्द्रमा, मंगल आदि अनेक ग्रह हैं। इन सबका सही ज्ञान विज्ञान है।

इसके विपरीत जो नहीं है उसके ज्ञान को मीमांसा (Metaphysics) कहते हैं। मीमांसा में सर्वप्रथम जो है उसके अस्तित्व को नकारा जाता है: यह नहीं है, यह नहीं है (नेति, नेति, It is not, It is not) फिर जो नहीं है उसके अस्तित्व को स्थापित किया जाता है (इति, इति, यह है, यह है, It is, It is)। तत्पश्चात् जिसे होते हुए भी पहले नकार दिया था उसका उपयोग जो नहीं है को सत्यापित करने के लिए इस्तेमाल किया जाना मीमांसा है। इस संसार में जो कुछ है वह भौतिक है, पदार्थात्मक है। इसे नकार कर पराभौतिकी या अभौतिक (Metaphysics) को स्थापित किया जाता है और भौतिक और पराभौतिक में सहसम्बन्ध स्थापित किया जाता है। इस प्रकार मीमांसा के ज्ञान को शाश्वत, अपरिवर्तनशील बताया जाता है।

मीमांसा के ज्ञान पर सवाल पूछने और चुनौती देने की गुंजाइश नहीं होती जबकि विज्ञान के ज्ञान को कोई कभी चुनौती दे सकता है, प्रश्न पूछ सकता है। मीमांसा में व्यक्ति के पद का स्थान महत्वपूर्ण है। विज्ञान में किसी व्यक्ति या व्यक्ति के पद का कोई स्थान नहीं होता। दूसरे शब्दों में विज्ञान का ज्ञान सार्वजनिक है जबकि मीमांसा का ज्ञान व्यक्तिगत/निजी है। विज्ञान में सभी बराबर हैं, मीमांसा में कुछ ज्ञानी हैं और सभी अज्ञानी हैं एवं असमान हैं। विज्ञान का ज्ञान लोकतांत्रिक पर्यावरण में बढ़ता है और अलोकतांत्रिक पर्यावरण में मर जाता है। इसके विपरीत मीमांसा का ज्ञान अलोकतांत्रिक या अधिनायकवादी प्रक्रिया में फलता-फूलता है और लोकतांत्रिक प्रक्रिया में मर जाता है। विज्ञान के ज्ञान से भूख, प्यास, रोग, घर आदि समस्याओं का समाधान होता है, मीमांसा से भूख,

प्यास, रोग, घर आदि समस्याओं का समाधान नहीं होता। विज्ञान से आपस में प्रेम, भ्रातृत्व, मेलजोल बढ़ता है जबकि मीमांसा आपस में हेय, द्वेष, मार-पीट, भेद-भाव आदि बढ़ता है। विज्ञान के ज्ञान से ज्ञानी में नम्रता एवं सबको समान देखने का भाव बढ़ता है। मीमांसा से ज्ञानी में घमण्ड और अपने से अन्य को छोटा समझने का दृष्टिकोण विकसित होता है।

दूसरा सवाल है विज्ञान का ज्ञान कैसे हासिल होता है? जन्म से मनुष्य तथा अन्य जानवर ज्ञान विहीन होते हैं। नवजात शिशु को अपने माँ-बाप, अपनी लिंग, जाति, धर्म आदि का कुछ भी ज्ञान नहीं होता। हर जीव में संवेदी अंग (आँख, कान, त्वचा आदि) होते हैं। इन संवेदी तंत्रों के जरिये जब जीव किसी बाह्य जीव/वस्तु के सम्पर्क में आता है तब संवेदी प्रक्रिया उत्पन्न होती है। संवेदी गतिवाही प्रक्रिया से उत्पन्न बाहरी दुनिया के बारे में वेग (Impulse) प्रत्येक जीव के मस्तिष्क तक पहुँचती है। प्रारम्भ में मस्तिष्क इस प्रकार के वेग की व्याख्या नहीं कर पाता। अतएव इन्हें संवेदन (Sensation) कहते हैं। बार-बार किसी एक वस्तु के बारे में घटित संवेदन को मस्तिष्क अर्थ देने लगता है। इसे प्रत्यक्षण कहते हैं। प्रत्यक्षण ज्ञान का प्रथम सोपान है। प्रत्यक्षण के जरिये व्यक्ति/जीव बाह्य दुनिया की आन्तरिक संरचना करता है और तदनुकूल उस बाहरी वस्तु के प्रति प्रतिक्रिया या व्यवहार करता है। प्रत्यक्षण के आधार पर जीव कार्य करता है। प्रत्यक्षण के अनुकूल कार्य करने के परिणामस्वरूप प्रत्यक्षण में परिवर्तन होता है। व्यक्ति/जीव पुनः बदले प्रत्यक्षण के अनुकूल व्यवहार करता है। इस प्रकार संवेदन-प्रत्यक्षण-कार्य-प्रत्यक्षण-कार्य..... की श्रृंखला से ज्ञान हासिल होता है। इस प्रकार के ज्ञान को प्रत्यक्षणात्मक ज्ञान कहते हैं। कमोवेश यह ज्ञान सभी मनुष्य तथा अन्य जीवों में होता है। यह प्रक्रिया एक दूसरी प्रक्रिया को जन्म देती है जिसे अधिगम या सीखना कहते हैं। सीखने की प्रक्रिया 'सामूहिक सीखना' और 'सामूहिक ज्ञान' की जाँच पड़ताल की प्रक्रिया को जन्म देती है। इसी सामूहिक अधिगम और आदान-प्रदान के क्रम में विज्ञान का जन्म होता है। जो लोग इसमें सक्रिय भाग लेते हैं वे मानते हैं कि विज्ञान के ज्ञान त्रुटिपूर्ण होता है, त्रुटि को सामूहिक प्रयास के जरिये कम किया जा सकता है और विज्ञान के जरिये सभी समस्याओं का साधन ढूँढा जा सकता है। धीरे-धीरे जो लोग इस प्रक्रिया में भाग लेते हैं वे यह समझने लगते हैं कि विज्ञान का ज्ञान सामूहिक मानसिक और शारीरिक श्रम से पैदा होता है, न कि किसी एक व्यक्ति से। वे समय के बीतने के साथ समझने लगते हैं कि विज्ञान को पूर्णरूपेण त्रुटि-विहीन करना कठिन है। अतएव हर विज्ञानी से यह उम्मीद की जाती है कि वह स्वयं त्रुटि ढूँढने का प्रयास करेगा और अन्य लोगों की आलोचना को नम्रतापूर्वक स्वीकार करेगा।

तीसरे प्रश्न का सम्बन्ध विज्ञान की आवश्यकता से है। उत्तर सरल भी है, कठिन भी। सभी जीवों में मनुष्य सर्वाधिक विकसित जीव/जानवर है। सभी जीवों में से मनुष्य ही एक ऐसा जीव है जिसने विज्ञान के ज्ञान को हासिल किया है। विज्ञान के जरिये मनुष्य ने अपने जीने की समस्याओं को हल करने में काफी हद तक कामयाबी हासिल की। यह दूसरी बात है कि कुछ मनुष्य ने अन्य मनुष्य को गुलाम बनाने, भूखा-नंगा रखने, हिंसा करने में विज्ञान का दुरुपयोग किया है। मूलतः विज्ञान सभी जीने की समस्याओं से मुक्ति हासिल करने का एक मात्र साधन है। आज यह निर्विवाद है कि किसी भी समाज/देश का अच्छा वर्तमान और सुनहला भविष्य उस देश/समाज में जैसा विज्ञान है, उस पर निर्भर करता है।

यहाँ यह ध्यान रखना चाहिए कि विज्ञान का ज्ञान वस्तु/चीज के बारे में होने के कारण सार्थक, ठोस और निरपेक्ष है जबकि मीमांसा का ज्ञान निरर्थक और निरपेक्ष है।

अब यहाँ यह प्रश्न उठ सकता है कि कैसे विज्ञान का ज्ञान सार्थक, सापेक्ष और निरपेक्ष होता है। इसका उत्तर ढूँढने के पहले हमें यह याद रखना चाहिए कि वस्तु/चीज, पृथ्वी, दुनिया, नदी, पहाड़ आदि किसी व्यक्ति की इच्छा पर निर्भर नहीं करते। यहाँ तक कि हमारा शरीर भी हमारी इच्छा पर निर्भर नहीं करता। इस समझ को हासिल करने में भी विज्ञान की भूमिका है और काफी लम्बा इतिहास है। इस समझ को लेकर विज्ञानी उन रास्तों, पगड़डियों, साधनों को ढूँढता है जिनके जरिये किसी वस्तु/चीज के बारे में वस्तुनिष्ठ ज्ञान हासिल किया जा सकता है। इन्हें विज्ञान में विधि (Method) कहते हैं। विधि भी सार्वजनिक होती है। सार्वजनिक का मतलब है कि कोई भी व्यक्ति उस विधि का उपयोग करके उस ज्ञान को हासिल कर सकता है जिसे पहले किसी विज्ञानी ने उस वस्तु के बारे में ज्ञान हासिल किया है। इस तरह से उसी विधि से जब दो विज्ञानी या अनेक विज्ञान उसी ज्ञान को हासिल करते हैं, तब वह ज्ञान विज्ञान होता है। अतएव पुष्टिकरण (Verification) वैज्ञानिक ज्ञान की आवश्यक शर्त है। मीमांसा में पुष्टिकरण का कोई स्थान नहीं है। दोहराया जाना (Repeatability) पुष्टिकरण का अभिन्न अंग है। विज्ञान में व्यवहार (Practice) और सिद्धान्त (Theory) में गहरा सम्बन्ध है। इसके अभाव में विज्ञान अविज्ञान हो जाता है। या यों कहें मीमांसा बनकर रह जाता है।

वैज्ञानिक विधि कितने प्रकार की होती है? मोटे तौर पर विज्ञान में निम्न विधियाँ हैं:—

1. प्रेक्षण (Observation)
2. प्रयोग (Experience)
3. तार्किक (Logical)
4. सांख्यिकीय (Statistical)
5. गणितीय (Mathematical)

विधि का चयन विज्ञानी समस्या के अनुकूल करता है। यहाँ यह ध्यान रखने की बात है कि विज्ञानी को अपनी समझ से अध्ययन के विषय के अनुकूल विधि का चयन करना होता है। अतएव विधि निरन्तर विकसित होती रहती है। विधि की खोज और विकास भी सार्वजनिक मानसिक एवं शारीरिक श्रम का परिणाम है।

LATE PAPERS

PART II

RESEARCH COMMITTEES' CHAIRPERSONS' ADDRESS

06. CHEMICAL SCIENCE

0206216 SHUKLA, RUDRA NARAYAN (Department of Applied Chemistry, Samrat Ashok Technological Institute, Vidisha 464001). **INDIAN PAPER INDUSTRY AND IT'S CHALLENGES OF DEALING WITH THE POLLUTION AND SCARCITY OF RAW MATERIALS**

Dignitaries, colleagues, dear students, and young scientist, on behalf of the Chemical Sciences Section, thank you for taking the time and effort to join us here in this 44th Indian Social Science Congress. I am honored to deliver this presidential address to make a justice with the purpose that has attracted us all here. My attempt here is not to take a deep-dive in science and technology, that is the domain of you all, rather I wish to highlight Specific objectives related to the New Global Technological Society. I admit, this address does not include mainly new ideas but it attempts to highlight that path for improved quality of society.

Over the course of my research period, I realized that there are such species like weeds and others that are serious problems for the eco-system. But they can be used in pulp and paper manufacturing and could become the alternative of present fibrous raw materials. I've found five such new plants that can be used in pulp and paper manufacturing, which are *Shorea Robusta*, *Ipomea Carnea Jacq*, *Lantana Camara*, *Prosopis Cheinesis* and *Leucaena leucocephala*.

Also, I realized the water in paper manufacturing industry can be used efficiently using processes like **zero-waste system**. I've used this model in *Shiv Skati Paper Mill, Vidisha* and *M.P. Paperboard Mill, Vidisha*. The results were promising and it helped in reducing the pollution in river *Betwa*.

In my academic career I focused on the medicinal plants which are found in *Vidisha* region mainly and with the help of hundreds of my M.Sc. applied chemistry students we analyzed the plants Phytochemically during their dissertation. This Vidisha region is affluent with the plants like *Andrographis Paniculata* (*Kalegh*), *Azadirachta indica* (*Neem*), *Carica Papaya* Linn (*Papaya*), *Barleria prionitis* (*Vajradanti*), *Mimusops Elengi* Seeds (*Maulsiri*), *Jatropha Curcas* Seed (*Ratanjot*), *Aloevera* (*Ghritkuari*), *Tridaxprocumbens* (*Pila Bhringraj*), *Solanum Xanthocarpum* (*Choti Katari*), *Butea Monosperma* (*Palash*), *Murraya koenigii* (*Mitha Neem*), *Acacia Nilotica* (*Babool*) etc.

INTRODUCTION

The main problems in the Pulp and Paper industries are scarcity of raw materials and the pollution. Paper is one of the most commonly used material in social life. One third of all of the wood processed worldwide is used in paper and pulp production. At present in India, wood resources cannot meet the growing needs of pulp and paper making industry. In order to make up for the lack of raw materials, a considerable amount of pulp has to be imported from abroad. Pulp and paper production has improved worldwide and will continue to growth in the near future. In 2020, **total global consumption** of paper was 451 million tonnes. Consumption of paper and paperboard per person varies significantly from country to country. One person uses about 60 kg of paper a year on average for each US resident and 14 kg for each Indian. In the heavily populated areas of Asia, only around 40 kg of paper per person is used. This means that Asian consumption will continue to grow intensely in the coming years if developments there follow the example of the West. In Finland, consumption of paper and paperboard per person is about 194 kg. Although India's population is about 7% of the world's population, it consumes barely 2% of the global paper output with consumption per person at only 9 kg against a global average of 55 kg, 65 kg in China and 215 kg in Japan.

The fibrous material found in plants is the essential and key material in the paper manufacturing process. The paper consists of a network of plant fibers with high cellulose content that is treated using various water-based processes. Although these fibers can be obtained from numerous different plants and trees, the most important source used is the wooden material due to its length and strength of its fibers.

Paper manufacturing also consumes a large quantity of resources, especially water and energy beside large quantities of raw materials and chemicals. Approximately 2-18 m³ of water (depending on the effluent management system used and whether water is recovered) and between 2 and 2.5 tonnes of wood are required to produce one ton of paper. During the manufacturing process, water acts as a breakdown medium for the raw materials, a transport for fibers, and for paper formation. The process begins with separation of cellulose from the other ingredients (lignin, oils, resins, etc.), which represents 50% by weight. To extract cellulose fibers, the wood must first be crushed (mechanical pulp) or wood chips subjected to a chemical treatment (chemical pulp). In the latter case, treatment involves either the use of an alkaline product (sulfate or caustic soda) or a sulfite. In both cases the aim is to solubilize the lignin to release the cellulose fibers. There are major differences between the two treatments. Thus, the alkaline method generates black effluents that are highly contaminating and are generally treated to recover the sodium sulfide and caustic soda. In the sulfite method, some of the chemicals used, such as sulfuric acid, can also be recovered. However, those chemicals that cannot be recovered are lost with waste effluent along with remnants of cellulose that have not been retained, thus meaning that the effluent has a high COD. If the pulp is obtained mechanically, the quality of the paste obtained is lower but less liquid waste is produced. In practice, only 30% of all the pulp produced worldwide is obtained using the mechanical process. The lignin fragments that remain together with the cellulose fibers give color to the paste, especially in the case of mechanical pulp. To gain white pulp, it must be exposed to a bleaching process, which can be performed in different ways. One alternative involves the use of hydrogen peroxide which, although it does not remove the lignin, does remove its color. Other bleaching technologies, which tend to be much less environmentally sustainable, are based on the use of chlorine gas or chlorine dioxide, which oxidise lignin with high efficacy. However, as these reagents are highly reactive, they inevitably also react with organic compounds present in the pulp and generate a large quantity of organochlorinated compounds, including dioxins and furans. Another option for bleaching pulp that does not generate by-products involves the use of ozone, which has tended to replace the use of chlorine as it does not produce contaminants.

A mixture of different types of wet pulp with filler substances (calcium carbonate, kaolin, titanium dioxide, etc.) and other additives (aluminum sulfate, dyes, starch, latex, etc.) is spread uniformly on a metal support and dried to form paper. To obtain writing or printer paper, the surface of the paper is subsequently mechanically smoothed.

All these processes consume a high volume of water, and this water must be of high quality. These characteristics make the paper industry unique. The effluents generated as a result of paper and paste production contain are highly contaminated with up to 250 different compounds. Some of these are of natural origin, from the wood (lignin, tannins, etc.), whereas others, such as phenols, dioxins, and furans, are synthetic and are incorporated into the effluent during the manufacturing and cellulose paste bleaching processes.

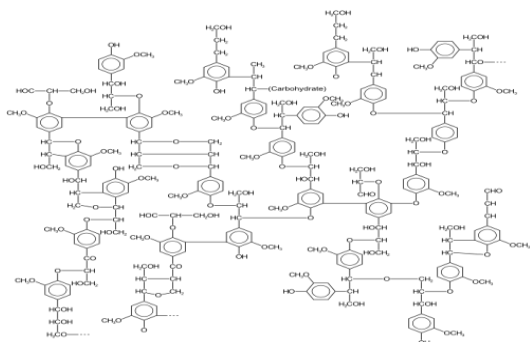


Figure-1-a.

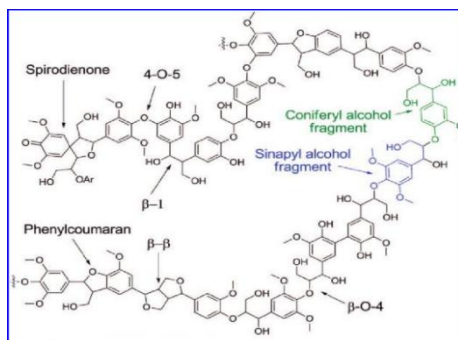


Figure-1- b.

Polyphenylpropane: coniferylalcohol (4hydroxy3methoxyphenylpropane), sinapylalcohol (3,5dimethoxy4hydroxyphenylpropane), and paracoumarylalcohol (4hydroxyphenylpropane).

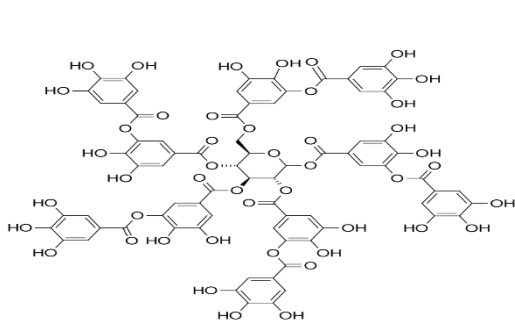


Figure-2

Tannins,

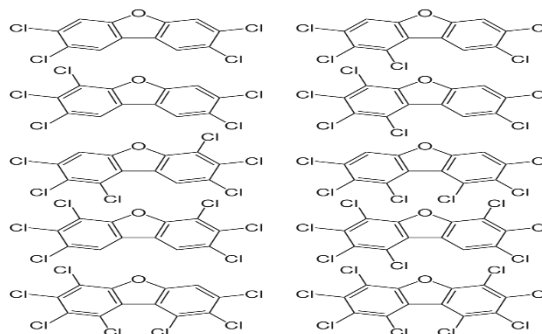


Figure-3

Dioxins and Furans

There are two diametrically opposed strategies for avoiding the environmental impact of discharging these effluents directly into the environment. The simplest option involves treating the effluents appropriately and discharging the treated flow into the environment. However, there is a more sustainable and, in most cases, cheaper alternative based on treating the effluents in order to recover the water for reuse. This latter alternative has two main objectives: to minimize both the water used and the liquid waste generated. This management model is known as a “closed cycle” or, alternatively, a “zero-waste system”.

Treatment of Water Without Reuse (Open Cycle)

In this case, the objective of treatment is to reduce the contamination in effluents to such a degree that they can be discharged, thereby complying with legislative requirements and avoiding any environmental impact.

Treatment of Water using a Zero-Waste System (Closed Cycle)

The operation of a zero-waste system is a much better concept than basically an effluent treatment technology. Really, this is an environmental management system that aims to achieve the lowest environmental impact of the process as a whole. Thus, the generation of liquid waste and consumption of drinking water are minimized by reuse of the water recovered from the effluent.

In order to treat effluents to achieve a sufficient quality that allows the water recovered to be reused, a more exhaustive treatment than in the previous case must be calculated. An initial homogenization and pH-neutralization step, followed by decantation to sediment the solids in suspension with the largest particle sizes, is required. Treatment then continues with advanced oxidation (preferably ozonization) to destroy larger organic molecules that may be refractory to a subsequent biological process, usually an anaerobic biological treatment, in which the content of organic matter dissolved in the liquid is reduced while generating biogas, followed by filtration of the digestion effluent, initially through a sand filter and then using ultrafiltration membranes. A reverse osmosis process completes the treatment. The permeate resulting upon reverse osmosis is of the quality required for reuse in the paper manufacturing process, whereas the rejection flow is treated using a vacuum evaporation process to reduce its volume as far as possible. The water recovered by evaporation can also be reused, whereas the concentrate, which has a minimum volume, must be managed as a waste. The sludges generated in the anaerobic digestion process, together with the plant residues, such as tree bark, sawdust, etc. generated during initial preparation of the wood, are burnt in a furnace. Both the heat generated by the furnace and that generated upon burning the biogas help to meet the energy requirements of the vacuum evaporator.

Thus, most of the water used during the process is recovered, a minimum quantity of waste that needs to be managed externally is generated. Overall, this is a highly sustainable environmental management system. It should be noted, however, that implementation of such a system gets more complex as the degree of contamination of the effluents increases. To guarantee a successful implementation, it is vital to introduce all possible improvements that result in fewer contaminants being generated into the paper and pulp manufacturing process. For example, by replacing chlorine and its derivatives in the paste-bleaching process with oxygen compounds (hydrogen peroxide or ozone).

The pulp and paper industry in India does face increasing economic and political pressures to reduce the volume and toxicity of its industrial wastewater.

Several mills have placed TEF (totally effluent-free) or MIM (minimum impact mill) products but have not achieved any significant success. But effluent closure or minimum impact could become a fairly significant marketing tool for the pulp and paper industry in the twenty-first century.

At present, most of this waste is recycled using a conventional approach, through biological and chemical processes, incurring high costs and low returns. Therefore, strategies relying on any one of the conventional treatment technologies do not lead to optimal utilization of the valuable resources in the waste.

Now we discuss about only **Lantana** and **Prosopis** that I used in preparation of pulp and paper.

Lantana is listed amongst the worst weeds in the world. *Lantana camara*, a plant of Verbenaceae/ family is a low erect vigorous shrub with stout recurved prickles and a strong odour it grows to 1.2-2.4 metres its root system is very strong, and it gives out a new flush of shoots even after repeated cuttings, Fruit small, greenish-blue black, blackish, drupaceous, shining, with two nutlets, almost throughout the year, dispersed by birds. Seeds germinates very easily by pollinating insects, and the act of pollination has become a serious problem for tropical countries, where it has invaded millions of hectares of land. *Lantana* was introduced in India in 1809. This weed is posing serious problems in plantation forestry. Chokes all other vegetation and become the dominant species. In India about 7-8 species of *Lantana* are found. Some important species of *Lantana* in India are *Lantana Camara*, *Lantana Indica*, *Lantana trifolia*, *Lantana Canulata* etc. *Lantana* is a serious problem in India in various locations. *Lantana* form every area is very -very difficult task. Villager's farmers, and administrators are facing this serious problem every day. Attempts to control *Lantana* failed.

The *Prosopis* belongs to the family leguminosae (Mimosaceae). About 43 species of this genus are known. Some of them are commonly found in India. These species are. The plant is evergreen spiny tree or shrub, with drooping branches. The bark is grayish and the pods are yellow, 10-25 cm long and 8-15 mm broad, straight or falcate, flat or cylindrical often with transverse depression between the seeds; 10-30 seeds are present in a pod and are ovoid flattened, 7 mm x 3 mm hard, yellowish brown and shiny. Delignification is the process in which we separate the lignin from wood by chemical treatments.

In paper industry to produce the pulp the lignin has to be separated from the woody tissue by chemical process. This is an essential step. By using different catalysts and kinetic studies of delignification some improvements were observed.

EXPREMENT

PROCEDURE OF DELIGNIFICATION

Wood meal (40.0g oven dry) was placed in a stainless steel bomb (400 ml capacity). To the stainless steel bomb cooking chemicals i.e. sodium hydroxide and sodium sulphide (according to the conditions given above) were then added. The ration of wood meal to liquor was maintained 1:5 by the addition of water into the bombs, whenever necessary. The bombs were tightly closed and placed inside a stationary pressure autoclave containing water. The autoclave was tightly closed and heated by gas to raise the reaction to the desired level of 170°C which was maintained within the limits of ± 10 manually by adjusting the flame of the burner for

definite intervals of the time of delignification schedule planned. After the completion of the schedule the digester was blown and the bombs were taken out and cooled in a water trough for five minutes. The cap of the bombs were then opened the contents filtered onto a pre weighed sintered crucible (IG-I) washed thoroughly with distilled water and then dried in an oven at $105 \pm 3^\circ\text{C}$. The overnight dried crucible was cooled in a desiccators and weighed to determine the yield of pulp by difference in weight of the sintered crucible.

For determination of degree of delignification same oven dry sample (1.0g) was taken and the Klason lignin content was determined according to the standard procedure as described in chapter II. The values were converted to obtain figures on wood basis. An example of this is given below:

Pulp yield	%	=	A
Klason lignin in pulp (Pulp basis)	%	=	B
Lignin in pulp (wood basis)	%	=	$B \times 100 / A$

QUINONE ADDITIVES IN KRAFT PULPING STUDIES COOKING PROCEDURE

The dry wood of *Lantana camara* Lenn & *Prosopis Chinensis* were converted into chips of suitable size in the chipper. The chips were dried in air and allowed standard on a scale of generally have a uniform 12% moisture content. The screened chips were used in experimental work. All the pulping experiment were carried out in a stow sets autoclave (bomb) digester which comprises of six stainless steel bombs each of 2-5 liters capacity rotating in the bath.

Preliminary experiment *Lantana camara* Lenn & *Prosopis Chinensis* were carried out to know the minimum amount of chemical and H-factor. The calculated H-factor provides a measure of combined effect of time and temperature. The amount of sodium hydroxide and sodium sulphide was varied from 16 to 19% as Na_2O . Experiment and other with additive of anthraquinone different dosages of anthraquinone 0.05%, 0.075% and 0.1% on wood basis were added to get optimum dosages of anthraquinone. In the same way different dosage of anthrone, 2,6 dichloroquinone-4-chlorimide and 8 hydroxyquinoline were added to get optimum dosages to optimum H-factor and cooking chemical (% of caustic as Na_2O). The pulp thus obtained were screened on a laboratory screen having 35/100 mm slit width, the rejects were collected and weighed to determine screened yield, rejects and total yield were determined.

The pulp thus obtained were beaten in PFI mill at fixed revolution (6000) standard sheets of about 60 gsm. were made in sheet making machine condition at $27 \pm 100^\circ\text{C}$ & $65 \pm 2\text{RH}$ and these dried standard sheet were tested for various strength properties i.e. tensile strength, tearing resistance, busting index, fold endurance etc.

The pulp with control addition of anthraquinone, anthrone, 2,6 dichloroquinone-4-chlorimide, 8-hydroxyquinoline were analysed for yield, kappa number, holocellulose and viscosity chemical analysis of pulp is carried out as per TAPPI standard procedures. Kappa number method was adopted for the determination of relative hardness and bleachability on degree of delignification of pulp. It may be used for all types and grades of chemical and semi chemical unbleached and semi bleached wood pulp obtained with a yield of 70%.

Bleaching of pulp was carried out using CEHH sequence to give the final pulp brightness around 75% ISO post color number was measured after keeping the brightness in a fixed circulation over at 105°C for four hours. Initial brightness was also measured.

DETERMINATION OF YIELD OF PULP

The pulp were seized and stored in polythene bags. 50 gm of each sample was taken after the pulp has attained uniform moisture and kept in over at $105 \pm 2^\circ\text{C}$. Overnight the dried pulp sample was cooled in daciater & weighed. The equivalent dried weight of the pulp was calculated. The pulp thus obtained were beaten in PFI mill at fixed revolution (6000). Standard sheet of about 6 gm were made in sheet making machine. Conditioning at $27 \pm 1^\circ\text{C}$ and $65 \pm 2\text{RH}$ (humidity factor) and this dried standard sheet were tested for

various strength property i.e. internal resistance tensile strength stress, tearing resistance busting strength fold number freeness etc The pulp with control and addition of additives were analysed in the same way and the pulp, holocellulose viscosity & degree of polymerization was also determined.

DETERMINATION OF HOLOCELLULOSE

The method used for the determination of holocellulose of pulp is as follows. About 50 gm of moisture free pulp was treated with 160 me of an aqueous solution containing 1.5 gm of sodium chlorite and 10 drops of glacial acetic acid were added to it and heated again at 70-80°C for one hour. The process was repeated four times till the dust become white. This was then filtered, washed with water and finally with acetone.

This method was adopted for the determination of the relative hardness and bleachability on degree of delignification of pulp. It may be used for all types and grades of chemical and semi chemical pulp unbleached and semi bleached wood pulp was obtained with a yield. The kappa number is the number of milliliters of N/10 potassium permanganate solution consumed per gram of moisture free pulp under specified condition. In this standard the pulp was weight 0.0001 gm which would consume 50% N/10 KMnO₄ (Potassium permanganate) solution or regularly between the limit of 30 & 70%. The sample was completely disintegrated in 800 ml. Distilled water in a 2 litter beaker. The beaker was placed in water bath maintained at 25°C. 100 ml of KMnO₄ (0.1N) and 100 ml of H₂SO₄ gas is mixed in 250 ml beaker and these content was added quickly to the disintegrated sample and continuously stirred for 10 minute. At the end of 10 min time, the reaction was terminated by adding 20 ml of 10% KI solution. The iodine liberated was filtrated against 0.2N sodium thiosulphate solution (hypo) using starch as an indicator. A blanck determination was also carried out in similar way kappa number can be calculated as follows :

$$\frac{(b-c) \times N \times d \times t}{w \times 0.1}$$

- b = Titter value for blanck determination.
 c = Titter value for sample determination.
 N = Normality of Na₂S₂O₃ (Hypo).
 D = Correction factor.

VISCOSITY DETERMINATION

SCAN method was used for determination of viscosity of pulp. The pulp were dissolved in CED solution. 25 gm of analytical grade CuSO₄ was dissolved in 2 litter hot distilled water and heated to boiling and reagent grade sodium hydroxide was added by vigorous shaking to make the solution alkaline. The precipitate was settled and washed by decanting with hot water to make the slurry 1500 ml. Temperature was below 20°C and 2 litter of 1% NaOH was added with vigorous shaking. The precipitate of Cu(OH)₂ to make it 500 ml and partly on vacuum evaporated on the total was carried out and 160 ml of 70% ethylene diamine was added to it. The content was stirred several times, then allowed to settle for 16 hrs. A clear supernatant liquor was taken by filtering it .The concentration of copper in distilled water was kept 1 M. and ratio of ethylene diamine to copper was 2%.

- R = X/Y
 X = Ethylene diamine (mol/ litter C.E.D. sol)
 Y = Mole copper per litter of C.E.D. soln.

Samples was weighed and put in dissolving vessel and 25 ml of distilled water was added to it and some copper wire was placed to it and disintegrated for 5 min. by shaking and them 25 ml of CED solution was added and shaking for 10 min. was continued for complete dissolution of pulp. A portion of solution was drained by suctions in capillary tube, viscometer and viscosity was calculated from the equation.

- rel = relative viscosity = $\frac{h_n}{h_n - t_n}$
 rel = $\frac{h_n}{h_n - t_n}$.

hn = Viscometer constant obtained by calibration.
 tn = efflux time for solution.

BLEACHING OF PULP

The pulp were bleached using CEHH sequence to the final pulp brightness around 75% ISO. The bleachability was carried out under optimized condition. The optimum chlorine for chlorination stage was determined. According to kappa number of pulp prepared from different soda activated pulping and following condition CEHH is combination of chlorine (C) alkaline extraction (E) and hypochlorite I & II (H).

S No.	Parameter	Consistency (%)	Time(Min.)	Temperature ($^{\circ}$C)	pH
1	Chlorination	3%	30 min.	30	02.5
2	Alkali Extraction	8%	60 Min	60	10.5
3	Hypochlorite I	8%	120 Min	40	11.0
4	Hypochlorite II	8%	120 Min	40	11.0

RESULTS AND DISCUSSION

INCREASED RATE OF DELIGNIFICATION

Delignification is the process in which we separate the lignin from wood by chemical. In this process we use different type of catalyst for the fast delignification. Kinetic analysis of the data of decrease in lignin content with time of cooking shows that in all the four pseudo first order reactions in time of lignin concentration. Following figures represent this finding. It will be seen from these figures that a faster delignification process usually referred to as bulk delignification is followed by a slower delignification process referred to as residual delignification state. It will be further seen from the following figures that the rate of delignification is almost independent of initial total active alkali concentration in case of all the four variations. The values of the first order rate constant (K1) for initial rapid process of delignification as determined from the slopes of the straight lines and also for the latter slower delignification process (K1) are recorded in **Table (1)** for all the Lantana camara Lenn & Prosopis Chinensis wood. A perusal of the data on first order rate constant for initial rapid process shows that Prosopis cheinesis have same rate of delignification and similarly in case Lantana camara Lenn the rate of delignification is almost the same. It will be further seen from the values of the first order rate constant of initial rapid process that the rate of delignification follows the order Prosopis cheinesis Lantana camara Lenn.

Table –1 Rate of Delignification at different sulphidities.

Species	Sulphidity	K1
PROSOPIS CHEINESIS	15%,	3.66x10-3
	20%,	5.72x10-3
	25%,	5.55x10-3
	30%	3.66 x10-3
LANTANACAMARA LENN	15%,	6.28x10-3
	20%,	
	25%,	
	30%	

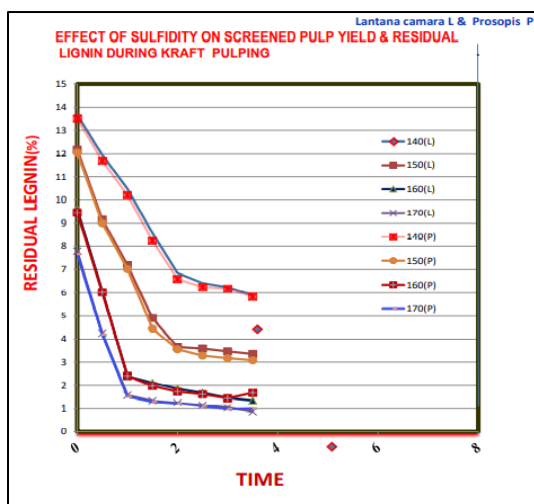


Figure-6

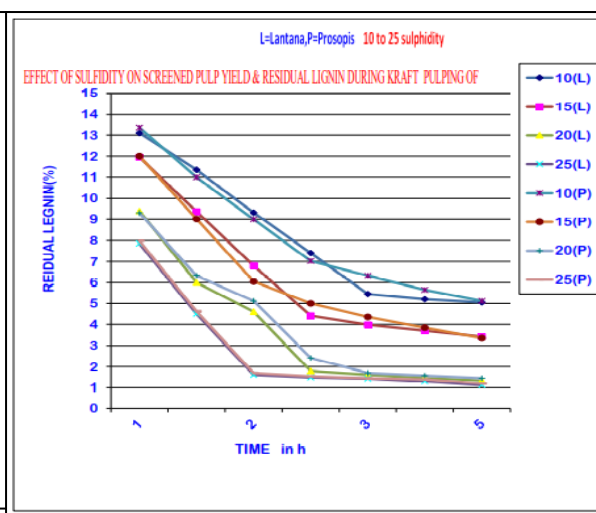


Figure-7

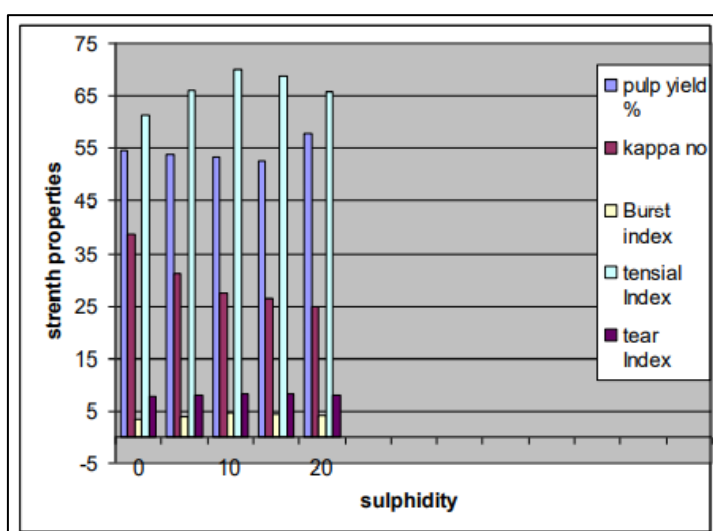


Figure-8

EFFECT OF SULPHIDE VARIATIONS

The effect of sulphide variation on rate of delignification in case of Prosopis cheinesis Lantana camara Lenn respectively. It will be seen from these figures that the effect of sulphide variation in case of Lantana camara Lenn is not so distinct and on an average almost the same rate of delignification is followed at sulphidity variation within 15% to 30%. However in case Prosopis cheinesis the sulphidity has marked influence on the rate of delignification. The rate of delignification decreased After 25% sulphidity, the values of first order rate constant are recorded.

LIGNIN TO CARBOHYDRATE RATIO

(A) EFFECT OF TOTAL ACTIVE ALKALI VARIATION: Since the changes in the ratio of lignin to carbohydrate in pulp residue are the result of solution of lignin and carbohydrate at different rates, it is of interest to examine the change in composition of pulps with yield. The presentation of data on changes in lignin to carbohydrate ratio with yield losses its meaning all-too-easily when merely assembled in columns of

figures, the analyses of this data collected in case of delignification studies of the four tropical hardwoods was done on the Ross diagram. The changes in lignin to carbohydrate ratio with yield at different times of cooking for *Prosopis cheinesis* Lantana camara Lenn, and, respectively. It will be seen from that in case of *Prosopis cheinesis* the changes in lignin to carbohydrate ratio with yield is highly influenced by initial total active alkali applied for cooking. that on using 15% total active alkali there are three distinct phases of change in lignin to carbohydrate ratio with yield which are different to those observed with 16% total active alkali application. With 15% total active alkali the first phase of change in lignin and carbohydrate ratio is for a short period and the change in yield is not appreciable, whereas there is substantial difference in lignin to carbohydrate ratio values. In the second phase change in yield is considerable as compared to change in lignin to carbohydrate ratio. This means that in the second phase there is more dissolution of carbohydrates as compared to lignin. In the third phase there is practically no change in lignin to carbohydrate ratio, whereas the yield has decreased from 57% to 51%. This again indicates that in this phase the change in yield is occurring entirely due to loss of carbohydrates and practically there is no delignification. Indicates that with 16% total active alkali application during the entire period of cooking, yield changes from 68% to 46% whereas there is only a little change in lignin to carbohydrate ratio. This indicates that for the most part carbohydrates are lost to a much greater extent than lignin. For Lantana camara Lenn show that in this case also initial active alkali concentration has marked influence on the pattern of change in lignin to carbohydrate ratio with yield during the entire cooking period. That at 14% total active alkali, on an average, there are two phases of changes in lignin to carbohydrate ratio. From 75% of yield to 56% lignin to carbohydrate ratio follows faster rate of dissolution as compared to from 56% to 48.6%. This means in the later part carbohydrates are dissolved to a greater extent as compared to lignin. At 15% total active alkali, shows that the changes in the lignin to carbohydrate ratio follow a reverse order as compared to that of 14%.

(B) EFFECT OF SULPHIDE VARIATION: Represent the effect of sulphidity variation keeping total active alkali constant at 15%, on changes in lignin to carbohydrate ratio with yield in case of *Prosopis cheinesis* and Lantana camara Lenn respectively. It will be noted from that in case of *Prosopis cheinesis* there is no effect of sulphidity variation on the pattern of change in lignin to carbohydrate with yield within 15% to 30% of sulphidity. All are on one smooth curve. Similar is the observation. In case of Lantana camara Lenn is observed at 25% sulphidity only. Sulphidities i.e. 15%, 20% and 30% follow one pattern of range of lignin to carbohydrate ratio with yield.

Table –2 Effect of alkali variation on first order rate constants calculated from the slope in above figures.

Specise	Total Active alkali	K1	K2
PROSOPIS CHEINESIS	15%,	6.2×10^{-3}	3.5×10^{-3}
	16%	5.5×10^{-3}	3.3×10^{-3}
LANTANA CAMARA LENN	14%,	6.0×10^{-3}	6.0×10^{-3}
	15%,	1.6×10^{-3}	1.6×10^{-3}

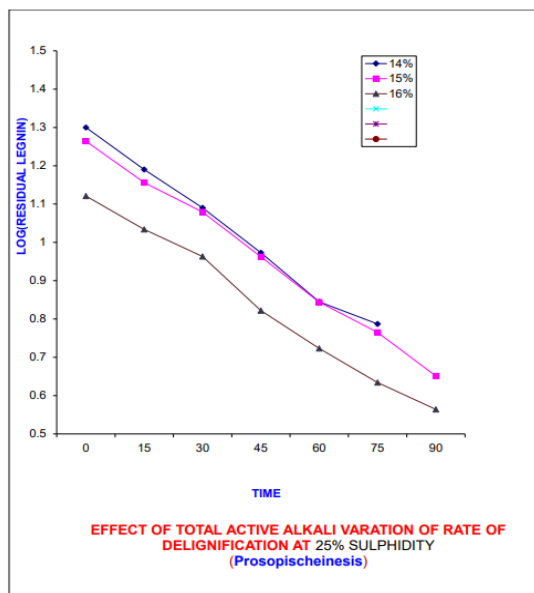


Figure-4

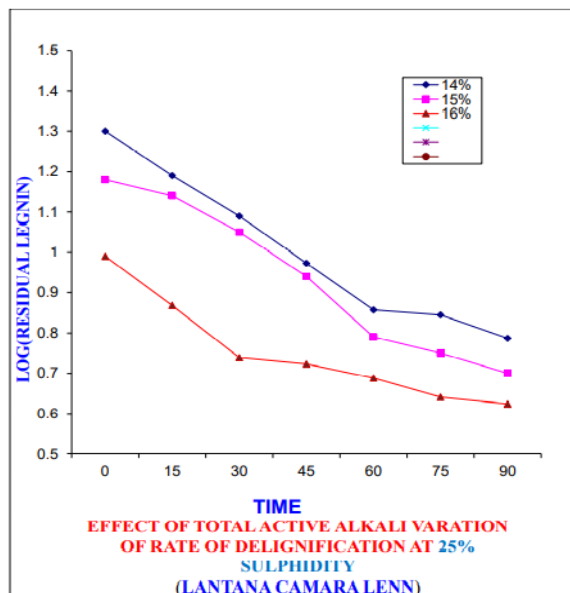


Figure-5

RELATIONSHIP BETWEEN RATE OF DELIGNIFICATION AND LIGNIN CONCENTRATIONS (S/V RATIO)

The relationship between lignin concentration i.e. its syringyl to guaiacyl unit molar ratio and rate of delignification of the four tropical hardwoods. It will be seen from this figure that the rate delignification increases with the increase in S/V ratio the milled wood lignin and there is a straight-line relationship for the three hardwoods i.e. Prosopis cheinesis and Lantana camara Lenn. During optimization of cooking condition, it was found that chemical used in Na_2O is 11 to 19 % active alkali & 20% sulfidity the yield obtained was Prosopis Chinensis & Lantana camara Lenn 57.5 % to 48.7 % & 52.2 to 35% with kappa number 17.1 to 41 & 18.6 to 40.9 was varied where and time variation was 150-160 $^{\circ}\text{C}$ & 45 Min at 160 $^{\circ}\text{C}$. 1.20 Min respectively it is reported in **Table No.3** in present study the reduction of kappa no was done using catalyst pulping. It is reported in **Table No.4** mentions the cooking chemical at different % amount i.e. 0.05, 0.1, 0.15, of Anthraquinone, Anthrone, 2,6 Di - Chlorquinone, 4 Chlorimide, 8 Hydroxy quinoline, Effect of A Q on screened pulp yield, kappa no at different alkali doses, sulfidity 20 (%), & maximum cooking temperature 160 $^{\circ}\text{C}$ during Kraft pulping of are reported in **Table N0 5**-

Table-3 OPTIMIZATION OF COOKING CONDITION

S.No.	Particular	Active alkali (% as Na_2O) (SULFIDITY 20%)				
		11	13	15	17	19
	Initial pH	13.30	13.35	13.40	13.40	13.40
	Lantana Camara Lenn					
1	Unscreened pulp yield (%)	52.2	51.0	50.2	45.8	35.0
2	Screened pulp (%)	51.0	50.1	49.0	44.7	34.6
3	Kappa number	40.9	36.8	31.2	22.8	18.6
	Prosopis Cheinesis					
1	Unscreened pulp yield	57.5	55.9	54.8	52.30	48.7
2	Screened pulp yield	56.9.2	55.4	54.4	51.3	48.2

3	Kappa Number	41.0	37.9	32.7	24.9	17.1
Cooking conditions: Time from ambient temperature to 105°C = 45 min. time from 105 to 160°C = 45 min. Time at 160°C = 120min. Liquor to wood ratio = 4.5:1 Result reported in duplicate.						

Table-4 DATA SHOWING AMOUNT OF DELIGNIFICATION VERSUS ADDITIVE CONCENTRATION

S. NO.	PULPING	% OF ADDITIVES ALONG WITH 15% (Na ₂ O) & (SULFIDITY 20 %)		KAPPA NUMBER	
		LANTANA	PROSOPIS	LANTANA	PROSOPIS
1	KRAFT	NIL	NIL	31.20	32.72
2	KRAFT-AQ	0.05	0.05	28.50	29.70
		0.10	0.10	27.10	28.10
		0.15	0.15	26.20	27.63
3	KRAFT-ANTHRONE	0.05	0.05	28.00	29.10
		0.10	0.10	27.80	27.80
		0.15	0.15	26.40	26.14
4	KRAFT-2.6 di-Chlorquinine 4 chlorimide	0.05	0.05	28.80	27.80
		0.10	0.10	27.60	26.90
		0.15	0.15	25.00	25.65
5	KRAFT - 8 Hydroxyquinoline	0.05	0.05	29.80	29.6
		0.10	0.10	27.80	27.9
		0.15	0.15	25.00	26.3

TABLE NO 5 EFFECT OF AQ ON SCREENED PULP YIELD & KAPPA NO AT DIFFERENT ALKALI DOSES, SULFIDITY 20 (%), & MAXIMUM COOKING TEMPERATURE 160°C DURING KRAFT PULPING

S. NO.	Alkali doses (%)	AQ doses (%)	LANTANA CAMARALENN			PROSOPIS CHEINESIS		
			Kappa No	Pulp Yield (%)	Rejects (%)	Kappa No	Pulp Yield (%)	Rejects (%)
1	12	0.000	46.7	51.0	3.8	48.0	54.0	3.3
		0.025	42.5	52.1	3.0	43.2	54.5	3.1
		0.075	37.0	52.5	2.7	35.6	54.9	2.0
		0.100	35.0	52.9	2.3	34.0	55.1	1.9
			33.8		1.9			1.7
2	13	0.000	38.8	50.70	2.20	39.6	53.2	2.4
		0.025	35.0	51.10	1.50	35.3	53.6	2.0
		0.075	30.1	51.60	0.90	28.7	54.2	1.0
		0.100	28.9	51.30	0.60	27.4	54.1	1.0
			27.6	51.80	0.5			0.8
3	14	0.000	34.6	50.0	1.6	35.2	52.5	1.8
		0.025	30.2	50.4	1.1	34.8	52.9	1.5
		0.075	26.8	50.9	0.7	25.2	53.0	0.8
		0.100	25.0	51.5	0.5	24.0	53.3	0.7
			24.2		0.3		53.8	0.6
4	15	0.000	30.2	49.8	0.8	32.7	52.1	1.1
		0.025	26.5	50.1	0.6	31.5	52.7	1.0
		0.075		50.5		29.1	52.9	

		0.100	23.8 22.3 21.7	50.8	0.4 0.2 0.2	28.5	53.3	0.6 0.6 0.5
5	16	0.000 0.025 0.050 0.075 0.100	26.2 235 22.8 21.9 20.4	46.5 47.1 48.5 48.7 49.3	0.8 0.6 0.4 0.3 0.1	29.8 27.2 26.5 25.1 24.5	51.2 51.5 51.8 52.4 52.8	1.1 1.1 0.9 0.6 0.5

Cooking conditions: Time from ambient temperature to 105°C= 45 min. Time from 105 to 160°C= 45 min. Time at 160°C = 120 min. Liquor to wood ratio= 4.5:1 Results reported in duplicate **TABLE – 6 COMPARISION OF FIBER DIMENSION OF LANTANA CAMARA LENN & PROSOPIS CHINENSIS AND OTHER WOODS**

S. No.	TYPE OF WOOD	AVERAGE LENGTH (L) mm	LUMIN WIDTH (I)	CELL (W) mm	AVERAGE FIBER DIAMETER L/D	SLENDE RATIO	RUNKAL RATIO
1	Bamboo	2.16	0.0060	0.0040	0.014	1540	1.33
2	Eucalyptus	0.969	0.1390	0.0035	0.0206	47.00	0.4806
3	B. Serrata	0.935	0.02880	0.0018	0.0364	26.00	0.133
4	Lantana camara	0.863	0.00301	0.0021	0.0063	98.82	0.93
5	Prosopis	0.899	0.01210	0.0029	0.0197	39.00	0.3791

TABLE – 7 CALCULATION OF FIBER DIMENSION OF LANTANA CAMARA LENN & PROSOPIS CHINENSIS

SAMPLE	SLENDER RATIO	RUNKAL RATIO	RATIO OF WALL THICKNESS TO LUMIN BREADTH
Sample I	94.44	9.3	0.465
Sample II	88.73	10.2	0.51
Sample III	88.46	12.8	0.64

TABLE -8 BAUER MC NET CLASSIFICATION OF PULP LANTANA CAMARA LENN & PROSOPIS CHINENSIS UNBLEACHED PULP

S.NO.	MESH SIZE	% Fiber
01.	+ 16	4.25
02.	-16+30	9.10
03.	-30+50	28.79
04.	-50+200	34.79
05.	-200	23.95

Bauer McNet fiber classification of unbleached pulp shows that the fiber pass through +16 mesh to +200 mesh is increasing by 4 % to 34 % respectively, but decreasing up to 23 % at –200 mesh. It is reported

Table – 9 DATA SHOWING % YIELD, ITS RELATED KAPPA NUMBER % BLEACHABILITY AT CERTAIN H-FACTOR

S.N	PULPI	H-	%YIELD	KAPPA NO.	%REDUCTION

0	NG	FACTOR						
			LANTA NA	PROSOP IS	LANTAN A	PROSOP IS	LANTAN A	PROSOP IS
	KRAFT-AQ	1000	49.5	53.8	16.50	15.50	32.0	33.5
2.	KRAFT	1000	45.2	50.9	21.20	20.20	41.0	41.0
3.	KRAFT-AQ	1200	47.0	49.6	15.80	16.80	30.2	31.8
4.	KRAFT	1200	44.8	47.9 2	20.00	21.00	39.5.	40.2
5.	KRAFT-AQ	1550	43.5	45.8	12.00	14.00	23.0	25.3

Data showing % yield, its related kappa number % bleachability at certain H-factor reported in Table 15 study shows that Kraft pulping of Prosopis cheinesis & lantana camara lenn with and without anthraquinone was done and result is expressed to study the effect of kraft pulping at constant conditions to study the rate of delignification. It was found that rate of delignification was higher with 0.1 % of each additives. Variation of H-factor was done from 1000 to 1550 H factor at constant cooking chemical (15% Na₂O) for Kraft pulping with and without anthraquinone. Result of which is depicted It reveals that optimum H-factor to get maximum screened yield is at 1200. It is clear from table that H factor could be reduced from 1550 to 1200 to obtain same kappa number so anthraquinone causes faster delignification. The trend of bleachability is lowest in Kraft pulping than that of Kraft AQ pulping at optimum H-factor 1200

Table N0 – 10 BLEACHING OF PULP PAPRAD FROM KRAFT ADDITIVE PULPING

S. N.	COOKING	TYPE OF WOOD	UN BLEACHED SCREENED PULP YIELD	KAP PA NO	SEQUENCE (CEHH) (%)	BLEACHED PULP YIELD	BRIGHTNESSES (%)	POST COLOUR NO	VISCOSITY CP	DEGREE OF POLYMERIZATION
1	KRAFT	LANTANA	50.20	31.2	C=6.5E=1.2 H=1.1H=0.5	37.5	63.1	1.8	4.4	675
		PROSOPIS	54.20	32.2	C=6.5E=1.2 H=1.1H=0	40.87	71.5	1.9	4.9	675
2	KRAFT ANTHRAQUINONE	LANTANA	54.95	28.5	C=5.6E=1.2 H=1.1H=0	40.8	71.2	1.23	5.3	663
		PROSOPIS	56.95	29.5	C=5.6E=1.2 H=1.1H=0	41.8 3	72.2	1.43	5.9	673.3
3	KRAFTANTHRONE	LANTANA	53.71	28.0	C=5.7E=1.2 H=1.1H=0.	39.6	72.6	1.42	5.6	698
		PROSOPIS	56.71	29.0	C=5.7E=1.2 H=1.1H=0.5	41.6	73.6	1.42	5.8	718
4	KRAFT -2.6 DI -CHLOR QUININE 4 C HLORIMIDE	LANTANA	53.50	28.8	C=6.0E=1.2 H=1.1H=0.5	39.9	73.65	1.56	5.82	697
		PROSOPIS	56.50	29.8	C=6.0E=1.2 H=1.1H=0.5	41.8	73.51	1.43	5.77	715

5	KRAFT -8 HYDR OXYQUINOLIN	LANTA NA	54.70	29.8	C=6.3E=1.2 H=1.1H=0.5	40.5	72.4	1.35	5.2	699
		PROSO PIS	56.70	30.2	C=6.3E=1.2 H=1.1H=0.5	42.5	73.4	1.32	5.7	711

Table 10 shows the studies on Bleaching of pulp prepared from Kraft additive pulping. Additives used are Anthraquinone Anthrone, 2,6dichloroquinone 4chlorimide, 8 hydroxyquinoline -line. pulping, In kraft AQ pulping the bleached pulp yield was increased by 7.8 %. Brightness increased by 4.6. %, post color number decreased by 0.37 elreph. viscosity increased 0.9 centipoises., degree of polymerization increased by 38 with respect to that of Kraft pulping. in lantana & in prosopis the bleached pulp yield was increased by 5.8 %. Brightness increased by 4.35 %, post colour number decreased by 0.47 elreph. Viscosity increased 1.0 centipoise., degree of polymerization increased by 38In kraft anthrone pulping kappa number decreased by 3.5 bleached pulp yield increased by 8.0%. Brightness increased by 6.6%, post colour was increased 0.38, Elreph viscosity increased by 1.2centipoise,degree of polymerization increased by 24 with respect to that of Kraft pulping. in lantana & in prosopis number decreased by 3.2 bleached pulp yield increased by 7.35%. Brightness increased by 6.5 %, post colour was increased 0.48 viscosity increased by 0.94 centipoise,degree of polymerization increased by 33 In kraft 2,6 dichloroquinone 4 chlorimide, kappa number decreased by 3.3 Bleached pulp yield increased by 5.2%,brightness increased by 4.4%post colour number was increased 0.24, Elreph viscosity increased by 0.80 centipoise,degree of polymerization increased by 22 lantana & in prosopis kappa number decreased by 2. Bleached pulp yield increased by 7.35%, brightness increased by 5.25,post colour number .47was found same ,viscosity increased by 0.8 centipoise, degree of polymerization increased by 30. In kraft 8 hydroxy quinoline kappa number was found to decrease by 2.3 point. Bleached pulp yield increased by 8.0%, brightness increased 4.3%, post colour number decreased by 0.45 Elreph viscosity increased by 0.86,degree of polymerization increased by 24. lantana & in Prosopis kappa number was found to decrease by 2.0 point. Bleached pulp yield increased by 4.4%, brightness increased 5.25%,post colour number decreased by 0.58 Elreph viscosity increased by 0.79,degree of polymerization increased by 26 From the above discussion of Table 16 it can be revealed that consumption of bleach chemical was lowest for pulp prepared from Kraft Anthrone pulping, because of its lower Kappa number. The order of consumption of bleach chemical with different additives was Anthraquinone, Anthrone, 2,6 dichloroquinone 4 chlorimide, 8 hydroxy quinoline. The maximum brightness was achieved in Kraft Anthrone pulps. The post colour number represents the tendency of pulp to turn yellow. It was lowest in case of anthraquinone and highest in case of Kraft pulping. Anthraquinone used less amount of bleaching chemical thus pulp prepared from Kraft AQ pulping had high viscosity and degree of polymerization both. The bleached pulps were beaten in PFI mill at fixed revolution 6000 and hand sheets were studied for physical strength properties.

TABLE 11 MECHANICAL STRENGTH PROPERTIES OF BLEACHED PULP PREPARED FROM KRAFT ADDITIVE PULPING OF PROSOPIS CHEINISIS & LANTANA CAMARA LENN

SN	PULPING	TYPE OF WOOD	Beating level (°SR)	Apparent density (g/cm ³)	Burst indx (kPaM ² /g)	Tensile index (KNm/g)	Tear index (mNM ² /g)	Double fold N0
1	KRAFT-	LANTANA	40	0.63	2.12	49.78	6.72	170
		PROSOPIS	40	0.71	3.21	54.00	6.17	185
2	KRAFT ANTHRA QUINONE	LANTANA	40	0.68	3.72	55.00	7.24	350
		PROSOPIS	40	0.73	4.60	67.00	6.80	340
3	KRAFT ANTHRONE	LANTANA	40	0.67	3.70	50.96	7.10	319
		PROSOPIS	40	0.78	4.66	66.78	6.67	321
4	KRAFT 2.6	LANTANA	40	0.64	3.67	53.09	7.13	345
		PROSOPIS	40.0	0.74	4.34	68.45	6.65	325

	DI-CHLORQUININE 4CHLORIMIDE							
5	KRAFT -8HYDR OXYQUINOLIN	LANTANA	40.0	0.63	4.67	56.87	7.15	338
		PROSOPIS	40 .0	0.73	4.23	69.5	6.78	388

Table 11 shows mechanical strength properties of Prosopis cheinesis & lantana camara Lenn of bleached pulp prepared from Kraft additive pulping. various properties were studied. it is clear from the table that density of Kraft, Kraft 2.6 dichloro quinone 4 chlorimide and Kraft 8 hydroxyl quinoline was same and in Kraft AQ and Kraft anthrone it was more than Kraft pulping. burst index of, Kraft additive was higher than that of Kraft pulping. tensile index of Kraft anthraquinone was higher than Kraft anthrone and Kraft 8 hydroxyl quinoline but less than Kraft 2.6 dichloroquinone 4 chlorinide. tear Index and double fold N0 was higher in Kraft AQ pulp as compared to that of other pulping. The results from table reveals that pulp were not degraded after bleaching. Kraft AQ pulping gave maximum brightness in pulp and yet retained its physical strength properties.

Case Study of water using a Zero-Waste System (Closed Cycle) at Shiv Skati Mill and M.P. Paper Mill

According to crystallization theory, precipitation is defined as a “reactive crystallization”. This definition is preferred as it emphasizes the formation of the solid product via a chemical reaction. I applied this principle in precipitation of ligning from black liquor received by these paper mills. Acidification of the black liquor by using mineral acids is easily filterable. Chemical flocculation process is a crucial process as it promotes the aggregation of particles after being destabilized by a chemical agent. In pulp and paper industry, flocculation is involved in different parts of the process: it is essential to form the paper sheet in the forming wire, determining retention, drainage rate and the formation, and it is also used in the wastewater treatment to separate the colloidal material and in the sludge thickening Hydrochloric acid gives lignin residue lower is as the sulphuric acid. Whereas Sulphur Dioxide and Acetic acid are not suitable precipitants. Lignins obtained can be used as a fuel value. Using this methodology water can be recycled and reused with greater efficiency.

CONCLUSION

A new approach has to be taken in order to deal with the scarcity of raw materials in Paper and Pulp industry. I’ve found five such species that can become an alternative to the raw materials presently in use. Also, I have experimented with some catalysts that has significantly increased the rate of delignification and the increase in yield is observed and the energy consumption was also decreased. Using methodologies like **Zero-Waste System** the water in paper and pulp industry can also be used efficiently. Which also helps the environment to fight pollution. Phytochemical analysis of medicinal plants with my students found locally helped them in their career and also helped the region to identify it’s flora that what it’s capable of.

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PART IV

RESEARCH COMMITTEES

14. ENGINEERING SCIENCE AND TECHNOLOGY

0414217 SHARMA, PRAMOD (Department of Civil Engineering, Samrat Ashok Technological Institute, Vidisha 464001). SIGNIFICANCE OF GLASS FIBRE CONCRETE IN CONSTRUCTION

The concrete is brittle in nature it needs some supporting agents like steel bars. But the conventional steel reinforcement boosts more thickness which in turn becomes uneconomical. The tensile strength of concrete was increased so that it can bear high tension at increased strain. Glass fibre was added to enhance the flexural and tensile strength of concrete. After the addition of fibre, a complex material was formed which showed different properties from non-reinforced concrete. The strength so achieved will vary with respect to type and amount of fibre used.

The addition of fibre in brittle concrete will help in mitigating the propagation of micro cracks as well as improving in other mechanical properties. Development of fast rate construction of road and other infrastructures, glass fibre reinforced concrete are being used in practice. Different varieties of fibres are available in the market such as steel fibres, glass, acrylic, polyester and some natural fibres such as sisal, jute, cellulose etc. are also used. From the above stated fibres, glass fibre is gaining additional popularity day by day. Glass fibre is a lightweight, very strong, and robust material. Glass fibre reinforced concrete (GFRC) does not fail immediately under load but yields gradually nevertheless in cement and concrete tensile failure begins with micro cracks. Cracks propagate quickly and cause destruction. The key of this accepted behavior of GFRC is due to randomly distribution of tiny glass fibres in it whereas uniform distributed fibres expand the loads in a wide range and let the matrix to behave cohesive. The existence of glass fibres provides crack arresting system.

- (i) to explore the utilization of glass fibre in concrete,
- (ii) to view the effect of glass fibre reinforced concrete on physical, mechanical and performance behavior.

Glass fibre and its properties Glass fibre are also famous with name of Glass wool or Fibre Glass. It was invented by Russell Games Slayter of Owen Corning. It is not durable and rigid as carbon fibre but it is economical than carbon fibre. It was primarily invented for thermal insulation but now it is used in different areas. Glass fibre is made when thin strands of silica based glass are extruded from suitable opening. Different types of Glass fibre are manufactured in market such A-glass, E-glass etc.



GLASS FIBRE

The glass fiber reinforced concrete usually finds applications in following construction works:

- Building renovation works
- Water and drainage works

- Bridge and tunnel lining panels
- Permanent formwork
- Architectural cladding
- Acoustic barriers and screens

Properties of Glass Fiber Reinforced Concrete

Addition of glass fibres of about 10% by volume increased the tensile strength by roughly two times, and the impact resistance by about 10 times. The cyclic loading tests conducted on glass fibre cement laminates showed fatigue resistance of Glass fiber reinforced concrete (GFRC) roughly comparable with that of Steel fiber reinforced concrete (SFRC).

- Thermal Glass fibers are useful thermal insulators because of their high ratio of surface area to weight. However, the increased surface area makes them much more susceptible to chemical attack. By trapping air within them, blocks of glass fiber make good thermal insulation, with a thermal conductivity of the order of $0.05 \text{ W / (m}\cdot\text{K)}$.

Tensile The strength of glass is usually tested and reported for “virgin” or pristine fibers—those that have just been manufactured. The freshest, thinnest fibers are the strongest because the thinner fibers are more ductile.

BENEFITS OF GLASS FIBER REINFORCED CONCRETE (GFRC)

There are lots of good to use GFRC for thin sections of concrete:

- **Lighterweight:** With GFRC, concrete can be cast in thinner sections and is therefore as much as 75% lighter than similar pieces cast with traditional concrete. According to Jeff Girard’s blog post titled, The Benefits of Using a GFRC Mix for Countertops, a concrete countertop can be 1-inch thick with GFRC rather than 2 inches thick when using conventional steel reinforcement.
- **High strength:** GFRC can have flexural strength as high as 4000 psi and it has a very high strength- to-weight ratio.
- **Reinforcement:** Since GFRC is reinforced internally, there is no need for other kinds of reinforcement, which can be difficult to place into complex shapes.
- **Consolidation:** For sprayed GFRC, no vibration is needed. For poured, GFRC, vibration or rollers are easy to use to achieve consolidation.
- **Equipment:** Expensive equipment is not needed for poured or vibrated GFRC with a face coat; for sprayed GFRC, equipment generally costs about Rs. 50,000.
- **Toughness:** GFRC doesn’t crack easily—it can be cut without chipping.
- **Surface finish:** Because it is sprayed on, the surface has no bug holes or voids.
- **Adaptability:** Sprayed or poured into a mold, GFRC can adapt to nearly any complex shape, from rocks to fine ornamental details.
- **Durability:** According to ACI 544.1R-96, State of the Art Report on Fiber Reinforced Concrete, “The strength of fully-aged GFRC composites will decrease to about 40 percent of the initial strength prior to aging.” Michael Driver, division manager with Nippon Electric Glass, a major manufacturer of AR glass fibers, disagrees. “There’s never a durability issue. Water can’t get in— there are no cracks— and that’s a durable material. GFRC will outlast precast concrete, cast stone, even some natural stone.” Durability has been increased through the use of low alkaline cements and pozzolana.
- **Sustainable:** Because it uses less cement than equivalent concrete and also often uses significant quantities of recycled materials (as a pozzolana), GFRC qualifies as sustainable.

CONCLUSIONS

As the concrete is poor in taking tension so to improve its tensile strength we can add glass fibres due to which the filaments of glass fibre will not separate the particles of concrete. The adding of glass fibres into the concrete mixture slightly improves the compressive strength at 28 days. It is observed from the experimental results, that the compressive strength of concrete, flexural strength of concrete, splitting tensile strength of concrete increases with addition of Percentage of glass fibers.

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19. LINGUISTICS

0419218 CHAUBEY, N P (5 Iswar Saran Ashram Campus, Prayagraj 211004). भारतीय भाषा और भारतीय विज्ञान

भाषा और विज्ञान में गहरा सहसम्बन्ध है। भाषा के विकास के साथ-साथ ज्ञान-विज्ञान का भी विकास होता है। अपनी भाषा से हासिल ज्ञान-विज्ञान से मनुष्य अपना परिवार, अपना समुदाय, अपना समाज, अपनी संस्कृति से अपने को जोड़ता है। अपनी भाषा से कटने का मतलब है ज्ञान-विज्ञान विहीन होना, अपने परिवार, समुदाय, समाज, संस्कृति आदि से कटना। इस सार को समझने की वजह से ब्रिटिश सरकार ने मैकाले की संस्तुति पर भारत में अंग्रेजी में ब्रिटिश शिक्षा तंत्र को विकसित किया। मैकाले का मानना था जब तक भारतीय अपनी भाषा में सीखना बन्द नहीं करेंगे तब तक उन्हें गुलाम बनाकर उन पर राज करना सम्भव नहीं है। अंग्रेजी में शिक्षा पाने पर शिक्षित भारतीय अपने परिवार, समुदाय, समाज और संस्कृति से कट जायेगा। वह अपनी संस्कृति से घृणा करेगा और ब्रिटिश आचार-व्यवहार सीखने पर गर्व की अनुभूति करेगा। इस प्रकार से ब्रिटिश हजारों वर्ष तक भारत पर राज्य कर सकेंगे। 'गले में टाई' बाँधते ही वह ब्रिटिश न होते हुए भी ब्रिटिश होने का भरसक प्रयास करेगा।

इस बात को विद्वान भारतीय समझते थे। भारत में अनेक विकसित-भाषा है: हिन्दी, बंगाली, तमिल, तेलगू, मलयाली, कन्नड़, मराठी, गुजराती, उर्दू, असमी आदि, आदि। भारतीय मनीषियों के विरोध के बावजूद भारत में अंग्रेजी शिक्षा तंत्र का विकास हुआ। आशा थी कि आज़ादी के बाद अंग्रेजी शिक्षा तंत्र खत्म हो जायेगा, परन्तु आज तक ऐसा नहीं हुआ। बल्कि भारतीय भाषाओं में शिक्षा तंत्र का मुहिम मर गया।

अतएव आज सभी भारतीय भाषा पिछले 400 वर्ष में जो विज्ञान विकसित हुआ है, उससे वंचित है। प्रथम 200 वर्ष तक ब्रिटिश ने भारतीय भाषाओं को विज्ञान से वंचित किया और 15 अगस्त 1947 में ब्रिटिश हुकूमत से मुक्ति पाने के बाद राष्ट्र-भक्त लोकतांत्रिक सरकारों ने ब्रिटिश अंग्रेजी शिक्षा तंत्र को जीवित रखकर किया। प्रश्न उठता है: क्यों?

15 अगस्त 1947 के पहले और बाद में भारतीय भाषा में शिक्षा की माँग सभी भारतीय कर रहे थे। जिन लोगों ने लोकतांत्रिक भारत की बागडोर सम्भाला वे भी इस माँग में शामिल थे और वादा करते थे। आज़ादी के बाद अनेक कमीशन गठित हुए और सभी कमीशन अपनी संस्तुति को अंग्रेजी में लिखे। देश का संविधान भी अंग्रेजी में लिखा गया। ब्रिटिश के तर्ज पर सारे कानून अंग्रेजी में लिखे गये। यद्यपि अधिकांश लोकसभा के सदस्यों को अंग्रेजी नहीं आती थी और आज भी नहीं आती, पर लोकसभा के सारे प्रस्ताव अंग्रेजी में पारित होते रहे। इसी तरह से भारतीय न्याय व्यवस्था, प्रशासन, स्कूल और विश्वविद्यालय अंग्रेजी में काम करते रहे।

यहाँ दो प्रश्न उठता है:

1. प्रथम इसका क्या परिणाम हुआ?
2. द्वितीय ऐसा क्यों हुआ?

प्रथम प्रश्न का उत्तर सरल और साफ है:

भारतीय-भाषा आधुनिक विज्ञान विहीन हो गये। आज न हिन्दी में विज्ञान है, न बंगाली में, न तमिल में, न तेलगू में, न कन्नड़ में, न मराठी-गुजराती में, न उर्दू में, न असमी में। विज्ञान विहीन भाषा मर जाती है। भाषा के मरने पर लोग अज्ञानी और अन्धविश्वासी हो जाते हैं। उनकी संरचनात्मकता मर जाती है और दूसरों के विज्ञान और प्रौद्योगिकी पर निर्भर करते हैं। अतएव उनकी आर्थिक विपन्नता के साथ-साथ उनका परिवार, समुदाय, समाज आदि टूट जाते हैं। उनका एक दूसरे से लड़ाना और उनकी जल-जमीन-जायदाद को छीनना आसान। वे लोकतंत्र में अपनी मलकियत का दावा नहीं कर पाते। चोर-उचक्के, अपराधी उनके नेता बन बैठते हैं। उनका सेवक मालिक बन जाते हैं और वे अपने सेवक का नौकर अर्थात् वे वेदीन हो जाते हैं। इसका क्या प्रमाण है?

सबसे बड़ा प्रमाण यह है कि 90% से अधिक भारतीय जनता जल-जंगल-जमीन से वंचित पशुवत जीवन बिता रही हैं जबकि 4.4% भारतीयों का 85% भारत के कुल धन पर कब्जा है। इनमें से मात्र 103 लोगों का 70% भारत के कुल धन पर कब्जा है और मात्र 19 लोगों का 3% भारत के कुल धन पर मलकियत है। भारी संख्या में लोग कुपोषण जनित रोगों और भूख से प्रतिदिन मरते रहते हैं। न रहने का घर, न पहनने का कपड़ा और न खाने का अन्न, पर अंग्रेज बनने का बढ़ता सपना। आये दिन मालिक और पुलिस इन्हें मारती रहती है। बहुत सारी स्वयं सेवी संस्थाएँ इनकी सेवा के नाम पर मालोमाल होती दिखती हैं। जब किसी राजनैतिक दल को किसी को बड़ा नेता सिद्ध करना होता है तो इन्हें कुछ खाने-पीने और मुफ्त में बस में ले जाने का प्रलोभन देकर माफिया इन्हें नेता जी की बैठक में ले जाते हैं। जब ये स्वतन्त्रता, बराबरी की माँग करते हैं तो या तो सरकार में बैठे इनके सेवक इन पर गोली चलाते हैं या इन्हें गंगा में नहाने पर स्वर्ग में खीर-पूड़ी मुफ्त में देने के नाम पर सलाह देते हैं।

अभी कोरोना वायरस के फैलाव की स्थिति को ले लीजिए। कोरोना प्रभावित देशों में फँसे मध्यम और उच्च वर्ग के 25 लाख लोगों को तालाबन्दी के पहले भारत सरकार में विशेष जहाज स्वदेश लाया और वगैर किसी पाबन्दी को उन्हें अपने-अपने घर भेजने का इन्तजाम किया। पर करोड़ों श्रम पर जीने वाले लोगों को बम्बई, बंगलौर, पुणे, अहमदाबाद, जयपुर, दिल्ली, हैदराबाद, मुरादाबाद, चेन्नई, तिरुवनन्तपुरम आदि शहरों से अपने-अपने गाँव जाने की बस, रेल, टैक्सी आदि की व्यवस्था नहीं किया। बल्कि वगैर पूर्व सूचना के और वगैर लोकसभा की अनुमति के 1897 के ब्रिटिश कानून का सहारा लेकर पूरे देश में तालाबन्दी घोषित कर दिया। कालान्तर में राष्ट्रीय विपदा प्रबन्धन कानून 2005 के अनुसार इस तालाबन्दी को जायज ठहराया।

अंग्रेजी में शिक्षा का विज्ञान पर क्या प्रभाव पड़ा? इसका उत्तर सरल है, पर समझना कठिन। आज भारत में विज्ञान नहीं के बराबर है। भारतीय विज्ञान में जो भी अनुसंधान होता है वह अमेरिकी-यूरोपीय विज्ञान का नकल और पोषक मात्र है। आज भारत पूर्णरूपेण अमेरिकी-विज्ञान और प्रौद्योगिकी पर निर्भर है। विश्वविद्यालयों में विज्ञान की पढ़ाई बहुत खराब होती है। आज तक जो भारतीय विज्ञान में शोध हुआ है, वह किसी भी भारतीय भाषा में उपलब्ध नहीं है। भारत की गरीब जनता की गाढ़ी कमाई का हजारों करोड़ विज्ञान के नाम पर खर्च होता है, पर फायदा अमेरिका-यूरोप उठाता है।

सन् 1961-1970 के बीच भारी संख्या में इलाहाबाद विश्वविद्यालय के अध्यापक ठीक से अंग्रेजी में पढ़ा नहीं पा रहे थे। अन्य विश्वविद्यालयों के अध्यापकों की अंग्रेजी क्षमता इससे भी खराब थी। लेकिन जब भारतीय भाषा में विज्ञान पढ़ाने का सवाल उठता था तब सब एक स्वर में यह कहते सुने जाते थे: 'हिन्दी वैज्ञानिक भाषा नहीं है, इसलिए इसमें विज्ञान की पढ़ाई नहीं हो सकती। इसी तरह का तर्क इण्डियन साइन्स कांग्रेस में भाग लेने वाले विज्ञानी कहते सुने जाते थे।

प्रश्न उठता है: आज़ादी के बाद भारत सरकार ने अंग्रेजी शिक्षा तंत्र को क्यों बनाये रखा? इसका उत्तर किसी किताब में नहीं लिखा है। अनेक वर्षों के प्रयास के बाद सन् 1990 में मानव संसाधन विकास मंत्रालय के एक वरिष्ठ अधिकारी से यह पता चला कि विज्ञान का भारतीय भाषा में पठन-पाठन और अनुसंधान न करने की नीति है। कुछ वर्ष बाद एक दूसरे अधिकारी से यह पता चला कि जो लोग चुनने के बाद मंत्री बनते हैं उन्हें यह भय होता है कि भारतीय भाषा में अच्छी विज्ञान की शिक्षा से लोग उन्हें नहीं चुनेंगे।

अन्तिम सवाल: क्या विज्ञानी भारतीय भाषा में विज्ञान की शोध पत्रिका और शोध पुस्तक लिखने और प्रकाशित करने का प्रयास नहीं कर सकते थे?

उत्तर है-हाँ कर सकते थे और बहुतों ने किया भी। लेकिन उनका प्रभावकारी फैलाव नहीं हो सका। क्यों? क्योंकि लोकतांत्रिक सरकारें इस प्रकार की पहल का समर्थन नहीं करती थीं। प्रत्येक राज्य में साहित्य ग्रन्थ अकादमी है। ये सभी कविता, कहानी, उपन्यास का राज्य की भाषा में प्रकाशन करते हैं, विज्ञान की नहीं। विश्वविद्यालय अनुदान आयोग भारतीय भाषा में वैज्ञानिक शोध पत्रिकाओं के प्रकाशन को बढ़ावा नहीं देता।

यहाँ सभी भारतीयों को यह जानना चाहिए कि जिन देशों ने विकास किया है वहाँ शिक्षा और वैज्ञानिक अनुसंधान उनकी भाषा में होती है। जर्मनी में जर्मन, फ्रांस में फ्रेंच, ब्रिटेन में अंग्रेजी, स्पेन में स्पैनिश, रूस में रूसी, चीन में चीनी, जापान में जापानी भाषा में शोध होता है। संयुक्त राज्य अमेरिका में 3000 भाषा बोलने वालों को मारने के बाद यूरोपीय डाकुओं ने अपना वर्चस्व स्थापित किया था। चूँकि काफी समय तक अमेरिका ब्रिटेन का गुलाम था, वहाँ की शिक्षा अंग्रेजी में है। पर विभिन्न भाषा-भाषी अमेरिकी अंग्रेजी शिक्षा तंत्र का निरन्तर विरोध करते रहते हैं। खूबी यह है कि अमेरिकी प्रेस इसका प्रसार नहीं करता।

यहाँ यह प्रश्न उठ सकता है: अनेक भाषा-भाषी अमेरिका विज्ञान में क्यों आगे हैं? उत्तर सरल है, पर समझना कठिन। वास्तव में संयुक्त राज्य अमेरिका अपने आन्तरिक बल पर विज्ञान में दुनिया में आगे नहीं है। द्वितीय विश्वयुद्ध के दौरान यूरोप से खासकर जर्मनी से भागे विज्ञानियों ने अमेरिका को विज्ञान में अग्रणी बनाया। तब से अमेरिका ने दुनिया भर में 'मस्तिष्क-बहिर्गमन' (Brain- Drain) प्रक्रिया को बढ़ाकर मेधावी होनहार विज्ञानियों को खरीदना शुरू किया। इसी कारण अमेरिका विज्ञान में आगे है न कि अपने आन्तरिक मानवीय संसाधनों के वजह से है। आज अमेरिकी शिक्षा तंत्र गहरे संकट में है। नित्य प्रतिदिन संकट गहरा रहा है। पर बाहरी दुनिया इस संकट से अनभिज्ञ है।

PART V

THEMATIC PANEL

18. SCIENCE COMMUNICATION AND SCIENCE POPULARIZATION

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फिर से लोकतांत्रिक भारत में विज्ञान और आस्था (**Science and Belief**) के बीच संघर्ष तेज हो गया है। मध्यकालीन भारत में इस प्रकार का संघर्ष हुआ था। आस्था की जीत के कारण भारत यूरोप से प्राचीन काल में आगे होते हुए भी विज्ञान में पीछे हो गया था। आस्था के समर्थकों ने विज्ञानियों को प्रताड़ित किया था। औषधि विज्ञान के विज्ञानियों को यमराज का सगा भाई कहकर (यमराज सहोदरः) अपमानित किया था। आस्था के पुजारियों ने 'विज्ञान' को अविद्या और अविज्ञान (मीमांसा) को विद्या कहकर आस्था को मुक्तिदायी बताया था (या विद्या विमुक्तये)।

विज्ञान और आस्था के बीच में लड़ाई 2600 वर्ष पूर्व शुरू हुई। अपने राज-पाट को छोड़कर गौतम बुद्ध ने दुःख से मुक्ति की विधि की खोज 32 वर्ष तक की थी। वे नगरे-नगरे, द्वारे-द्वारे 32 वर्ष तक भटकते रहे। अन्त में उन्हें पता चला कि सारे दुःखों का कारण 'धन-संचय' (परिग्रह) है। तब विज्ञान आज जैसा विकसित नहीं हुआ था और न ही आज जैसा धनसंचय कुछ बड़े-बड़े उद्योगपतियों के हाथ में हुआ था। तब कार्ल मार्क्स, गैलेलियो, न्यूटन, चार्ल्स डार्विन, आइन्सटीन, भी पैदा नहीं हुए थे। उस समय समाज का धन छोटे राजाओं और व्यापारियों के हाथ में संचित होता था। जब सारनाथ से गौतम बुद्ध ने 'परिग्रह' (धन संचय) के विरोध में अपरिग्रह (धन न संचय करना) का प्रचार करना शुरू किया और इस बारे में राजाओं को पता चला तब राजाओं ने उन्हें सारनाथ छोड़ने के लिए मजबूर किया। 78 साल के बूढ़े गौतम बुद्ध को बनारस छोड़कर अपने राज्य की शरण लेनी पड़ी। कहा जाता है कि कुशीनगर पहुँचते-पहुँचते गौतम बुद्ध की मृत्यु हो गयी। गौतम बुद्ध की मृत्यु के साथ-साथ भारत से गौतम बुद्ध का अपरिग्रह सिद्धान्त भी गायब हो गया। कालान्तर में गौतम बुद्ध का ज्ञान बौद्ध धर्म बन गया। जिस गौतम बुद्ध ने भगवान में आस्था नहीं किया था वह स्वयं भगवान बुद्ध बन गये। लोग 'बुद्धम् शरणं गच्छामि, धम्मम् शरणं गच्छामि' का पाठ करने लगे।

पन्द्रह सौ वर्ष बाद आदि शंकराचार्य ने एक नयी आस्था की दीवार खड़ी की। उन्होंने इस संसार को मिथ्या/असत्य और ब्रह्म (**God**) को सत्य कहा (ब्रह्म सत्यम् जगत् मिथ्या)। यद्यपि बनारस के विज्ञानियों ने शंकराचार्य को गलत सिद्ध कर दिया, फिर भी शंकराचार्य का झूठ राजाओं की मदद से फलता-फूलता रहा। जब कबीर ने सत्रहवीं सदी में इसका विरोध किया तो शंकराचार्य के समर्थकों ने उनके घर में आग लगा दी। कबीर के घर को जलते सभी ने देखा, पर कोई आग बुझाने आगे नहीं आया। अन्त में बेघरबार बूढ़े कबीर को मरने के लिए बनारस से मगहर भागना पड़ा। तबसे 'कबीरा खड़ा बाजार में' कहावत बन गयी।

सबसे दारुण कथा नालंदा और तक्षशिला विश्वविद्यालयों की है। सम्भवतः भारत दुनिया का पहला देश था जहाँ तक्षशिला और नालन्दा विश्वविद्यालय विज्ञान के केन्द्र थे, पर आस्था के भक्तों ने भारत से विज्ञान का समूल नाश करने हेतु तक्षशिला और नालन्दा विश्वविद्यालय में आग लगा दी।

फलस्वरूप भारत विज्ञान में दुनियाँ से पीछे हो गया और अन्त में ब्रिटेन का गुलाम बन गया। मुगल काल के अन्तिम चरण में भारत ब्रिटेन का गुलाम बन गया। प्रथम चरण में ईस्ट इण्डिया कम्पनी का प्रभुत्व रहा। उस काल में बनारस में 'काशी करवट' स्वर्ग जाने का मार्ग हुआ करता था। जो धनी अपनी पत्नी के साथ स्वर्ग का आनन्द भोगना चाहते थे उन्हें सज्जधज कर काशी करवट लगाना पड़ता था। विश्वनाथ मन्दिर के तहखाने से एक नाला गंगा में मिलता था। नाले में धारीदार फर्श होता था। जो लोग उसमें करवट लगा कर स्वर्ग यात्रा पर निकलते थे, उनको करवट लगाते चलना पड़ता था। नाले के छोर पर पहुँचते तक वे मर जाते थे। वहाँ पर नियुक्त व्यक्ति उनके शरीर से सोना-चाँदी-रूपया-पैसा निकालकर फेंक देते थे। कहा जाता है इसका दूसरा रूप रोम के चर्च में प्रचलित था। वहाँ पोप स्वर्ग जाने वाले भक्तों को टिकट देता था। जब अंग्रेजों को काशी करवट के बारे में पता चला तो उन्होंने इसे बन्द कर दिया। आजकल काशी करवट का दूसरा नाम 'काशी परिक्रमा' है।

कालान्तर में जब अंग्रेजों के समझ में आया कि भारत में लूट की प्रशासन को कायम रखने के लिए आस्था महत्वपूर्ण और प्रभावशाली औजार बन सकती है, तब उन्होंने भारतीय विज्ञान को नष्ट करने और आस्था को सुनियोजित ढंग से सींचने का संकल्प किया। अंग्रेजी के जरिए शिक्षा और धार्मिक संगठनों को राजकीय प्रत्यक्ष और अप्रत्यक्ष रूप से बढ़ावा देना, आजादी की लड़ाई लड़ने वाले समूहों को कुचलने के लिए ऐसे राजनैतिक संगठनों को बढ़ाना जो धर्म, जाति, लिंग, भाषा के आधार पर भारतीय विरोधी जनता में फूट डाल सके। 'बाँटों और शासन करो' (**Divide and Rule**) इसी का प्रचलित नाम है। शासन लूट-खसोट, मारपीट का पर्यायवाची है। हिन्दू सभा, मुस्लिम लीग, जमात, राष्ट्रीय स्वयं सेवक संघ, इण्डियन नेशनल पार्टी आदि अनेक प्रकार के संगठन खड़े हुए। ये सब अपने अपने ढंग से ब्रिटिश काल में आस्था-आजादी की भारतीय संघर्ष रत जनता को याद दिलाते रहे। जनता को आजादी के नारे में मिली आस्था की घूँटी नहीं दिखती थी। 'वैष्णव जन तो तेणे कहिए, पीर परायी जाणे रे' के समर्थक गाँधी जी 'रघुपति राघव राजाराम' का गान करने लगे।

अंग्रेजों ने कलकत्ता, मद्रास, बम्बई, इलाहाबाद और दिल्ली में विश्वविद्यालय खोला। जमींदारों, धनिकों के लड़के ब्रिटेन के कैम्ब्रिज, आक्सफोर्ड विद्यालय पढ़ने जाते थे और लौटने पर इनमें कुछ इन्हीं विश्वविद्यालयों में पढ़ाते थे। इनमें से जब कोई विज्ञान में अनुसंधान करने की सुविधा का माँग करता था, तो अंग्रेज वाइस चान्सलर यह कहकर कि अनुसंधान इंग्लैण्ड में होता है न कि भारत में उनको चुप करा दिया करता था। कहा जाता है कि रिसर्च के लिए एक कमरे की माँग को ठुकरा दिये जाने के बाद जगदीशचन्द्र बोस ने अपने घर में प्रयोगशाला स्थापित किया। धीरे-धीरे कुछ भारतीय विज्ञानी खोज करना शुरू कर दिये। उनमें 'जगदीशचन्द्र बोस, प्रफुल्लचन्द्र राय, महेन्द्र लाल सरकार, मेघनाद साहा, एस. सी. बोस, एन. आर. धर, सी. वी. रमण, रामानुजम आदि प्रचलित हैं। अंग्रेज और अंग्रेजी हुकूमत के समर्थक इतिहासकारों ने 'भारत में कभी विज्ञान नहीं था का व्यापक रूप से प्रचार किया। परन्तु कालान्तर में धर्मपाल, कौशाम्बी, देवीप्रसाद चट्टोपाध्याय जैसे अनेक भारतीय विद्वानों ने इसका खण्डन किया। यहाँ इसका विशद वर्णन न तो सम्भव है और न ही समीचीन।

ब्रिटेन से आजादी हासिल करने के बाद पंडित जवाहरलाल नेहरू ने पंचवर्षीय योजना के जरिये भारत के विकास का नया रास्ता ढूँढ़ा। उनके अमेरिकी सलाहकारों ने बताया कि भारत के लोग 'दूसरी दुनियाँ' में विश्वास करते हैं जिसके वजह से भारत का विकास कठिन है। अतएव पण्डित नेहरू ने ब्रिटिश स्थापित वैज्ञानिक शोध संस्थानों का पुनर्गठन किया, आई.आई. टी. और नये विश्वविद्यालय की स्थापना प्रारम्भ किया। भारत की संसद ने 1958 में वैज्ञानिक नीति प्रस्ताव (**Scientific Policy Research or SPR**) पारित किया। नेहरू द्वारा वैज्ञानिक दृष्टिकोण या स्वभाव (**Scientific Temper**) का प्रचार-प्रसार शुरू हो गया। इस प्रकार से नये सिरे से आस्था और विज्ञान में आजाद भारत में फिर से संघर्ष प्रारम्भ हो गया।

अमेरिकी सरकार ने आग में घी डालने का काम किया। गुप्त रूप से 'हिन्दू सभा' को 'विश्व हिन्दू परिषद्' में बदल दिया। राष्ट्रीय स्वयं सेवक संघ और जमात को अपना संगठन बना दिया। महेश श्रीवास्तव को ट्रान्सडेन्टल मेडिटेशन (**Transdental Meditation**, दूसरी दुनियाँ का ध्यान) का महान प्रणेता बना दिया। वे विश्वविख्यात महर्षि हो गये। देखते-देखते वे अरबों की सम्पत्ति के मालिक बन गये। 'सेक्स के द्वारा भगवान' के संस्थापक रजनीश श्रीवास्तव को भगवान रजनीश बना दिया। अन्तर्राष्ट्रीय श्रीकृष्ण मिशन की स्थापना हो गयी। पी. आर. सरकार को सशस्त्र क्रान्ति के द्वारा 'आनन्द मार्ग' का संस्थापक बना दिया। योगासन के नाम पर रामदेव यादव 'बाबा रामदेव' बन गये। पतंजलि का नाम बेंचकर बाबा रामदेव 10-15 हजार करोड़ के मालिक बन बैठे। आजकल सभी टी. वी. चैनलों पर वे छाये हैं। आशाराम बापू, राम रहीम, श्री श्री रवि शंकर तथा हजारों छोटे-बड़े बाबा इसी राह पर चलकर स्वर्गीय सुख का आनन्द ले रहे हैं। इन सबका एक ही काम है भारतीय जनता को विज्ञान विरोधी और आस्था समर्थक बनाकर देशी-विदेशी पूँजीपतियों के लूट में सहायता करना।

प्रो. जी. सी. पाण्डे इतिहास के प्रकाण्ड विद्वान् थे। वे कई विश्वविद्यालय के कुलपति रह चुके थे और भारतीय समाज विज्ञान अकादमी के अध्यक्ष थे। एक दिन बात-चीत के दौरान उन्होंने यह बताया कि तथाकथित ऋषि-मुनि-योगी वैसा नहीं थे, जैसा बताया जाता है। वास्तव में भारतीय ऋषि-मुनि-योगी चरित्रहीन, असत्यवादी और हिंसक एवं छल कपट, मारपीट में माहिर होते थे। तब लेखक को इस पर विश्वास नहीं हुआ था।

खुले में कांग्रेस की सरकार धर्मनिरपेक्षता और वैज्ञानिक दृष्टिकोण का प्रचार करती और गुप्त रूप से जन संघ, आर. एस. एस., विश्व हिन्दू परिषद्, शिवसेना, बहुजन दल, आनन्द मार्ग, श्रीकृष्ण अन्तर्राष्ट्रीय मिशन आदि के जरिए आस्था को बढ़ावा देती है। फिर से 'मुँह में राम बगल में छूरी' तथा 'राम नाम जपना पराया माल अपना' का साम्राज्य लोकतांत्रिक भारत में बढ़ने लगा। विज्ञानियों का स्थान 'कारसेवकों' ने ले लिया। आस्था का हाइड्रोजन बम बनाया गया। इसका सबसे बड़ा धमाका 1992 में बाबरी मस्जिद पर हुआ। फिर क्या पूछना था, जिधर देखो राम रथ पर सवार लालकृष्ण आडवाणी, चक्रधारी सारथी नरेन्द्र मोदी, बाँसुरी बजाते मुरली मनोहर जोशी, नृत्य करती साध्वी उमाभारती जैसी अप्सराओं का समूह और कारसेवकों की सेना। 'जित देखो तित लाल।' आस्था से निकली केशरिया धूल से भारत का समूचा आसमान भर उठा। दिन रात हो गया, रात दिन।

आज लोकतांत्रिक भारत में चारों तरफ 'आस्था' का बोलबाला है। पिछले वर्षों में ऐसे तीन विज्ञानी मारे जा चुके हैं जो 20-30 वर्ष से भारत में विज्ञान का प्रसार कर रहे थे। एक प्रसिद्ध कलाकार को नंगे देवी-देवताओं के चित्रण के लिए भारत से भागना पड़ा और अन्त में उनकी मृत्यु विदेश में ही हुई थी। अब ऐसा कोई बड़ा विज्ञानी नहीं है जो खुलकर आस्था का विरोध कर सके। स्कूल, कॉलेज और विश्वविद्यालय के अध्यापक, हेडमास्टर, प्राचार्य, प्रोफेसर, कुलपति आदि सभी 'आस्था न कि विज्ञान' के भक्त हैं। राष्ट्रीय विज्ञान प्रौद्योगिकी संचार परिषद् विज्ञान के बजाय योग और आस्था के प्रचार-प्रसार में लग गयी। 'वैज्ञानिक दृष्टिकोण' भारतीय विज्ञान से ओझल हो गया। 'वैज्ञानिक दृष्टिकोण' भारतीय विज्ञान से ओझल हो गया। यही बात भारत की लोकसभा, राज्य सभा, सरकार आदि पर लागू होती है। कभी-कभार कुछ लोग भारतीय संविधान में चर्चित 'वैज्ञानिक दृष्टिकोण' (**Scientific Temper**) का जिक्र करते दिखते हैं।

प्रश्न उठता है: आस्था क्या है? विज्ञान क्या है? आस्था और विज्ञान में क्या अन्तर है? कैसे अमेरिका ने आस्था को बढ़ावा देकर भारत जैसे देशों के विज्ञान को नष्ट किया? भारत की जनता ने क्यों नहीं आस्था का विरोध किया? आदि, आदि।

विज्ञान का अर्थ है किसी वस्तु, चीज, व्यक्ति, समूह, समाज का वस्तुनिष्ठ ज्ञान। जो है, जैसा है उसका ज्ञान विज्ञान है। जो नहीं है, उसका ज्ञान विज्ञान नहीं मीमांसा है। पृथ्वी पर पृथ्वी के नीचे, पृथ्वी के ऊपर, पृथ्वी के दायें-बायें, आगे-पीछे जो कुछ

भी है का सही ज्ञान विज्ञान है। जो कुछ पृथ्वी पर, भीतर, आगे-पीछे और ऊपर है उसे पदार्थ कहते हैं। अतएव विज्ञान का ज्ञान पदार्थात्मक है। किसी भी पदार्थ/वस्तु के बारे में तीन सवाल उठता है:

1. यह क्या है?
2. यह कैसे है?
3. यह क्यों है?

किसी भी निर्जीव या सजीव पदार्थ के बारे में क्या, कैसे और क्यों का सही उत्तर विज्ञान है। चूँकि वस्तु/पदार्थ/व्यक्ति/समाज/देश/दुनियाँ निरन्तर बदलती रहती है, इसलिए विज्ञान का ज्ञान भी बदलता रहता है। विज्ञान का ज्ञान अनेक व्यक्तियों के सामूहिक, मानसिक और शारीरिक श्रम से पैदा होता है। अतएव विज्ञान सार्वजनिक है। इस प्रकार के ज्ञान की पुष्टि सम्भव है। जिस ज्ञान की पुष्टि न की जा सके उसे विज्ञान नहीं कहते हैं। कोई भी, कभी भी, किसी विज्ञान के ज्ञान को चुनौती दे सकता है और उसे गलत सिद्ध कर सकता है। अविज्ञान या मीमांसा के ज्ञान को कोई चुनौती नहीं दे सकता। इसमें पण्डित/मुल्ला/मौलवी/पादरी-पोप जो कहते हैं उसे सत्य मानना पड़ता है। इस ज्ञान के अनुयायी पहले इस दुनियाँ में जो कुछ है को नकारते हैं (नेति नेति, It is not, it is not) और फिर जो नहीं है उसके होने के ज्ञान को सही ज्ञान बताते हैं। जिस पत्थर सोना, चाँदी को ये मिथ्या कहते हैं उसी से भगवान राम, कृष्ण की मूर्ति तराशते हैं। पत्थर से शिव लिंग बनाते हैं और लोग दूध पीने के बजाय शिवलिंग को दूध से नहलाते हैं। कुछ वर्ष पूर्व 'शिवलिंग दूध पीता है' का देशव्यापी बड़ा तमाशा हुआ था।

यहाँ एक घटना का वर्णन समीचीन लगता है। जब यह लेखक आठ वर्ष का था तब एक दिन उसकी माँ ने पूजा घर में पूजा करने के लिए कहा। उस दिन उसके दोनों बड़े भाई घर पर नहीं थे। माँ-भाभी वगैर पूजा के भोजन नहीं कर सकती थीं। बच्चों के भोजन पर कोई प्रतिबन्ध नहीं था। माँ के निर्देशन में बालक लेखक ने पूजा-अर्चना की। शंख बजाने में मजा भी आया। पूजा खत्म होने के बाद बालक ने माँ से पूछा: वहाँ तो सब पत्थर रखे थे। ये पत्थर हमारे घर के सामने की नदी में मिलते हैं। यहाँ कोई भगवान नहीं दिखा। माँ ने कहा: हाँ ये वही पत्थर हैं जो तुम नदी में देख रहे थे। उनका अन्तिम वाक्य था 'मानो तो देव नहीं तो पत्थर'। यह वाक्य आज भी लेखक के कान में गूँजता है। बालक लेखक के पिता जी उसी दिन मरे थे जिस दिन उसकी माँ व्रत रखी थी। तब से उन्होंने व्रत रखना बन्द कर दिया था।

यहाँ यह प्रश्न पूछा जा सकता है: क्या सचमुच में भारत के लोग अन्धविश्वासी आस्थावान हैं? इसका उत्तर ढूँढ़ने के पहले एक घटना का वर्णन यथोचित लगता है। राष्ट्रीय विज्ञान एवं प्रौद्योगिकी परिषद् की पहलकदमी से लेखक ने लोकविज्ञान संचार संस्थान का जन शिक्षा परिषद् में एक बड़ा अनुसंधान प्रोजेक्ट का जिम्मा लिया था। इसी सिलसिले में लेखक सोनभद्र के दक्षिणांचल में स्थित अत्यन्त गरीब तहसील दुद्धी का भ्रमण किया। एक गाँव में एक सभा हुई। अधिकांश लोग गरीब जनजाति के थे और कुछ बनिया जाति के लोग थे। करीब 200-300 नवजवान, बूढ़े लोग बैठक में सम्मिलित थे, महिलायें भी थीं। बातचीत के दौरान लेखक ने पूछा: आप लोग भूत-प्रेत में क्यों विश्वास करते हैं? उनमें से एक 60 वर्ष से अधिक उम्र की महिला उठकर बोली: हमारे गाँव में कोई डॉक्टर नहीं है। जब हमारे परिवार में कोई बीमार हो जाता है तो हम क्या करें? मजबूरी में हमें ओझा, बैगा और पण्डित के पास जाना पड़ता है। आप हमारे गाँव में एक डॉक्टर दे दीजिए हम भूत-प्रेत भगाने वालों के पास नहीं जायेंगे। लेखक आश्चर्यचकित हो गया क्योंकि दिल्ली में राष्ट्रीय विज्ञान और प्रौद्योगिकी संचार परिषद् के लोग तथा अन्य बड़े विज्ञानी निरन्तर भारतीय जनता को अन्धविश्वासी बता रहे थे।

अतएव यह स्पष्ट है कि भारतीय जनता जो जीने के लिए अथक श्रम करती है, अन्धविश्वासी नहीं है। पर जो तंत्र उसको निरन्तर लूटती है, वह उसे अन्धविश्वासी, आस्थावान, काहिल, मूर्ख, जाहिल आदि से विभूषित करती रहती है।

यहाँ एक अन्य प्रश्न उठ सकता है: क्या भारत के विज्ञानी अन्धविश्वासी या आस्थावान हैं? इस प्रश्न का उत्तर ढूँढ़ने के पहले इलाहाबाद विश्वविद्यालय के भौतिकी विभाग में जो 1950 के दशक में प्रारम्भ हुआ और आज जो जवाहरलाल नेहरू विश्वविद्यालय में हो रहा है का संक्षेप में जिक्र प्रासंगिक लगता है। इलाहाबाद विश्वविद्यालय की स्थापना ब्रिटिश शासन काल में हुई थी और इसे लोग 'पूरब का आक्सफोर्ड' के उपनाम से जानते थे। भौतिकी विभाग इस विश्वविद्यालय का सबसे अच्छा विभाग माना जाता था। प्रोफेसर मेघनाथ साहा इस विभाग के संस्थापकों में से थे। प्रो. कृष्णन, प्रो. कोठारी, प्रो. मेनन आदि अनेक मूर्धन्य भौतिक विज्ञानी इससे जुड़े थे। 1950-1960 के दशक में प्रो. राजेन्द्र सिंह, प्रो. मुरली मनोहर जोशी के प्रवेश से विभाग का कलेवर बदल गया। धीरे-धीरे प्रो. राजेन्द्र सिंह (रज्जू भैया) इस विभाग के विधाता बन गये जो बी.एस.सी. और एम.एस.सी. के छात्र राष्ट्रीय स्वयं सेवक संघ की शाखा में प्रतिदिन भाग लेते उन्हें परीक्षा में अच्छे अंक मिलते थे और उनकी पी-एच. डी. एवं नियुक्ति में वरीयता दी जाती थी। इसी क्रम में प्रो. मुरली मनोहर जोशी भारतीय जनता दल के अध्यक्ष बने, आड़वाणी के रथ पर सवार होकर बाबारी मस्जिद को ध्वस्त किये और भारत के विज्ञान एवं प्रौद्योगिकी तथा शिक्षा मंत्रालय के मंत्री बने। देखते-देखते अध्यापक से वे करोड़पति नेता बन गये। इसी विभाग के प्रो. कृष्णा जी और आई. ई. आर. टी. (I.E.R.T.) इलाहाबाद पॉलीटेक्निक के निदेशक अवकाश पाने पर महर्षि महेश योगी के आश्रम कई वर्षों तक तपस्या किये। कालान्तर में प्रो. आर. आर. यादव जो संघ के बड़े प्रचारक थे, विश्व हिन्दू परिषद् के अध्यक्ष अशोक सिंहल की कृपा से इस विभाग में प्रवेश किये और पूर्वांचल विश्वविद्यालय के कुलपति (वाइसचान्सलर) बने। इसके विपरीत प्रो. नरसिंहम, बंगलौर लगातार आस्था, अन्धविश्वास का विरोध करते रहे। विज्ञान में न्यूक्लियर भौतिकी की नौकरी छोड़कर डॉ. एम. पी. परमेश्वरन ने केरल शास्त्र साहित्य परिषद् (KSSP) ने विज्ञान के प्रसार के लिए स्थापना की। उन्होंने और भारी संख्या में उनके जैसे विज्ञानियों ने आस्था के खिलाफ

विज्ञान का प्रचार-प्रसार किया। प्रो. अनिल सद् गोपाल, डॉ. विनोद रैना और अनेक विज्ञानियों ने मध्यप्रदेश में एकलव्य की स्थापना की। वैज्ञानिक दृष्टिकोण का प्रचार-प्रसार के लिए राष्ट्रीय स्तर पर विज्ञान जत्था का आयोजन होने लगा। कालान्तर में देशव्यापी साक्षरता अभियान प्रारम्भ हुआ। यहाँ यह उल्लेख करना आवश्यक है कि 12 प्रतिष्ठित विज्ञानियों की बैठक में 'वैज्ञानिक दृष्टिकोण' को बढ़ाने पर प्रस्ताव पारित हुआ था। इसमें प्रो. यशपाल, प्रो. बी.एम. उद्गाँवकर, प्रो. पी.एम. भार्गव, प्रो. ए. रहमान आदि जैसे विज्ञानी सम्मिलित थे। इसी प्रस्ताव के अनुकूल जब प्रो. यशपाल विज्ञान और प्रौद्योगिकी विभाग के सचिव हुए तब 'राष्ट्रीय विज्ञान और प्रौद्योगिकी' संचार परिषद् (National Science and Technology Council) की स्थापना हुई।

उपर्युक्त वर्णन से यह स्पष्ट है कि सभी विज्ञानी आस्था या अन्धविश्वास के समर्थक नहीं होते। जो विज्ञानी कम, राजनीतिज्ञ अधिक होते हैं वे 'आस्था' के प्रचार-प्रसार के जरिए अपना आर्थिक, सामाजिक जीवन को अच्छा बनाने में लगाते हैं। विज्ञान की उपाधि (डिग्री) इसमें सहायक होती है। इसका मतलब भारत जैसे देश में सही अर्थ में विज्ञानियों की संख्या बहुत कम है। स्कूल, कॉलेज और विश्वविद्यालयों में विज्ञान की पढ़ाई अत्यन्त दोषपूर्ण। विज्ञान की पढ़ाई कैसी हो, राजनीति तय करती है न कि विज्ञानी। प्रो. कृष्ण कुमार के काल में राष्ट्रीय शिक्षा अनुसंधान एवं प्रशिक्षण परिषद् ने विज्ञान शिक्षा पाठ्यक्रम तैयार किया था। वह कालान्तर में खत्म हो गया। आज केरल शास्त्र साहित्य परिषद् (KSSP), एकलव्य और साक्षरता अभियान भी प्रभावहीन हो गये। अब आस्था के वगैर कोई भारत में विज्ञानी नहीं हो सकता।

यहाँ एक घटना का वर्णन समस्या को समझने में मदद कर सकता है। बात 1985-86 की है जब लेखक दिल्ली में रहता था। राष्ट्रीय विज्ञान और प्रौद्योगिकी संचार परिषद् के सलाहकार-अध्यक्ष, डॉ. नरेन्द्र सहगल थे। उनसे लेखक की अच्छी मित्रता थी। भारत में सरकार की ओर से विज्ञान के प्रचार-प्रसार में उनका अकथनीय योगदान है। एक दिन उन्होंने लेखक को वैज्ञानिक दृष्टिकोण का वैज्ञानिक अध्ययन करने हेतु एक रिसर्च प्रोजेक्ट तैयार करने के लिए कहा। प्रो. रामकृष्ण मुखर्जी भारतीय समाज विज्ञान के अध्यक्ष थे और समाज विज्ञान में उनका विश्वभर में नाम था। वे इण्डियन स्टैटिस्टिकल संस्थान के निदेशक रह चुके थे। लेखक ने उनके साथ मिलकर एक शोध प्रस्ताव डॉ. नरेन्द्र सहगल को सौंपा। एक महीने बाद डॉ. सहगल ने अपने सलाहकारों से बैठक करायी। सलाहकारों को प्रोजेक्ट अच्छा लगा था। पर बैठक में 'ईश्वर में आस्था' की चर्चा को हटाने का सुझाव दिया गया। प्रो. मुखर्जी इस प्रस्ताव से सहमत नहीं थे। डॉ. सहगल ने इस मामले को हल करने के लिए डॉ. आचार्य को कहा। डॉ. आचार्य सहमत नहीं हुए। अन्त में प्रो. मुखर्जी और मैंने शोध प्रस्ताव को वापस ले लिया।

अब एक दूसरा सवाल पूछा जा सकता है: क्या योरोप और अमेरिका के विज्ञानी आस्थायान् या अन्धविश्वासी नहीं हैं? इसका सही उत्तर देना सम्भव नहीं है क्योंकि लेखक कभी योरोप-अमेरिका नहीं गया। जो लेखक को जानकारी उपलब्ध है उसके आधार पर कहा जा सकता है कि भारी संख्या में योरोपीय-अमेरिकी विज्ञानी न तो अन्धविश्वासी दिखते हैं और न ही ईश्वर में आस्था रखते दिखते हैं। पर वे दूसरे प्रकार के अन्धविश्वासी हैं। वे राजनीति जनित बाजार-विज्ञान में अन्धी आस्था रखते दिखते हैं। योरोप और अमेरिका में विज्ञान और आस्था के मिश्रण के दो सूक्ष्म मार्ग दिखते हैं। प्रथम मार्ग का नाम **Reductionist/Positivist** विज्ञान का है। दूसरा मार्ग **Modernism Post-Modernism** का है। इसका यहाँ विशद वर्णन सम्भव नहीं है।

विश्वास (Belief) आस्था का पर्यायवाची है। इसका वैज्ञानिक अध्ययन आधुनिक मनोविज्ञान में हुआ है। मनोविज्ञान में इसे अभिवृत्ति (Attitude) कहते हैं। सर्वप्रथम 1910-1930 के बीच अभिवृत्ति का वैज्ञानिक अध्ययन हुआ। यह पता चला कि 'अभिवृत्ति' कोई स्वतंत्र मनोवैज्ञानिक प्रक्रिया नहीं है। अतएव अभिवृत्ति पर 1930-1950 के बीच वैज्ञानिक अध्ययन बन्द हो गया। द्वितीय विश्व युद्ध के अन्त में अमेरिका के सामने एक विचित्र समस्या पैदा हुई। समाजवादी विरोधी अमेरिकी सेना के लोग सोवियत संघ के जेल से रिहा होकर जब अमेरिका लौटे तो वे सोवियत संघ के समाजवाद के समर्थक बन गये थे। इसी तरह से चीन से लौटे सी. आई. ए. के कार्यकर्ताओं में परिवर्तन देखने को मिला। इसे अमेरिकी शब्दावली में 'मस्तिष्क धोना' (Brain Washing) कहा गया और अमेरिकी मनोविज्ञान में इस विषय पर गुप्त अनुसंधान प्रारम्भ हो गया। 1950 के बाद पुनः मनोविज्ञान में 'अभिवृत्ति' पर अमेरिका में अनुसंधान होने लगा। येल विश्वविद्यालय (Yale University) के मनोविज्ञानियों को यह कार्यभार सौंपा गया। 'अभिवृत्ति और अभिवृत्ति परिवर्तन' पर विश्वव्यापी अनुसंधान 1950-1970 के बीच हुआ। 'अभिवृत्ति' परिवर्तन के सिद्धान्त विकसित हुए। इसका यहाँ विशद वर्णन सम्भव नहीं है।

वृहद् अनुसंधान के बाद यह पता चला कि अभिवृत्ति के तीन पक्ष हैं:-

1. ज्ञान (Knowledge)
2. भाव (Emotion or Affect)
3. कार्य या व्यवहार

विश्वास, आस्था, रूढ़ि (Stereotype), पूर्वाग्रह, (Prejudice) सामाजिक दूरी आदि अभिवृत्ति के विभिन्न नाम हैं।

जिस समाज में व्यक्ति पैदा होता, बड़ा होता और जीता है, उस समाज और दुनियाँ का वैज्ञानिक ज्ञान होने पर उसकी अभिवृत्ति, विश्वास वैज्ञानिक होते हैं और ऐसी मनोदशा को वैज्ञानिक स्वभाव (Scientific Temper) या वैज्ञानिक दृष्टिकोण (Scientific Outlook) कहते हैं। इसमें पालन-पोषण और शिक्षा की महत्वपूर्ण भूमिका है। ऐसे दृष्टिकोण या अभिवृत्ति में पूर्वाग्रह, अन्धविश्वास, रूढ़ि आदि का कोई स्थान नहीं होता है। परन्तु न तो दुनियाँ में किसी समाज या देश का वैज्ञानिक ज्ञान के

आधार पर गठन हुआ है और न ही सभी को वैज्ञानिक शिक्षा समान रूप से दी जाती है। हर देश, हर समाज में निरन्तर अवैज्ञानिक शिक्षा का दिन-रात प्रचार-प्रसार होता है। ऐसी स्थिति में अन्धविश्वास या आस्था का पैदा होना, विकसित होना, फलना-फूलना स्वाभाविक है। यह समस्या और तब गम्भीर हो जाती है जब देश-समाज दो या दो से अधिक खेमों में बँट जाता है। एक खेमे में धनी/ताकतवर और दूसरे खेमे में मेहनतकश किसान-मजदूर/ताकतवर खेमा का हित लोगों में अज्ञान और अन्धविश्वास बढ़ाने में होता है। बाजार का वह मालिक होता है। विज्ञापन के जरिए और विद्यालयों-विश्वविद्यालयों में अवैज्ञानिक शिक्षा के जरिए वह आस्था या अवैज्ञानिक अभिवृत्ति को मजबूत करने के लिए दिन-रात काम करता है। आज टी. वी. चैनल 24 x 7 के जरिए इसी काम को करते हैं। मन्दिर, मस्जिद, चर्च भी इस काम को बखूबी से करते हैं।

अमेरिका ने बखूबी से 'मस्तिष्क धोना' (**Brain Washing**) अनुसंधान का सोवियत संघ में समाजवाद को ध्वस्त करने और दुनियाँ भर के लोगों में अन्धविश्वास मजबूत करने का काम किया। राजनीति, शिक्षा, विज्ञापन, जनता में अन्धविश्वास/आस्था पैदा करने और गुमराह करने के आज सबसे अधिक प्रभावशाली औजार हैं। आस्था के जरिए भारी संख्या में जनता को गुमराह के पथ पर ले जाना अत्यन्त सरल है। वर्तमान भारत में 'गुमराह' राजनीति का पर्यायवाची बन गया है। भारत में विज्ञान इतना कमजोर हो गया है कि विज्ञान और आस्था के बीच संघर्ष भारतीय विज्ञानियों को नहीं दिखता और जिन्हें दिखता है वे 'लिखा न भाग वैदेही विवाहु' कहकर चुप्पी साध लेते हैं। चुप्पी में ही उन्हें अपनी भलाई दिखती है। 'चेरि छोड़ि होउब नहिं रानी' का सभी बुद्धिमान ख्याल रखते हैं। आज भारतीय जनता 'होइहैं वही जो राम रचि राखा' और 'राम नाम सत्य है' पर भरोसा करने के अतिरिक्त और कोई उपाय नहीं है।

एक और सवाल: क्या विज्ञान-विहीन आस्थावान महान भारत सचमुच अपनी आर्थिक, सामाजिक, सांस्कृतिक समस्याओं का हल करके आत्मनिर्भर दुनियाँ का सबसे बड़ा देश और विश्वगुरु बन सकेगा? इस प्रश्न का उत्तर कौन देगा? शायद दो तरह के लोग इसका उत्तर दे सकेंगे: प्रथम आस्था के प्रहरी राम भक्त-योग गुरु-सर्व द्रष्टा और उनके योद्धा इस प्रश्न का सही उत्तर दे सकेंगे। उनमें भारत के लोगों की निःशर्त आस्था बनी रहनी चाहिए। दूसरा महान कार्य भारत के किसान-मजदूर-बेरोजगार नवजवान जो आज सड़क पर हैं और जिनका अस्तित्व खतरे में है।

यहाँ उपनिषद् काल में प्रचलित कहावत का उल्लेख करना उचित लगता है। उपनिषद् काल में विज्ञान और मीमांसा का संघर्ष पैदा हो गया था, परन्तु आज की तरह सशक्त नहीं हुआ था। एक विज्ञान के समर्थक ऋषि ने अपने लड़के को मीमांसा/आस्था के ऋषि के आश्रम में शिक्षा के लिए भेजा। जब शिक्षा पूरी करने के बाद उनका लड़का घर वापस आया तो उन्होंने उससे पूछा: सत्य क्या है? लड़के ने उत्तर दिया: भगवान सत्य है। पिता ने कहा इसे सिद्ध करो। पिता ने कहा आज से तुम खाना तब तक नहीं खाओगे जब तक तुम यह सिद्ध नहीं कर देते हो कि भगवान सत्य है। प्रतिदिन शाम को पिता उस सवाल को पूछता था। इस प्रकार चार दिन बीत गये। पाँचवें दिन जब पिता ने पूछा: क्या सत्य है? पुत्र ने कहा: भूख सत्य है, भगवान सत्य नहीं है। फिर पिता ने उसे भोजन दिया। तबसे भारत में यह कहावत: 'भूखे भजन न होई भुवाला' प्रचलित है।

अब आखिर में यह पूछा जा सकता है: आस्था बनाम अन्धविश्वास के कौन माता-पिता हैं? क्या आस्था/अन्धविश्वास का निदान है? उत्तर साफ है, पर समझना कठिन: धन आस्था की जननी (माता-पिता हैं)। धर्म और धन में गहरा घनात्मक सहसम्बन्ध है, राज्य धन-धर्म का सबसे बड़ा रखवाला है। आस्था का निदान सम्भव है पर अत्यन्त दुरुह/कठिन। धन-विहीन विज्ञान युक्त समाज/संसार की रचना से आस्था/अन्धविश्वास का अन्त सम्भव है। पर धन विहीन विज्ञान सम्मत बराबरी, आजादी और भाईचारे के सिद्धान्त पर नया समाज/नयी दुनियाँ की रचना असम्भव नहीं तो अत्यन्त दुरुह/कठिन अवश्य है। करुणानिधान कोरोना ने यह साफ कर दिया है। वर्तमान विश्व विज्ञानी, दार्शनिक, शिक्षक, समाज सेवी, पूँजीतंत्र के गुलाम हैं। वे इससे हटकर सोचने के लिए तैयार नहीं दिखते। मजदूर-किसान के संगठन भी इस तरह की सोच करते नहीं दिखते। विश्वविद्यालयों, महाविद्यालयों, विद्यालयों को भ्रष्टाचार ने निगल लिया है। पर ऐसा नहीं है कि पृथ्वी वीरों से पूर्णरूपेण खाली हो गयी है और भीगे नयनों से पृथ्वी के प्रलय को देखने के बजाय कोई उपाय नहीं है। जो लोग पृथ्वी की विनाश लीला में भाग नहीं ले रहे हैं और जो पृथ्वी को विनाश से बचाकर हरी-भरी देखना चाहते हैं, उन्हें प्राचीन, मध्यकालीन भारत के विज्ञानियों से सीखना चाहिए। विज्ञान का मार्ग कंटकाकीर्ण, अत्यन्त जोखिम भरा है। इस मार्ग पर चलने पर दुःख ही दुःख है, भारत रत्न या नोबेल पुरस्कार की कोई सम्भावना नहीं है। सुदामा, एकलव्य, शम्बूक, गौतम बुद्ध, तुलसीदास, सूरदास, कबीर, गलिलियो, मार्क्स, गाँधी, ईसामसीह, हजरत मुहम्मद आदि की कहानी इसका गवाह है। भारत में विज्ञानियों को प्रारम्भ में पण्डित कहा जाता था। जो ज्ञानवान होता था उसे पण्डित तब कहा जाता था जब वह समदर्शी (सबको बराबर, न कोई छोटा न कोई बड़ा) समझता और गाय और हाथी की तरह सीधा (सरल) होता था और अपने श्रम पर जीता था:—

**विद्या विनय सम्पन्ने, ब्राह्मणे गवि हस्तिनी।
सुनिश्चैव, स्वपाके च पण्डिताः समदर्शिनी।**

ब्राह्मण कोई जाति नहीं थी, बल्कि जो ब्रह्माण्ड का ज्ञान ढूँढ़ता था वह ब्राह्मण और अपने ज्ञान के अनुकूल व्यवहार करने पर पण्डित कहा जाता था। सिद्धान्त या वैज्ञानिक ज्ञान और व्यवहार (**Theory and Praxis**) के बीच में गहरा सम्बन्ध आवश्यक था। जो ज्ञान/सिद्धान्त और व्यवहार में अपने व्यवहार से सह-सम्बन्ध नहीं दिखा पाता था उसे 'मूर्ख पण्डित' कहा

जाता था। पंचतंत्र में वर्णित 'चार मूर्ख पण्डितों' की कहानी (चत्वारः मूर्ख पण्डितः) इसी को दर्शाती है। पर अंग्रेजी शिक्षा के साथ यह गायब हो गया।

भारत के विज्ञानियों/पण्डितों ने ज्ञान और धन, ज्ञान और व्यवहार, धन और धर्म के बीच के सम्बन्ध को भी ढूँढ़ा था।

विद्या ददाति विनयम्, विनयात् याति पात्रताम्

पात्रत्वाद् धनमाप्नोति, धनाद् धर्मः ततः सुखम्॥

जब जो लोग धनी होने पर लोगों को सताने लगे तब भारत के पण्डितों ने न धनी बनने की अभिलाषा का त्याग कर भिक्षा पर जीने का मार्ग चुना। ब्राह्मण धन केवल भिक्षा। पर ब्रिटिश लुटेरों ने ब्राह्मण जिसके पास कोई धन नहीं था, उसे भारत में जाति-पाँति के बीच विभेदन का स्रोत कहा। आज भी आजाद भारत के शासक इस झूठ को अनेक प्रकार से प्रचार करते रहते हैं। ऐसे लोगों के बारे में तुलसीदास ने 'ममता पाई काहि मद नाहि' कहा था।

प्रश्न है: क्या आधुनिक विश्व खासकर भारत के विज्ञानी धन की अभिलाषा का परित्याग कर एक नयी दुनियाँ/नया भारत का वैज्ञानिक ज्ञान के आधार पर रचना करना पसन्द करेंगे?

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