YOJANA

TECHNOLOGY

FOCUS
Industry 4.0
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Atmanirbhar Bharat

The Prime Minister in his address on 12th May 2020 gave a call for self-reliant India. The definition of self-reliance has undergone a change in the globalised world and he clarified that when the country talks about self-reliance, it is different from being self-centered. He said that India's culture considers the world as one family, and progress in India is part of, and also contributes to, progress in the whole world. He noted that the world trusts that India has a lot to contribute towards the development of the entire humanity.

Five pillars of self-reliant India

Self-Reliant India will stand on five pillars viz. **Economy**, which brings in quantum jump and not incremental change; **Infrastructure**, which should become the identity of India; **System**, based on 21st century technology driven arrangements; **Vibrant Demography**, which is our source of energy for a self-reliant India; and **Demand**, whereby the strength of our demand and supply chain should be utilised to full capacity. He underlined the importance of strengthening all stakeholders in the supply chain to increase, as well as fulfill, the demand.

Atmanirbhar Bharat Abhiyan

The Prime Minister announced a special economic package and gave a clarion call for *Atmanirbhar Bharat*. He noted that this package, taken together with earlier announcements by the government during COVID-19 crisis and decisions taken by RBI, is to the tune of Rs. 20 lakh crore, which is equivalent to almost 10% of India's GDP. He said that the package will provide a much needed boost towards achieving 'Atmanirbhar Bharat'. He observed that the package will also focus on land, labour, liquidity and laws. It will cater to various sections including cottage industry, MSMEs, labourers, middle class, industries, among others.

Talking about the positive impact of reforms like JAM trinity and others, brought about in the last six years, Prime Minister said that several bold reforms are needed to make the country self-reliant, so that the impact of crisis such as COVID-19, can be negated in future. These reforms include supply chain reforms for agriculture, rational tax system, simple and clear laws, capable human resource and a strong financial system. These reforms will promote business, attract investment, and further strengthen Make in India.

Self-reliance will prepare the country for tough competition in the global supply chain, and it is important that the country wins this competition. The same has been kept in mind while preparing the package. It will not only increase efficiency in various sectors but also ensure quality.

Highlighting their contribution to the country, Prime Minister said that the package will also focus on empowering the poor, laborers, migrants, etc., both from organised and unorganised sectors.

He observed that the crisis has taught us the importance of local manufacturing, local market and local supply chains. ❑

Source: PMO

YOJANA seeks to provide a vibrant platform for discussion on matters of social and economic development of the country through in-depth analysis of these issues in the wider context of government policies. Although published by the Ministry of Information and Broadcasting, YOJANA is not restricted to expressing the official point of view.

IN THIS ISSUE

NEXT ISSUE: Self-Reliant India

e-Yojana

In spite of the COVID-19 pandemic, e-Yojana magazine published by the Publications Division is a fabulous achievement in this period of time in particular. As a UPSC aspirant, we always rely on the authenticated material, especially published by the Government of India. But e-Yojana is not in the PDF format. It sometimes takes much time to read side by side and then taking it down. So if possible, please provide a PDF version of magazine.

– Preet Tilva
preettilva4000@gmail.com

The Constitution Issue

I really like the issue, Constitution of India. The important aspects are covered very well. Also, the easy to understand writing style of writers is praiseworthy. I request you to please bring an issue on India's internal security. It can enable us to understand and appreciate the role of our security forces and the government's foreign policy in that regard.

– Priya Singh
booksandnotesofpriya@gmail.com

Rights & Duties

It's another wonderful and magnificent issue of Yojana magazine on Constitution of India. It provides us a deep understanding of our Constitution, from our fundamental rights to moral duties. As a citizen of India, we are not only liable to protect our rights but also have to be liable for the moral duties. I want to suggest that please also cover "social security and universal basic income" related topics in your upcoming issues. My enormous gratitude to Yojana team and intellectual authors.

– Biyaso Thakur
Chamba, Himachal Pradesh
biyasorajpoot08@gmail.com

An issue on 'Ethics'

I am always thankful to Yojana which gives me the complete and authentic knowledge about the concerned topic. I request you to publish an issue on "Ethics" meant not only for the aspiring civil servants but for all the regular readers so that they will also connect and also if possible publish a regular monthly magazine which is especially for those who are preparing for the government exams.

– Suraj Gupta
Muzaffarpur
surajdx2@gmail.com

Innovation & Scientific Development

I am a regular reader of Yojana and find it extremely useful. Every issue contains valuable information which is very specific in content. I would like to suggest the content for next month issue. It would be great to learn about innovation and scientific development in India in the past two decades. I would be extremely thankful for your cooperation.

– Shubham Kumar
shubhamrishu361@gmail.com

Polity & Governance

I'm a regular reader of Yojana (English). I'm preparing for UPSC and would like Yojana team to prepare a special issue on Polity and Politics (Governance) as the political fluctuations keep happening in India. It will be very helpful for PSIR.

– Prakash Mohan Singh
prakashmohansingh25@gmail.com

Government Initiatives

I am an aficionado of your esteemed magazine and have a suggestion which I request team Yojana to consider. Please publish a digest on the most successful government schemes till date. It would be of great help to economists, civil services aspirants and also to other policy makers who want a deep knowledge on policy formulation and implementation. I would also request you to publish another digest on schemes which failed because of improper implementation and how to avoid such failures in future.

– Omkaar Pattanayak
pattanayakomkaar@gmail.com

Women Empowerment

I am a civil service aspirant. I want to suggest that please cover "women empowerment" in your upcoming issue because a lot of government initiative have been taken in this regard in recent time apart from Supreme Court judgement. This will help UPSC aspirants as well as society.

– Abhiranjan Maddheshiya
Gorakhpur
abhiranjan5698@gmail.com

Helpful in Competitive Exams

I am a regular reader of Yojana. I would like to thank all the team members of Yojana for providing such lucid information. It helps me a lot in CSE UPSC preparation. This developmental magazine is also helpful for various other competitive exams.

– Mehrajuddin Parray
Tangmarg, Baramulla, J&K
mehrajudin92@gmail.com

Production Quality

I am a UPSC aspirant. The magazine proves very beneficial to me. The page quality is excellent.

The content is highly useful for us. Thank you for each and everything.

– Amar Darade
amardarade11@gmail.com

Technology as an enabler

For every generation, technology and its advent have a different meaning. Mass production was considered its ultimate use in the early industrial revolutions. In early nineties, it was seen bringing digital revolution through automation. Then came the World Wide Web which changed the paradigm of communication and technology. There is an entire generation of today which has seen an era without mobiles and computers which is hard to imagine now. How would the life be to scan through the shelves of library to look for something which is just an online search away these days? Those who have seen the days of telephone booth and STD/PCO centres have stories to share to the generation which is now dependant on the mobiles for its majority of needs.

In the scenario the world is encountering due to COVID-19, technology has become an integral part of our lives more than ever before. Be it the students having their online classes and taking exams at home, professionals working from home, mass production of the PPE kits or AI-enabled research and healthcare, it has proven to be the enabler in equipping humankind for this enormous challenge the world is facing.

The Industry 4.0 is paving way for intelligent technologies in automation and smart manufacturing through blockchain, robotics, cognitive computing. This would involve optimum utilisation of resources, lesser wastage with a circular approach leading to sustainable development, thus improving human lives.

Technology when coupled with innovation can provide solutions of immense possibilities. Government is fostering this in different sectors of the economy through initiatives like Atal Innovation Mission by providing platform and collaboration opportunities for different stakeholders.

The Government of India's ambitious Digital India Programme is aimed at transforming India into a digitally empowered society and knowledge economy. Also, this is allowing penetration of technologies in the rural India and taking development to the last miles. This has also led to need of localisation of content to reach the masses in a manner like never before. Developers have been able to simplify and augment user experiences and facilitate better productivity for Indian language users. IT organisations are now leveraging the power of artificial intelligence to enrich their products and make them more accessible to local language users. In the development sector, initiatives like real-time monitoring are allowing data collection and dissemination to cater to the most localised needs.

Technology has changed the way the world operates. It is saving lives by early-prediction of cyclones thus helping in disaster management, diagnosing and treating patients and in multitude of ways enabling us to lead better and secure lives. It is rightly said that first the humans shape technology and then the technology shapes their lives. ❑

Industry 4.0

Dr Ranjeet Mehta

The world is facing greater disruption, an increasing innovation pace and is caught up in a revolutionary period. The days of simple product innovation are dwindling. Technology, talent, and new innovation ecosystems are emerging; building greater complexities into our final innovation offerings. Intelligent automation and technology are fueling this new industrial revolution. And this unprecedented, exponential pace of change is increasingly reliant on collaborative platforms to realise the result which is more radical innovations.

We are in the midst of a significant transformation regarding the way we make products, thanks to the digitisation of manufacturing. This transition is so compelling that it is being called Industry 4.0 to represent the fourth revolution that has occurred in manufacturing. Industry 4.0 is signaling a change in the traditional manufacturing landscape. Also known as the Fourth Industrial Revolution, Industry 4.0 encompasses three technological trends driving this transformation: connectivity, intelligence and flexible automation.

From the beginning of civilisation, human beings have tried to increase their capacity and power. At first they were using equipment made of wood or rocks but with the advancement of science they explored modern and efficient equipment, and this process is going on. Machines are one of the greatest inventions of humans. Industrial revolutions have a huge impact on our society and they also affect the world economy.

The first industrial revolution came with the advent of mechanisation, steam power and water power. The second industrial revolution revolved around mass production and assembly lines using electricity. The third industrial revolution came with electronic and IT systems and automation. The fourth industrial revolution is associated with cyber-physical systems. Industry 4.0 describes the growing trend towards automation and data exchange in technology and processes within the manufacturing industry, including: The Internet of Things (IoT), The Industrial Internet of Things (IIoT), Cyber-physical Systems (CPS), Smart Manufacturing, Smart Factories, Cloud Computing, Additive Manufacturing, Big Data, Robotics, Cognitive Computing, Artificial Intelligence & Blockchain etc. This automation creates a manufacturing system whereby the machines in factories are augmented with wireless connectivity and sensors to monitor and visualise an entire production process and make autonomous decisions. It is further estimated that wireless connectivity and the augmentation of machines will be greatly advanced with the full rollout of 5G. This will provide faster response times, allowing for near

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real-time communication between systems.

The fourth industrial revolution also relates to digital twin technologies. These digital technologies can create virtual versions of real-world installations, processes and applications. This can then be robustly tested to make cost-effective decentralised decisions. These virtual copies can then be created in the real world and linked, via the Internet of Things allowing for cyber-physical systems to communicate and cooperate with each other and human staff to create a joined up real-time data exchange and automation process for Industry 4.0 manufacturing.

When computers were introduced in Industry 3.0, it was disruptive because of addition of an entirely new technology. As Industry 4.0 unfolds, computers are connected and communicate with one another to ultimately make decisions without human involvement. A combination of cyber-physical systems, the Internet of Things and the Internet of Systems make Industry 4.0 possible and the smart factory a reality. As a result of the support of smart machines that keep getting smarter as they get access to more data, our factories will become more efficient and productive and less wasteful. Ultimately, it is the network of these machines that are digitally connected with one another which create and share information that results in the true power of Industry 4.0.

Radical Pace of Innovation

We are connecting innovation more than ever before. Innovation is fundamentally undergoing a radical change. Wherever we turn in the manufacturing world, the technological revolution immerses us. The scale, scope, and complexity are things we have certainly never experienced. It is exposing us to exponential technologies. We seem to have caught up in such levels of
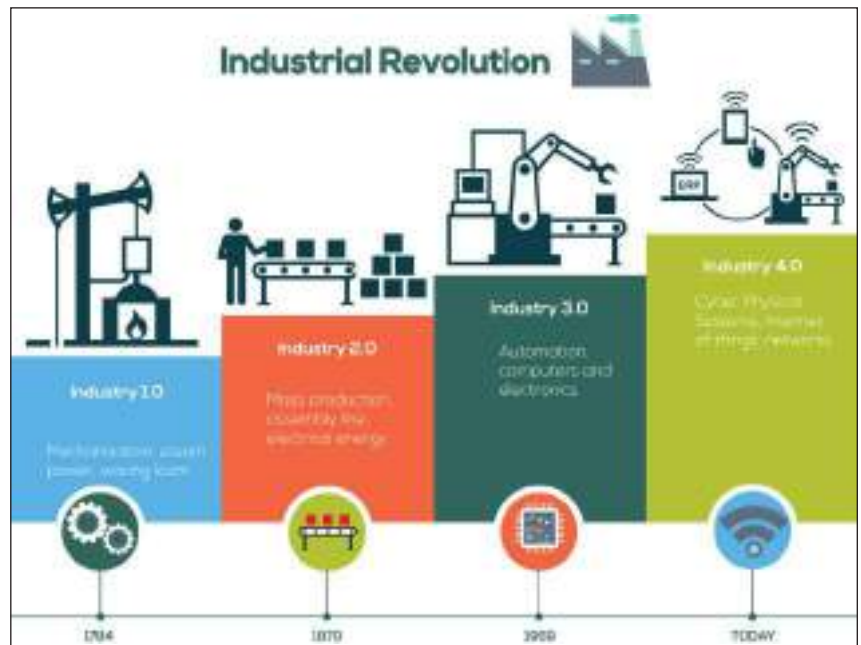
velocity, scope, and systems impact – it is seemingly exponential, occurring at faster rates of change. Companies are radically overhauling entire systems of production, management, and governance on a constant basis of change. We have unprecedented processing power, storage capacity, and access to various avenues of knowledge. These are being combined with emerging technology in fields such as artificial intelligence, robotics, 3D printing, nanotechnology,

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Industry 4.0 describes the growing trend towards automation and data exchange in technology and processes within the manufacturing industry, including: The Internet of Things (IoT), The Industrial Internet of Things (IIoT), Cyber-physical Systems (CPS), Smart Manufacturing, Smart Factories, Cloud Computing, Additive Manufacturing, Big Data, Robotics, Cognitive Computing, Artificial Intelligence & Blockchain.

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biotechnology, material science, and quantum computing. It is creating fresh challenges and opportunities within innovation.

The world is facing greater disruption and an increasing innovation pace and actually caught up in a very revolutionary period. The days of simple product innovation are dwindling. Currently, the technology, talent, and new innovation ecosystems are emerging; building greater complexities into our final innovation offerings. Intelligent automation and technology are fueling this new industrial revolution. And this unprecedented, exponential pace of change is increasingly reliant on collaborative platforms to realise the result which is more radical innovations.

Organisations everywhere are facing mounting pressure to transform–to shift from product-centric business models to new models focused on creating and capturing different sources of new value propositions. As a result, innovation is becoming more complex. We are looking increasingly to our engineers, designers, and scientists to unlock these new knowledge flows that bring us whole new areas of technological-

Aatmanirbhar Bharat Abhiyan
Ease of Doing Business for Corporates

➢ Improvement in rankings in 'starting a business' and 'insolvency resolution' have contributed to the overall improvement in India's ranking on EoDB.

➢ Further **key reforms** to include –

- Direct listing of securities by Indian public companies in permissible foreign jurisdictions.
- Private companies which list NCDs on stock exchanges not to be regarded as listed companies.
- Including the provisions of Part IXA (Producer Companies) of Companies Act, 1956 in Companies Act, 2013.
- Power to create additional/ specialized benches for NCLAT
- Lower penalties for all defaults for Small Companies, One-person Companies, Producer Companies & Start Ups.

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based innovation. Product innovation is continually giving way to new concepts that have technology built into them. Our innovation has become increasingly complex, connected, and contextual.

Industry value chains are being radically redesigned to accommodate connected worlds being more reliant on everything being digital. As we continue to design manufacturing to be fully connected-up, we can adjust faster, scale differently, and deliver quantities to varying cycles of demand, closer to the need of the day and more appealing to the customers. Our innovation scope changes with these new dynamics.

The customer is increasingly at the epicenter of the economy. The products and services are enhanced through the digital capabilities that boost their value and worth. New materials are making our assets more durable and resilient, and data and analytics provide valuable feedback needed to build even better services and performance for the future. Innovation is the unlocking mechanism.

Industry 4.0 is not only as relevant as it was before the global COVID-19 emergency; it is actually far more relevant moving forward. The world is gripped by the pandemic. The global supply chain is experiencing a level of disruption that has never been seen before. Some manufacturers have ceased production completely, some have seen greatly reduced demand and others have seen a huge increase in demand. Every manufacturer is impacted by this crisis in some way and for many this poses an existential threat.

The consequences of the fourth industrial revolution can be seen in the shifts of our emphasis taking place around innovation. Industry is focusing more on technological innovation. It is constantly looking at the changes to the existing business models to reflect these changes, and further integrating innovation systems to explore entirely new business models. We can say that innovation is becoming reliant on the fourth revolution and how it is all connecting all of us, to provide the future growth through greater collaboration. Recognising the transforming potential will revolutionise how we manage innovation going forward.

Emerging Digital Business Models

We need to appreciate new digital business models and their impact. We are increasingly reliant on digital engineering and science. There is scope to have radically different product development and processes to manage. These are multiplying by this rate of industrial change. The traditional supply chain has a very different potential when factories and operations become highly connected and start operating as Industry 4.0 entities.

The new business models will emerge from the way they can be operated, be responsive in the supply networks. All this requires digital management. As we connect more, the customer experiences can hugely benefit. We can target, sell, and market on greater connecting knowledge platforms. We can understand channel choice and provide more tailored pre-sales and post-sales support to manage the entire lifecycle as we continue to build the connected industry 4.0 ecosystems. Further, Blockchain technology is not only disrupting banking and finance, but it also has the potential to impact many industries and community as a whole. For instance, this technology can enable a car to respond as per the need by installing a digital wallet based on

Blockchain technology. This wallet works by logging all transactions made involving the vehicle, including maintenance, modifications, charging or filling up gas. It makes it possible to predetermine the total cost of ownership and calculate return on investment for the car on a very detailed level.

Industry 4.0 Post COVID-19

Industry 4.0 is not only as relevant as it was before the global COVID-19 emergency; it is actually far more relevant moving forward. The world is gripped by the pandemic. The global supply chain is experiencing a level of disruption that has never been seen before. Some manufacturers have ceased production completely, some have seen greatly reduced demand and others have seen a huge increase in demand. Every manufacturer is impacted by this crisis in some way and for many this poses an existential threat.

We have noticed during COVID-19 pandemic that how exhibitions are getting ready on

virtual spaces. How physical conferences are converting into digital webinars? Prior to the crisis, Industry 4.0 was an area of great interest to many manufacturers. At this point, it probably seems insensitive and inappropriate to discuss Industry 4.0 in the way it was discussed pre-crisis. The business drivers of Industry 4.0 pre-crisis were focused on competitive advantage, cost reduction, productivity, sustainability and innovation. The goal was to make smooth businesses to run better.

The focus for many manufacturers now is survival first and foremost and beyond that, damage limitation. The immediate financial impact on manufacturers is already resulting in a huge reduction in non-essential spending and investments. Many Industry 4.0 solutions currently being considered or being deployed fall into the category of non-essential business activities.

Now, the bigger question is-Is Industry 4.0 relevant anymore? If it

is relevant, why and what role does it have to play moving forward? We believe Industry 4.0 is not only as applicable as it was before but it is actually far more relevant moving forward. The priorities for most manufacturers today fall into three distinct Stages: Stage 1 – Survival; Stage 2 – Recovery; Stage 3 – Business as usual in the new post-crisis paradigm.

The goal for all manufacturers will be to get to Stage 3 as soon as possible at the lowest cost. In defining the operating model for Stage 3 they will factor-in lessons learnt from the crisis and try to build a more resilient and agile business. I believe one of the major weaknesses is a lack of real-time visibility across the business. Visibility that is essential to support critical business decisions. For example- What is the demand for products and where can we manufacture them? What are our current raw materials, work-in-progress and finished goods inventory levels? What is our manufacturing capacity, both in terms of human resources and asset availability?

Another key learning from the crisis will be driven by manufacturers' reliance on human capital and the impacts of social distancing. If we go one level deeper than the supply chain view, then manufacturing in particular will be highlighted as a big area for improvement. During the crisis, production plans would have been changing on a much higher frequency as a result of changing demands and availability of raw materials, key staff and assets. Manufacturing has a much higher volume and frequency of transaction than the supply chain.

COVID-19 is causing radical shifts in workflow across the globe as millions practise social distancing and comply with self-quarantine recommendations. The pandemic's dramatic appearance has accelerated numerous trends while slowing others. Although, there is no doubt

Aatmanirbhar Bharat Abhiyan

Other interventions for MSMEs

➢ e-market linkage for MSMEs to be promoted to act as a replacement for trade fairs and exhibitions.

➢ Fintech will be used to enhance transaction based lending using the data generated by the e-marketplace.

➢ MSME receivables from Gov and CPSEs to be released in 45 days

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that COVID-19 is a transformative force, it is not bringing us into Industry 5.0.

Although businesses have had reason to embrace digital workflows in the past, COVID-19 has provided another strong incentive to move towards a smart factory, complete with smart manufacturing or smart printing processes. While conventional wisdom says that a dedicated office space is required to maximise productivity but this theory is being put to the ultimate test during COVID-19.

COVID-19 Leading to Digital Transformation

The integration of digital infrastructure to streamline public health to respond to the COVID-19 pandemic is very crucial in the context of epidemic forecasting and decision-making, one such example in India is the Aarogya Setu app by Government of India. This application is official COVID-19 tracker. This explains that digital contact tracing is conferring a new form of immunity–digital immunity. The fastest scalable solution to India's COVID-19 challenge was to employ digital technology for diagnosis and for contact tracing. Aarogya Setu app can also be tapped for providing telemedicine, especially in remote parts, during this moment of crisis.

This digital infrastructure implementation increasingly fuels the digital transformation initiatives within an organisation as well. But due to the pandemic, the transition will see significant changes in industries especially in technology, food delivery services, customer service, and virtual events. In the present situation, we are seeing major occurrences worldwide, including soaring adoption of online services, an enormous requirement for internet services, and enhanced connectivity among industries, regardless of their sizes.

The impact of the COVID-19 pandemic has demonstrated the value of IT and digital transformation across industries and businesses and they must utilise this time to speed up the transition. It has been demonstrated in the enhanced corporate ability of long-distance collaborative work, wide recognition of the value of digital transformation and information technology among all employees, and the ability to market online and business development.

To conclude, in the time of Coronavirus crisis, Digital Industry 4.0 plays a vital role in envisioning and modeling outbreaks. As the pandemic continues to spread around the world, it will become imperative for organisations to look for new solutions or ways to stay ahead of the competition. Because most enterprises will fail to spot their financial targets due to supply-chain disruptions and lowered customer demand. The COVID-19 pandemic hit manufacturers in an unexpected and unprecedented way. For the first time in modern manufacturing history, demand, supply and workforce availability are affected globally at the same time. Social distancing and employee safety measures put an additional level of pressure on manufacturers, as 40-50% of their workforce will be unavailable to perform their functions on-site. While office employees and knowledge workers are able to shift to remote work as the default operating mode, most factories are simply not designed to be managed

remotely and lack the digital tools and infrastructure needed to support such activities.

However, this situation must be viewed as an opportunity and companies must focus on digital infrastructure. Organisations that adapt their technological capacity and investments on digital platforms can alleviate the impact of the COVID-19 and keep their businesses running in the long term. So, as companies move to become more digital, I believe they can drive more value in terms of customer experience as digital solutions enable business-customer relationships on screens rather than in person.

Going forward, many organisations may adopt remote-working agreements as strategies to reduce costs, improve productivity, and increase worker satisfaction. Many manufacturers are increasing efforts to equip their human workers with digital connected-worker tools that incorporate safety checks into workflows, ensure collaboration with colleagues when physical contact is off the cards, and other such processes that ultimately balance business continuity and employee health.

This is also the dawn of a new era where 'frontline' workers and desk workers are harmonised with tools that can support the flow of collaboration and data, where something that happens on the factory floor initiates a communication or workflow in the back office. Although, the concept of using connected-worker technology to empower workers around safety, quality and productivity may be heightened right now, it will still be just as critical to build business resiliency after this pandemic is over. What most of us consider normal has already fundamentally shifted. Manufacturers who understand and act on this new normal will have ample opportunities for growth in this era of Industry 4.0. ❑

AIM: Fostering Innovation

R Ramanan
Naman Agrawal
Himanshu Agrawal

India, as a country is surrounded with challenges that demand. The last few years have seen innovation in India reach a tipping point with the large-scale social innovations and now the big impact innovations in public service. Recognising this need, the Government of India has set up Atal Innovation Mission to promote a culture of innovation and entrepreneurship in the country.

The Rise of Social Entrepreneurship

Sustainable development is the practice of improving human life while protecting the environment. It is perhaps the most important and the most formidable long-term challenge that the world faces. Creative thinking has always been essential for improving national well-being. New inventions and innovations in agriculture, mass production, transportation and communication during the Industrial Revolution were largely responsible for proving Economist, Thomas Malthus wrong, who predicted that the world couldn't support an exponentially increasing population. In the same vein, today's inventors and innovators could very well prove wrong the skeptics who say that economic development and environmental protection cannot possibly go hand-in-hand.

While social entrepreneurs have existed since the beginning of time, the relatively recent surge of social entrepreneurship is part of a larger and more recent

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Atal Tinkering Lab (ATL)

context. It is emerging at a historical juncture, when the traditional distinctions between business and civil society organisations between who should provide public and private goods, are blurring.

Social entrepreneur is a creature of his or her time—a hybrid that combines the driving passion for improving a lot of excluded groups with the practical, innovative and opportunistic traits of the entrepreneur. Social entrepreneurs are focused on the delivery of public goods using business approaches. They are too busy finding the solutions that will allow all people to participate as active producers and consumers in the local, national and global economies.

India, The Innovator: Gathering Momentum

India, as a country is surrounded with challenges that demand. The last few years have seen innovation in India reach a tipping point with the emergence of innovative Indian companies, the large-scale social innovations and now the big impact innovations in public service. Social enterprises are beginning to leverage Innovation. SKS Microfinance[1] has successfully innovated on the Grameen Bank Microfinance Model. This Business Model Innovation has figured out a unique way to '*scale up*' the penetration and impact of a Microfinance organisation. SKS has acquired a membership of 5.7 million, across 16 States in 11 years.

Akshay Patra[2] is the world's largest NGO-run school meal program–it reaches 10 million children across five States of India, six-days a week. And they serve freshly cooked meals at Rs. 1.50 per meal. This was achieved through a 'technological Innovation: to prepare meals on large scale in a short time' and a 'logistics innovation-to reach the meals to the schools'. A number of other large

scale Innovations like Goonj[3]– creating rural value from urban waste in a manner that is mutually dignified and MV Foundation–a new way to take kids out of child labor and into schools are bringing through Non-linear solutions for the country's huge developmental challenges.
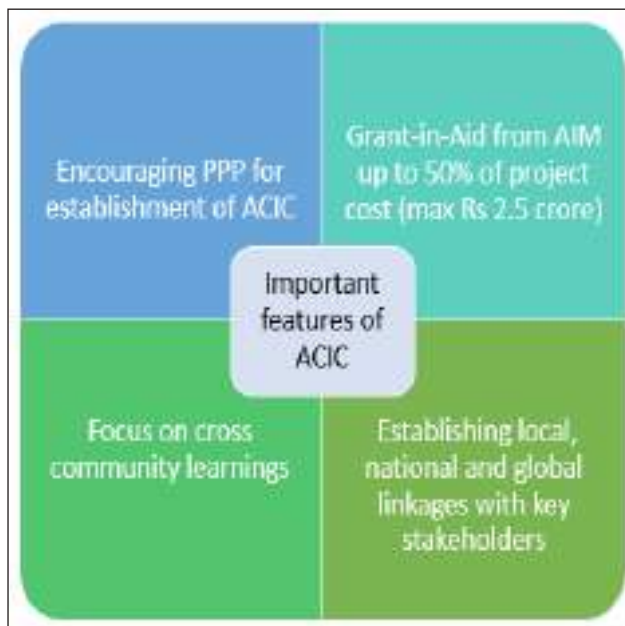
Atal Innovation Mission

Recognising this need, the Government of India has set up Atal Innovation Mission (AIM) to promote a culture of innovation and entrepreneurship in the country. AIM's objective is to develop new programmes and policies for fostering innovation in different sectors of the economy, provide platform and collaboration opportunities for different stakeholders, create awareness and create an umbrella structure to oversee innovation ecosystem of the country.

Six major initiatives taken in first year of its establishment:

- **Atal Tinkering Labs**- Creating problem-solving mindset across schools in India.

Important features of ACIC

- Encouraging PPP for establishment of ACIC
- Grant-in-Aid from AIM up to 50% of project cost (max Rs 2.5 crore)
- Focus on cross community learnings
- Establishing local, national and global linkages with key stakeholders

- **Atal Incubation Centres**- Fostering world-class startups and adding a new dimension to the incubator model.

- **Atal New India Challenges**- Fostering product innovations and aligning them to the needs of various sectors/ministries.

- **Mentor India Campaign**- A national Mentor network in collaboration with public sector, corporates and institutions, to support all the initiatives of the mission.

- **Atal Community Innovation Centre**- To stimulate community centric innovation and ideas in the unserved /underserved regions of the country including Tier 2 and Tier 3 cities.

- **ARISE**- To stimulate innovation and research in the MSME industry.

Initiatives under Atal Innovation Mission

1. **Atal Tinkering Labs - at School Level**

Over the last two years, AIM has launched the establishment of thousands of Atal Tinkering Labs enabling students from grade 6 to grade 12 to have access to and tinker with innovative tools and technologies like 3D printers, robotics, miniaturised electronics do-it-yourself kits, thus stimulating a problem solving innovative mindset to solve problems in the community they are in. Atal Tinkering Labs are being established in schools nationwide with 4880+ operational in 650+ districts and over 2 million students having access to ATLs.
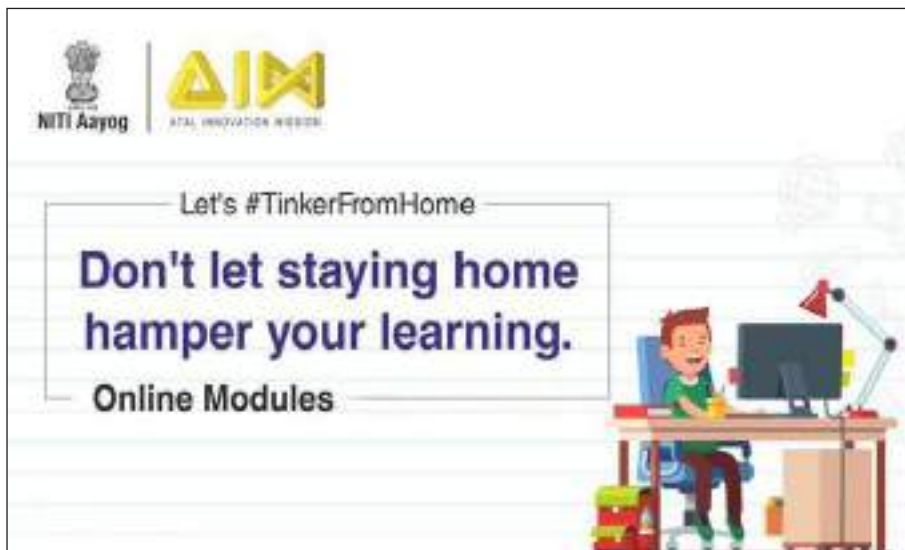
Some activities related to ATL Operational Excellence, Proactive Promotion of Innovation & Thought Leadership, Collaborations & Partnerships and New Initiatives by AIM:

- 2000+ ATL Teachers Trained with Corporate Partners.

- ATL Gandhian Challenge **-** launched in all schools along with UNICEF.

- India Stamp Creativity challenge- launched with UNICEF and India Post.

- PM India Innovative Learning DHRUV Program – AIM invited as key partner by MHRD.

- Russia AIM SIRIUS ATL Student Innovation Exchange finalised.

- Singapore Inspreneur 3.0 ATL showcasing of Top 6 Innovations.

2. **Atal Incubators at Universities, Institutions, Industry Level**

To promote creation of a supporting ecosystem for start-ups and entrepreneurs, AIM has been establishing world-class incubators called Atal Incubation Centres (AICs) in universities. Institutions, corporates, etc. that would foster world-class innovative start-ups and become scalable and sustainable enterprises. To date, AIM has selected 102 universities / institutions / private players to establish world class Incubators each of which will foster creation and nurturing of 40-50 world class Startups

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every four years. 50+ of them are already operational with 900+ operational Startups and the remaining will be operationalised during this year.

Some activities related to AIC Operational Excellence, Proactive Promotion of Innovation & Thought Leadership, Collaborations & Partnerships and New Initiatives by AIM:

- Indo French Knowledge Summit at Lyon **-** 5 AIC startups **-** received immediate funding interest by VCs.

- Youth-CoLab Sustainable Innovation Challenge along with UNDP–based on Gandhian Values.

- Entrepreneur World Cup National Innovation Challenge - CCAMP AIC Startup emerged as India winner.

- Ongoing discussions and interests expressed for Incubator and Startup collaborations by Indo German, Netherlands, Swedish, French, Australian Embassies, US India Business council, etc.

- Bill and Melinda Gates Foundation partnership in AIC/Startup Training.

- UNLEASH Startups Challenge with Netherlands embassy support.

3. **Atal Community Innovation Centres - Serving Unserved and Under-Served Regions of India**

To promote the benefits of technology led innovation to the unserved/ underserved regions of India including Tier 2, Tier 3 cities, aspirational districts, tribal, hilly and coastal areas, AIM is setting up Atal Community Innovation

Centres with a unique partnership driven model wherein AIM would grant up to Rs. 2.5 crore to an ACIC subject to a partner proving equal or greater matching funding. Over 300+ Applications have been received across the country and 50+ ACICs will be established during the next two years.

Some activities related to ACIC Operational Excellence, Proactive Promotion of Innovation & Thought Leadership, Collaborations & Partnerships and New Initiatives by AIM:

- 300+ Applications received to date and over 1300 registrations.

- 25 ACICs to be operationalised during FY2020-21.

4. **Atal New India Challenges - Product and Service Innovations with National Impact**

To create product and service innovations having national socio-economic impact, AIM has launched over 24 Atal New India Challenges in partnership with five different ministries and departments of central government. 52 winners have been selected for grant aid and hand holding by Incubators/mentors of AIM out of 950+ applications received for the same.

Some activities related to ANIC Operational Excellence, Proactive Promotion of Innovation & Thought Leadership, Collaborations & Partnerships and New Initiatives by AIM:

- 24 ANICs launched, 5 Ministries supported.

- 26 winners selected and announced for first tranche disbursement, 26 shortlisted for handholding with incubators for subsequent disbursement.

5. **Applied Research and Innovation for Small Enterprises (ARISE) - to Stimulate MSME Industry Innovation**

To promote innovation in a phased manner in the MSME/Start-up sector AIM will be launching ARISE along
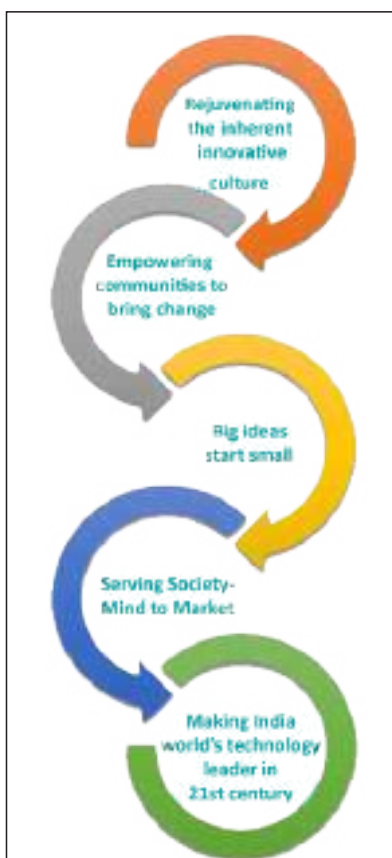
with partner Ministries so that great research ideas are converted to viable innovative prototypes followed by product development and commercial deployment.

6. Mentorship and Partnerships - with Public, Private sector, NGOs, Academia, Institutions

To enable all the initiatives to succeed, AIM has launched one of the largest mentor engagement and management program "Mentor India – The Mentors of Change".

To date, AIM has over 10000+ registrations nationwide on AIM with 4000+ of them allocated to ATLs and AICs. What's even more promising is that other government agencies are also leveraging Innovation for Inclusive Growth. The Defence Institute for High Altitude Research (DIHAR) in Ladakh has played an innovative and transformational role in accelerating the socio-economic development of Ladakh. Many initiatives like solar energy based low-cost Green Houses, zero energy-based storage have transformed the vegetable and animal productivity and output, and even raised the tree line above 13000 ft.

Additionally, the Government of Karnataka partnered with the Azim Premji Foundation to innovate primary education in government schools. They have instituted an innovative process to assess the school's capability to build student competencies rather than mere marks. This will lead to many more students passing out of primary school having acquired the basic competencies. The growing innovation momentum in Corporates, Social Enterprises, NGO's and government agencies is beginning to have a significant impact. More and more organisations have embedded Innovation cells into their organisation structure.

This reinforces our belief that 'Innovation is for India, what quality was for Japan; a transforming agent'. Let's build this momentum to the point it makes India the Innovation Capital of the world. ❑

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Social Media: The Force Multiplier

Amit Ranjan

The beauty of the new-age social media tools lies in their universality and pervasiveness. They are easy to install and use and have a simplified user experience. While the physical world is constrained by the limitations of distances and boundaries, the virtual world is all encompassing–indeed we are all part of a continuous global village.

When the World Wide Web was born in the 1990s, its initial users (referred to as *"early adopters"*) were from the technology community–engineers, innovators, academicians, researchers etc. Governments were not amongst these early adopters–they took to it only later. But when they did, it came as a resounding signal of the internet's mainstream impact, as also an endorsement for its relevance, scale, and transformative role across the world.

Three decades later, the internet has been truly adopted by governments across the globe with full gusto. Social media has become a game changer in the way federal, regional, and local government agencies are engaging, interacting, and communicating with citizens.

The Indian Government has been at the forefront of these emerging trends–it has rapidly adopted the latest digital technologies and embraced new forms of social media communication tools in the discharge of its governance and administrative duties. The Government of India's ambitious Digital India Programme is aimed at transforming India into a digitally empowered society and knowledge economy. This initiative is anchored by the Ministry of Electronics and Information Technology *(*MeitY*),* but is implemented across the federal framework of the country covering central, state, and local organisations in both the public and private space.

The beauty of the new age social media tools lies in their universality and pervasiveness. They are easy to install and use and have a simplified user experience. While the physical world is constrained by the limitations of distances and boundaries, the virtual world is all encompassing–indeed we are all part of a continuous global village. As Bill Gates famously said - *"The Internet is becoming the town square for the global village of tomorrow"*. All this has meant that Indians coming from different socio-economic backgrounds, irrespective of their educational levels, are able to use and benefit from applications like WhatsApp, Facebook, Twitter, Instagram, LinkedIn–these have all become household names. Most of these apps are available in multiple Indian vernacular languages (besides English). Inexpensive mobile phones, cheap bandwidth and data-plans, vernacular content–all these factors acting in consort have helped in amplifying social media's reach and impact even in the rural hinterlands of the country beyond the large cities and towns.

Most government departments and agencies now maintain an active presence on the popular social media channels. They have created official accounts, have large number of followers, and regularly share news updates, departmental notifications, or public announcements on their channels. Not just departmental accounts even executive officers, bureaucrats, politicians, ministers etc. are active on social media and regularly cross share (or retweet) each others' updates. The content they share can be of any form–videos, images, presentations, text, pdfs, GIFs etc, though videos are often the most engaging format and evoke the best viewer response.

Here is a compilation of twelve ways in which Indian Government agencies are using social media as a

force multiplier in their work:

Crisis / Disaster Management

Whenever there is a big, unexpected crisis, citizens tend to panic and look for directions and advisories from their elected representatives. The government machinery springs into action and they need to emphatically communicate to citizens the SOP (standard operating procedures) to be adopted. What adds to the heat of the moment is the possibility of (panic induced) rumours that may lead citizens astray. Social media is now increasingly being used by governments to reach out to citizens during such crisis. Two recent examples bear out this trend–

the first one is a cyclone alert from the National Disaster Management Agency (NDMA) on India's eastern coasts (in the state of Odisha), while the other one is an advisory from PIB (Indian Government's Press Information Bureau) to citizens for the lockdown imposed due to COVID-19.

Citizen Engagement

One of the best roles social media can play is to act as a medium for continuous engagement between governments and its citizens. Citizens should feel their governments are participatory and welcoming, and be able to contribute their ideas, comments and suggestions in policy formulation and program

implementation. The Indian Government's MyGov platform has proven to be popular with citizens in this regard. Apart from MyGov, other social media channels used by the Indian Government (Twitter, Facebook, WhatsApp, Instagram) also promote citizen engagement, participation, and transparency in this important relationship.

Citizen Grievances & Support

Social media has emerged as a very impactful, real-time channel for citizen grievances and support. Most citizen services (specially the public facing ones) maintain active accounts on social media and encourage citizens to directly reach out with their grievances. Given all this is happening in full public view, there is pressure on the service providers to resolve the issue (if possible, in real-time, else with some delay), while appearing fair, transparent, and responsive for everyone to see. Sometimes when the query gets resolved quickly, citizens express their gratitude and elation immediately. This expression can act as an authentic validation or testimonial for the service. The two examples below are common on social media these days–the first one is about a traffic complaint to Mumbai Police, while the other one is a real-time grievance filed by a traveller on Indian Railways to the Railways Bengaluru Division.

Law & Order

Amongst governmental agencies, police departments are arguably one

Figure 1

of the most active users of social media channels. This is because their jobs hover around real-time, public facing situations, which are frequently subject to rumours, false alerts etc. They are required to display trust in their public dealings and communicate unequivocally. The Police frequently needs to make public announcements–something that social media is well-suited for. This Delhi Police advisory on Twitter (Figure 1) is a telling example how police uses social media to alert citizens about circulating rumours.

Hiring & Recruitment

Some government agencies are using social media hiring channels for attracting best-in-class talent for their job vacancies. "LinkedIn" is a popular online recruitment platform–here is an example of a vacancy posted by NISG (National Institute of Smart Government) for technical positions in UIDAI (Unique Identification Authority of India) which runs the Government of India's Aadhaar program. LinkedIn offers two advantages–it is a publishing tool

for job postings, and it also has over 500 million registered users across the world (including 62 million Indian users). They can readily view these vacancies and apply if interested.

Foreign Relations

Social media bridges the distance between nations on the internet. Many governments agencies are using social media channels effectively to engage with their foreign counterparts. Embassies and foreign consulates are active on Twitter & Facebook, engaging with each other or sharing important updates to their citizens. Below is an example of the Indian Government (through their official Twitter account) wishing the people of Paraguay on their Independence Day and how the Indian Government's Ministry of External Affairs (MEA) has published all their official Twitter handles on the MEA website (https://mea.gov.in/)

Business & Industry Relations

Government agencies partner with businesses, industry bodies and trade organisations on a regular basis for policy, consultations, networking

etc. Businesses play a key role in driving social media's impact by contributing significantly to the internet economy via advertising, paid services etc. Many monetisation models on the internet (wholly or partially) rely on enterprises, B2B (business to business) and large corporations with large advertising and marketing budgets, which contributes to the nation's economy. The two examples shared on the left exemplify this–the first is a Facebook post from Ministry of Commerce & Industry showing the Minister addressing an industry gathering, while the second is an invitation on Twitter for an industry summit on Education by the Indian Consulate in Indonesia.

Live Traffic Updates

Real time traffic updates and advisories get regularly shared in the metropolitan cities via the local Traffic Police social media accounts. These updates are helpful to commuters in avoiding traffic jams or taking detours to save time. Often these live updates are picked up by local FM radio channels that do their civic bit, by sharing it on with live audiences that have tuned into the channel while on the roads. Here are two examples of Delhi Traffic Police sharing updates on Twitter for a road blockage, and traffic advisory for traffic re-routing owing to some festivities.

Government Procurement

The government (as an entity) is the largest producer and buyer of goods and services in the country. It's buying (or procurement) is largely

& Broadcasting's Chandigarh Bureau for digital printing.

Crowdsourcing Ideas & Innovation

The internet is fundamentally participatory in character–people openly share their knowledge, skills, and experiences in the belief that others can benefit from it. Sometimes this is free, or there may be some incentives for it. Crowdsourcing is a popular activity on the internet, where you get to tap into the collective "wisdom of the crowds". On the left is an example on how the Indian Government's community participation platform MyGov is leveraging crowdsourcing, by hosting a "Logo Design Competition" for an upcoming government heritage complex. Citizens are invited to contribute their logo entries for the contest, which has an accompanying cash prize to generate excitement and motivate participants.

Citizen Service-Delivery Apps

The government has launched various service delivery apps for its citizens. Social media is a key channel to drive awareness about these apps and get people to download them. Because these apps are mass targeted, the intent is to make them "go viral" and spread via "word-of-mouth" from person to person. Social media channels like Twitter, Facebook, WhatsApp are best-suited for this virality. The two examples here showcase this–DigiLocker is meant for digitised documents & certificates, while UMANG is like a gateway (or a directory) to multiple government services. While these apps have their individual social media handles, they are also promoted by the government departments.

Transparency & Accountability

Citizens want ready access to government departments and its functioning officers. Given the size and expanse of the official setup, it is often not easy to figure out who is the concerned officer-in-charge (in

based on open tendering process, which gives everyone a chance to participate in an unbiased, non-discriminatory way. Hence, tender notices have to be published publicly on the main outreach channels. Traditionally, tender notices were advertised in newspapers; now with the advent of e-tendering, these notices are increasingly getting posted on social media channels as well. The two examples above bear testimony to this trend–the first one is a tender notice from Ministry of Power inviting bids for electric cars, while the second one is from Ministry of Information

whose jurisdiction the case falls) and their contact details. Social media can come to the rescue in some cases. Here is an example of how the police department in Dima Hasao, one of the districts in Assam has publicly shared telephone numbers of their top officers and their rank and file. Such measures reduce bureaucracy, while promoting transparency and accountability in the eyes of the citizens. ❑

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Digital Platforms

Dr Sheetal Kapoor

Timely information, direct money transfer to the poor, needy and vulnerable groups can help save many lives and at this point the digital apps developed by the government are playing an important role in responding to the crisis. The article elucidates about technology platforms which are shining examples of how the government is doing a good job by making itself a driver and enabler during COVID-19 crisis.

It is imperative for governments to provide accurate, useful and up-to-date information to people, particularly through times of crisis. During COVID-19 pandemic, Indian government's use of digital technology and providing information on national portals, mobile apps or through social media platforms is the game changer to reach to the masses. Timely information, direct money transfer to the poor, needy and vulnerable groups can help save many lives and at this point the digital apps developed by the government are playing an important role in responding to the crisis. The Prime Minister also while addressing the nation on 12th May, 2020 gave a call for 'self-reliant India' and mentioned how with direct benefit transfer during corona crisis, government has been able to transfer funds directly to the actual beneficiary accounts and able to curb corruption and leakages.

Aarogya Setu App

The 'Aarogya Setu' App enables people to assess themselves the risk for their catching the coronavirus infection. It calculates this based on people's interaction with others, using cutting-edge bluetooth technology, algorithms and artificial intelligence. Once installed in a smartphone through an easy and user-friendly process, the app detects other devices with Aarogya Setu installed that come in the proximity of that phone.

Aarogya Setu Bug Bounty Programme

Aarogya Setu Production Build: Aarogya Setu Production build of the android app, followed by the iOS along with API documentation will be made available to open source research community.

Security/Privacy Related Flaws:

- discovered by the security researchers should be notified to : as-bugbounty@nic.in only, with subject line : Security Vulnerability Report, so that Aarogya Setu team can first verify the vulnerability (if any) and take action to fix the vulnerability.
- doing so will be called 'responsible disclosure' and only such responsible disclosures shall be eligible for rewards.

Any improvements to the source code of AarogyaSetu can also be reported to as-bugbounty@nic.in, with the subject line : Code Improvement

Bounty/Reward Category	Maximum Reward Amount (in INR)
Security Vulnerability	Rs. 300000 (Rupees Three Lakhs) Upto Rs. 100000 (Rs. One lakh) per vulnerability mentioned under point 3.2 "in-scope vulnerabilities". Submission can be done for one individually or all three. Please mention in the submission accordingly.
Suggestion/Improvement in the Source code	Upto Rs. 100000 (Rupees One Lakh) for the in-scope code improvements.

Source: *mygov.in*

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Disbursal plan for PM Jan Dhan Yojana Women Beneficiaries

DEPARTMENT OF FINANCIAL SERVICES

Under PM Gareeb Kalyan Package, accounts of PMJDY women beneficiaries are being credited with the instalment of Rs. 500 for the month of May. The money in the bank is safe and there is no need to rush for withdrawal.

Bank A/C ending with	Date of Disbursal
0 and 1	4th May 2020
2 and 3	5th May 2020
4 and 5	6th May 2020
6 and 7	8th May 2020
8 and 9	11th May 2020

In case of an emergency, you can withdraw the money immediately. However for orderly disbursal, you may follow the Bank's payment plan as given here.

After 11th May, beneficiaries may withdraw any day at their convenience.

This will help in ensuring social distancing and avoiding overcrowding in banks. Beneficiaries are requested to follow the above schedule & ensure safety of all! Beneficiaries can also use the neighbourhood **ATMs** with **Rupay cards, Bank Mitras, CSPs,** for withdrawal to avoid crowding at the Branches. Please note that as per Govt of India directions, there are no charges for withdrawing money from any of bank's ATM.

Stay Safe, Stay Healthy

Your safety is paramount to us

The App can then calculate the risk of infection based on sophisticated parameters if any of these contacts is tested positive. The App is helping the government to take necessary and timely steps for assessing risk of spread of COVID-19 infection, and ensuring isolation where required. The App's design ensures privacy-first and the Government, after apprehensions from some people has assured users about the data safety and security of the app. The personal data collected by the App is encrypted using state-of-the-art technology and stays secure on the phone till it is needed for facilitating medical intervention and is available in 11 languages.

Chatbot

The Government of India has launched a WhatsApp chatbot so that the citizens can get instant and authentic answers to all of their queries related to the Coronavirus pandemic. Users have to drop a 'Hi' on the number +91-9013151515 or can call on the MyGov Corona Helpdesk to get answers to pertinent queries such as the symptoms of the deadly disease, nearest COVID-19 testing facility.

Corona Kavach

It is a COVID-19 tracker application, created by the Union Ministry of Electronics and Information Technology in collaboration with the Ministry of Health and Family Welfare. This application provides users with real-time location of infected users who have activated the 'Kavach' feature.

COVID-19 Feedback

This application has been

The 'Aarogya Setu' App enables people to assess themselves the risk for their catching the coronavirus infection. It calculates this based on people's interaction with others, using cutting-edge bluetooth technology, algorithms and artificial intelligence.

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developed by the centre to get direct feedback from people who have undergone coronavirus treatment in the country.

COVID-19 National Helpline

A 24x7 National Helpline number +91-11-23978046 and toll-free number 1075 have been launched where people can access corona related information by the government. Also, the centre has an e-mail id: ncov2019@gov.in to attend to queries of people related to the disease.

SAMPRAC

Defence Research and Development Organisation (DRDO) has developed an app called **'SAMPRAC'** to enable tracking people under quarantine. It is a software that includes an app that can be installed on the smart phones of the infected COVID-19 patients. It is a server-side application that is used by the state authorities to track the patients. The system enables geo-fencing, AI-based automated face recognition (between selfie taken during registration and subsequent selfies sent by the patient), and would have the capability to display the information to the state officials on a map which can be colour-coded to depict hotspots and containment zones. Honest usage of this app can give them an option of home isolation instead of isolation in a government facility. It is expected to drastically reduce the overhead of tracking every patient under home isolation, thereby reducing the load on the state machinery. The officials can easily track the violators and can also perform random checks. The violators would be shown in red on a map if they break the geo-fence or their selfie(s) does not match; in blue if their smartphones stop sending periodic updates; and in green if everything is found satisfactory.

Direct Benefit Transfer (DBT)

It is a scheme by Government of India to transfer the benefits

and subsidies of various social welfare schemes like LPG subsidy, MNREGA payments, old-age pension, scholarships etc. directly in the bank account of the beneficiary. The government's technology-driven direct benefit transfer (DBT) has been crucial in implementing PM Garib Kalyan Yojana that was rolled out to provide relief to the poor and vulnerable amid the COVID-19 crisis.

About 20 crore women from low income groups having Jan Dhan account were given direct benefit transfer of Rs. 500/- per month for free with Rs. 10,025 crore already transferred. During the lockdown, direct benefit transfer of Rs. 2,000 each was provided to 8.19 crore beneficiaries under Pradhan Mantri Kisan Samman Nidhi (PM KISAN) scheme. 8 crore beneficiaries of Ujjwala LPG scheme have been offered 3 cylinders free of cost. 2.20 crore building and construction workers received financial support worth Rs. 3,950 crore because of DBT. Besides, 6.81 free cylinders reached Ujjwala Yojana beneficiaries

> **The Survey of India has developed an e-platform that collects geotagged information on the nation's critical infrastructure in order to help the government and public health agencies take critical decisions in response to the current COVID-19 pandemic situation.**

and over 12 lakh EPFO holders benefitted from the withdrawal of non-refundable withdrawal advance, which amount to Rs. 3,360 crore.

SAHYOG

The Survey of India (SoI) has developed an e-platform that collects geotagged information on the nation's critical infrastructure in order to help the government and public health agencies take critical decisions in response to the current COVID-19 pandemic situation. The platform has geo-located information of hospitals,

testing labs, quarantine camps, containment and buffer zones as well as information on biomedical waste disposal sites. The mobile based application, called SAHYOG, works as a key tool in helping community workers carry out the government's objectives of door-to-door surveys, contact tracing, deliveries of essentials items and to create focused public awareness campaigns. This platform and app have been created to enhance the efforts of the government in improving its response system at this crucial time. The platform strengthens the public health delivery system of the State and central governments and subsequently provides the necessary geospatial information support to citizens and agencies dealing with the challenges related to health, socio-economic distress, and livelihood challenges.

Some other technology apps developed by the government and playing an important role during COVID- 19 crisis are:

BHIM App

BHIM (**Bharat Interface for Money**) is an Indian mobile payment app developed by the National Payments Corporation of India (NPCI), based on the Unified Payments Interface (UPI). It was launched on 30th December, 2016 and helps in facilitating e-payments directly through banks as a drive towards cashless transactions. Transactions on BHIM are nearly instantaneous and can be done 24/7 including weekends and bank holidays. BHIM also allows users to check the current balance in their bank accounts and to choose which account to use for conducting transactions, although only one can be active at any time.

RuPay

It is a card scheme, conceived and launched by the National Payments Corporation of India to fulfil the Reserve Bank of India's vision to have a domestic, open and

Revolutionizing Indian Railways

Ticket Booking and Rail Updates made easy with IRCTC Rail Connect App

- Will replace the existing 'IRCTC connect' app
- 24/7 service with no time based checks
- Mobile app to be synchronized with NGET for ticket booking
- Supports General, Ladies, Tatkal & Premium -Tatkal quota booking
- Integrated with IRCTC e-wallet for easier transactions
- Advanced security features of self-assigned PIN to login

#TransformingIndia

f ⊻ MyGovIndia   www.transformingindia.mygov.in

multilateral system of payments. RuPay facilitates electronic payment at all Indian banks and financial institutions.

IRCTC

Through the mobile app by Indian Railway Catering and Tourism Corporation Limited (**IRCTC**) consumers need not stand in long queues and can book e-tickets from home.

GeM

It is an e-commerce portal or the government e-Marketplace, which has been created to allow government departments to buy their requirements from various vendors without cash or physical payments.

UMANG App

UMANG (Unified Mobile Application for New-age Governance) is a Government of India all-in-one single unified secure multi-channel multi-platform multi-lingual multi-service freeware mobile app for accessing over 1,200 central and state government services in multiple Indian languages over Android, iOS, Windows and USSD (feature phone) devices, including services such as AADHAAR, Digi Locker, Bharat Bill Payment System, PAN, EPFO services, PM-KVY services, AICTE, CBSE, tax and fee or utilities bills payments, education, job search, tax, business, health, agriculture, travel, Indian railway tickets bookings, birth certificates, e-District, e-Panchayat, police clearance, passport, other utility services from private companies and much more.

SWAYAM

It is an online education programme initiated by the Government of India to achieve the principles of education policy by providing access, equity and quality. The objective of this effort is to take the best teaching learning resources to all, including the most disadvantaged. The Study Webs of Active-Learning for Young Aspiring Minds (SWAYAM) seeks to bridge the digital divide for students who have hitherto remained untouched by the digital revolution and have not been able to join the mainstream of the knowledge economy. It is done through a platform that facilitates hosting of all the courses, taught in classrooms from Class 9 till post-graduation to be accessed by anyone, anywhere at any time. More than 1,000 specially chosen faculty and teachers from across the country have participated in preparing these courses which are available free of cost. These courses are of great help to learners as they have been designed by one of the best faculties from India and follow four quadrant approach to learning.

Thus, by installing and using the government apps, Indian citizens can save time, money as these apps are proving to be of great help during COVID-19 pandemic, playing a significant role in responding and reaching to the needy and vulnerable groups. ❑

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Localisation Through AI

Balendu Sharma Dadhich

Artificial intelligence has started to change the very face of local language technologies, products, tools, services and features. As a result, developers have been able to simplify and augment user experiences and facilitate better productivity for Indian language users. Virtual assistants now understand verbal commands given in Hindi. These revolutionary developments in local language technologies are surely going to benefit the developers and the users alike but things can also be seen from the broader perspective of digital inclusion.

If I were writing this article a decade back, I would have been talking about how to input text in Indian languages in a computer or a mobile phone, and perhaps how to use email and web search in your favourite local language. I may have also talked about the fact that now various technology products come with a facility to activate a local language user interface. But times have changed, and technologies as well as the ability to work with Indian languages have evolved beyond the basics.

IT organisations are now leveraging the power of artificial intelligence to enrich their products in order to make them more accessible to local language users. Localisation is undoubtedly an important aspect but the story goes far beyond this. Artificial intelligence has started to change the very face of local language technologies, products, tools, services and features. As a result, developers have been able to simplify and augment user experiences and facilitate better productivity for Indian language users. This has paved the way for innovative user-device interactions and access to intelligent technologies, many of them running in the cloud, on platforms and suites such as Windows, Android, Office 365 and Google Docs.

As artificial intelligence makes its presence felt in the productivity space, a typical local language user is waking up to a process of transformation happening around him. All of a sudden, you are neither limited to using a keyboard to input text nor you necessarily have to learn another language to interact with people unfamiliar with your language. Such experiences are not entirely uncommon for English language users, however, for typical Indian language users it is a relatively new phenomenon and they are loving it.

These revolutionary developments in local language technologies are surely going to benefit the developers and the users alike but things can also be seen from the broader perspective of digital inclusion. Language agnostic computing is one important aspect of digital inclusion which has started taking place due to the new developments in language technology space, now powered by artificial intelligence.

Virtual assistants such as Google Assistant and Amazon Alexa now understand verbal commands given in Hindi. While Cortana, the virtual assistant that

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comes with Windows 10, is yet to understand spoken commands in Indian languages, it can translate text from English to Hindi, Bangla, Tamil, Urdu and many other languages. Just say, "Hey Cortana, translate- *the weather today is very good*- in Hindi." The intelligent interactive application will dutifully pronounce the Hindi translation besides transcribing it in Devanagari and Roman scripts- "*Aaj mausam bahut achchha hai*". Such AI-enabled experiences inside the operating system will be very useful to non-Hindi speakers such as tourists and businessmen apart from common PC users who may want to get Cortana's help for some quick translations.

Translations Inside Office Suites

Got a mail in languages that you don't understand? Try the built-in translator inside Outlook to understand what the mail says. Responding to the mail is as easy as reading it as you can compose your message in English and translate it in the language of your choice before pressing the 'Send' button. Office applications take advantage of Microsoft Translator which in turn leverages the machine translation engine, empowered by the latest generation neural machine translation technologies. Google Docs too can accomplish the task for you. Both the Office suites draw their power from services running at a cloud server.

Such experiences of communication among people using different languages may go a long way in breaking the linguistic barriers. Importantly, language translation is not just an add-on service but it's a core part of Microsoft products and services. Apart from the Internet and mobile (like on Bing and Microsoft Translator for Android), its power can be

> It is not just about saving you from some hassle but empowering you in ways you may not have thought were possible. The power of artificial intelligence has started to change the way we work with local languages. Technologies that work in an intensely complex manner in the background appear so simple and friendly to use, in your own language.
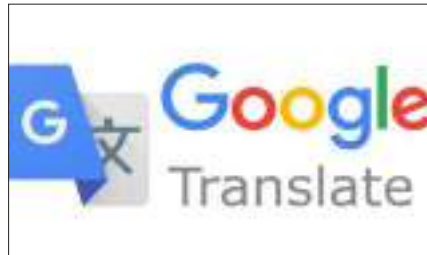
experienced in familiar productivity and communication applications including Word, Excel, PowerPoint, Outlook, and Skype.

The recently released data of Census of India 2011 indicates a robust growth in the number of people speaking local languages. Rise in these numbers coupled with increased technological awareness, expectations and a higher per capita income are expected to encourage a greater demand for local language products and services. Products enriched by artificial intelligence have the potential to empower this section of society and help boost overall productivity.

Presentations Break Language Barriers

Did you know you can translate your Power Point presentations from English to Hindi? Or into Tamil, Bangla and Urdu? With the help of 'Presentation Translator' (https://translator.microsoft.com) plugin from Microsoft, you can do that in seconds.

Considering the way business opportunities are emerging in different parts of the country, you may need to connect with variety of audience at state capitals and tier 2/3 cities and in such situations this powerful plugin from Microsoft can make your life easier by converting your presentations into multiple local languages, saving a great deal of time and resources. Not just this, the plugin can also generate automated live captions in an Indian language as you speak in English or any other supported world language. It is not just about saving you from some hassle but empowering you in ways you may not have thought were possible. The power of artificial intelligence has started to change the way we work with local languages. Technologies that work in an intensely complex manner in the background appear so simple and friendly to use, in your own language, when accessed from inside Windows and Office.

Microsoft Translator app on Android and iOS can recognise and translate content from typed or printed text, spoken word and even from photos. If you happen to visit Russia or China, you need not worry about navigating the streets of Moscow or Beijing as when you click an image of a billboard or road sign, Microsoft Translator can promptly translate the Russian or Mandarin text inside the photo into Hindi. In contrast, if a foreign tourist on a visit to a city like Jaipur or Agra wants to convey his thoughts in Hindi, he can do so by speaking into the Microsoft Translator app as his words get translated into Hindi and pronounced. These are amazing examples of user empowerment as artificial intelligence plays the role of a facilitator in the background and people on both sides of the communication process get benefited.

Google's Indic Keyboard can recognise Hindi handwriting. Similarly, Windows now has a Handwriting panel that too can do the trick. If you have a PC with a touch-screen you can use your stylus to write on the panel. Writing in the Hindi will show handwriting recognition results in Hindi and the content also gets transcribed.

> Disability, coupled with inability to use English language, multiplies the challenges that people with disability face as most accessible technologies and tools don't understand Indian languages. Unfortunately, most people with disability come from the not-so-privileged section of society which is often deprived from quality education and hence finds it difficult to converse in English. Accessible tools, with their ability to narrate text in Hindi, will make an empowering impact on the lives of common local language users and not just people with disability.

Screen Reader Connects with Hindi

That Narrator, the screen reader from Microsoft, can speak Hindi is not just an important development from the local language perspective but also from the standpoint of people with disability. The application can read out commands, menus and text on the screen besides explaining the desktop environment it operates in.

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Predicting Your Thoughts

The intelligent app brings artificial intelligence to your phone keyboard as it learns from your actions and predicts the next word you are about to type. The app works in 24 Indian languages including Hindi and can save you the effort of typing a few hundred characters every day.

Microsoft has been working with Indian languages for over two decades since the launch of Project Bhasha in 1998, allowing users to input localised text easily and quickly using the Indian Language Input tool. The company has recently made available the Microsoft Indian language Speech Corpus, offering speech training and test data for Telugu, Tamil and Gujarati`. Microsoft also recently announced support for email addresses in multiple Indian languages across most of its email apps and services. Also, as part of the latest Windows update, added Tamil 99 virtual keyboard to Windows 10. Through its global Local Language Program (LLP), it provides people access to technology in their native language. This includes Language Interface Packs for Indian languages like Hindi, Kannada, Bengali, Malayalam, amongst others. ❑

RTM for Development

Sujoy Mojumdar
Koushiki Banerjee

Development programmes are actively embracing real-time monitoring approaches across a range of sectors; from maternal health to nutrition and water, sanitation and hygiene (WASH)-to improve planning, monitoring, and decision making efforts. It has been critical in helping UNICEF and other organisations deliver timely data to government partners and others to help inform key policies and programming decisions.

The Importance of Real-Time Monitoring

The use of real-time monitoring (RTM) to support national systems strengthening is growing, primarily due to the ubiquitous penetration of mobile phones into global audiences. According to the International Telecommunication Union, in 2011 alone, there were six billion mobile subscribers–with 79 per cent of them in the developing world (Abaza and Marschollek, 2017). This has been a boon in countries and regions where mobility and physical connectivity challenges can affect the diffusion of knowledge of key issues, which can stymie progress against key health and socioeconomic indicators. India is no stranger to RTM systems, having been one of the early adopters of mobile and digital technology in the low-and-middle-income world. It has 1.16 billion telecommunication subscribers in the world, as of March 2019 (TRAI, 2019), and has been adding nearly six million subscribers per month (TRAI, 2019). In fact, the Ministry of Health's National Health Portal has shortlisted a whopping 72 monitoring platforms that have been authorised to track indicators from health records in hospitals to mapping water supply sources (2020).

Development programmes are actively embracing RTM approaches across a range of sectors; from maternal health to nutrition and water, sanitation and hygiene (WASH)-to improve planning, monitoring, and decision making efforts. During this COVID-19 response, it has become an even greater priority to invest in RTM models that adhere to physical distancing protocols. Caseloads are increasing rapidly with shorter doubling times and countries are scrambling every day to better understand what is influencing the outcomes as quickly as possible. Plus, given the transmission model, traditional monitoring efforts such as door-to-door assessments come with

Individuals answering IVR survey on water, sanitation and hygiene service availability in his household and community

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high risks for health and community workers. Real-time monitoring that allows low-touch data collection and dissemination would therefore be best in this context, as proven before during the Ebola and H1N1 outbreaks, both which had similar contact restrictions.

The practice of real-time monitoring for strengthening national monitoring systems has been employed by UNICEF and government partners to strengthen health, education, water and sanitation and social protection systems around the world. As of 2019, 77 UNICEF country offices including India's are using real time approaches enabled by the use of information and communication technologies which enable faster retrieval and analysis of data and information, than paper-based or other traditional systems.

When using real-time approaches, data and information is provided more rapidly than before and allows stakeholders to monitor progress towards goals by rapidly accessing and reviewing data and information, seeing trends, and identifying corrective actions required based on informed evidence-based decisions within a day, or in some cases, within a few hours. Therefore, it is an efficient solution to monitoring needs and objectives. Just as important to keep in mind is that RTM approaches are only effective where the capacity to utilise frequent data and insights is sufficient and responsive; otherwise, the approach may have a negative effect of creating extra data collection burden without commensurate response.

When implemented, RTM integration helps to:

• Provide a monitoring platform for communities and governments to track progress towards shared goals

• Identify supply, demand and bottlenecks in service delivery chains

• Increase accountability of government to the rapid delivery of services

• Improve service delivery to hard-to-reach communities through informing corrective measures

• Assess and educate consumers and beneficiaries on relevant knowledge, practices and attitudes.

Scalable Routine Data Collection and Dissemination System

In 2014, UNICEF, in partnership with Nyaruka Ltd, released RapidPro, a globally accessible and free open source routine data systems application (https://rapidpro.io/).

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RapidPro "collects data via short message service (SMS) and other communication channels (e.g. voice; social voice; social media channels, such as Facebook Messenger, Telegram, WhatsApp) to enable real-time data collection and mass-communication with target end-users, including beneficiaries and front line workers."(UNICEF, 2020). Its prior avatar, RapidSMS, was launched in 2008 to send text messages and was mainly used in Africa to monitoring child health and HIV interventions; however, there was a call for more functionality that options not dependent on paid telecommunication lines. In 2015, the RapidPro Surveyor application was created to provide a chat-like interface on smartphones without network connectivity (Dial, 2018).

It has in part been successfully taken up because of its flexibility in information capture and delivery, and because it has been critical in helping UNICEF and other organisations deliver timely data to government partners and others to help inform key policies and programming decisions. RapidPro has been developed to be a 'global public good' by UNICEF and the ambition is to garner investment to encourage the buy-in of real-time monitoring systems in 110 countries by 2021.

It functions through the integration of the following key elements:

Flows: Flows are the set of interactions based on user responses to questions, which determine what the subsequent action is. By using flow architecture, the creator can establish automated and complex text and voice pathways without programmer assistance.

Channels: These are used to send and receive messages. This includes SMS, voice, and social media, and can be used either to push data as part of education campaigns out or collect it from users for monitoring and assessment purposes. New channels are being added to RapidPro.

Campaigns: Flows, channels and messages come together under a campaign, which is the automated framework for RapidPro-based RTM. This allows both communication with users on a large-scale and personalisation based on user feedback, through flow architecture.

Analytics: Analytics displays the data generated by interactions with end users, by displaying results in real-time within RapidPro or sending them to a customised dashboard for further visualisation, generating a

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custom report, or exporting to Excel for additional analysis.

Integration into Various Countries' Programmes

Albeit being available for less than a decade, RapidPro has already been leveraged for a range of purposes across countries, from soliciting feedback from adolescents on what health issues matter to them to monitoring knowledge and attitudes around water, sanitation and hygiene programmes. Below are a few global examples that illustrate its functionalities:

(i) Water, Sanitation and Hygiene Status in Rural India

In 2019, RapidPro was piloted in two of India's most populous states, Uttar Pradesh and Bihar, which carried almost 30 per cent

burden of open defecation globally (Coffey et. al. 2014) at the start of Swachh Bharat Mission, to assess the status of sanitation services and related knowledge. UNICEF India used the interactive voice response (IVR)–or, automated calling with pre-recorded messages-as the communication channel. UNICEF's field offices supported their respective state governments in developing the application according to each state's needs, and the IVR flows were launched in four districts: Gaya in Bihar; Sonbhadra, Mirzapur and Bhadoi in UP. Various categories of questions on sanitation and hygiene access and usability were asked in multiple-choice format to users identifying as (i) members of rural households, (ii) swachhgrahis (community sanitation workers) and (iii) Gram pradhans (village heads) to ensure reliability and a holistic perception around sanitation services. This allowed the governments to not only appreciate the tool for its flexibility and scaled reached, but also to receive rapid inputs to questions they were interested in. In UP, for example, approximately 3,500 users responded to the calls, and the crowd-sourced responses indicated that 92.1 per cent of households have functional toilets and 96 per cent of households with them had all members using the toilets.

(ii) U-Report: A Global Tool

U-Report is a free messaging tool built using RapidPro in 2011 and is currently used by UNICEF and partners in 60 countries, benefitting 8 million users (UNICEF, 2020 (b)). Its objective is to encourage participation of youth, through popular social media channels, in a safe environment in which they do not feel judged for asking about critical or sensitive issues. Its function, as opposed to the convention RTM objectives, is to provide a conversational option. Its most popular functions are to provide feedback–through polls for participants via social media–by
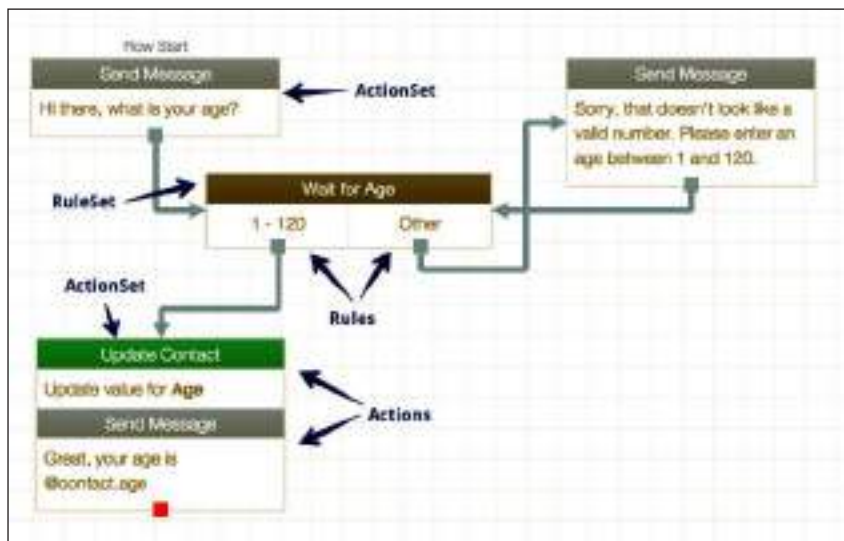
Example of a flow concept that can be coded for on the platform.
The channel for this can be anything from SMS to voice to social media.
(Source: http://rapidpro.github.io/flows/concepts/)

An example of flow set-up for the Uttar Pradesh WASH RapidPro effort, where each flow targeted a different stakeholder population

providing knowledge and information on specific issues that participants want to build their capacities on. Its success has broadened its reach to the general populous.

As of 30 March, 2020, U-Report has been used for assessing knowledge, practices and attitudes around COVID-19 across 43 countries, with responses collected from over 2.2 million people. In India, UNICEF recently collected 23,000 responses from 28 states and four union territories, to a U-Report survey assessing the general population's existing understanding of the COVID -19 pandemic and the sources of information that they rely on. Respondents had the option of completing the survey over WhatsApp or Facebook Messenger, in ten languages. The results showed that, even with the inundation of messages received through WhatsApp, 67 per cent of respondents cited the television as their primary source of information and one-fifth of the users found it difficult to practice social distancing, this especially from rural respondents.

(iii) Real-time Monitoring of Social Cash Transfer Programme in Nepal

UNICEF Nepal supports the Government of Nepal in monitoring social cash transfers disbursed in 'child grant' expansion districts, through RapidPro. In Nepal, a quarter of the population lives in poverty, meaning that many children are affected by multiple deprivations. The RapidPro pilot started in 2018 and targets

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mothers receiving cash transfers from the government with SMS and IVR messages that help improve both governance accountability and knowledge within the beneficiary population. The tool sends out polls through IVR to beneficiaries about grant implementation and delivery, and pushes key information about the child grant programme in general, to ensure that recipients know about registration and payment days. Through the platform over 68,000 children's caregivers were reached, as per mid-2019, and almost 30 per cent being actively responsive to IVR calls. This monitoring effort showed that 47 per cent of beneficiaries reported spending child grants on education and 36 per cent on nutrition. Some also gave feedback on the challenges in accessing the transfers, which will help the government figure out pointed solutions based on the user's area of residence.

Lessons Learned

While RapidPro has been received positively in the global community, its

success, again, is very much dependent on how it is utilised by the users i.e. governments, development partners and other stakeholders. The following are key lessons garnered from various countries' range of interventions, as well as recommendations for going forward:

- Flexible real-time monitoring options such as RapidPro are important for development. Accountability and transparency is hard to maintain and manage at a large scale, when hundreds of thousands to millions of people are involved in progressing towards a national goal. RapidPro offers a structured and low-touch approach that allows for just that, and ensures that the data is being analysed in accordance to the objectives defined without integrity loss due to human error, physical bulk issues such as paper-based collection and review, and disagreement in analysis approaches later on in the process. Especially in countries as large, culturally and geographically diverse as India, digital tools can easily respond to many demands and challenges in social sector programming.

- Integration requires time, capacity building and buy-in from multiple stakeholders with various perspectives. Governments and other users should cater for the time required to set up logistical arrangements internally and with data network operators, develop and pilot questions or messages that will be useful and not redundant, create functional dashboards, train implementers on utilising the data and its representations, and so on. This is important for sustained interest in the approach as well as ensuring that the resulting policy or programming action is as accurately reflective of collected data as possible.

> **RTM approaches are only effective where the capacity to utilise frequent data and insights is sufficient and responsive; otherwise, the approach may have a negative effect of creating extra data collection burden without commensurate response.**

- It is important to keep equity in mind, especially when seeking to include the most marginalised and vulnerable. While telecommunications seems to have saturated all markets globally, there are still many populations living at the edges of modern society's resource spread, who perhaps would not be able to add their voice to monitoring systems that use tools they do not have access to. Implementers should realise that RTM platforms are not the end all of information and require scrutiny at all steps to ensure that the right respondents are being included directly or through complementary efforts. Another key population to keep in mind is women, who customarily have lesser access to digital communication options, yet are often the most likely to take up social issues and roles as community leaders.

There are many other lessons that can be sourced from the tool's website. Regardless of which tool itself is used, the overall objective should be

> **Especially in countries as large, culturally and geographically diverse as India, digital tools can easily respond to many demands and challenges in social sector programming.**

to collect and inform policies based on data that is as representative as the population being served by a government or any implementer. When considerations around equity, feasibility and personalisation needs are taken into account, RapidPro offers itself as a highly viable option for a gamut of programmatic objectives that can inform everything from grassroots action to national guidelines.

All views, thoughts and opinions are personal and do not necessarily reflect on the position of the authors' organisation.   ❑

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Images Credit : UNICEF Uttar Pradesh

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Covid-19 Virology

Dr Sarah Cherian
Dr Priya Abraham

This century has witnessed the emergence of three different coronaviruses (CoVs) that have spread beyond the country that they were first identified in. They are- Severe Acute Respiratory Syndrome CoV (SARS-CoV) in 2003, the Middle East Respiratory Syndrome CoV (MERS-CoV) in 2012, and the 2019 novel CoV (2019-nCoV, later officially named SARS-CoV-2). First identified in Wuhan (Hubei, China) in December, 2019, CoV disease 2019 (COVID-19) caused by SARS-CoV-2 was declared a pandemic by the World Health Organisation (WHO) in March, 2020.

SARS-CoV-2 and other CoVs belong to sub-family *Coronavirinae* in the virus family *Coronaviridae* comprising four genera *Alphacoronavirus*, *Betacoronavirus*, *Gammacoronavirus* and *Deltacoronavirus.* These are enveloped with positive sense single-stranded ribonucleic acid (RNA). The word "corona" in Latin means "garland, wreath or crown". Coronaviruses have characteristic club-shaped peplomers projecting out of the virus envelope. CoVs are known to infect different animal species and can cross species' barriers to cause illness in humans. Alphacoronaviruses and betacoronaviruses are transmissible to humans. The alphacoronavirus strains 229E and NL63, along with the betacoronavirus strains OC43 and HKU1, tend to cause only mild symptoms in humans. The betacoronavirus strains MERS-CoV, SARS-CoV and SARS-CoV-2, all can cause severe respiratory distress with mortality up to the tune of 34.4%, 9.19% and 6.8% respectively, though there may be regional differences (*Prompetchara et al., 2020; Tu et al., 2020*).

Since its discovery in Wuhan city in Hubei province, in late December 2019, the virus has spread to 215 countries and territories, infecting over 45 lakh individuals and leading to over 3 lakh deaths. Most of the early cases had links to the Wuhan wet/seafood market, where speculation about the animal source/intermediate host ranged from bats, snakes and pangolins *(Huang et al., 2020; Cyranoski 2020)*. However, to date no confirmed animal host has been identified with certainty. This review summarises the knowledge with respect to the viral agent causative of COVID-19 disease, its transmission and symptoms, epidemiology, and the treatment strategies being pursued.

The SARS-CoV-2 Virus Structure, Etiology, Genome and Replication Cycle

The SARS-CoV-2 virus has a diameter of approximately 50–200 nm and possesses spikes on its surface (up to 20 nm in length) that provide it the crown-like appearance under an electron-microscope (**Figure 1**). Like other CoVs, the virus is sensitive to ultraviolet rays and heat. Furthermore, these viruses can be effectively inactivated by lipid solvents such as ether, ethanol, chlorine-containing disinfectants, and chloroform *(Cascella et al., 2020).*

Figure 1: Transmission electron microscopy image of SARS-CoV-2.
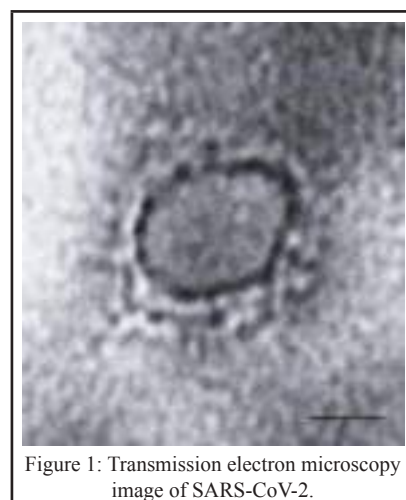
The CoVs are amongst the largest known RNA viruses with genomes

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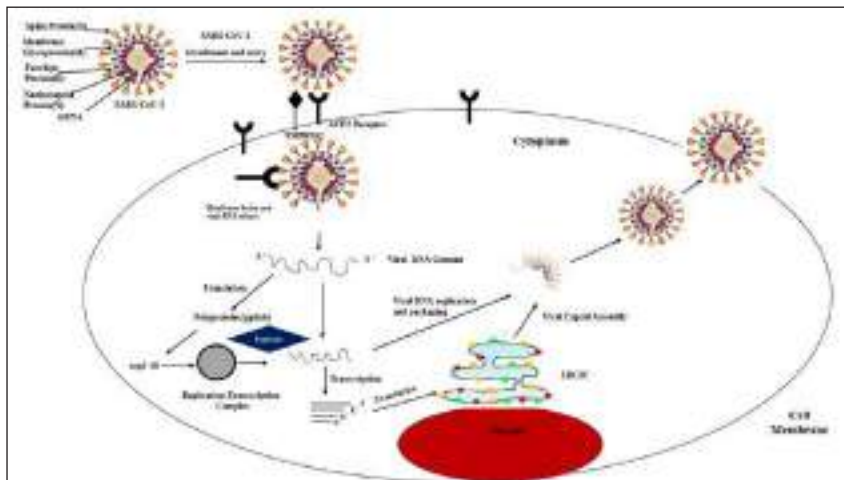
Figure 2: A simplistic schematic representation of the replication process in SARS-CoV-2 within a human cell.

approximately 30kb in length. The SARS-CoV-2 genome (29,891 nucleotides) comprises majorly of four structural proteins, i.e., nucleocapsid (N) protein that holds the viral RNA; spike (S) protein; envelope (E) protein and membrane (M) protein that create the viral envelope (*Perlman et al., 2009*). SARS-CoV-2 enters host cells using the surface S protein to bind to the host receptors of epithelial cells in the respiratory tract. The angiotensin-converting enzyme 2 (ACE-2) has been identified as the predominant receptor for SARS-CoV-2 (*Wrapp et al., 2020*). This process is dependent on S protein priming by a host serine protease (TMPRSS2) (*Matsuyama et al., 2020*). Once the virus enters the host cell, the viral RNA is released into the host cell cytoplasm. Viral RNA is translated to produce polyproteins which are further cleaved to form structural proteins for the RNA replicase transcriptase complex, which is responsible for the replication and transcription of viral RNA. Viral nucleocapsids are assembled and bud from the endoplasmic reticulum Golgi intermediate compartment (ERGIC). As viral nucleocapsids encase viral RNA to produce new CoV virions, they are budded out. Figure 2 provides a schematic representation of the replication process.

Genome comparison of SARS-CoV-2 showed that it had maximum (96.3%) nucleotide identity with BatCoV RaTG13 sequence, 89% identity with bat SARS-like-CoVZXC21 and 82% identity with that of human SARS-CoV (*Chan et al., 2020; Andersen et al., 2020*). Based on this, the virus causing COVID-19 was called SARS-CoV-2. Genomic analyses thus suggested that SARS-CoV-2 probably evolved from a strain found in bats. The potential amplifying mammalian host, intermediate between bats and humans, that could have directly triggered virulence towards humans, is yet to be identified. The Malayan pangolin CoV spike protein sequence

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is more similar to the SARS-CoV-2 in the receptor binding domain of the spike protein (*Xiao et al., 2020*)

Transmission

Animal-to-human transmission was assumed to be the main mechanism of transmission initially as the first cases of the COVID-19 disease were linked to direct exposure to the Huanan Seafood Wholesale Market of Wuhan. However, noting that subsequent cases were not associated with this exposure mechanism, it was concluded that the virus could also be transmitted from human-to-human. Though symptomatic people are the most frequent source of COVID-19 spread, the possibility of transmission before symptoms develop could not be excluded.

As with other respiratory pathogens, including flu, the transmission occurs primarily through respiratory droplets from coughing and sneezing, but it can also occur through contact with contaminated surfaces. Viable viral particles may remain on stainless steel and plastics and other fomites for up to 72 hours after application (*Doremalen et al., 2020*). Aerosol transmission is also possible in case of protracted exposure to elevated aerosol concentrations in closed spaces. The possibility of faecal–oral transmission of SARS-CoV-2 also cannot be ruled out, though more evidence is needed.

Incubation periods for SARS-CoV-2 may vary but have been known to be generally within 3 to 7 days with the median observed to be 5.1 days (95% confidence interval [CI]: 4.5-5.8 days), with 97.5% of those who develop symptoms doing so within 11.5 days (95% CI: 8.2-15.6 days) of infection (*Lauer et al., 2020*).

The basic reproduction number (R0), or the number of cases directly generated by one case in a population where all individuals are susceptible, has been reported to be between 2.13 and 4.82, which is similar to SARS-
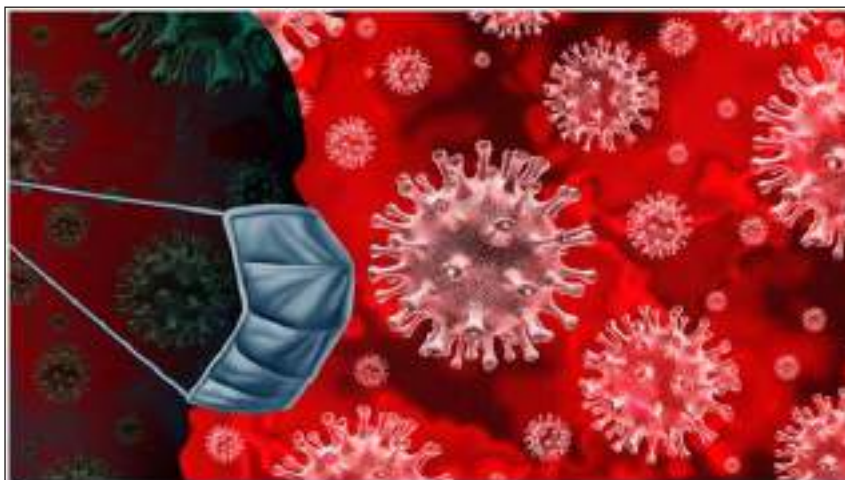
CoV (*Julien et al., 2020*). Data showed that the doubling time was about every seven days (*Tsang et al., 2020*).

Epidemiology

As of May 19, 2020, a total of 47,31,458 confirmed cases of COVID-19 occurring in at least 215 countries/territories were reported with 3,16,169 deaths (*WHO, 2020*). The estimated case-fatality rates ranged from 0.5% to 5.7% (*Yang[1] et al., 2020*). Children population seems to be the least affected by the disease, while the highest rate of death is among the elderly and people with comorbidities. Few reports have suggested an *in vivo* evolution of the virus, which may explain the rapid spread and changing epidemiology of SARS-CoV-2 (*Shen et al., 2020*), but further evidence is needed.

A study from China that included more than 70,000 COVID-19 patients revealed that majority of the confirmed cases were aged between 30-79 years (86.6%) (*Wu et al., 2020; Chen et al., 2020*). Among about 1,000 deaths, the majority were among patients of >60 years of age, with the 80 years age group characterised by the highest fatality rate (~20%). Relatively fewer cases were reported among young children (0-9 years old); while more males were affected by the disease, the male-to-female ratio being ~1.06:1 in China.

Initially, among countries excluding China, the countries with most cases were Italy and the Islamic Republic of Iran. The epidemiological scenario since has drastically changed. According to WHO statistics (as of 19 May, 2020), the most reported cases are in United States of America (14,77,516), Russian Federation (2,99,941), The United Kingdom 2,46,410, Brazil (2,41,080), Spain (2,31,606) and Italy 2,25,886. Today about 34.4% (74/215) of reporting countries are experiencing local transmission of the infection (*WHO, 2020*).

Clinical Features and Progress of Disease

Symptoms and signs of COVID-19 may appear 2 to 14 days after exposure and can most commonly include fever, dry cough, fatigue, generalised body ache, nausea, vomiting diarrhoea and shortness of breath. Most infected individuals may be asymptomatic while some may present with acute respiratory distress syndrome. Severity of illness is associated with advancing age and those with other medical conditions such as diabetes, hypertension and chronic lung disease.

Once SARS-Cov-2 enters the respiratory tract, it leads to infection of angiotension converting enzyme 2 (ACE2) expressing target cells such as the alveolar type 2 cells and perhaps other unknown target cells in the lungs (*Prompetchara et al., 2020*). Cells infected with virus may escape the interferon (IFN1) produced by the host which may lead to increased virus replication in the lungs. The gastrointestinal symptoms of COVID-19 may be caused by direct viral damage to the intestine rather than the immune-pathogenic response to the lung infection of the host. There is recruitment of neutrophils, macrophages and monocytes to the release of high levels of pro-inflammatory cytokines. The "cytokine storm" leads to inflammation related lung injury. Death which is mainly seen in the elderly is finally due to multiple organ failure.

Laboratory Diagnosis

For early diagnosis, detection

Aatmanirbhar Bharat Abhiyan
Health Reforms & Initiatives

Increased investments in Public Health –

➤ Public Expenditure on Health will be increased.
➤ Investments in grass root health institutions
  • Ramp up Health and Wellness Centres in rural and urban areas

Preparing India for any future pandemics –

➤ Infectious Diseases Hospital Blocks – all districts
➤ Strengthening of lab network and surveillance –
  • Integrated Public Health Labs in all districts & block level Labs & Public Health Unit to manage pandemics.
➤ Encouraging Research—National Institutional Platform for One health by ICMR
➤ National Digital Health Mission: Implementation of National Digital Health Blueprint

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of SARS-CoV-2 viral RNA is recommended. There are many assays that detect viral RNA using real-time PCR. Most screening assays detect the envelope (E) gene. If it is positive, confirmatory testing to detect other viral genes such as the RNA dependant RNA polymerase (RdRP) gene, the Orf1 gene and the nucleocapsid (N) region is carried out. Currently, there are many manufacturers of these real time PCR assays. They, however, have to be certified by regulatory agencies receiving the US Food and Drug Administration Emergency Use Authorisation (FDA-EUA) or receive Conformitè Europëenne (CE) marking. Other assays will have to be validated by established governmental laboratories that have been certified for testing. For viral RNA testing, nasal, throat, nasopharyngeal or oropharyngeal swabs are required. The need of the hour is to have sensitive assays that are more affordable with a shorter turnaround time.

Several immunoassays are now available to detect IgM and IgG class of antibodies, the immune response to the virus. They may be rapid lateral flow immunochromatography based, enzyme immunoassay based or automated chemiluminescence immunoassays. Most assays can detect IgM antibodies by approximately

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Animal-to-human transmission was assumed to be the main mechanism of transmission initially as the first cases of the COVID-19 disease were linked to direct exposure to the Huanan Seafood Wholesale Market of Wuhan. However, noting that subsequent cases were not associated with this exposure mechanism, it was concluded that the virus could also be transmitted from human-to-human.

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the 10th day and IgG antibodies by the 20th day post infection (*Vashist, 2020*). Their use is mainly for sero-surveillance and sero-epidemiology and cannot substitute viral RNA detection in acute cases.

Treatment Strategies

Under the circumstances of no specific treatment for COVID-19 currently, supportive care and prevention of complications is of utmost importance in clinical management. Ventilator support is given for patients experiencing respiratory distress. Conservative fluid management is given as it may worsen the lung oedema, interfering with oxygen delivery. Systemic corticosteroid therapy is not recommended either, as it may delay viral clearance.

Currently, there is not sufficient evidence that any existing antiviral drug can efficiently treat COVID-19 pneumonia. However, there are several clinical trials on potential antiviral therapies taking place. The drug therapies can be divided into two main categories depending on their target. The first acts on the coronavirus directly, either by inhibiting crucial viral enzymes responsible for genome replication, or by blocking viral entry to the host cells. The second class of inhibitors act on the host immune system or inhibit inflammatory processes. Most of these drugs are actually being repurposed for the COVID-19 trials (*Tu et al., 2020*). Among the ongoing drug therapy options for COVID-19 are repurposed drugs like remdesivir, favipiravir, that exhibit broad-spectrum antiviral activity as virus replication inhibitors, HIV protease inhibitors such as lopinavir and ritonavir, virus-cell membrane fusion inhibitors such as recombinant human Angiotensin-Converting Enzyme 2 (rhACE2), entry inhibitors like Arbidol (umifenovir), anti-parasitic agents such as ivermectin and anti-malarial drugs such as

hydroxychloroquine. Interferons are secreted by the virus-infected cells and recombinant interferon therapy either used alone or in combination with other drugs, is being tried as immune system enhancers. Intravenous immunoglobulin, neutralising antibodies, monoclonal antibodies, thalidomide, methylprednisolone etc. are being evaluated for attenuating the inflammatory response. Plasma therapy and convalescent sera therapy are also being implemented to treat SARS-CoV-2 patients and has shown some encouraging results. Herbal therapies are also an attractive therapy option for the COVID-19 disease as clinical evidence has shown the beneficial effect of traditional Chinese medicine (TCM) in the treatment of SARS-CoV-2 (*Yang[2] et al., 2020*).

Several trials are also initiated to test vaccines targeting the SARS-CoV-2 (*Tu et al., 2020*). Multiple nucleic acid-based vaccine candidates have been proposed. Among the vaccines under trial include a lipid nanoparticle-encapsulated mRNA vaccine that does not require the virus, DNA vaccine candidates, a vaccine composed of a non-replicating adenovirus vector and the genetic sequence of the S protein of SARS-CoV-2, a stabilised subunit vaccine, a nanoparticle-based vaccine using antigens derived from the CoV S protein and a genetically modified

Among the vaccines under trial include a lipid nanoparticle-encapsulated mRNA vaccine that does not require the virus, DNA vaccine candidates, a vaccine composed of a non-replicating adenovirus vector and the genetic sequence of the S protein of SARS-CoV-2, a stabilised subunit vaccine, a nanoparticle-based vaccine using antigens derived from the CoV S protein and a genetically modified artificial antigen-presenting cells (aAPCs) expressing the conserved domains of the viral structural proteins delivered by lentivirus vector.

artificial antigen-presenting cells (aAPCs) expressing the conserved domains of the viral structural proteins delivered by lentivirus vector. However, the development of these vaccines currently represents a more long-term strategy to prevent COVID-19 outbreaks in the future.

Concluding Remarks

It must be emphasised that further studies are needed to understand the mechanisms of transmission, the incubation time, the clinical course, and the duration of infectivity of the SARS-CoV-2. Several public measures are being taken at local, national and international levels to reduce the rates of transmission, including social distancing and self-isolation. Unfortunately, as no effective treatment or therapeutic drug is available for the disease, only supportive treatment and classical intervention measures are available currently for confronting the SARS-CoV-2 pandemic.

The SARS-Cov-2 pandemic has no doubt posed a significant challenge globally on the public health system. It is also a lesson in that more systematic approaches are needed to prepare ourselves in advance for any potential future pandemics. Finally, an understanding of the spill over from bats to humans possibly as a result of shifts in their ecology and behaviour, with evidence suggesting that altered roosting habitats, diet, and movement behaviours are increasing. We need to review the ways that changing resource landscapes (urban and agricultural habitats) affect the processes that culminate in cross-species transmission of viruses. Towards this end, the role played by deforestation, increased contact with wild life, food habits, population density, climate change and increased globalisation in the emergence of such a pandemic needs to be recognised. Enhanced surveillance and ensuring better public health among populations would also be a step in the right direction.

Acknowledgement

Image Courtesy:

Fig.1: Dr Atanu Basu, Senior Scientist & Deputy Director, ICMR-National Institute of Virology, Pune.

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Migration & Economic Growth

Suchita Krishnaprasad

It is a phenomenal task to settle millions of workers and it requires effective collaboration from many interest groups. There are reports that the lockdown has helped the environment to recover from the damages, and that the pollution levels have dipped significantly. Considering, that the land and its people form inseparable components of sustainable development, this pandemic can provide a good opportunity to revive social dialogue as well.

Social distancing and 'stay home, stay safe' became the mantras when the nationwide lockdown was announced on 24 March, 2020 in an attempt to arrest the spread of coronavirus. Lockdown 2.0 was announced from 14 April, 2020 when the 'curve' indicating the number of infected cases continued to rise despite the restrictions. This time the degrees of restrictions across regions varied depending on the spread and intensity of the virus infection. However, by this time the capability to 'stay home and stay safe' of about one-tenth of the population had worn out because they neither lived in what could be called as a home, nor were they safe inside their dwellings, given the accepted norms of social distancing and hygiene.

These were the migrant workers who provide support services to every sector and across the classes. Their savings had dried out as they supported themselves without jobs. And though the government by declaring it as a national disaster had made it obligatory for the employers to pay the wages, as per the National Disaster Management Act, it is difficult to assess its implementation. This is because, firstly, the administrative machinery to ensure compliance across the nation is far from adequate. Secondly, the income earned by the self-employed workers cannot be termed as wages, which means that these workers would have to go without earnings when there is no work. Then there are those engaged in piece-rated jobs, whose remuneration would differ depending on pieces made. And finally, the MSMEs or tiny enterprises are financially too fragile to release the wages without production. Perhaps only the domestic workers, whose contracts involve a significant personal component making them relatively indispensable, might have received their wages during the lockdown(s)[i].

By the end of the lockdown 1.0, the virus had made its appearance in the urban slums, where it was feared to flare faster due to the sheer density of population, the use of common toilets, etc. Thousands began to go back to their home states and later governments arranged for safe return of the migrants.

A Challenge and an Opportunity

Harris-Todaro model of migration (1970) shows how rural/agricultural workers decide to migrate to urban/industrial spaces when the expected wage rate in the urban-industrial sector is significantly higher than their present wages in the rural sector. The expected wage is a ratio of the present urban wage rate and the 'chance' of finding a

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Free Food grain Supply to Migrants for 2 months

- Migrants in various states require food-grain assistance
- Migrants who are neither NFSA or State Card beneficiaries in the state they are stationed will be provided 5 kg of grains per person and 1 kg Chana per family per month for two months
- About 8 crore migrants are expected to benefit.
- Rs. 3500 Crore will be spent on this intervention for 2 months
- Cost will be fully borne by Government of India
- State Governments responsible for implementation, identification of migrants and full distribution and providing detailed guidelines.

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job. The latter being a ratio of the number of jobs available, and the total number of aspirants, which includes those living in the urban sector and the new migrants. Naturally, if the 'chance' of finding a job is poor, the expected wage is low, and the decision to migrate is put off. What plays an important role in changing this calculation is the presence of a kin or a community member in the urban sector. Availability of such a support induces migration, which is a rational personal choice, by providing at least an initial base to a new migrant. And while every migrant may dream of a secure job in formal sector, as more migrants flow in, they are compelled to settle in the unorganised or informal sector. In fact even their hosts may be earning their livelihood out of the informal sector. As bad harvest, subdivision of family land and poor employment opportunities drive more and more people to migrate to mega cities, this number swells, and it is nearly impossible to track the size of work force in the urban informal sector.

But as workers began returning due to the pandemic, there was an opportunity to prepare a data base of this labour market, which is significant, given the employment potential and contribution of this sector to the GDP. This opportunity was available in at the posts where they had to register themselves, and seek a medical certificate to be allowed to return to their home states.

Mapping this huge workforce would have been possible if, for example, the registration form could include the details of demographic information, level of skill, the kind of employment, the income earned, and

> **The administration can get a better picture of the need for employment generation programs in the surplus states, besides the advantage of knowing the size of pool of experienced and skilled workers now available to the home state, provided there are opportunities.**

whether or not the worker intended to return to work after the normalcy. This information is crucial to the formation of Labour Market Information System, which could be developed by compilation of information at the Labour commissioner's office. Inadequate information may be a strong impediment in proper utilisation of funds allotted towards social protection of migrant workers[ii], and the need for a sound data base cannot be over emphasised[iii].

More on Labour Market Information

Having data of the number of skilled and unskilled workers who moved back may be useful for both, the states they left, and those they returned to, especially if a sizeable portion of this population does not wish to return. In other words, once the lockdown is lifted, there are chances of a high labour surplus in some states and relative deficits in others. The administration can get a better picture of the

need for employment generation programs in the surplus states, besides the advantage of knowing the size of pool of experienced and skilled workers now available to the home state, provided there are opportunities.

In fact by further classifying this pool skill-wise, it may be possible to bring them together through co-operative forms of organisation. States that have suffered a poor industrial growth for long and hence have had a high outflow of migrants can now look at return of migrants as a reclaimed human capital. There is a possibility of building clusters of new MSMEs or units based on co-operatives using the skill and experience of the return-migrants. This is simply because migrants who have returned back are more likely to identify and hence tune and team up with each other. An ILO issue brief (2013) clearly brings out how cooperatives offer migrant workers options for better lives[iv].

Phasing Out the Return of Migrant Workers

Given the mammoth size of this operation, some phasing out could have helped. For instance, one could begin with the mega metros with large numbers trapped in 'red' zones of COVID-19. Many States have trained and deployed ASHA workers to spread awareness about the virus in slums[v] and identify those who are likely to be infected, based on the symptoms. This information could have been used to inform the uninfected, to be ready for a safe return. The next step could be classification of migrants hailing from within and those from outside the state, to arrange for an appropriate mode of transport.

A similar process could then be followed for the two-tier metros. Such a phasing out would reduce anxiety and hence 'illegal and unsafe' movements of workers.

An Opportunity for Social Dialogue

It's a phenomenal task to 'settle' millions of workers and it requires effective collaboration from many interest groups. This, then, is a great opportunity to initiate social dialogue. There are reports that the lockdown(s) have helped the environment to recover from the damages, and that the pollution levels have dipped significantly. Considering, that the land and its people form inseparable components of sustainable development, this pandemic can provide a good opportunity to revive social dialogue as well.

One can conceive of several avenues to benefit from social dialogue. Firstly, once the phase-wise return is planned, NGOs can be encouraged to participate in ensuring a safe return of migrants by collaborating with the medical personnel. Several states administered a quarantine to the return-migrants once they reached their home states. This is another stage where collaboration between local self-government, and NGOs could be beneficial. States with a large inflow of return migrants are likely to face a downward pressure of wages. An effective social dialogue can ensure that such revisions are acceptable, and at the same time 'sweat shops' are minimised.

A similar collaboration could bring about significant benefits if deployed in the process of initiation of new economic activities spearheaded by the return-migrants. Permission to utilise the CSR funds could go a long way in promoting entrepreneurial development (Sanghi, Sensharma 2014).

Opportunities Untapped

At present, it appears that we have missed some of the opportunities mentioned above, though some are waiting to be tapped. For example, the registration forms of workers desirous to return contained the bare minimum details such as name, age, and the points of travel. Hospitals that issued medical certificates could have been used as data collection points.

Skill-Mapping of Migrants

The Uttar Pradesh government has released its first skill map of migrant workers who returned to the State during the lockdown. The government has said it will provide them jobs in the State as per their skills and experience and will constitute a Migrant Commission for it. So far, around 23-24 lakh migrant workers have returned to Uttar Pradesh during the lockdown, the government said.

The largest set of these migrant workers are related to the construction sector, with over 1.52 lakh engaged in work in real estate or construction agencies. The list also includes large number of painters, carpenters, drivers (9,052), electricians and persons associated with electronics, security guards, furniture and fitting workers and auto-repair mechanics.

Will it make the urban labour market so tight as to roll out better terms of employment in the times to come, restarting the process of migration, with more decent working and living conditions? Historically, employers have chosen to offer better employment conditions to attract workers when necessary, the mill workers' quarters in Mumbai constructed to incentivise migration being a case in point.

Alternatively, there might be a Ricardo Effect. Employers may opt for labour saving technology in response to an upward movement in the wage rate, triggered by a relative labour shortage. This, of course, is possible only if a sign of recovery is visible.

Economic Growth: Slowdown & Lock Down

Indian economy has been going through a rough patch for a while. The GDP growth rate of the economy had slipped to 5 per cent in the first quarter of FY20. The annual report of the RBI for the fiscal year 2018-19 (or FY19) shows a significant decline in every macro-economic indicator.

Macro- Economic Indicator	Apr- June 2018	Apr- June 2019
Private Final Consumption Expenditure (PFCE)	7.3%	3.1%
Government Final Consumption Expenditure (GFCE)	6.6%	8.8%
Gross Fixed Capital Formation (GFCF)	13.3%	4.0%
Exports	10.2%	5.7%
Imports	11.0%	4.2%
GDP	8%	5%

The US-China trade war could be an important exogenous factor affecting the economy.

As we move beyond Lockdown 4.0, there is a talk that 'herd immunity' might work better than social distancing. This is because virologists are warning us of a return of the virus within a year. So, extending lockdowns might not deliver much. In any case, following Pigou's Maximum Social Advantage principle, it would be baseless to carry on

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with the lockdown extension beyond its optimum. i.e. when the net benefits from lockdown have been maximised. Net benefits would be an estimate of the number of lives saved, including the cost of medical assistance and equipment needed to look after number of patients added in the absence of lockdown, and perhaps the environmental 'recovery' if that can be factored in, minus the costs in terms of loss of production, livelihood and the rate of economic growth. And though the chances of a big spike in the number of infected persons in the absence of the lockdown are very real, the resulting poor economic growth[vi] has now become an overwhelmingly strong reality[vii], enough to convince us that we might have passed the optimum.

Opportunities Ahead

Boosting the consumption demand at the earliest is the need of the hour, since consumption expenditure constitutes almost 60 per cent of India's GDP[viii]. And ensuring decent earnings to the workers in general, including the migrants can easily facilitate this, mainly because of their high propensity to consume. Economists have also suggested use of surplus food grain stock to help the workers tide over the immediate periods of 'coerced unemployment', to use the word coined by Prof. K.R. Sham Sundar.

There are successful examples of migrant workers' co-operatives that emerged as a response to crisis in many countries[ix]. States can benefit by collaborating with ILO which has a rich experience of hand-holding many such projects across the globe. Creating opportunities of gainful employment by utilising the skills the return-migrants have acquired so far, especially through co-operatives not only follows the Prime Minister's call

to be 'Atma-Nirbhar' (self-reliance), but it can also facilitate decentralisation of the process of growth. The State governments may have to work on improving infrastructure, building industrial estates, for setting up new MSMEs, etc. for such projects to become feasible. In fact, the initial employment generation can take place through such investment, which can push up the economic growth through multiplier.

Nurkse (1953) wrote of the 'unlimited supply of labour' in LDCs as a 'potential source of saving', provided there was migration of the disguisedly unemployed workers from rural to the urban industrial sector. Harris and Todaro added the next leaf to the story of rural-urban migration when they explained the growth of urban informal sector due to this migration. We are now witnessing times when

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the 'return-migrants' can become a renewed source of economic growth by planting the seeds of their on-the- job skills learnt in the urban sector into their home states. If this happens, i.e., migrants become gainfully employed in their home states/districts, we might write the next leaf in the received theories on migration. The migrant workers await a decent treatment which might in fact be a critical support to economy as a whole. ❑

Endnotes

[i]A survey of 11,000 workers conducted by Stranded Workers' Action Network has observed that 89% of the migrant workers have not been paid wages. https://economictimes.indiatimes.com/news/economy/indicators/national-database-of-workers-in-informal-sector-in-the-works/articleshow/73394732.cms?from=mdr

[ii]https://www.reuters.com/article/us-health-coronavirus-india-migrants-spe/special-report-indias-migrant-workers-fall-through-cracks-in-coronavirus-lockdown-idUSKBN2230M3

[iii]Especially the funds collected from employers and the government for Building and Construction Workers laylargely unclaimed because of migrant nature of workforce, Unpublished ILO Project Report on Mapping and Assessment of Social Dialogue and Labour Administration in Maharashtra(2015). https://www.news18.com/news/india/only-plans-no-execution-rs-28000-crore-collected-as-cess-for-construction-workers-over-23-years-unused-2025181.html

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[v]https://timesofindia.indiatimes.com/india/corona-bhubaneswar-toscreen-2-lakh-slum-dwellers/articleshow/75131819.cms

[vi]https://economictimes.indiatimes.com/news/economy/indicators/imf-projects-indias-growth-rate-at-1-9-in-2020-forecasts-globalrecession-due-to-covid 19/articleshow/75142792.cms?from=mdr

[vii]India touched the highest unemployment rate so far of 27.1 per cent by the end of April 2020, according to a Report by CMIE

[viii] https://economictimes.indiatimes.com/news/economy/indicators/indias-worrying-growth-statistics-and-what-they-mean-for-the-future/articleshow/72735008.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst

[ix]https://mfasia.org/migrant-workers-cooperatives-as-a-crisisresponse/

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Online Learning in Lockdown

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Dr Bhanu Pratap Singh

COVID-19 has beyond the wildest imagination of the mankind, changed the ways of living, working, teaching & learning. Millions of students have been driven out of university campuses and the faculty is confined to their homes. This has forced the teaching community to look for alternatives to maintain the continuity in the teaching and learning process. The pandemic has forced all the teachers to Work from Home and to come up with innovative ways of imparting education.

"Education is a virtue; it stays with an individual throughout their life". But the means for the virtue is on the crossroad across the globe due to the corona pandemic. More than 960 million students across the globe are looking towards their institutions for the way forward from the current ongoing challenges. The lockdown due to COVID-19 has put the government on the tight rope leading the academic administrators in the country to plan a series of activities by the concerned ministry and various regulators including UGC, IGNOU, CBSE, NCERT, NIOS etc. to find alternatives to ensure the continuation of education. Amidst this background, the department and regulators have started moving towards developing an online mode of education–as, hopefully, a viable alternative arrangement.

COVID-19 has beyond the wildest imagination of the mankind, changed the ways of living, working, teaching and learning. Millions of students have been driven out of university campuses and the faculty is confined to their homes. This has forced the teaching community to look for alternatives to maintain the continuity in the teaching learning process. The pandemic has forced all the teachers to Work from Home (WFH). Since ages, teaching involves eye contact, non-verbal communication and real-time discussions among teachers and students. The transition from standing before the students in the classrooms for delivering lectures to working from home may be the future of pedagogy.

Educational Technologists for long have advocated that Information Technology will be a significant intermediary in education. Teachers

Aatmanirbhar Bharat Abhiyan
Technology Driven Education with Equity post-COVID

➤ PM eVIDYA- A programme for multi-mode access to digital/online education to be launched immediately; consisting of:

- DIKSHA for school education in states/UTs: e-content and QR coded Energized Textbooks for all grades (one nation, one digital platform)
- One earmarked TV channel per class from 1 to 12 (one class, one channel)
- Extensive use of Radio, Community radio and Podcasts
- Special e-content for visually and hearing impaired.
- Top 100 universities will be permitted to automatically start online courses by 30th May, 2020.

➤ Manodarpan- An initiative for psychosocial support of students, teachers and families for mental health and emotional wellbeing to be launched immediately.

➤ New National Curriculum and Pedagogical framework for school, early childhood and teachers will be launched: integrated with global and 21st century skill requirements

➤ National Foundational Literacy and Numeracy Mission for ensuring that every child attains Learning levels and outcomes in grade 5 by 2025 will be launched by December 2020

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are today using IT tools to connect and teach. This is one new paradigm added to the way teaching fraternity will interact with their students and among themselves in the future. The internet is a treasure trove of amazingly well-curated content and pedagogical tools. The internet-based education depends on several factors and robust connectivity along with a better sustainable collaboration between telecom firms and streaming companies, in lowering the transmission bit rate from high definition to standard definition to develop tools that make learning truly enjoyable. It is the time to look for the other possibilities that are going to chart a new way in education sector. Whether the present challenges is going to decide the future road map for the education sector of the nation during and post-COVID-19 scenario.

Before discussing the present challenge, it is pertinent to look back into the history of the satellite education in our country, which has laid down the strong base for this generation to carry forward teaching and learning through the development of satellite education. Educational media has been one of the major issues in contemporary world education. Radio and television broadcast has been extensively used for more than 75 years now. It is not only the television, radio or other small media like films or film stripes that are being used, but satellite communication for education is used world over. Though satellite communication is of recent origin, it has shown significant promises. It is an extremely resilient medium, and has been adapted in the business and industry.

Satellite Instructional Television Experiment (SITE) was the largest communication experiment in the use of satellite in support of developmental and educational programmes in modern times. The telecast via this satellite began in India from August 1, 1975. Indian Space Research Organisation (ISRO) with All India Radio (AIR) took the responsibility of broadcasting ETV programmes to the selected villages in six states of Andhra Pradesh, Bihar, Karnataka, Odisha, Madhya Pradesh and Rajasthan, selected on the basis of their educational backwardness. The instructional objectives of SITE were in the fields of education, agriculture, health and family planning and national integration. About 2400 Direct Reception Television Sets (DRS) deployed for SITE

IGNOU's educational programmes began in May 1991 on the national network of Doordarshan thrice a week in the early morning. These programmes supplement the self-instructional texts provided to the students of the university.

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were located in different cultural, linguistics and agricultural regions of the country. Different socio-economic environments were also chosen for the purpose. Television broadcasts via satellite were made available for four hours a day, one and half hour in the morning and two and half hours in the evening. The experience during SITE period was quite encouraging for further expansion of television service in the country.

Based on the success of SITE, India approved a proposal to launch a multipurpose and space communication system of her own called Indian National Satellite (INSAT) in 1977. The major objectives of INSAT were to produce and transmit varied programmes designed to awaken, inform, enlighten, educate, entertain and enrich all sections of the people in different parts of the country. It has also aimed to promote alternative approaches to education for children, youth and adults. Later, in order to further strengthen the alternate approaches to education, INSAT-1A was launched in its orbit on April 10, 1982. However, it developed mechanical snags and in September 1982, it ceased to function. Soon, INSAT-1B was launched on August 30, 1983. About four thousand television sets were installed and commissioned. These television programmes were telecast in the morning and evening. Morning transmission was devoted to school education for children in the age group of 5-8 years and 9-12 years. These programmes were not only syllabus oriented but provided broader perspectives of enriching school lessons.

The local Doordarshan Kendras and Central Institute of Educational Technology (CIET), NCERT were requested to produce relevant programmes. India's space programmes took another big leap on July 24, 1993 when the multi-functional indigenously built satellite INSAT-2B launched into space from French Guyana in South America. Prior to this broadcast of IGNOU's educational programmes began in

May 1991 on the national network of Doordarshan thrice a week in the early morning. The broadcasts of audio programmes began in January 1992 from Bombay and Hyderabad and later from Delhi and Lucknow. The IGNOU programmes are syllabus-based and cater to the learners enrolled in IGNOU programmes. These programmes supplement the self-instructional texts provided to the students of the university. These broadcasts mark a major step in the progress of IGNOU in fulfilling its educational objectives and in the country's development. Gyan Darshan (GD) came into existence on 26th January 2000; it is an exclusive and dedicated twenty-four hour educational and developmental TV channel of India. It is a joint collaborative venture of Ministry of Human Resource Development, Ministry of Information & Broadcasting, IGNOU, UGC, CEC, NCERT, CIET, SIETs, National Institute of Open Schooling (NIOS), Department of Space and Technology, IITs, Technical Teachers Training Institute's, Department of Space, DECU, Ministries of Rural Development, Health, Labour, Environment, National Aids Control Organisation (NACO) etc.

> **People started to identify alternative platforms for reading newspapers, magazines, books, journals etc. and their dependence on e-content increased multifold. Many public and private schools immediately initiated engaging online classes, and home assignments were provided online.**

Electronic Media Production Centre (EMPC) of IGNOU has been identified as the coordinating and transmission agency. Gyan Darshan has become completely digital in the span of fourth year on January 26, 2004. It has expanded into a bouquet of channels namely GD-1, GD-2, GD-3 Eklavya, and GD-4 Vyas. The primary target audiences of the channel are the students studying in undergraduate and postgraduate classes in universities and colleges all over the country, particularly in small towns. Students pursuing correspondence courses, teachers teaching undergraduate and postgraduate courses and also the staff of training colleges, and students appearing for various competitive examinations watch this channel.

On September 20, 2004, EDUSAT-the dedicated satellite for education in India was launched by ISRO. It is the first Indian satellite exclusively built for the use of education sector. The satellite is capable of providing high bandwidth two-way interaction by creating a private network of Satellite Interactive Terminals (SITs) and Receive Only Terminals (ROTs) installed all over the country. Some of the major institutions like Indira Gandhi National Open University (IGNOU), National Council for Educational Research and Training (NCERT), Consortium for Educational Communication (CEC), Visvesvaraya Technological University, and Vigyan Prasar have very effectively utilised EDUSAT.

Now, before going ahead to elaborate more about the alternatives under the lockdown scenario, take a pause and review the change noticed among the people in their teaching learning paradigm, a significant growth in online readership. People started to identify alternative platforms for reading newspapers, magazines, books, journals etc. and their dependence on e-content increased multifold. Many public and private schools immediately initiated engaging online classes, and home assignments were provided online. Even both the public and private universities/colleges streamed video lectures with the use of various platforms. These efforts of the institutions are in sync with the UGC Regulation 2016, which higher education institutions to provide 20 per cent of total course through online platform SWAYAM. Soon the online streaming of lectures started concerns, like lack of technology, absence of appropriate digital training and issues related to the bandwidth surfaced.

The Zoom app, which was used extensively for video conferencing was later denounced for grave privacy concerns. Eric S. Yuan, CEO, ZOOM even apologised for all the security

MOOCs OFFERED BY SWAYAM ARE NOW ELIGIBLE FOR CREDIT MOBILITY

issues that the video conferencing app was packed with. Zoom's privacy policy was revealed to have clauses which gives the company full right to share user data with third-party marketers. The use of Education Technology (ET)/Information & Communication Technology (ICT) in imparting education/learning is on the driver's seat during the lockdown period globally. It has become inevitable tool in reaching to students and all such people in imparting teaching & learning. Internet is the most useful technology of modern times not only in our daily lives but also for educational purposes. Importance of internet in education goes without saying; it helps the students to research things, and relearn the content taught/discussed in their classrooms. For the effective education, mere access to internet information resources is not enough. It is necessary to prepare the students beforehand to work with information or to provide those, who use the distance form of education with special tasks destined to develop intellectual skills of critical thinking, working with verbal texts, multimedia environment, to create all kinds of so-called secondary texts (abstracts, summaries, essays, etc.), to be able to work with information. The usage of the information resources located in the Internet is not such a simple affair. It requires not only the ability to search for it in the huge ocean of the Internet, but to process it, to use it effectively for the cognitive goals.

As per one of the estimates published in March 2020 in the Statista Research Department Report, India is the second-largest internet user in the world. However, as per the report of TRAI, only 34 per cent of the total population had access to the Internet in 2017. The figure carries a vast gender disparity, where the ratio of male and female users is approx. 70 per cent and 30 per cent respectively. An analysis of the rural-urban division of internet usage complexes the internet penetration and shows the disparity. A whopping 66 per cent of the total population lives in rural India. Still, it accounts for just 25.3 per cent internet density compared to the 34 per cent of the urban population having around 98 per cent internet connectivity. As per the March 2020 trends of the Speedtest Global Index, India ranks at 130 out of 141 nations with a download speed of 10.15 Mbps compared to the global average of 30.47 Mbps. The disparity of internet speed exists in rural-urban basis where rural areas still have slow internet availability compared to urban areas. Under such a situation, infrastructure readiness has to be assessed in terms of household assets ownership. The National Statistical Organisation (NSO) 75th Round survey on 'Social Consumption of Education in 2017-18' had probed households' ownership of computers and access to the internet. Further, the survey probed if a household member of age five years and above had used internet to find, evaluate and communicate

information from any location during the last 30 days preceding the date of survey, via any of the above-mentioned devices, and smartphone, etc. The analysis based on the 75th Round survey only included households, which had students aged between 5-29 years and were currently enrolled and attending schools/colleges/universities. The survey showed that 8.3 per cent of households had computers and 21.6 per cent had internet facility. Further, a larger share of households had access to internet facility versus ownership of computers. However, there are large variations between rural and urban areas and intra-regional gaps as well. In urban areas, 20 per cent of households had computers and 39.8 per cent had access to internet. The corresponding numbers in rural areas were 4 per cent and 15 per cent respectively. In the top two urban quintiles, 68.3 per cent and 50 per cent of households had internet access, respectively. This number was 18 per cent in the bottom-most urban quintile. Twenty-nine per cent of households had internet access in the top-most rural quintile and 5.7 per cent in the bottom-most quintile.

The Indian youth are sometimes characterised by limited digital skills. Only 17.6 per cent of the youth could use a computer and 18.4 per cent could access internet. As per the NSO (2019), the ability to use of computer could include any of the following tasks—copying or moving a file or folder, using copy and paste tools to duplicate or move information within a document, sending e-mails with attached files (example, document, picture, and video), using basic arithmetic formulae in a spreadsheet, connecting and installing new devices (example, modem, camera, printer), finding, downloading, installing and configuring software, creating electronic presentations with presentation software (including text, images, sound, video or charts), transferring files between a computer and other devices, writing a computer program using a specialised programming language. The ability to use internet meant that the household

member was able to use internet browser for website navigation, using e-mail and social networking applications, etc., to find, evaluate and communicate information. As a matter of fact, relatively speaking, only the top most urban quintiles in India are the most ready for online education.

One alternative to online education may be the delivery of education via television. The National Family Health Survey 2015-16 shows that 86 per cent of urban households and 51.5 per cent of rural households had colour television. In the short-run, the television holds a much more viable, equitable, cost-efficient and scalable alternative than online education. The current crisis has acted as a fillip to encourage digital education. It is equally important here to look for the judicious mix of Open Educational Resources (OER) along with delivery of education via television/satellite. OER is the teaching, learning and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use. It may include full courses, modules, text books, streaming videos, tests etc. The 2012 OER Paris Deceleration provided the broader guidelines on how to make best use of OER. It has the potential of bridging the gap between formal, informal and non-formal education, widening the participation in higher education by expanding access for non-traditional learners and promoting lifelong learning among the broader learners base. The institutions may repackage and share the already available knowledge on OER, without reinventing the wheels. An independent learner, who has access to Internet, can access the courses of his choice from the best University of the world at a competitive cost. Even UNESCO recommended the use of various tools of distance learning programmes and open educational applications and platforms to reach learners remotely and limit the disruption of education.

It has now become inevitable fact that the institutions need to rapidly move ahead with the delivery of the lessons with the help of digital learning both through satellite and internet based tools. Therefore, the digital thrust may be the future learning paradigm, accordingly the institutions need to augment the faculty training & development programmes on little large and sustainable scale to enable them teach digitally. This effort shall help the institutions to organise virtual class rooms & video conferencing. These efforts of the universities may also help the faculty in steering the process towards digital delivery. This impact is going to last longer. The possibilities of replacement of books with e-content & e-book cannot be ruled out. The rapid increase in the use of online delivery of lessons appears to be the future lesson planning for institutions and good business opportunities for entrepreneurs. In such a scenario, the days ahead are for the Open and Distance Learning institutions and dual mode universities besides for some of the new institutions. While going ahead towards the future educational challenges, opportunities and the emerging need, it is important for all the institutions of higher education to pause and review the en-route challenges, limitations and doable road map for marching ahead.

Providing equity in access of bandwidth and technology among the majority of the remote learners in country is going to be the biggest challenge besides the immediate availability of adequate numbers of trained manpower (both the content & technical experts). The mindset of both the facilitators (teachers/content experts) & taught is going to take some time in coping with the adaptability. The awareness narratives are essential for the parents to accept the possible shift in learning paradigm. In order to address the above challenges, it is essentially important to align the appropriate use of OER, SWAYAM platform and integrating e-library besides encouraging the faculty to create content for Social Media/ YouTube, contribute on MOOCS, develop Moodle Cloud contents, which is having four quadrant approaches for learning and assessments, etc. It may take little time but the real tasks for the institutions begin in working on the selection of appropriate new media mix, Learning Module System i.e. Apps, mobile learning, etc. A well-researched Instructional Technology consisting of right packaging of learning content having features like real time peer group interactions with simultaneous assessment through proper MCQs keeping a very close eyes on learning outcome with online dialogue box/discussion forum; may help the institutions in realising the dividends of future online teaching learning opportunities. The challenges of the lockdown may become a blessing in disguise in accessing the potential and the capabilities of our institutions in responding to the future necessity of online learning. ❑

ACCOUNTANCY PART - I
(Class XI) May, 2020
To enroll log on to - https://swayam.gov.in/
National Council of Educational Research and Training

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eNAM: Platform for Marketing

REACH MORE TRADERS

✓ Sell 150 Commodities

✓ Transparent e-bidding

✓ Direct Online Payments

To strengthen agriculture marketing and facilitate farmers to sell their harvested produce through the online portal, 177 new mandis have been linked with the National Agriculture Market (eNAM). The new mandis integrated are as follows: Gujarat (17), Haryana (26), J&K (1), Kerala (5), Maharashtra (54), Odisha (15), Punjab (17), Rajasthan (25), Tamil Nadu (13) and West Bengal (1). With this, the total number of eNAM mandis across country is 962.

National Agriculture Market (eNAM) is a highly ambitious and successful scheme of Government of India which networks the existing APMC mandis to create a unified national market for agricultural commodities with a vision to promote uniformity in agriculture marketing by streamlining of procedures across the integrated markets, removing information asymmetry between buyers and sellers and promoting real time price discovery based on actual demand and supply.

Earlier, 785 mandis were integrated with eNAM across 17 States and 2 UTs, with a user base of 1.66 cr farmers, 1.30 lakh traders and 71,911 Commission Agents. As of 9 May 2020, total volume of 3.43 crore MT & 37.93 lakh numbers (Bamboo & Coconut) collectively worth more than Rs. 1 lakh crore has been traded on eNAM platform. Digital payment worth Rs. 708 cr have been done benefitting more than 1.25 lakh farmers.

REACH MORE MARKET

✓ Real time information on trade and price

✓ Extended access to markets across the state

✓ Information on quality of commodities

eNAM facilitates trade beyond mandi/ state borders. A total of 236 mandis participated in inter- mandi trade across 12 States whereas 13 States/UT have participated in the inter-state trade allowing farmers to interact directly with distantly located traders. At present, 150 commodities, including food grains, oilseeds, fibers, vegetables and fruits, are being traded on eNAM. More than 1,005 FPOs have been registered on eNAM platform and have traded 2900 MT of agri-produce worth Rs. 7.92 crores.

To de-congest mandis during COVID-19 lockdown situation, FPO trade module, Logistics module and eNWR based Warehouse module were also initiated. Since then, 82 FPOs from 15 States have traded on eNAM with total quantity of 12048 Quintals of commodities worth Rs. 2.22 cr. Also, nine Logistics Service Aggregators have partnered with eNAM having 2,31,300 transporters providing availability of 11,37,700 trucks to service transportation need of eNAM stakeholders.

National Agriculture Market (eNAM), a pan-India electronic trading portal with the objective of integrating the existing Mandis to "One Nation One Market" for agricultural commodities in India, was launched on 14th April 2016, by the Prime Minister Shri Narendra Modi. Small Farmers Agribusiness Consortium (SFAC) is the lead agency for implementing eNAM under the aegis of Ministry of Agriculture and Farmers' Welfare, Government of India.

The NAM portal provides a single window service for all APMC related information and services which includes commodity arrivals, quality & prices, provision to respond to trade offers and electronic payment settlement directly into farmers' accounts and helping them for better market access.

FAQs on eNAM

How is eNAM different from conventional Mandi system?

eNAM is not a parallel marketing structure but rather a device to create a national network of physical mandis which can be accessed online. It seeks to leverage the physical infrastructure of the mandis through an online trading portal, enabling buyers situated even outside the Mandi/ State to participate in trading at the local level.

How does eNAM operate?

The eNAM electronic trading platform has been created with an investment by the Government of India (through the Ministry of Agriculture & Farmers' Welfare). It offers a "plug-in" to any market yard existing in a State (whether regulated or private). The special software developed for eNAM is available to each mandi which agrees to join the national network free of cost with necessary customization to conform to the regulations of each State Mandi Act.

Do the conventional Mandis lose business due to eNAM?

Mandis do not lose any business. eNAM basically increases the choice of the farmer when he brings his produce to the mandi for sale. Local traders can bid for the produce, as also traders on the electronic platform sitting in other State/ Mandi. The farmer may choose to accept either the local offer or the online offer. In either case the transaction will be on the books of the local mandi and they will continue to earn the market fee. In fact, the volume of business will significantly increase as there will be greater competition for specific produce, resulting in higher market fees for the mandi.   ❑

Source: https://enam.gov.in

Connecting Farmers to Supply Chain

In present situation of COVID 19, farmers are looking for help in their harvest reaching the market, seed/fertilizer procurement, etc. A robust supply chain management is urgently required to facilitate the timely delivery of the produce at the best possible prices. Kisan Sabha App has been developed by CSIR-Central Road Research Institute (CSIR-CRRI), New Delhi to connect farmers to supply chain and freight transportation management system.

- The portal connects the farmers, transporters, Service providers (like pesticides/ fertilizer/ dealers, cold store and warehouse owner), mandi dealers, customers (like big retail outlets, online stores, institutional buyers) and other related entities for timely and effective solution.

- The portal acts as a single stop for every entity related to agriculture, be they a farmer who needs better price for the crops or mandi dealer who wants to connect to more farmers or truckers who invariably go empty from the mandis.

- KisanSabha also works for people in agriculture services sector such as dealers of fertilizers/ pesticides,who can reach out to more farmers for their services.

- It would also prove to be useful for those associated with cold store(s) or godown(s). KisanSabha also provides a platform for people who want to buy directly from the farmers.

- Kisan Sabha has 6 major modules taking care of Farmers/Mandi Dealers/ Transporters/Mandi Board Members/ Service Providers/Consumers.

Kisan Sabha aims to provide the most economical and timely logistics support to the farmers and to increase their profit margins by minimizing interference of middlemen and directly connecting with the institutional buyers. It will also help in providing best market rates of crops by comparing nearest mandis, booking of freight vehicle at cheapest cost thereby giving maximum benefit to the farmers. ❑

MSME Champions

The Union Ministry of MSME has launched CHAMPIONS portal www.champions.gov.in, a technology-driven Control Room-Cum-Management Information System. The system utilising modern ICT tools is aimed at assisting Indian MSMEs march into big league as National and Global Champions.

The CHAMPIONS stands for Creation and Harmonious Application of Modern Processes for Increasing the Output and National Strength. The portal is basically for making the smaller units big by solving their grievances, encouraging, supporting, helping and handholding.

It is a technology packed control room-cum-management information system. In addition to ICT tools including telephone, internet and video conference, the system is enabled by Artificial Intelligence, Data Analytics and Machine Learning. It is also fully integrated on real time basis with GOI's main grievances portal CPGRAMS and MSME Ministry's own other web-based mechanisms. The entire ICT architecture is created in house with the help of NIC in no cost. Similarly, the physical infrastructure is created in one of ministry's dumping rooms in a record time.

As part of the system a network of control rooms is created in a Hub & Spoke Model. The Hub is situated in New Delhi in the Secretary MSME's office. The spokes will be in the States in various offices and institutions of Ministry. As of now, 66 state level control rooms are created as part of the system. A detailed operating procedure has been issued, officers have been deployed and training has been conducted. ❑

Fighting COVID-19 Through Innovation

DRUVS Cabinet

Automated UVC currency sanitising device NOTESCLEAN

Hyderabad-based Defence Research and Development Organisation (DRDO) premier lab, `Research Centre Imarat (RCI), has developed an automated contactless UVC sanitisation cabinet, called Defence Research Ultraviolet Sanitiser (DRUVS). It has been designed to sanitise mobile phones, tablets, laptops, currency notes, cheque leafs, challans, passbooks, paper, envelopes, etc.

The DRUVS cabinet is having contactless operation which is very important to contain the spread of virus. The proximity sensor switches, clubbed with drawer opening and closing mechanism, makes its operation automatic and contactless. It provides 360 degree exposure of UVC to the objects placed inside the cabinet. Once the sanitisation is done, the system goes in sleep mode hence the operator need not wait or stand near the device.

The RCI has also developed an automated UVC currency sanitising device, called NOTESCLEAN. Bundles of currency notes can be sanitised using DRUVS, however disinfection of each currency notes using it will be a time consuming process. For that purpose, a sanitising technique has been developed, where one has to just place the loose currency notes at the input slot of the device. It picks the notes one by one and makes them pass through a series of UVC lamps for complete disinfection.

DRDO) has also developed an Ultra Violet (UV) Disinfection Tower for rapid and chemical free disinfection of high infection prone areas. The equipment named UV blaster is a UV based area sanitiser designed and developed by Laser Science & Technology Centre (LASTEC), the Delhi based premier laboratory of DRDO with the help of M/s New Age Instruments and Materials Private Limited, Gurugram.

The UV Blaster is useful for high tech surfaces like electronic equipment, computers and other gadgets in laboratories and offices that are not suitable for disinfection with chemical methods. The product is also effective for areas with large flow of people such as airports, shopping malls, metros, hotels, factories, offices, etc.

The UV based area sanitiser may be used by remote operation through laptop/mobile phone using wifi link. The equipment has six lamps each with 43 watts of UV-C power at 254 nm wavelength for 360 degree illumination. For a room of about 12 x 12 feet dimension, the disinfection time is about 10 minutes and 30 minutes for 400 square feet area by positioning the equipment at different places within the room.

This sanitiser switches off on accidental opening of room or human intervention. One more salient safety feature of the product is the key to arm operation. ❑

Source: PIB

R&D Expenditure & Scientific Publications

The country's gross expenditure in R&D has tripled between 2008 & 2018 driven mainly by Government sector and scientific publications have risen placing the country internationally among the top few. This is as per the R&D Statistics and Indicators 2019-20 based on the national S&T survey 2018 brought out by the National Science and Technology Management Information System (NSTMIS), Department of Science and Technology (DST).

The report shows that with the rise in publication, the country is globally at the 3rd position on this score as per the NSF database, 3rd in the number of Ph.D. in science & engineering. The number of researchers per million population has doubled since 2000.

The report captures the R&D landscape of the country through various Input-Output S&T Indicators in the form of Tables and graphs. These pertain to Investments in national R&D, R&D investments by Government and Private sector; R&D relationship with economy (GDP), Enrolment of S&T personnel, Manpower engaged in R&D, Outrun of S&T personnel, papers published, patents and their international S&T comparisons.

The survey included more than 6800 S&T Institutions spread across varied sectors like central government, state governments, higher education, public sector industry, and private sector industry in the country, and a response rate of more than 90% was achieved.

Some of the key findings of the report are the following:

India's gross expenditure in R&D has tripled between 2008 & 2018

- The Gross expenditure on R&D (GERD) in the country has been consistently increasing over the years and has nearly tripled from Rs. 39,437.77 crore in 2007-08 to Rs. 1,13,825.03 crore in 2017-18.

- India's per capita R&D expenditure has increased to PPP $ 47.2 in 2017-18 from PPP $ 29.2 in 2007-08.

- India spent 0.7% of its GDP on R&D in 2017-18, while the same among other developing BRICS countries was Brazil 1.3%, Russian Federation 1.1%, China 2.1% and South Africa 0.8%.

Extramural R&D support by central S&T agencies has increased significantly

- DST and DBT were the two major players contributing 63% and 14%, respectively of the total extramural R&D support in the country during 2016-17.

- Women participation in extramural R&D projects has increased significantly to 24% in 2016-17 from 13% in 2000-01 due to various initiatives undertaken by the Government in S&T sector.

- As on 1st April 2018, nearly 5.52 lakh personnel were employed in the R&D establishments in the country.

The number of researchers per mn populations has doubled since 2000

- Number of researchers per million population in India has increased to 255 in 2017 from 218 in 2015 and 110 in 2000.

- India's R&D expenditure per researcher was 185 ('000 PPP$) during 2017-18 and was ahead of Russian Federation, Israel, Hungary, Spain and UK.

- India occupies 3rd rank in terms of number of Ph. D.'s awarded in Science and Engineering (S&E) after USA (39,710 in 2016) and China (34,440 in 2015).

India is placed 3rd among countries in scientific publication as per NSF database

- During 2018, India was ranked at 3rd, 5th and 9th in scientific publication output as per the NSF, SCOPUS and SCI database respectively

- During 2011-2016, India's growth rate of scientific publication as per the SCOPUS and SCI database was 8.4% and 6.4% as against the world average of 1.9% and 3.7%, respectively.

- India's share in global research publication output has increased over the years as reflected in publication databases

India is ranked at 9th position in terms of Resident Patent Filing activity in the world

- During 2017-18 a total of 47,854 patents were filed in India. Out of which, 15,550 (32%) patents were filed by Indian residents

- Patent applications filed in India are dominated by disciplines like Mechanical, Chemical, Computer/Electronics, and Communication.

- According to WIPO, India's Patent Office stands at the 7th position among the top 10 Patent Filing Offices in the world. ❑

Source: www.dst.gov.in

S&T Based Innovative Solutions

The National Innovation Foundation – India (NIF), an autonomous body of the Department of Science and Technology (DST) has identified several S&T based innovative solutions through the Challenge COVID-19 Competition (C3), a campaign which was running from 31 March to 10 May 2020 for engaging innovative citizens to come up with ideas and innovations to tackle the pandemic.

NIF is providing incubation and mentoring support for further dissemination to the generator of the ideas. A foot-operated device for hand sanitisation and washing and an innovative sprayer for sanitization are the two recently supported innovations under the campaign.

Shri Mupparapu Raju from Warangal, Telangana, has designed the *foot-operated device for hand sanitisation and washing*, which is a timely solution in response to need for contactless devices in the prevailing COVID-19 environment. It facilitates dispensing of soap and water by way of operating the device by foot, and not hands. As a result, there is no hand-related contact between the user and sanitizer, soap, or water, which are adequately stored in separate containers as a part of the device. Shri Raju has implemented the device at various locations in the State of Telangana. NIF has extended support to the innovator for value addition and in meeting the production commitments.

Implementation of Foot-operated device for Hand Sanitization and Washing at Warangal and Mahabubabad districts of Telangana.

The other supported innovation is *an innovative sprayer capable of sanitising or washing large areas like roads, societies, doors, compounds, walls, etc*. The sprayer consists of two radial fans of aluminum moving opposite to each other. In terms of mechanism, each fan sucks air from two opposite directions, which is released through nozzles at high pressure with minute droplets sizes. As the

The Sprayer is being deployed for sanitization on the streets of various locations in Maharashtra

panel rotates 180 degrees, it can cover from the ground upto 15 feet tall walls. Any tractor of power more than 15 horsepower (hp) can be used to operate this through Power Take-Off (PTO). By deploying this sprayer, one can sanitize the societies, roads, and so on at a maximum distance of 30 feet from the center of machine and upto 15 feet height. Which means the machine will sanitise 30 feet horizontally and 15 feet vertically. As a result, compounds, doors can easily be sanitized with this sprayer. Nozzles in the sprayer are such that during operation of the device, the required area can be sanitised at ease, be it a spacious location or a congested location.

The sprayer has been actively used at various locations in the State of Maharashtra viz. Satana, Nashik, etc.

A large number of citizens have participated in the Challenge COVID-19 Competition (C3) and helping the country come out of this crisis through Science and Technology based innovative solutions. The relevance of technologies to COVID-19 and the pace at which these have been designed, prototyped and eventually made available for social and commercial dissemination establishes the fact that Challenge COVID-19 Competition (C3) of NIF has been accepted very well by common people who believe that Innovation can indeed help the nation conquer crisis. ❑

Source: PIB

'GOAL' Programme for Tribal Youth

The GOAL (Going Online As Leaders) programme of the Ministry of Tribal Affairs (MoTA) has been launched in partnership with Facebook. The programme is designed to provide mentorship to tribal youth through digital mode. The digitally-enabled program envisages to act as a catalyst to explore hidden talents of the tribal youth, which will help in their personal development as well as contribute to all-round upliftment of their society.

The programme intends to upskill and empower 5,000 tribal youths in the current phase to harness the full potential of digital platforms and tools to learn new ways of doing business, explore and connect with domestic and international markets as is the vision of the Prime Minister. It has been designed with a long term vision to develop the potential of tribal youth and women to help them acquire skills and knowledge through mentorship in various sectors including horticulture, food processing, bee keeping, tribal art and culture, medicinal herbs, entrepreneurship among others.

In this program, 5000 scheduled tribe youth (to be called as 'Mentees') will get an excellent opportunity to get training by experts from different disciplines and fields (to be called as 'Mentors'). There will be 1 mentor for 2 mentees. The programme aims to enable Scheduled Tribe (ST) youth in remote areas to use digital platforms for sharing their aspirations, dreams and talent with their mentors.

- GOAL (Going Online As Leaders), Joint initiative of Facebook India with Ministry of Tribal affairs
- 5,000 young tribal entrepreneurs, professionals, artisans and artists will be trained on digital skills under digital entrepreneurship program
- Aspiring candidates invited to apply at online portal "goal.tribal.gov.in"

- Application will be open from May 4, 2020 till midnight of July 3, 2020.
- Leaders from the industry and academia invited to register as mentors on "goal.tribal.gov.in"

The mentees and mentors will be selected based on their inputs in such a way that it represents tribal youth from varied professions and has representation from urban and rural area across India. The IT based system is designed to match mentors and mentees so that they are from similar profession and preferably speak same language. The selected mentees will remain engaged in the program for nine months or 36 weeks comprising of 28 weeks of mentorship followed by eight weeks of internship. The program will focus on three core areas – Digital Literacy, Life Skills and Leadership and Entrepreneurship, and on sectors such as Agriculture, Art & Culture, Handicrafts & Textiles, Health, Nutrition, among others. At least 250 Fellows who are getting scholarship from Ministry of Tribal Affairs under National Scholarship and Fellowship Scheme and are part of Tribal Talent Pool will also be mentored through the program.

All the selected mentees will be provided with smartphones and Internet access (for one year) by Facebook along with exposure to various external forums that will give opportunity to the participants to showcase their entrepreneurial skills and leadership abilities.The programme will also create awareness amongst tribal beneficiaries about various schemes initiated by Central and State Governments for welfare of STs as well as their fundamental duties. Efforts will be made to integrate the program with other government schemes such as Mudra Yojana, Kaushal Vikas Yojana, Jan Dhan Yojana, Skill India, Start Up India, Stand Up India, among others. This will enable participants to leverage opportunities provided under these government schemes. ❑

Source: goal.tribal.gov.in

Swasth Vayu

CSIR NAL Swasth Vayu trials

Swasth Vayu BIPAP Machine

CSIR-National Aerospace Laboratories (NAL) Bangalore, a constituent of lab of CSIR has developed a Non Invasive BiPAP Ventilator in a record time of 36 days to treat COVID-19 patients. BiPAP Non-Invasive ventilator is a microcontroller-based precise closed-loop adaptive control system with a built-in biocompatible "3D printed manifold & coupler" with HEPA filter (Highly Efficient Particulate Air Filter). These unique features help to alleviate the fear of the virus spread. It has features like Spontaneous, CPAP, Timed, AUTO BIPAP modes with provision to connect Oxygen concentrator or Enrichment unit externally. The system has been certified for safety and performance by NABL accredited agencies. The system has undergone stringent biomedical tests and beta clinical trials at NAL Health Centre.

The major advantage of this machine is that it is simple to use without any specialised nursing, cost effective, compact and configured with majority of indigenous components. This is ideal for treating COVID-19 patients in Wards, Make shift Hospitals, dispensaries and home in current Indian COVID-19 scenario. CSIR-NAL is in process of taking it forward with the regulatory authorities for the approval and expected to get shortly. CSIR-NAL has already initiated dialogue with major public/private industries as a partner for mass production.

Swasth Vayu BiPAP Machine in
Auto Test mode with Test Lung

Non-invasive Ventilator with externally connected Oxygen concentrator will be ideal to treat moderate or mid-stage severe COVID-19 patients who do not require intubation and invasive ventilation. ❑

Source: PIB

Tropical Cyclones

Tropical cyclone Amphan intensified rapidly in the Bay of Bengal to become a "Super Cyclonic Storm" – the equivalent of a strong Category 4/weak Category 5 on the Saffir Simpson scale. It weakened ahead of landfall on Wednesday 20 May as a very severe cyclonic storm (strong Category 2 equivalent), bringing dangerous winds, storm surge and flooding to coastal areas of West Bengal in India and Bangladesh.

Amphan (pronounced Um-Pun) impacted densely populated areas, including the Indian city of Kolkata (Calcutta) at a time when restrictions due to the COVID-19 pandemic is complicating disaster management – and making it more necessary than ever before.

Tropical Cyclone Naming

Tropical cyclones can last for a week or more; therefore there can be more than one cyclone at a time. Weather forecasters give each tropical cyclone a name to avoid confusion. Each year, tropical cyclones receive names in alphabetical order. Women and men's names are alternated. The name list is proposed by the National Meteorological and Hydrological Services (NMHSs) of WMO Members of a specific region, and approved by the respective tropical cyclone regional bodies at their annual/ bi-annual sessions. Nations in the western North Pacific began using a new system for naming tropical cyclones in 2000.
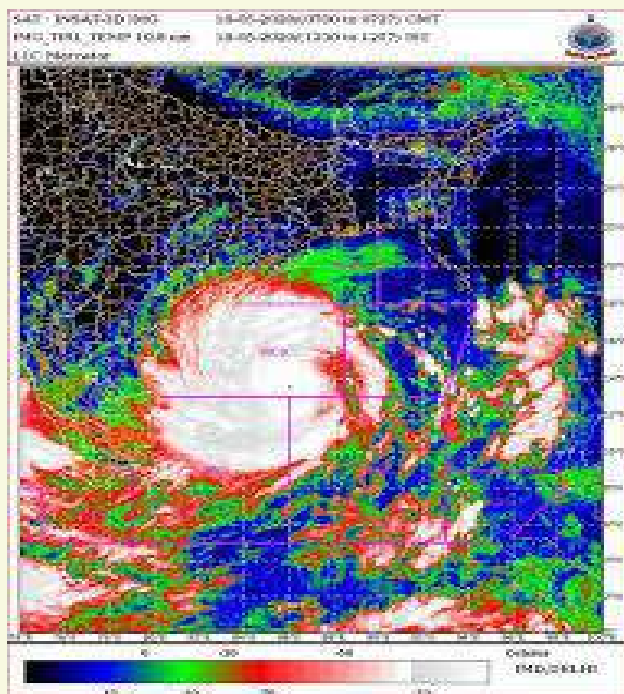
There is a strict procedure to determine a list of tropical cyclone names in an ocean basin by the Tropical Cyclone Regional Body responsible for that basin at its annual/biennial meeting. There are five tropical cyclone regional bodies, i.e. ESCAP/WMO Typhoon Committee, WMO/ESCAP Panel on Tropical Cyclones, RA I Tropical Cyclone Committee, RA IV Hurricane Committee, and RA V Tropical Cyclone Committee. For instance, Hurricane Committee determines a pre-designated list of hurricane names for six years separately at its annual session. The pre-designated list of hurricane names are proposed by its Members that include National Meteorological and Hydrological Services in the North/Central America and the Caribbean. Naming procedures in other regions are almost the same as in the Caribbean. In some of the regions, the lists are established by alphabetical order of the names. In other regions, the lists are established following the alphabetical order of the country names. In general, tropical cyclones are named according to the rules at a regional level.

World Meteorological Organization maintains rotating lists of names which are appropriate for each Tropical Cyclone basin. If a cyclone is particularly deadly or costly, then its name is retired and replaced by another one.

It is important to note that tropical cyclones/ hurricanes/typhoons are not named after any particular person. The tropical cyclone/hurricane/typhoon names selected are those that are familiar to the people in each region. Obviously, the main purpose of naming a tropical cyclone/hurricane is basically for people easily to understand and remember the tropical cyclone/hurricane/ typhoon in a region, thus to facilitate tropical cyclone/ hurricane/typhoon disaster risk awareness, preparedness, management and reduction. ❑

International Day of Yoga
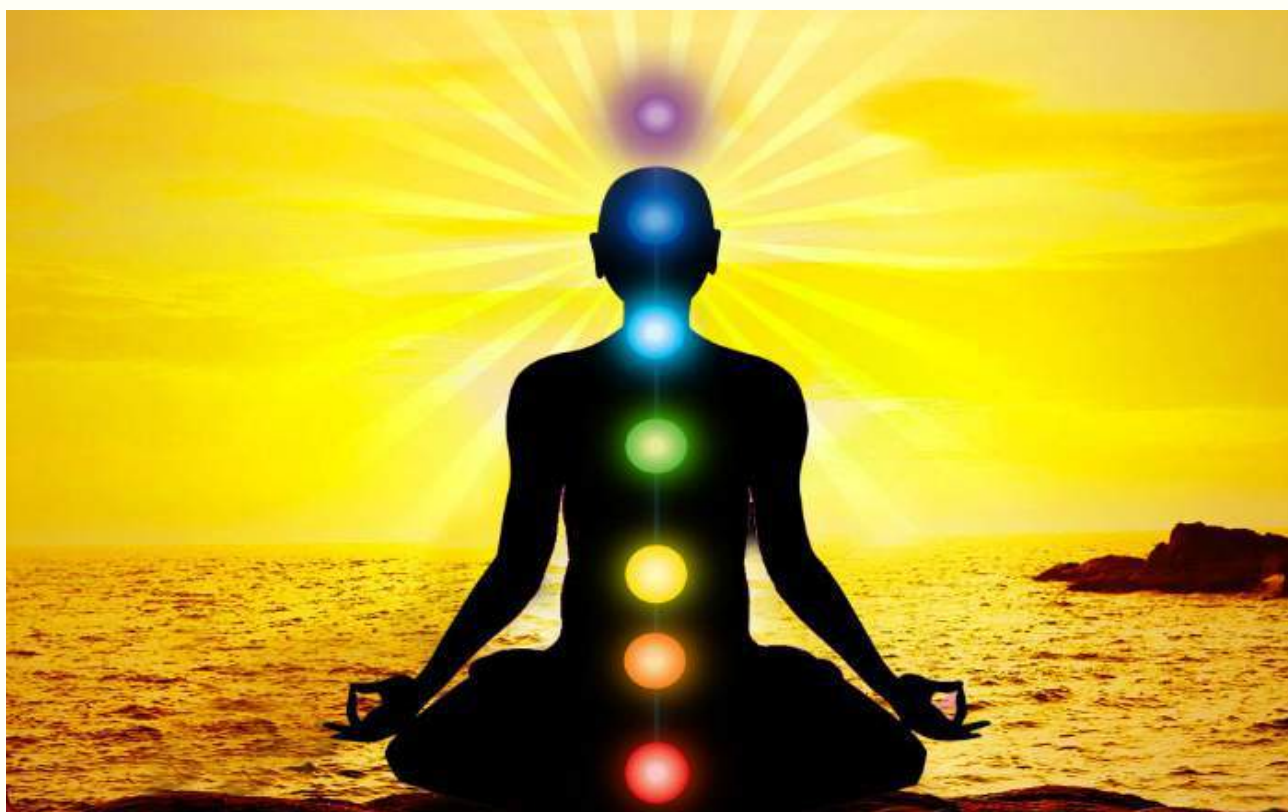
While addressing the 69th session of United Nations General Assembly (UNGA) on September 27, 2014, the Honorable Prime Minister of India urged the world community to adopt an International Day of Yoga. On December 11, 2014, the 193 member UNGA approved the proposal by consensus with a record 177 co-sponsoring countries, a resolution to establish 21 June as "International Day of Yoga".

Yoga is essentially a spiritual discipline based on an extremely subtle science which focuses on bringing harmony between mind and body. It is an art and science for healthy living. The word "Yoga" is derived from the Sanskrit root 'yuj' meaning "to join", "to yoke" or "to unite". According to Yogic scriptures, the practice of Yoga leads to the union of an individual consciousness with the universal consciousness. According to modern scientists, everything in the universe is just a manifestation of the same quantum firmament. One who experiences this oneness of existence is said to be "in Yoga" and is termed as a yogi who has attained a state of freedom, referred to as mukti, nirvāna, kaivalya or mokṣa. "Yoga" also refers to an inner science comprising of a variety of methods through which human beings can achieve union between the body and mind to attain self-realisation. The aim of Yoga practice (sādhana) is to overcome all kinds of sufferings that lead to a sense of freedom in every walk of life with holistic health, happiness and harmony.

How Yoga Can Help

Yoga is essentially a path to get liberated from all the bondages. However, medical research in recent years has uncovered many physical and mental benefits that Yoga offers, corroborating the experiences of millions of practitioners. A small sampling of research shows that:

- Yoga is beneficial for physical fitness, musculoskeletal functioning and cardio-vascular health.
- It is beneficial in the management of diabetes, respiratory disorders, hypertension, hypotension and many lifestyle related disorders.
- Yoga helps to reduce depression, fatigue, anxiety disorders and stress.
- Yoga helps to regulate menstrual and menopausal symptoms.
- In essence, Yoga is a process of creating body and mind that are stepping-stones, not hurdles, to an exuberant and fulfilling life. ❑