



Kurukshetra

A JOURNAL ON RURAL DEVELOPMENT

Vol. 69

No. 7

Pages 52

May 2021

Promoting Innovation

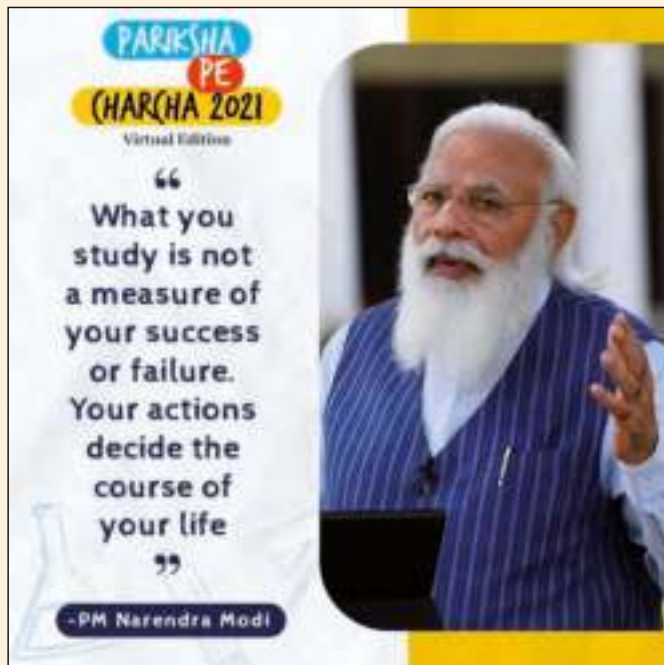
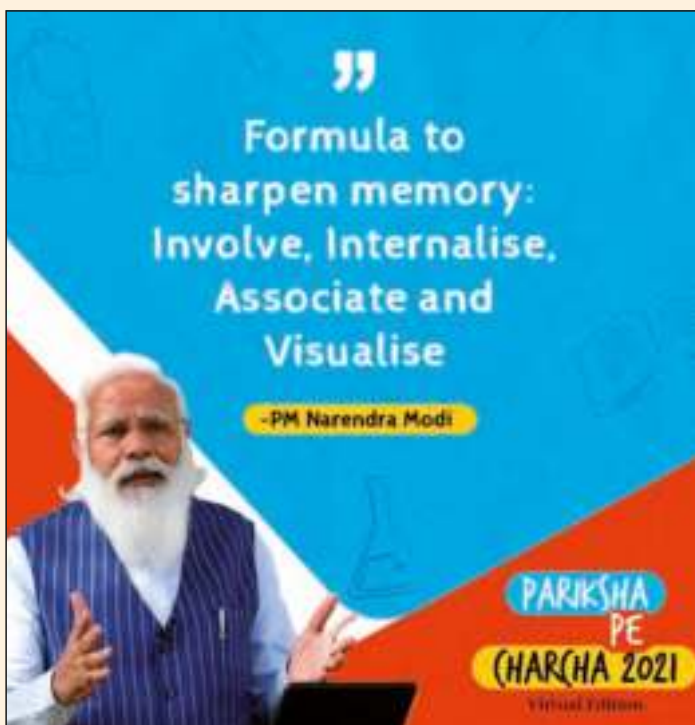


PM Interacts with Students, Teachers and Parents in Virtual Edition of "Pariksha Pe Charcha 2021"

In the 4th edition of Pariksha Pe Charcha, Prime Minister, Shri Narendra Modi interacted with students, teachers and parents in virtual mode on April 07, 2021. The interaction, which lasted for more than ninety minutes, saw students, teachers and parents seeking guidance on various issues of importance to them from the Prime Minister. This year too, students from across the country, and also Indian students residing abroad, participated in the event.

Termining this year's interaction as first virtual edition of Pariksha Pe Charcha, Shri Modi said, Corona has led to many innovations and despite the disappointment of not being able to be among the students face to face, there should not be a break in Pariksha Pe Charcha this year. He said, Pariksha Pe Charcha is not only a discussion on examination but also an occasion to talk, among family members and friends, in a relaxed atmosphere and create new confidence.

Students M. Pallavi from Andhra Pradesh and Arpan Pandey from Kuala Lumpur asked the Prime Minister about how to reduce fear of examination. Shri Modi said, the fear is mainly due to the atmosphere that has made examination be all and end all of life, which makes students over conscious. The Prime Minister said,



that life is very long and these are just a stage of life. He advised parents, teachers and peers not to put pressure on the students. He said, exams should be treated as merely a good occasion to test oneself and should not be turned into a question of life and death. He said that parents who are involved with their children know their strength and weaknesses.

Shri Modi emphasised the need of positive reinforcement and cautioned against negative motivation by scaring the child. He also pointed out that with the active efforts of the elders, children find the light within as they observe the exemplary behaviour of the elders. He said "positive motivation augers well for growth and development of youngsters." First Part of the motivation is training and a trained mind precedes motivation, he said.

(Source: Press Information Bureau)



The Monthly Journal
Kurukshetra

MINISTRY OF RURAL DEVELOPMENT

Vol. 69 No. 7 Pages 52

May 2021

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Subscription* :

Inland

1 Year : ₹ 230

2 Years : ₹ 430

3 Years : ₹ 610

Abroad (Air Mail)

One Year

₹ 530 (SAARC Countries)

₹ 730 (Other Countries)

* Revised from April 2016

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Innovations have been a driving force in growth of the economy across the world. India being one of the fastest growing economies of the world, it has emerged as an important destination for innovations in various fields. India is ranked amongst the top 50 countries (48th) by World Intellectual Property Organization in the Global Innovation index 2020 an improvement from 81st rank in 2015. The consistent improvement in India's global rankings is owing to the immense knowledge capital, the vibrant startup ecosystem, and the work carried out by the public and private research organizations.

The Government of India has taken several measures across sectors to promote innovation. The decade (2010-20) was identified as the decade of innovation. The Department of Science and Technology, the Department of Biotechnology and the Department of Space are playing important roles in promoting the national innovation Ecosystem. Keeping in mind the central theme of this issue 'promoting innovation', it focusses on the various aspects of innovations being carried out across sectors.

The fast-growing \$ 180 billion Information Technology Enabled Services ITES and biotech industry in the country over the past decade has shown the world, India's scientific, engineering and technological advancement and capabilities. The global industrial majors are leveraging on Indian talent through setting up Research and Development hubs in India. Aatma Nirbhar Bharat has now turned the gaze of this world-class innovative talent inwards, to create products and services for the Indian market at par with other countries. This issue covers the aspects of promoting a culture of innovation and entrepreneurship in the country.

For promotion of healthy lifestyle, there is a need to innovate and promote nutritionally wholesome diets and healthy lifestyles both during- as well as in the post COVID-19 pandemic period. There is a need for innovating strategies to minimize disruption of food supplies so that needy people have access to healthy diets.

In an era of Information and communication technology advancement through innovation has resulted in creation of millions of new jobs. To ensure employment through innovations, India needs to monetize innovative ideas by unshackling our entrepreneurial spirit. For innovation to flourish, ideas must be funded and taken to market.

Innovation supports economic growth. India's demographic dividend with the majority of the population in the working age group calls for innovation to provide sustainable employment for the youth. For addressing gender issues and empowering the women population, it is imperative to promote innovation at grassroot level.

With a huge market available for scaling up of the innovations, the push to the Innovation sector in India is huge both from the government as well as the private players. The government is focused on creating innovation and incubation labs. This issue discussed measures being taken to ensure that India positions itself in the top ten economies in the Global Innovation Index.

Agriculture plays a vital role in India's economy as more than half of the population depends on it and its allied sectors such as, livestock, fisheries, forestry and sericulture. These interlinked sectors are known as allied sectors which include horticulture, sericulture, food processing and animal husbandry. This issue explains various measures the government is taking to boost farmers' income with a special focus on agri-allied sectors.

Hope readers find all the write ups in the issue informative and insightful.

Promoting a Culture of Innovation and Entrepreneurship

R. Ramanan, Naman Agrawal, and S. Mohit Rao

It is a known fact that Indian scientists, thinkers, and innovators are well known across the world who have made several significant scientific discoveries. India is considered as one of the major scientific centres in the world which have excelled in the fields of mathematics, warfare, geometry, astronomy, medicine, space science, physics, chemistry, botany, etc. The world is changing at a rapid pace. Radical technological advancements are transforming the world and giving rise to new technology and business innovations at an exponential rate.

One of the oldest civilisations in the world, the Indian civilisation has been one of the most active contributors to the global science and technology arena. Be it the idea of zero, decimal systems, binary digits, wootz steel, plastic surgery, cataract surgery, Ayurveda, defence to just name a few.

It is a known fact that Indian scientists, thinkers, and innovators are well known across the world who have made several significant scientific discoveries. India is considered one of the major scientific centres in the world which have excelled in the fields of mathematics, warfare, geometry, astronomy, medicine, space science, physics, chemistry, botany, etc. This extends to many other areas, including fine arts, architecture, literature, and economics too.

Science and technology plays a pivotal role in the development of a nation, be it economic, social, or overall development. India has one of the strongest networks of Science and technology institutions and a sizeable pool of highly skilled manpower. India has been steadily rising in the Global Innovation Index (GII) rankings and was ranked at 48th position in 2020 from 52nd position in 2019¹. The power of the 3rd largest scientific and technical manpower in the world has many Multi National Companies like Samsung, Bosch, Microsoft, CISCO, etc. have started focusing on India to leverage the capability we have to offer. India is the youngest country in 2020, with 64 percent of the population in the working-age group². This provides a huge opportunity for the young, ambitious, and increasingly educated youth to become job creators rather than being job seekers.

The world is changing at

Science and technology plays a pivotal role in the development of a nation, be it economic, social, or overall development. India has one of the strongest networks of Science and technology institutions and a sizeable pool of highly skilled manpower.



a rapid pace. Radical technological advancements are transforming the world and giving rise to new technology and business innovations at an exponential rate. Electronics miniaturisation has enabled a computer the size of a room to fit the size of our pockets with the convergence of computing, storage, and communications at incredibly lower costs. Robotics and artificial intelligence are driving next-generation productivity and automation.

The Internet of Things (IoT) links cutting edge sensor technologies to conventional industries - from facilitating precision farming to water treatment and maintenance, climate change control, forecasting and disaster management, driverless cars and spacecraft. Big data and analysis as well as artificial intelligence enable electronic commerce and complex decisions thanks to advanced and user-friendly tools. All these technologies are accessible today and are affordable. Unless our children in the schools have access to and become familiar with these technologies, tinker with, experiment with, design solutions, create prototypes,

test them and let their imagination and creativity express themselves without restraint; we will all be far behind. When you can create prototypes and solutions at the school level, you also create the mindset and confidence to become a job creator of the future. However, a holistic innovation ecosystem that allows the employees to express themselves as great scientists and innovators has to be put in place properly. With over 1.35 billion people, over 200 million students, nearly 10,500 engineering establishments and a similar number of business schools, over 150 million young Indians are entering the world of work. Therefore, there is a need to make sure that these students realise their true potential. There is a need to address issues such as the need to update curricula, which are generally considered inadequate, communications to use them effectively in technical writing, institutional prevention strategies to increase the visibility of research conducted by scientists and the financing of entrepreneurial activities. To promote and create incentives for this commercialised innovations which are worth, after the necessary care and especially according to the national will, to promote talents which aim at the improvement of humanity, for which India has been known since Antiquity.

The Indian government has already actively identified the problems and is implementing the appropriate reforms. The results are visible in the ranking of India to facilitate business. In recent decades, the focus has been on math, science, technology and innovation. India's science and technology sector will benefit from the following factors:

- The increase in income leads to an increased consumption of suction products.
- The increasing affordability of Indian SMEs is likely to be a key driver of demand for high-end technology products.

India as the Innovation Nation: Gathering Momentum

The last few years have seen innovation in India reach a tipping point. There has been emergence of Innovative Indian companies, the large-scale social Innovations, and now the big impact innovations in public service.

India, as a country, is surrounded by challenges that demand innovative non-linear solutions for challenges which need to be addressed such as poverty, education, healthcare, and the environment. Here too, one is able to see significant innovations beginning to happen.

With the confluence of a unique demographic dividend where over 150+ million students will be entering into the workforce over the next few years, one of the fastest-growing major economies of the world, and affordable, advanced, accessible technologies enabling rapid prototyping and deployment of innovations in every sphere of life; the Government of India is taking major steps to create and promote an ecosystem of innovation and entrepreneurship nationwide. One such significant intervention is the flagship initiative Atal Innovation Mission to help transform a nation of job seekers to a nation of researchers, innovators, and job creators.



Innovation plays a key role in the economic development of any nation, and the various technological changes contribute considerably to the development of under-developed countries. The growth can be achieved through a high level of technology. Science, technologies and innovations have been largely responsible for rapid economic growth in developed countries, for instance Mobile devices and recent technological developments in the ICT sector have enabled billions of people to connect and open the door to unlimited possibilities in fields such as AI, IoT, Robotics, 3D Printing, Quantum Computing, etc.

Changing Trends and Challenges

- **Rapidly Evolving Ecosystem**—Demands of all the ecosystem stakeholders are now rapidly changing, and nowadays they all want high growth and quick adaptability to customer changing requirements which commonly results in acquisitions and restructuring.
- **Focus on Futuristic Deep Techs** – Corporates and startups have started facing a hard time acquiring customers that can give them high economic returns by minor modifications/incremental innovations. Hence, to derive high value, their focus has been shifted towards next-gen technologies like genetic engineering, IoT, 5G, quantum computing, etc.
- **Digitisation and Democratisation of Information**—As more and more users have started using digital technologies, a huge volume of data are being generated. Now, organisations need to deal with increasing data, maintaining transparency and dissemination of information through their value chain network.
- **Requirement for Specialised Manpower**—As the world is progressing exponentially in the field of science and technology, the requirement of the workforce is shifting from having non-skilled labour to someone specialised in next-gen technologies. There is an acute shortage of people having the desired skill set. Also, their desires are different, and most of them do not want to be employed, rather would want to establish their startup.

Impact of Changing Trends in the field of Science and Technology

- **Business:** Business leaders have started understanding the changing environment

and started challenging their assumptions to innovate relentlessly and continuously. Many companies have introduced new technologies trying to fulfil existing and unserved demands by disrupting across the complete product value chain.

- **Government:** Government and regulators have also started to be up-to-date with changing environment and trying to understand what they are regulating to attain a worldwide competitive position. For doing this, governments and organisations should also start to work with the end-users, i.e., businesses and civil society.
- **People:** With the increasing use of technology by the business, some fundamental issues on data privacy have started to key in how the data is used by them, and this is forecasted to get intensified in the coming times. Similarly, biotechnology and artificial intelligence revolution are being considered to push current thresholds of life span, health and other cognitive capabilities, which in turn is forcing to redefine moral and ethical boundaries.

Important Aspects for Attaining Success

- **Adaptive mindset**
 - The world is currently flooded with unreliable un-tested ideas/solutions and they are unlikely to make it to market unless adaptive mindset approach is used to bridge the gap between customers real demands and supply of feasible solutions.
- **Being digital**
 - Startups must make full use of data, design and digital presence to keep ahead with changing global trends, thus creating business value.
- **Building corporate relationship and strategic partnership**
 - Building corporate relationships is an important step for organizations, to achieve visionary results, which may seem to be impossible to achieve single handedly.
- **Being Flexible and Agile**
 - Flexible organisms work as machines, they are made up of multiple components

working independently to achieve a particular goal. Similarly internal teams having end to end accountability, work in autonomous manner and take decisions in a rapid manner.

- These teams should incorporate agile development practices. Model elements should be developed with the final design, such as scrum and test-and-learn, design thinking.

Atal Innovation Mission

The Atal Innovation Mission has adopted a holistic framework that can create immediate impact and others that are necessary for the long term. There are a growing number of startups in India thanks to the several startup initiatives in the country both from the private sector as well as the government - but there is a greater growing need for new greenfield incubators across the various fine academic and other institutions of the country to provide the necessary support system in many ways to startups to enable their success - from access to technology labs, mentoring networks, to access to venture capital, financial, hiring networks, etc. There is also a need to support scaling of existing proven Incubators. With 100 smart cities been identified in the country, we need to ensure thriving vibrant incubators in all these smart cities.

Recognising this need, the Government of India has setup the 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.

Atal Innovation Mission (AIM) is Government of India's flagship initiative to create and promote a culture of innovation and entrepreneurship across the length and breadth of our country. AIM's objective is to develop new programmes and policies for fostering innovation in different sectors of the economy, provide platforms and collaboration opportunities for different stakeholders, and create an umbrella structure to oversee the innovation & entrepreneurship ecosystem of the country. AIM's initiatives have played an important contributory role in the advancement of India from a position of 81 in the Global Innovation Index in 2015 to a position of 48 in 2020.

Brief on activities being carried out under Atal Innovation Mission:

1) Atal Tinkering Labs (ATL) - At School Level

Over the last 3 years AIM has launched the establishment of thousands of Atal Tinkering Labs (ATL) 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 around the community they are in. Atal Tinkering Labs are being established in schools nationwide with 7000+ operational in 660+ districts and over 2.5 million students having access to ATLs. 112 out of 115 Aspirational Districts have ATL coverage. AIM has launched a first of its kind Artificial Intelligence Do-It-Yourself learning module in a partnership with Nasscom and several key industry partners of NASSCOM.

Below are some activities related to ATL Operational Excellence, Proactive Promotion of Innovation and Thought Leadership, Collaborations & Partnerships and New Initiatives by AIM:

- 7000+ ATLs are fully operational as of date enabling over 2.5+ Million students between Grade VI-Grade XII to advanced emerging tinkering DIY technologies and creating a problem solving and innovative mindset.
- 5000+ ATL Teachers Trained with Corporate Partners
- ATL Tinkering challenges at school level, ATL Tinkering fests at Regional level and ATL Tinkering Marathons at National level promoting problem solving and innovation in all ATL students across the country.
- ATL Student Innovator Program and Student internship and ATL Student Entrepreneur Programme have been conducted
- Regional Mentor Meets across country –FB Live sessions with Prof Tarun Khanna, Super Mentors
- National ATL Tinkering Marathons – Top 10 District level, Top 100 at National level winners Recognition.
- Global Student Innovation exchange programmes like Singapore Inspreneur ATL showcasing of Top Student Innovations to PM, MEA Ministers of both countries.
- Nobel winner Satyarthi, Nobel Prize Sweden delegates and Nobel winner Prof. Muhammad Yunus from Yunus Social Business visits and interacted with AIM ATLs Labs and students.
- AIM SIRIUS partnership launched by the Prime

Minister and the Russian President enabling student innovation exchanges between 50+ Indian and Russian talented students promoting co-innovation and cultural bonds.

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, corporate, etc that would foster world class innovative start-ups and become scalable and sustainable enterprises. To date AIM has selected close to 70 universities /institutions/private players to establish world class incubators, each of which will foster creation and nurturing of 50 world class Startups every four years. The AIM, till date, has supported 2000+ operational Startups, 625+ women-led startups, creating new jobs across the length and breadth of the country.

3) Atal Community Innovation Centres - Serving Unserved and Under-Served Regions/ Communities 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 crores to an ACIC subject to a partner proving equal or greater matching funding. Over 25 ACICs are currently being established across the country and 50+ ACICs will be established during the next two years.

4) Atal New India Challenges (ANIC)–Stimulating 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.

AIM has also helped launch 15+Defence challenges along with Defence iDEX (Innovations for Defence Excellence) program where AIM is the key strategy and operational partner to Defence.

AIM has also helped other ministries like Jalshakti, Urban Housing and Development, Agri and Food processing, Chemicals and Fertilisers to launch innovation challenges and innovation demos to spur innovation and entrepreneurship.

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 has launched 15 ARISE (Applied Research and Innovation for Small Enterprises) Challenges along with five partnering Ministries including Indian Satellite Research organization, Ministry of Defence, Ministry of Housing and Urban Affairs, Ministry of Food Processing Industries and Ministry of Health. This will enable great early stage applied research innovations to be converted to viable innovative prototypes followed by product development and commercial deployment.

6) Mentorship and Partnerships – collaborating with Public, Private sector, NGOs, Academia, Institutions

Over the last five years India has jumped over 33 places from rank 81 to rank 48 in the Global Innovation Index rankings index. Atal Innovation Mission initiatives are key to further promoting the culture of innovation and giving expression to the innovative and entrepreneurial ideas of startups to enable development of one of the most Innovative Nations of the world.

Conclusion

The remarkable growth of the fast-growing 180 billion USD IT/ITES and biotech industry in India over the past decade has showed the world India's scientific, engineering and technological prowess and capabilities. The best multinationals of the world are leveraging Indian talent and rushing to set up large R&D hubs in India. AatmaNirbhar Bharat has now turned the gaze of this world-class innovative talent inwards, to create products and services for the Indian market at par with other countries. Catalysing this stupendous potential are affordable, accessible, advanced IR 4.0 technologies, including 3D printing, IOT, AR/VR, biotech, cognitive computing, AI/Blockchain, to name a few. With one of the fastest-growing startup ecosystems—

over 30,000 startups and 250 incubators—India can surely position itself as one of the leading innovative nations of the world.

With 22 percent of its population still below the poverty line, 44 percent of its economy still agri-based, many districts still combating unacceptable percentages of infant mortality and maternal mortality, and only a mere 13 percent of women entrepreneurs, India needs to ensure that rapid economic progress encompasses societal progress.

The time is ripe for micro-finance and rural-financing schemes to spur great innovations and entrepreneurial initiatives on the socio-economic front. It is crucial to ensure gender equality, address economic disparity and equal opportunities for differently abled communities. Fast-growing economies such as ours also need to be extremely wary of climate change-related issues. Therefore, it is important that the Sustainable Development Goals remain the overarching objective of every organisation.

To summarise, India did get left behind in the industrial revolution that swept the world in the last century. But India does have a fantastic chance to contribute to the world in the knowledge-based revolution that is sweeping the world today. That is why AIM initiatives are so important and need to be embraced by all. The children and youth of the future deserve it to realise the Vision of a New India by 2022. We all need to make it happen collectively.

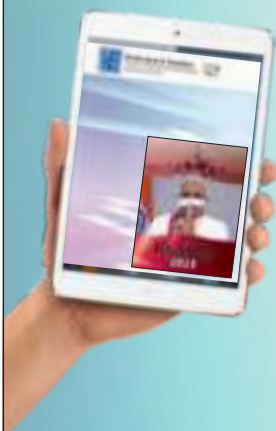
Footnote

- 1 World Intellectual Property Organization, Global Innovation Index 2019, accessed 06th April 2020, <https://www.wipo.int/pressroom/en/articles/2019/article_0008.html>
- 2 The Hindu, India is set to become the youngest country by 2020, accessed 06th April 2020, <<https://www.thehindu.com/news/national/india-is-set-to-become-the-youngest-country-by-2020/article4624347.ece>>

(The authors are former Mission Director, Atal Innovation Mission, Senior Associate, and Young Professional, NITI Aayog. Email: naman.agrawal@nic.in. Views expressed are personal)

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India: Growing Market of Innovations

Irtif Lone

Innovations are driving the economy across the globe. With India being one of the fastest growing economies across the globe, it is positioned as an important destination for innovation. Over the last few years, it has jumped the ranks and stands today at 48th rank among the 131 economies in the global innovation index. With a huge market available for scaling up of the innovations, the push to the Innovation sector in India is huge both from the government as well as the private players. Major corporations across the globe are opening up their research and development centers in India. The government is focused on creating innovation and incubation labs. However, a lot more needs to be done before an India positions itself in the top ten economies in the Global Innovation Index.

Today, not only in India but across the globe economies are driven by innovation. It has become the driver of progress and prosperity. The dimensions that innovation has achieved across the lengths and breadths of human race, is a success story in itself. One of the prime examples of this is a statement made by Yuval Noah Harari, a historian, philosopher, and the bestselling author, who argues,

“For scientists, death isn’t a divine decree – it is merely a technical problem. Humans die not because God said so, but because of some technical glitch. The heart stops pumping blood. Cancer has destroyed the liver. Viruses multiply in the lungs. And what is responsible for all these technical problems? Other technical problems. The heart stops pumping blood because not enough oxygen reaches the heart muscle. Cancerous cells spread in the liver because of some chance genetic mutation. Viruses settled in my lungs because somebody sneezed on the bus. Nothing metaphysical about it. And science believes that every technical problem has a technical solution.”

This probably explains the nature of innovations at its best, where death is being termed as a technical glitch. Even, otherwise also, with each passing day innovations are bringing positive change to the people and is fostering the new age progress of the society. However, it does not satiate



the desire of the human race to keep craving for the unimaginable and unthinkable. This clubbed, with the need to create a sustainable world in the times when the natural resources are depleting at an extremely dangerous rate and the population is increasing rapidly, innovation becomes all the more a necessity.

India today is home to around 17 percent of the world population, only next to China, with a growing economy and huge entrepreneurial potential waiting to be tapped. We are on the cusp of change, where the Start-ups and businesses based on innovation are making an enormous impact globally. In the last few years, more than 37 unicorns have come from India, which as a number is not only promising but also encouraging. Entrepreneurship is adopting innovation as the economic model which is sustainable for the foreseeable future. Therefore, there is a huge market for innovations.

India has unleashed the power of innovation to and improve the living conditions for the

billions of people. The social change which the innovations have brought, right from the beginning of times, as much as the history tells us, we have come a long way. From being hunters and food gatherers to becoming agriculturists and growing our own food. And it did not stop there, with the invention of the wheel we laid foundation for the industrial revolution which has brought an immense change to the way we live. Today, the society is run by the vast information and data in the cyberspace, which has an over all effect on the life of every organism in this world. With every innovation, technology is becoming independent and efficient, having an impact on social structure, breaking the walls of economic and social differences as well as creating medical technologies to overcome the issues, which we find no answer to today, thus furthering the progress of the society.

The modern world today at its core has innovations. While the widely accepted notion about innovation is that high end research and development goes in to bringing out these innovations, which necessarily is not true. They can be even incremental improvements over the existing systems in existence. However, these innovations have the impact making ability across the value chain of any product or service being offered. Be it in the product development, the marketing reach out, the branding or the last mile reach in the logistics sector, all of these qualify for being called an innovation.

The Global Innovation Index (GII), every year ranks the world economies based on their innovation capabilities. The study is based on the 80 different indicators, capturing the multi-dimensional aspects of innovation. In this sphere, India has shown a lot of improvement over the last three years jumping from 57th rank among the 131 participating nations to 48th rank in 2020.

The various statistics that have emerged over the years, which notably signify innovation is being taken up by various industries and firms across the country. Being one of the fastest growing economy and an emerging market to the world. It has become an important destination

for investments. Therefore, an easy opportunity for all and any kind of innovations impacting the large chunk of population, both for the quality of production as well as the scaling-up. The ability to adapt to the changing markets remain to be at the core of the industries today, which anticipate the technologies and demographic trends. As such, it has become inevitable to offer cutting edge technologies at affordable prices, thus leading to the economic competitiveness, which is one of the major strengths of India as nation, today.

However, the thin line between affordability and aspiration must be maintained, the lesson we learned from Tata. So, the difficulty the brand had to face while they were trying to sell the car as the cheapest in the market as against selling the features of the car, eventually led to diminishing the brand value of Nano.

One of the most innovative industries we have these days is the telecom industry, where both the service providers as well as the manufacturers of the mobile phones have been riding the horse of

One of the most innovative industries we have these days is the telecom industry, where both the service providers as well as the manufacturers of the mobile phones have been riding the horse of innovation. This clearly indicates that the change is inevitable and the building block for the modern world.

innovation. This clearly indicates that the change is inevitable and the building block for the modern world. Also, especially important to understand is that the innovations thrive in competitive markets and

become the driver of economic development and creation of jobs.

Post the economic reforms of 1991, the growth of Indian origin companies going multinational increased manifold, and one of the main pillars of this growth has been Innovation. One specific phenomenon in the Indian Innovation ecosystem has been that of “Jugaad”, or “frugal Innovation” as you may know it. This informal innovation to a large extent has driven the rural economy, based on agriculture and its allied sectors.

The frugal innovations or the grassroots innovations are usually the products created by the economically downtrodden people at individual levels based on the local knowledge, who are not formally connected to any institution. These innovations, are mostly, an incremental change to the existing products available in the market.

As such the need to promote innovation, which serves the poor must be pivotal to this entire process specifically in our country, as we are emerging economically stronger with every passing year. Therefore, much heed needs to be paid to the research and development in the field of social sector where there is a huge market for scaling of the innovations to break the glass ceilings.

Since, a large part of the economy in India is in informal sector, it became important that the innovative ability of this informal sectors is catered to and provided the required support for growth and development. Therefore, organisations such a National Innovation Foundation, have done tremendous work in scouting these ideas and providing complete cycle of support and build cooperation with research institutions, businesses, and governmental organisations at various levels.

The organization was setup in March 2000, under the aegis of Department of Science and Technology, Government of India. The mandate of the organization has been to strengthen the grassroots technological innovations and traditional knowledge, across the country. They have also created a database of over 3,22,000 technological ideas, innovations, and traditional knowledge practices from across the country. However, there still are places which the organization has not been able to reach out to, due to various organizational limitations. National Innovation Foundation has so far filed about 1182 patents. NIF succeeded in commercializing products across the countries in six continents.

The frugal innovations in India have been an extremely important factor in promoting the culture of innovation in the rural spaces and small markets. A large number of these have been in the domain of agriculture, engineering, veterinary sciences and importantly in the social sectors as well. However, most of them have not been able scale-up and does not match the aspirations of the mainstream Indian consumer.

However, one of the major barriers to innovation, is the financial barrier, even in the

frugal innovations. The cost of developing these innovative products often becomes an end point for the product to see the light of the day. The diffusion of the various innovations that already exist and have scale-up potential to reach the mainstream also remain to be a challenge. But the non-availability of institutional support to create prototypes of the products and the financial requirements often push these to the idea warehouses.

Considering the federal nature of the country, what needs to be acknowledged is that there are certain imbalances in the eco-system created among various states, where we have states like Delhi, Kerala, Karnataka doing much better as compared to the other states such as North-East and Jammu and Kashmir which are still to pick the threads in the innovation. However, now there are many organisations sprouting to cater to such needs and building innovation and fabrication labs across these states and UT's. In Jammu and Kashmir,

to strengthen the role of industries in promoting the culture of innovation, two Centers for Invention, Innovation, Incubation & Training (CIIT) in Jammu & Kashmir in collaboration with Tata Technologies have already been set-up. These

centers are to be established at cost of more than Rs. 300 Crores. Therefore, initiatives like this will go long way in addressing the imbalances among the states and union territories.

Make in India, an initiative by the Government of India was launched on August 15, 2014 by the Hon'ble Prime Minister to encourage companies to manufacture in India, which have boosted not only the manufacturing capacities of the country but also has had a huge impact on the building the innovative culture. The multinational companies, today spend a huge part of their resources on research and development of new products, promoting the culture on innovation across the board. This is of course, in addition to the boost it has given to the jobs and economic growth in country.

The various ministries of the Central government have been also playing an important role in building the culture of innovation and

The various ministries of the Central government have been also playing an important role in building the culture of innovation and entrepreneurship in India. The relation between innovation and entrepreneurship goes a long way, however innovation as a part of the government functioning plays an important role too.

entrepreneurship in India. The relation between innovation and entrepreneurship goes a long way, however innovation as a part of the government functioning plays an important role too. Ministry of Electronics and Information Technology (MeitY) has taken various initiatives to improve innovation-led ecosystem with a scheme such Technology Incubation and Development of Entrepreneurs, Centre of Excellences in IoT/ FinTech space as well technology and theme-based incubation centers and programs to promote technology incubation and also to support start-ups and MSMEs protect IPRs nationally and internationally.

Tremendous work is being undertaken under the science and technology ministry, where the Department of Science and Technology has been particularly promoting the innovations across the country. They have launched programmes such as NIDHI program (National Initiative for Developing and Harnessing Innovations) under which grant of around Rs. 10.00 lacs for the innovators are provided for 'Proof of concept'.

There are also many other schemes, such as that of NITI Aayog, DST, BIRAC, MEITY which promote the establishment and scaling up of incubation centers, that nurture innovative start-up businesses in their pursuit to become scalable and sustainable enterprises. This is helping to promote tech entrepreneurship through financial and technical support to incubators engaged in supporting ICT startups using emerging technologies such as Internet of Things (IoT), Artificial Intelligence (AI), Block-chain, Robotics etc.

This now, coupled with the approval of Foreign Direct Investments under the Automatic route including innovation/Research and Development, shall play an important role in strengthening the entire ecosystem.

The fast pace with which the India has been jumping the ranks is tremendous and over the years keeping the consistency at its growth is remarkable. Over the period, India has established close to 7,000 Research and Development institutions. More than 20 percent of these institutions are in Maharashtra, followed by Karnataka, Tamil Nadu, Andhra Pradesh, and Gujarat. Among its

asian counterparts, India has been ranked as the top innovation destination in Asia. With the establishment of various Incubation Centers, of which almost 500 have been established with the support of Government through its various ministries, the innovation is taking the center stage.

Today, India also has major multinational companies having established their research and development centers in India, with few of them biggest across the globe. Companies like, Google, Amazon and Facebook have set-up their Research and Development institutions offices in the country to cater to the needs across globe, specifically in Asia.

There is no denying the fact that lot is being done for strengthening the Innovation ecosystem both at the level of government and the arrival of private players, specifically the corporates who have established corporate incubators and accelerators to facilitate the ideas which are related to the service and products they offer. One of the major examples in this sector is Jio GenNext, an accelerator operated by Reliance Jio for launching in the Jio ecosystem. There are many similar programs which are being launched by various corporates, which is an incredibly positive sign for the growth of innovative culture.

Out of the many challenges that appear, the need to bring together the industrial experience and the academic research together for building new products remains at the top.

However, much more needs to be done before we compete with the developed countries and have our aspirations to figure in the top ten countries in the Global Innovation Index. One of the major indicators of the growing innovation culture is the patent filing, in which though there has been an increase over the last several years, the country still lags behind. Many centers supporting the process of filing had been established across the country specifically under the aegis of World Intellectual Property Organization. As on date China and United States are the two countries leading the number of patent filings.

Out of the many challenges that appear, the need to bring together the industrial experience and the academic research together for building new products remains at the top. The research and development which takes place across the academic institutions has to be aligned with

the needs and requirements of the mainstream consumers or the technological advances being made at the national level. This would eventually affect the everyday lives of the citizens involving overcoming old mode of thinking and embracing new technologies and processes with ease. And this will ignite the flame of creativity and innovations in the society both in government and private setup but also transform the societies and their ways of dealing with problems. The use of novel ideas will have a far-reaching impact, as well as provide insight in the solutions which work. The potential of innovation, in every sector, private and public is immense, however, for the government sector, it will provide an opportunity to deal with the public welfare in much focused and result oriented experiences.

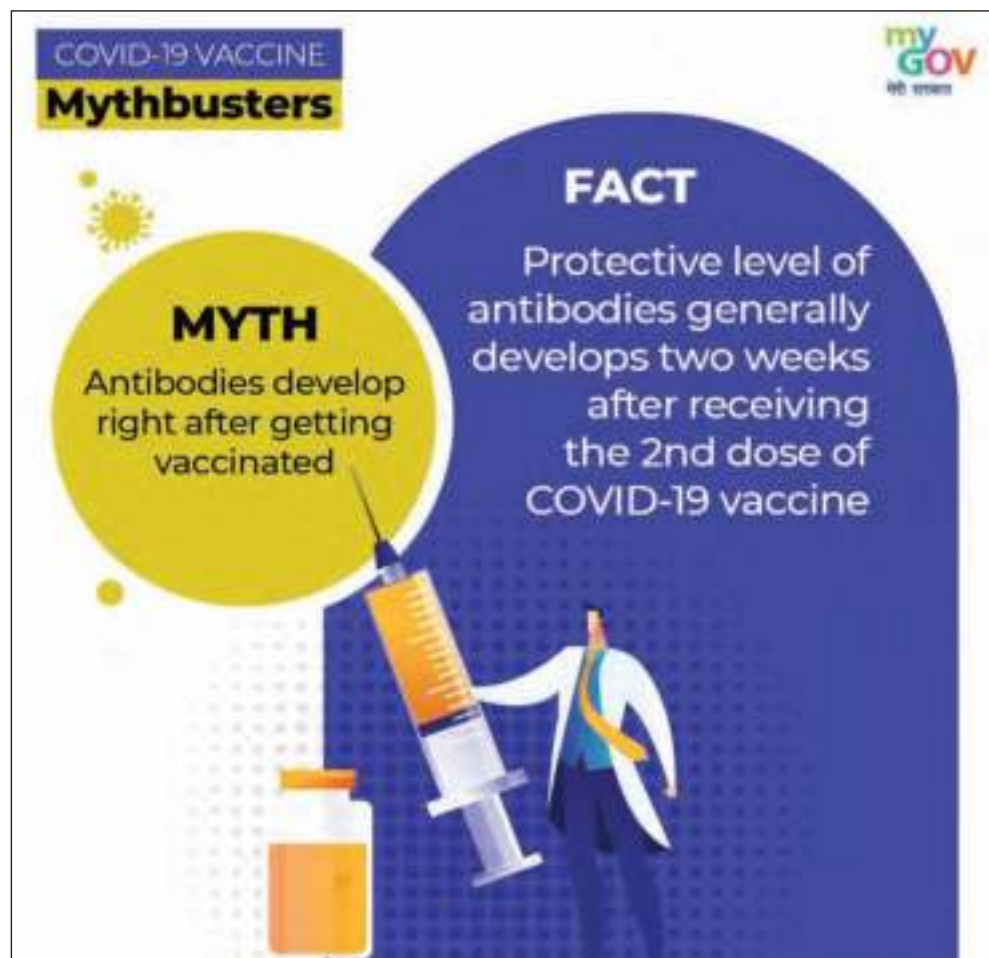
As they say, "It's easier said, then done". This task is not going to be easy, the imbalances that exist within the framework of different states and union territories in the country are an immense challenge to be worked out for the central government and its ministries to bring them on a common platform to discuss and develop innovative forms of governance or the liberty to the private sector with some financial assistance available to test the prototypes and other innovative services. All this must be done while keeping the central authority and local autonomy.

To overcome the cultural challenges, such as risk aversions and the fear of failures loom larger on the midset, and the social issues which the society is still grappling with will have to dealt with extreme caution.

With each passing day, the innovators are multiplying not only in India but across the globe, which is both impressive and heartening. The scaling up of these innovations would need a large population, who have the purchasing power as a market and what better country is there then India, right now. Not only, is the country a market for the innovation being taken up within the country, but also is seen as a market by the foreign players who customise their products keeping in view the needs and requirement of the people of India.

It is time, that Innovation is talked about and celebrated in the mainstream media, giving it the much-deserved recognition for bringing the economic and social change.

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Empowering the Nation through Nari Shakti

Sanyukta Samaddar and Pankhuri Dutt

Improvements in healthcare, education, and political representation have had a significant positive impact on the lives of Indian women. Government policies over the years have helped challenge regressive social and cultural practices that impacted gender equality. As we complete 75 years of India's independence, we must ensure that existing barriers to the economic empowerment of women are also addressed such that Indian women also contribute equally to India's growth story.

Indian women have played a very important role in India's independence movement and in ensuring fair and equal constitutional rights for all. In the years post-independence, economic growth, improved access to healthcare and educational institutions, increased financial access, legal rights to inherit property, and several other targeted policies have helped reduce gender inequality. These policy changes have also had a positive impact on social and cultural norms to a large extent. This article discusses those policies and developments in health, education, and political sphere that yielded positive outcomes and empowered Indian women. The article uses

data from NITI Aayog's SDG India Index report to show how states rank against each other in these parameters. Improvement of women's status in these sectors is especially important as these are directly associated with India's efforts towards achieving the Sustainable Development Goals under the Agenda 2030. The last section discusses challenges, solutions, and opportunities to improve the female labor force participation and ensure economic empowerment of Indian women.

Political Representation

Father of the nation Mahatma Gandhi, who was instrumental in empowering women during

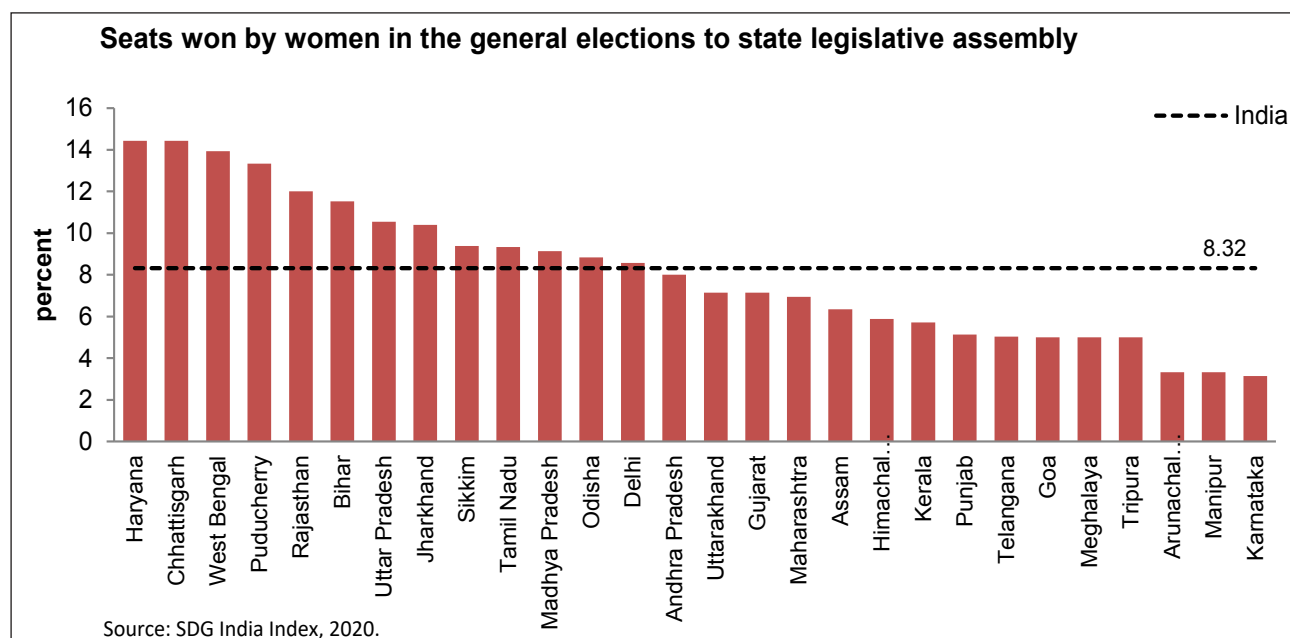


the freedom movement, endorsed equality for Indian women in his book, the Constructive Programme. This book laid out Gandhi's vision of a free India and equality of women was one of the main pillars. The first wave of women's movement which started along with the freedom movement resulted in universal adult franchise and equal rights for all in independent India. However, even though the Constitution gave women equal rights, social barriers like child marriage, dowry, widow remarriage etc. continued to be stymies in their path towards equality. Moreover, political participation of women in the early years after independence was limited. As a result, the second wave of the women's movement in India sought autonomy and equality by protesting domestic abuse and political marginalization (Misra, 2006). This culminated into the landmark policy change in 1992, the 73rd Amendment to the Constitution of India, that reserved 33 percent of seats in Panchayati Raj Institutions for women to ensure their participation and representation in the political decision-making process at grassroots. Currently, 15 percent states/UTs have 50 percent or more female elected PRI representatives with a national average of 44 percent representation (NITI Aayog, 2020).

Research suggests that empowering Indian women politically ensured increased and appropriate infrastructure investments for development and in public goods, improvement

in health infrastructure, improvement in learning outcomes of school children, reduction in bias against women voters against female leaders, and an increase in the share of female leaders (Pathak & Macours, 2016). Over the years, female voter turnout and their presence in central and state level governments has also improved (Rai, 2011). The gender gap in voter turnout specifically has been bridged successfully. India is also among the first few countries in the world to have had a female head of government. India has also had several female cabinet ministers holding important portfolios like Finance (Nirmala Sitharaman, 2019), Health and Family Welfare (Rajkumari Amrit Kaur, 1947; Sushila Nayyar, 1967, Sushma Swaraj, 2003), External Affairs (Indira Gandhi, 1967; Sushma Swaraj, 2014), and Defense (Indira Gandhi, 1975, Nirmala Sitharaman, 2017). The first female Chief Minister was Sucheta Kriplani, who led the Uttar Pradesh Government in 1963. She was followed by Ms. Mayawati in the 1990s. Other female chief ministers include Nandini Satpathy in Odisha; Janaki Ramachandran and J. Jayalalitha in Tamil Nadu; Rajinder Kaur Bhattal in Punjab; Rabri Devi in Bihar; Sushma Swaraj and Sheila Dixit in Delhi; Uma Bharati in Madhya Pradesh; Vasundhara Raje Scindia in Rajasthan; Mamta Bangerjee in West Bengal; and Anandiben Patel in Gujarat.

According to data from the Inter Parliamentary Union, on an average, globally, 25.5 percent of parliamentarians are female while countries like



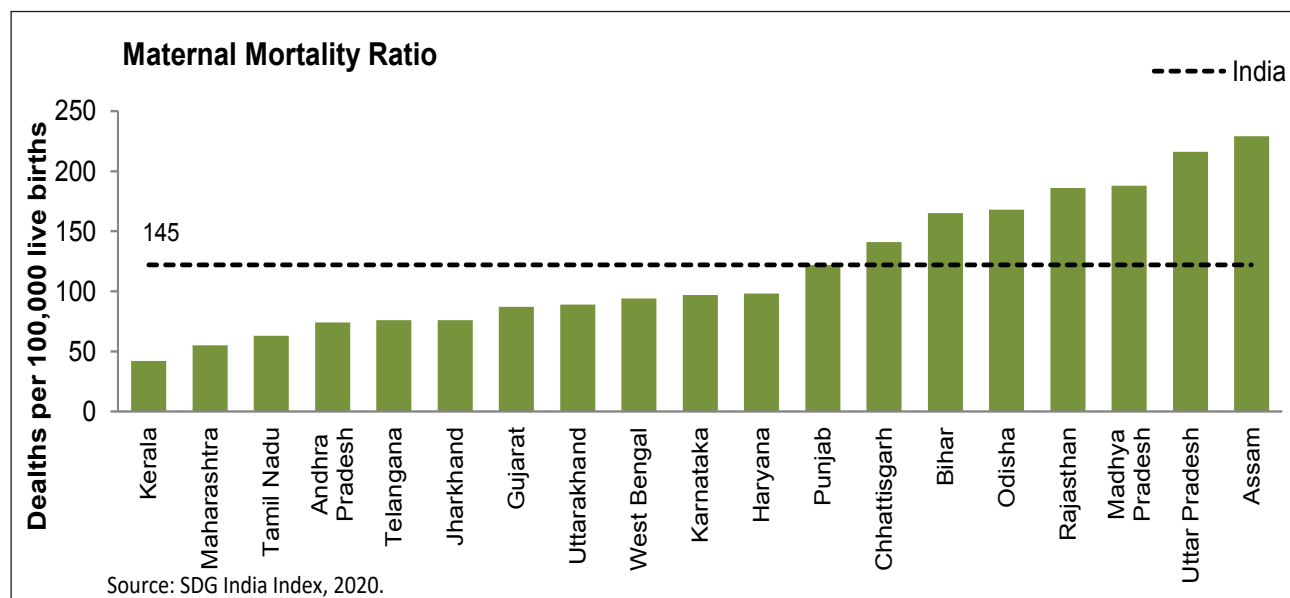
Rawanda, Cuba, and United Arab Emirates boast of 50 percent or more female parliamentarians. In comparison, the Lok Sabha recorded the highest ever share of female parliamentarians at only 14 percent in 2019 while in the Rajya Sabha, women held 11 percent of the total seats in 2020. State Legislative Assemblies have 9percent and State Legislative councils have 5percent elected women on an average (NITI Aayog, 2020). Political representation of Indian women has been identified as one of the targets towards achieving the fifth Sustainable Development Goal of Gender Equality. These numbers are low and have grown slowly over the years. Consequently, political representation is one area where there is scope for improvement at both central and state level.

Health

Some vital areas of concern for women in the health sector have seen massive improvements since independence. For instance, according to World Bank data, female life expectancy at birth has increased from 40.5 years in 1960 to 70.6 years in 2019. Similarly, maternal mortality ratio, which is defined as the number of deaths from pregnancy related causes per 100,000 live births, steeply declined from 2000 in the 1940s to 145 in 2017 (Zodpey & Negandhi, 2018). Reduction in global maternal mortality ratio to 70 per 100,000 deaths is a target under the third Sustainable Development Goal. States like Kerala, Maharashtra, Tamil Nadu have already achieved this target.

The Government of India launched several initiatives to address this specific area of concern. For instance, the Poshan Abhiyan was launched in 2018 with a budgetary allocation of Rs. 9,000 crore to improve the nutritional outcomes of children, pregnant women and lactating mothers. This scheme works around four pillars. It relies on inter-sectoral convergence for better service delivery; uses technology for monitoring and tracking women and children; provides intensified health and nutrition services for first 1000 days of a child’s life that are critical for development; and aims to convert nutrition into a Jan Andolan. The scheme uses strategic partnerships for service delivery. For instance, Tata Trusts supports the programs through Swasth Bharat Preraks who are young, qualified professionals that provide inputs on strategy, implementation, monitoring, and reporting. Similarly, NASSCOM Foundation is associated with the project to provide technology and administrative support (NITI Aayog, 2019).

Another scheme called the Janani Suraksha Yojana was launched to ensure safe, institutional delivery through cash benefits while Laqshya, Labour room Quality Improvement Initiative, was launched to provide quality maternal care during and post-delivery. At present, 54.7 percent deliveries in India are institutional with states like Kerala, Telangana, Mizoram, Andhra Pradesh, and Maharashtra in the lead. In addition to improving the health care facilities for women,



and especially pregnant women, the government also introduced cash incentive schemes like the Maternity Benefit Programme, Pradhan Mantri Matru Vandana Yojana. It was launched in 2016 to provide partial compensation through cash incentives to new mothers to allow them enough recovery time and a financial cushion after the delivery of their first born. While the government programmes have helped in improving outputs like number of institutional deliveries, both ante-partum and post-partum care of mothers remain a challenge that must be addressed.

Education

In its efforts to provide quality education and reduce the gender gap in literacy rates, the Government of India has introduced several schemes, programmes, and policies over the years that helped improve gross enrollment rates and reduced dropout rates. For instance, the Right of Children to Free and Compulsory Act 2009 made free and compulsory education a right for all children below the age of 14. India's new education policy lays the roadmap to ensure the education system and the research environment in India is catered to equip students with necessary and relevant skills and knowledge (GOI, 2020). All

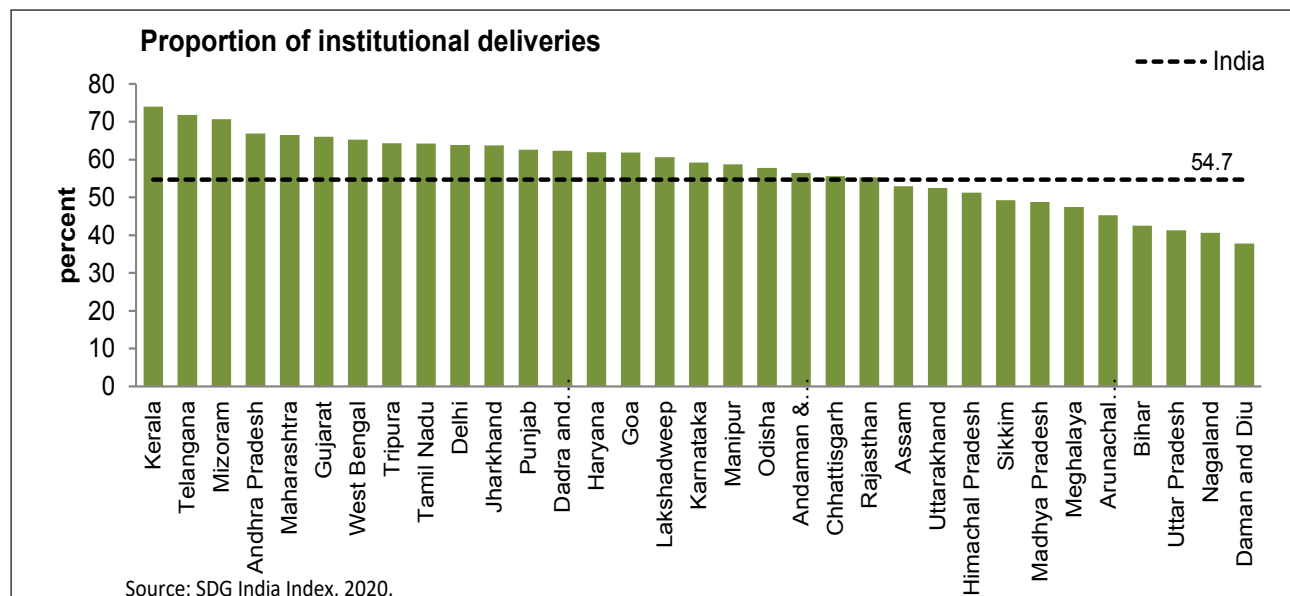
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these initiatives will contribute towards achieving the fourth Sustainable Development Goal.

According to the Census of India, the female literacy rate was 7.3 percent in 1941, and it increased to 29.76 percent in 1981. By 2011, the female literacy ratio had increased to 65.46 percent. Research suggests that the gender divide in education in India is due to several reasons that include social and cultural practices where

women are expected to play a secondary role in society; a mindset where marriage and childbirth are considered more important than academic excellence and financial independence of woman; and purely financial decisions where limited

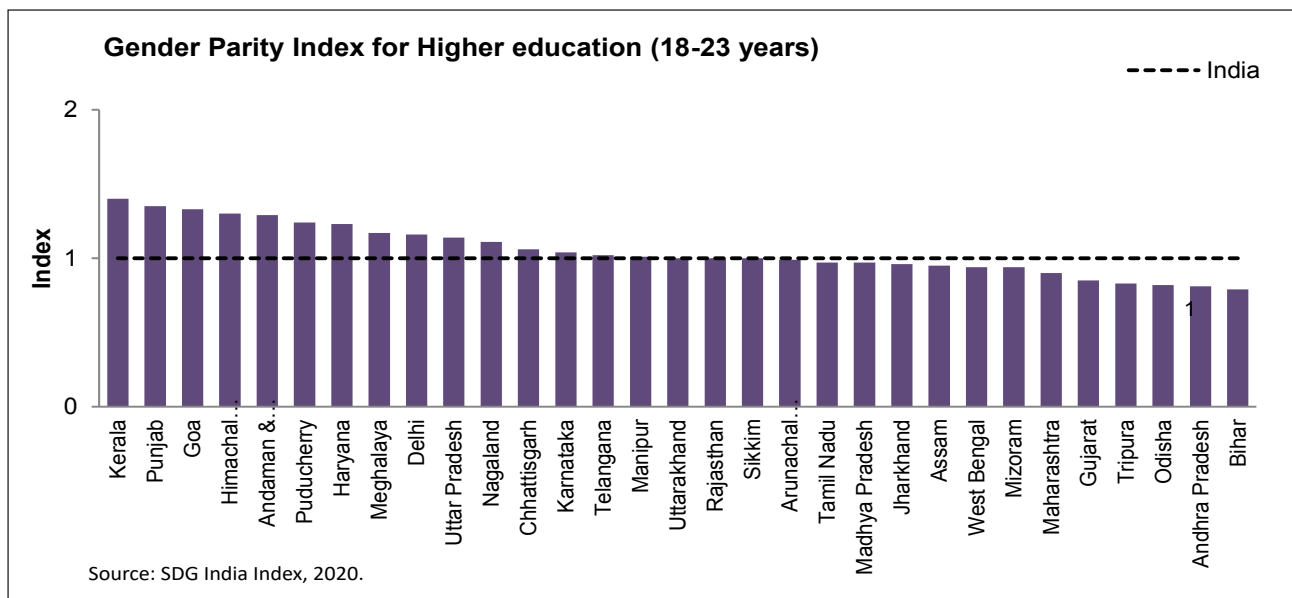
household investments are directed towards the well-being and education of the male child because of a historically higher association with income generation. To address these issues, the National Programme for Nutritional Support for to Primary Education was launched in 1995 as a centrally sponsored scheme that provided cooked, mid-day meals in government and government aided schools. Research suggests that this programme had a major impact on improving nutrition outcomes among primary school children and reducing gender gap in school participation (Derez





& Goyal, 2003). Another significant initiative in the recent years has been the Beti Bachao, Beti Padhao campaign of Government of India. This scheme not only targets the declining trend of child sex ratio; but also aims to eliminate post-birth discriminations by encouraging education and economic participation for the girl child. It was also on served that lack of separate, safe, and clean toilets often keeps girls away from school.

The Total Sanitation Scheme of the Government of India and the School Sanitation and Hygiene Education Programme were introduced to increase the number of gender-segregated toilets in government schools in late 1990s. Research indicates that separate female toilets were indeed positively associated with the gender parity indices of enrollment and participation at upper primary levels (Ray & Datta, 2017).



As literacy rates improved, so did the enrollment of women in higher educational institutions. In 2018-19, the All-India Survey on Higher Education reported an all-India gender parity index value of 1. This implies higher education parity between male and female in the age group between 18 and 23 years. States like Kerala, Punjab, Goa, Himachal Pradesh, Haryana, Meghalaya and Delhi report a gender parity value for higher education that is greater than one. This is significant as women's enrollment in higher education was less than 10 percent at the time of independence. In the first few decades post-independence, women gained access to higher education through state sponsored and highly subsidised academic institutions. The government also formulated policies to ensure equal access and opportunity for women to pursue education in public sector institutions. The National Policy of Education 1986, especially highlighted the role of education in empowering Indian women. However, research suggests that initially their participation remained limited to non-professional and non-market linked courses (Chanana, 2007). Post 1980s, private institutions were also permitted to enter the higher education market to meet the demand for engineering and medical colleges that allowed more women to pursue these subjects. Moreover, the association between science and technology streams and higher income ensured that women, at least in urban areas and those without brothers, pursued these subjects as well (Chanana, 2007). For instance, according to UGC's annual report of 2017-18, 31 percent of students pursuing a PhD course in engineering or technology were women and 43 percent of enrolled students in a PhD programme in the medical sciences stream were women. However, gender equity in education is still a challenge when its contribution towards the economic empowerment of women and their subsequent participation in the formal labour force is questioned. Making a girl's education affordable and accessible will yield higher economic outcomes

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only when issues around social preferences are also addressed actively.

Towards Empowering Indian Women and India

While the pre-independence years had started to witness positive developments like the 1929 legislation that made 14 the minimum age for girls to be married; and the 1937 Hindu Women's Right to Property that allowed widows to inherit property from her husband, their implementation was restricted to mostly the elite sections of the population. Over the years, Government of India took some impactful decisions to help elevate the position of women across social, regional, religious, and income classes. In addition to sector specific policies that target the well-being of Indian women, the government of India introduced several policies, schemes, and initiatives to empower women economically. These schemes and policies addressed a host of issues that ease out economic and social concerns that hindered the economic empowerment of women, despite India's economic growth and development since independence. Suppression of Immoral Traffic in Women and Children Act, 1954; Special Marriage Act, 1954; Guardianship Act, 1956; Dowry Prohibition Act, 1961 and 1984; Medical Termination of Pregnancy Act, 1971; Maternity Benefit Act, 1961; Equal Remuneration Act, 1976 are some examples.

However, gender inequality in several areas remains a concern in India and across the world. Therefore, achieving gender parity is the fifth Sustainable Development Goal of the Agenda 2030. India aims to bridge these gender gaps through sound social protection schemes, financial inclusion, skill development schemes and the use of new technology. In the process, it aims increase the female labor force participation rates and empower Indian women. According to estimates from the International Labour Organization, the female labour force participation rate (FLPR) in India peaked in 2005 at 32 percent and has been

declining since then. In 2019, only 21 percent of the female population above the age of 15 years was economically active. The global average was around 47 percent. In comparison, the male labour force participation rate in India was 2 percentage points higher than the global average of 74 percent and stood at 76 percent in 2019 as per ILO's modeled estimates.

Access to financial services has been a major impediment towards the economic empowerment of women. Women across the globe disproportionality experience poverty due to income inequality, unequal burden of division of labour at home; and poor control over household finances. Research suggests that in developing countries like India, most women remain dependent on their husband's income and almost one-third have no control over household spending on major purchases. Transferring money directly to women is a way of improving their financial autonomy.

For instance, a study found that transferring money from government schemes directly into an India woman's account was associated with higher FLPR in India.

Digital financial services have been a game changer especially in countries like India where access to conventional banking channels is usually limited for women. During the months following the Great Lockdown in 2020, the government of India could seamlessly ensure direct benefit transfers to all the female account holders of the Aadhar linked, Jan Dhan Yojana accounts.

The government has also introduced credit schemes for female entrepreneurs like the Stand-Up India scheme for loans between Rs. 10 lakh and Rs. 1 crore that has lower margin money requirements for female borrowers. Similarly, the Pradhan Mantri Mudra Yojana (PMMY) also provides credit to non-corporate, non-farm, micro and small enterprises upto Rs. 10 lakh. The success of these two programs is reflected in high share of female borrowers. As of February 2021, 81 percent loans amounting to Rs. 20,749 crores were sanctioned to female borrowers under the Stand-Up India scheme while the PMMY scheme

had 68 percent female borrowers with a loan sanction amount of Rs. 6.36 lakh crore¹. These success stories indicate that appropriate product design of formal financial products and services that cater to specific needs of female borrowers can improve their financial inclusion.

Security is a major issue associated with empowering women. The government has introduced One-Stop Centers (OSC) across the country to increase access to services like police, legal help, psychological support, and temporary support to women affected by violence. A 24-hours Women's Helpline has also been established to provide counselling and guidance on relevant government schemes and provision to women affected by violence (NITI Aayog, 2020). In addition to strengthening the Working Women's Hostel facilities, the government of India is trying to improve the security of Indian women through the Pradhan Mantri Awaas Yojana. This scheme

Social protection through employment programs like Mahatma Gandhi National Rural Employment Generation Act (MNREGA) and the National Social Assistance programmes have helped Indian women significantly. For instance, MNREGA which requires a minimum female participation rate of 33 percent, had 57 percent participation by women in 2019-20.

encourages women to invest in property under their name by providing concessional interest rates.

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Employment Generation Act (MNREGA) and the National Social Assistance programmes have helped Indian women significantly. For instance, MNREGA which requires a minimum female participation rate of 33 percent, had 57 percent participation by women in 2019-20. The National Social Assistance programme provides pension to those over 60 years of age, widows, and disabled people among others. Women constitute 59 percent of the beneficiaries at Central level and 55 percent of the beneficiaries at the state level (NITI Aayog, 2020).

Skill development schemes and peer group support have a huge impact on women empowerment. A large share of India's female labour force engages in informal work that ranges from domestic aid to childcare to informal businesses. Increased literacy rates have not yet translated into formal jobs for Indian women. One way to ensure more women join and remain in the formal labor force is through continued

investment in their skill development so that they can supplement their educational qualifications with skills that can help them land jobs. Between 2014 and 2018, there was a 97 percent increase in the female enrollment rate for long-term skill development courses. Moreover, almost half of the candidates enrolled in the short-term skill development scheme, the Pradhan Mantri Kaushal Vikas Yojana (PMKVY), were women (GOI, 2020). Another way is to encourage and incentivise women to formalise their businesses through financial incentives, peer group support, and by creating an enabling environment. Research in India indicates that peer effect has significant impact on outcomes of microenterprise training programmes. Presence of a female peer provides a social support network that encourages women to borrow formally and expand their businesses (Field, Jayachandran, Pande, & Rigol, 2016). NITI Aayog's Women Entrepreneurship Platform (WEP) connects aspiring and established female entrepreneurs in a digital ecosystem that supports them through skilling, marketing assistance, compliance support, and funding among other services.

As we complete 75 years of India's independence, one can only hope that all these policies have a positive impact and once again Indian women can become an equal part of India's growth story.

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Footnote

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Kurukshetra

FORTHCOMING ISSUE

June 2021 : Sustainable and Inclusive Rural Growth

COMING SOON

Rural Infrastructure

Innovating Healthy Lifestyle

Dr. Santosh Jain Passi and Akanksha Jain

There is a need for innovating strategies to minimise disruption of food supplies so that people, particularly the needy, have an easy year round access to healthy diets. Policy measures need to be put in place for improving food environments in the country, particularly in the context of current pandemic. Health-care systems need to be revamped and the health programmes reprioritised— both at the national and the sub-national levels.

Healthy lifestyle should be an integral part of everyone's daily routine particularly in the wake of current pandemic. Coronavirus disease or COVID-19 caused by the Novel Coronavirus SARS-CoV-2 is highly transmissible. Although identified during December 2019, the World Health Organisation (WHO) declared it as a pandemic in March 2020. During the early phase, dietary patterns of the masses underwent drastic adverse changes leading to deterioration of their nutrition and health status - both at the individual, state and the national/international levels.

With a greater reliance on the processed/convenience/junk foods, snacks and other ready-to-eat food items, their diet quality was gravely compromised. As a result, there was an increased

prevalence of all forms of malnutrition - be it under-nutrition, micronutrient malnutrition or over-nutrition. It is envisaged that the closure of schools/online classes, greater confinement to home and lack of outdoor physical activity will aggravate childhood obesity or increase the risk. Further, the drastically changed lifestyles caused by lockdowns, quarantining and unexpected crisis, in many cases, have caused negative emotions such as boredom, depression, stress and fear; which in turn, have led to overeating/emotional eating, especially that of the ready-to-eat/convenience foods laden with salt, sugar and fat. On the other hand, prolonged lockdowns changed people's psyche, particularly the younger generations, who refined their cooking skills for taking charge of their own meals. Electronic media and social



networks played an important role in promoting home-cooked food as well as in establishing healthy eating practices.

Due to unhealthy diets, people are already facing high rates of morbidity, mortality and disability including double/triple burden of malnutrition. COVID-19 and malnutrition being inter-linked; malnourished individuals are at a greater risk of infection while COVID-19 increases the risk of malnutrition - both biologically and socio-economically.

Good nutrition is imperative before, during and after any infection - especially the febrile infections; and this is true even for COVID-19. Maintaining appropriate diet and healthy life style practices is important for supporting strong innate immunity. Components of a Healthy Life Style include:

- Diet-related parameters
- Physical activity and overall fitness
- Socio-psychological and mental wellbeing

Fried foods are highly popular in India but the trans (TFA) fat generated during frying poses numerous adverse health effects. With elevated temperatures and increasing number of frying cycles/increased duration of frying - viscosity, colour and TFA content of the oil increase. Thus, food products fried in such oils will have much higher total fat and many fold higher TFA content compared to the food items fried in early frying cycles.

Hence, innovative approaches are needed to generate awareness among the masses regarding the trans fat linked deleterious health effects along with the innovative strategies for curbing TFA formation during frying procedures - both at the household and the commercial levels.

Cold pressed (*kacchi-ghani*), physically refined oils with higher smoking point ($>200^{\circ}\text{C}$) are better suited for frying; the frying temperatures should be kept under check (preferably between $160-180^{\circ}\text{C}$); the number of frying cycles in a particular lot of oil be limited and drain the finished fried food products properly to remove the excess oil/fat including the TFAs. Do not heat the oil for prolonged durations – both prior to and during frying. The used oils should be cooled, strained and temporarily stored in refrigerator (4°C)/freezer (-20°C) till finally utilized in the preparation of *pulav/curries/dals* or dough-making etc. Avoid reheating/reusing this oil for frying purposes; and reduce the frequency as well as restrict the quantity of fried food consumption.

- Adequate sleep
- Restricting alcohol intake (if any) and abstaining from smoking/drug abuse

Diet-related Parameters: In the case of diet, the most important aspect is eating a variety of foods—both within and across the food groups so as to ensure adequate intake of important nutrients. Simply by adding variety and bringing about dietary diversity, our diets tend to attain a nutrient balance. However, in view of our decreasing energy needs with no change in protein needs or increasing needs of various micronutrients (vitamins and minerals), antioxidants, phytochemicals and dietary fibre, it is a challenge to achieve the much needed nutrient balance in our diets. Therefore, we need to innovate our own ways to include plenty of fresh fruits and vegetables, whole cereals/ millets, pulses (preferably with husk), nuts, oil-seeds and healthy fats in our diets for not only supporting our immune system but also to reduce inflammation. On the contrary, foods high in fats, sugar and salt – though extremely palatable, should be avoided as these can lead to the occurrence of various non-communicable diseases (NCDs).

POSHAN Abhiyaan is a right step by our Government for improving food and nutrition security of the masses; however, for its success, the community needs to be empowered to reap the benefits. It is a Jan Andolan – by the people, for the people. Although the issue of food security is addressed under most of our public welfare schemes/policies, nutrition security is often overlooked. Interventions directed towards Information, Education and Communication (IEC)/ Behaviour Change Communication can be invaluable in creating awareness among the masses regarding various aspects of nutrition as well as the social safety net programmes like supplementary feeding programmes (ICDS/MDM) and Public Distribution System/PDS. Effective, customised, easy to comprehend messages are needed to convey the importance of eating right using locally available, seasonal and easily accessible nutrient-rich foods. Thus, there is an ample scope for innovating appropriate messages in local/regional languages as well as in developing effective communication techniques/technologies.

It is important that people remain hydrated and drink ample amounts of potable water or fresh fruit/vegetable juices (at least 6-8 glasses/day)

Ayurveda - our ancient system of medicine, highlights the four pillars of life, namely - **Aahar** (diet), **Vihar** (lifestyle), **Achhar** (conduct with the external world) and **Vichhar** (mental health). According to this, like medicine, food can recuperate an individual by establishing the connection between elements of life, food and body. Individuals' temperament and physical/emotional state can be regulated by their food choices (quality and quantity) and lifestyle. Ayurveda recommends inculcation of healthy lifestyle, meditation, pranayama, adequate sleep and **Satvik** food for leading a happy/peaceful life as well as for fighting various diseases, including COVID-19.

A **Satvik diet** includes foods and eating habits that are natural, vital, provide calmness/purity and promote longevity, intelligence, strength and good health. **Satvik** foods include: fruits, vegetables, sprouted whole grains, cereals, pulses, nuts and oil-seeds, low fat milk and milk products, pure fruit juices and the cooked food consumed within 3-4 hours of cooking.

for strengthening their immune system; however, sugar-sweetened beverages should be avoided. Access to safe drinking water provides protection against infectious diseases which in turn exacerbate under-nutrition. Here too, innovative technologies/approaches are needed to improve potable water accessibility to ensure adequate fluid intake by the masses.

Novelty of Coronavirus disease with an absolute lack of curative measures or vaccination forced people to revisit the traditional remedies. Age-old preparations (*Kadhas* etc.) using immunity-boosting herbs and spices have been/are being consumed by a large majority of our people for strengthening their immunity; a strong innate immunity is proven to prevent COVID-19.

Based on Ayurvedic principles, the Ministry of AYUSH released a set of immune boosting guidelines and recommended several Ayurvedic *kadhas* (herbal tea/decoctions) made using basil, cinnamon, black pepper, dry ginger, giloy etc. They promote golden (*haldi*) milk as well as the use of turmeric, cumin, coriander and garlic in cooking. In October 2020, our Health Ministry released the Protocol for the Management of COVID-19, which includes dietary measures, yoga and Ayurvedic herbs/formulations such as *Ashwagandha* and AYUSH-64 (polyherbal Ayurvedic formulation for treating Influenza-like illnesses) for preventing the coronavirus infection and treatment of mild/asymptomatic cases; and *Chyawanprash* (under Registered Ayurveda physician's guidance) which is believed to be effective in post-recovery phase. AYU SAMVAD - one of the largest public awareness campaigns in recent times taps Ayurveda for solutions to fight COVID-19 pandemic; and is operationalised by the All India Institute of Ayurveda, Ministry of AYUSH.

COVID-19 pandemic has led to increased food losses/wastage the world over putting people's food and nutrition security at risk. Food and Agriculture Organisation (FAO) has proposed several innovative technologies to improve food production, distribution and consumption; and thus, transforming our food systems for betterment. Popularity of various Apps for preventing food loss or reducing food waste or promoting food-donation has been on a rise. Several nations started developing Apps to facilitate the logistics, transport and e-commerce of perishable foods. However, the '*Feeding India App*' focuses on donation of food for the needy; and through this App, restaurants or even individuals can donate food which is collected and distributed by a



network of more than 4,500 volunteers. Operating in nearly 45 Indian cities, till September 2020, such feeding programmes had served nearly 4.8 million meals.

Although COVID-19 is a respiratory virus disease and not a food-borne one, yet there is a need to maintain good food hygiene. In this regard, home-cooked food is the best option.

As life slowly returns to normalcy, possibly people may go back to their unhealthy eating habits; therefore, it is crucial that the healthy food habits including the practice of home cooking (adopted during the current phase) are carried forward. Healthy citizens make a healthy nation and the onus lies on each of us to keep health and nutrition a priority in post-COVID life too. There is a need to reinvent our dietary patterns and cooking practices. COVID-19 has created havoc but the silver-line is that it has taught us to track back to our conventional food systems with a greater reliance on home-cooked food for preventing the risk of infection. We need to innovate and promote nutritionally wholesome diets and healthy lifestyles both during- as well as in the post COVID-19 period.

Appropriate actions are needed to improve the food environment which include effective restrictions on marketing of unhealthy foods/beverages, particularly to the children; imposing ban on industrially produced trans fats; taxing sugar sweetened beverages or unhealthy foods; mandating effective front-of-pack nutrition labelling without any ambiguity/misinformation; and introducing nutrition standards for the food served or sold in schools/colleges, hospitals and other public institutions.

For protecting and promoting optimal breastfeeding/ complementary feeding practices, exclusive-dedicated spaces need to be assigned at public places. These timely investments can confer enormous benefits to the child-mother duo; and can save a huge exchequer for the nation in terms of healthcare costs.

Dietary diversity is a qualitative measure of food consumption patterns reflecting household's access to a variety of foods; and is a proxy for nutrient adequacy of the individuals' diets. Incorporating a variety of foods in the daily diets, particularly the fresh fruits/vegetables imparting

COVID-19 Crisis

Ministry of AYUSH recommendations, based on Ayurvedic literature and scientific publications, for preventive health measures and boosting immunity with special reference to respiratory health.

Measures for Enhancing Immunity

- Drink warm water throughout the day.
- Daily practice of Yogasana, Pranayama and Meditation for at least 30 minutes.
- Spices like Haldi (Turmeric), Jeera (Cumin), Dhaniya (Coriander) and Lahsun (Garlic) recommended in cooking.

Simple Ayurvedic Procedures

- Nasal Application**– Apply Sesame Oil/Coconut oil or Ghee in both the nostrils (Pratimarsh Nasya) in morning and evening.
- Oil Pulling Therapy**– Take 1 table spoon Sesame or Coconut Oil in mouth. Do not drink, swish in the mouth for 2 to 3 minutes and spit it off followed by warm water rinse. This can be done once or twice a day.

Ayurvedic Immunity Enhancing Tips

- Take Chyavanprash 10gm (1tsf) in the morning. Diabetics should take sugar free Chyavanprash.
- Drink Herbal Tea/Decoction (Kadha) made from Tulsi (Basil), Dalchini (Cinnamon), Kalimirch (Black Pepper), Shunthi (Dry Ginger) and Munakka (Raisin) - once or twice a day. Add jaggery (Natural Sugar) and/or fresh Lemon Juice to your taste, if needed.
- Golden Milk- half tea spoon Haldi (Turmeric) powder in 150 ml Hot Milk - once or twice a day.

Immunity Boosting Measures for Self-Care

Actions During Dry Cough/Sore Throat

- Steam inhalation with fresh Pudina (Mint) leaves or Ajwain (Caraway Seeds) can be practiced once in a day.
- Lavang (Clove) powder mixed with Natural Sugar/Honey can be taken 2-3 times a day in case of cough or throat irritation.
- These measures generally treat normal dry cough and sore throat. However, it is best to consult doctors if these symptoms persist.

rainbow colours, not only help in making the diet nutritionally adequate but high amounts of antioxidants, phytochemicals and dietary fibre impart numerous therapeutic benefits. Bio-fortification is a feasible and cost-effective approach of delivering micronutrients to populations having limited access to diversified diets and various micronutrient interventions/supplements or commercially fortified foods. Therefore, newer avenues of bio-fortification need to be identified and worked on.

Establishment of Home/terrace gardens needs to be promoted. In addition to happiness and pleasure, such practices will encourage the intake of fresh fruits/vegetables which are far tastier and nutritious too. Non-recyclable plastic containers can be used as pots – this will also help in improving the environment.

Although social media can come in a big way to advocate people to eat healthy but simultaneous efforts are needed to make available such healthy, nutritionally wholesome and safe foods suiting the palate of masses. Nutritious wholesome salads, immune boosting mixes, nut-n-oilseed mixtures can be formulated for in-between snacking replacing the junk foods. An easy availability within their economic reach will surely enthuse people to try such food-items and make them a part of their dietaries.

There is a need to innovate alternate packaging materials (other than plastic) for an easy access to nutritionally wholesome food since in the wake of current lifestyle and shrinking nuclear family structures, every one cannot/may not be able to prepare a variety of food-items for themselves.

Further, during this COVID-19 pandemic, numerous emotional and mental health issues have emerged due to the 'normal' people being exposed to 'extraordinary situations'. These include lack of appetite (anorexia), anxiety, depression, disturbed sleep/insomnia as well as severe mental illnesses and substance misuse which have thrown an unprecedented challenge to mental health care. Therefore, innovative ways for promoting Yogic lifestyle is need of the hour. Yogic practices aim at aligning individuals' bio-rhythm with that of the nature, thereby improving their overall health. Yoga helps in enhancing wellness, particularly during these unusual times characterised by reduced physical activity coupled with increased emotional

distress. It is well documented that regular yoga practice helps in improving lung capacity, blood circulation, body flexibility and coordination, mental relaxation as well as in boosting our immunity. In the case of diabetics, hypertensive and the patients of various other ailments, yoga and meditation work wonders in stabilising their condition; and this is much more applicable during this COVID-19 period. Therefore, each one of us needs to devise his/her coping up strategies as per the individual's circumstances and time resource. Under current situation, supervised online yoga camps/classes/lessons have proved rather useful. Many such facilities have been extended by our government which are being provided at subsidised/concessional rates or free of cost. The Morarji Desai National Institute of Yoga (Ministry of AYUSH, GoI) is the nodal agency for developing and promoting of yoga culture across the country. Since last few years, although emphasis is being given and we annually celebrate the International Yoga Day (21st June) but concerted efforts are needed to universalize the practice of yoga/meditation.

For addressing mental health issues, we need to devise innovative approaches which may include:

- Maintaining a structured daily routine of life.
- Ensuring regular breaks and rest while working from home.
- Ensuring adequate sound sleep; neither compromising with sleep nor indulging in excessive sleep/lethargy.
- Having a health promoting nutritious diet as a regular routine; neither missing meals nor having too much of food/snacking.
- Keeping in touch with relatives and friends, even though remotely.
- Indulging in some pleasure-giving activities and hobbies (not-related to the usual work).
- Exercising regularly; practising relaxation exercises like yoga and meditation.
- Engaging in some religious activities (particularly for the religious individuals).
- Taking out time for self and spending quality time with the family.

Quality sleep for appropriate duration is rather important for physical and mental health. Sleep deprivation or interrupted sleep can cause adverse consequences like lethargy, stress, depression, anxiety and cognition/memory/performance deficits. In adolescents and children, disrupted

sleep can lead to poor scholastic performance and behavioural problems. A delayed sleep-wake schedule is rather common, particularly among the younger generations. Here too, some innovations are needed to regulate the sleep-wake schedule for improving the quality of sleep such as sirens for putting off the light after a scheduled time or increasing the electricity tariff at late night or some other effective commune actions.

Increased *outdoor physical activity*, including dedicated sports periods in schools/colleges is need of the hour. Inclusive sports lead to improved health, socialisation, improved self-esteem as well as positive changes in attitude and behaviour. In addition, walking, jogging and cycling tracks need to be constructed along the roadside.

As an immune boosting measure as well as for destroying the coronavirus in the nasal cavity itself (if any), the Ministry of AYUSH has recommended once-a-day steam inhalation. Therefore, making Steam-inhalation facilities easily available at shopping-malls, office hubs, parks and other commonly visited places can help in promoting this activity.

Many a times, in trying to cope with stress, people indulge in alcohol that provides negligible nutritional value except calories; while its excess intake is linked to numerous chronic diseases. Therefore, it is recommended to restrict alcohol consumption within limits. Much more stringent laws and regulations are needed for restricting alcohol intake; rationing of alcoholic drinks and increased taxation are some of the strategies. Further, not only more stringent laws pertaining to smoking and drug abuse need to be imposed but these also need to be followed strictly.

Periodic health check-ups are important for screening and early detection of the disease/disorder so that timely action can be taken. For government employees and the health insurance policy holders, mandatory health check-ups should be carried – periodicity should be age-dependent. For the retired personnel, life-cum-health certificate should be submitted once in every year. Existing health issues – particularly the NCDs, are known to increase the individual's susceptibility to COVID-19.

Our government has initiated various schemes to promote start-ups in various sectors including food processing. *Innovative start-ups* can be launched for the production of ready-to-eat healthy food-items; and for their convenient, smart

and biodegradable packaging for transportation/storage. The Ministry of Food Processing Industries has been extending financial assistance for undertaking demand driven Research and Development activities relating to product/process development, efficient technologies, improved packaging and value addition at commercial level. The Agro-Processing Cluster Scheme encourages entrepreneurs to set up food processing units by linking producers/farmers groups to the food processors and extending marketing facilities through well-equipped supply chain with modern infrastructure/technology.

Further, there is a need for innovating strategies to minimise disruption of food supplies so that people, particularly the needy, have an easy year round access to healthy diets. Policy measures need to be put in place for improving food environments in the country, particularly in the context of current pandemic. Health-care systems need to be revamped and the health programmes reprioritised—both at the national and the sub-national levels. The United Nations Decade of Action on Nutrition and the 2030 Sustainable Development Goals (SDGs) are a once-in-lifetime opportunity to cost effectively improve the diets, eliminate malnutrition, reduce death and disability from NCDs, and promote sustainable development.

The new Recommended Dietary Allowances (RDA-2020), recently brought out by the Indian Council of Medical research (ICMR) mandate diet n lifestyle changes for all age, gender and socio-economic groups - particularly the sedentary workers. Keeping this in view, new food formulations need to be designed to meet the nutrient needs as well as to suit the Indian palate.

To sum up, *we need to innovate and promote nutritionally wholesome diets and healthy lifestyles both during- as well as in the post COVID-19 pandemic period. In the wake of current crisis, it is all the more pertinent that we adopt & follow a nutritionally sound, healthy and happy lifestyle!!*

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Ensuring Employment Growth through Innovations

Manjula Wadhwa

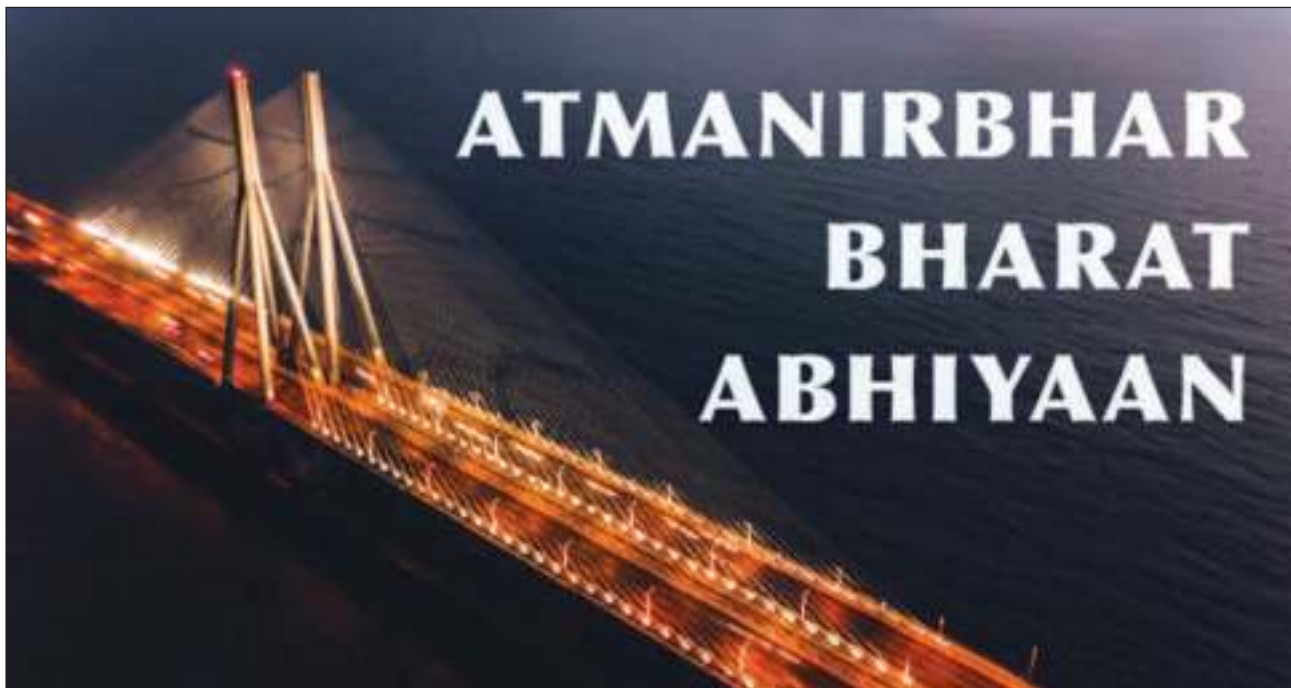
In the present age of Information and communication technology (ICT), the technological advances have been constantly innovating the Indian job sector, giving rise to millions of new jobs. What India needs urgently, is the comprehension that in today's knowledge-driven economy, innovation is the primary driver of the progress. India's ability to generate wealth and create social good will come to naught unless we monetise innovative ideas by unshackling our entrepreneurial spirit. For innovation to flourish, ideas must be funded and taken to market. Without capital, even the most transformative ideas can die before they take flight.

India is a country with over 1.39 billion people, 31 percent of which are between the age of 18 and 35 (Census of India, 2011) and many of these young people are in search of jobs, despite being educated. For example, only one in every four urban males under 29 years is employed even though they hold at least a certificate or diploma (National Sample Survey Office, 2013). It is the universal assumption that support for innovation for entrepreneurship development is the sine-qua-non for accelerating the economic development of any country.

Before delving deep in the subject, it is cardinaly important for us to understand the concept of Innovation. Innovation is production or adoption, assimilation, and exploitation of a value-added novelty in economic and social spheres; renewal and enlargement of products,

services, and markets; development of new methods of production and the establishment of new management systems. In fact, it is both a process and an outcome. In simple words, we can understand innovation as a new or changed entity creating or redistributing value. The renowned author and Management Consultant, Peter Drucker has aptly explained it, "*Innovation is the specific instrument of entrepreneurship. The act that endows resources with a new capacity to create wealth*".

In the present age of Information and Communication Technology (ICT), the technological advances have been constantly innovating the Indian job sector, giving rise to millions of new jobs. According to the Indian Staffing Federation (ISF) research, the future is set to see another three million new jobs in the IT space, catapulting India's tech army to reach 7 million by 2023.



The new-age jobs are envisioned to spawn in emerging technology areas such as the Internet of Things (IoT), Artificial Intelligence (AI), Machine Learning (ML), big data, blockchain, Augmented Reality (AR) and data science, among others. While these technologies add greater efficiency to enterprise operations by reducing human hours and increasing productivity levels, the new jobs also call for skilled professionals adept at handling digital tools, which most Indian enterprises apparently lack at present.

These Digital technologies are bringing a barrage of benefits to people across the country. Mobile learning, for instance, is significantly flourishing in India, providing affordable, accessible and quality education to a huge populace in the country. These digital learning platforms are giving people instant access to several learning programs to study subjects that interest them. One just needs a smartphone with an internet connection to carry the entire world in his/her pocket. Similarly, with platforms like LinkedIn, it has become so easy for recruiters to post jobs, conduct interviews and eventually absorb talents as per the enterprise requirements. From a candidate's point of view too, social media has emerged as a great job searching platform through which they can stay updated about multiple job roles and successfully seek an opportunity to work in their dream organisation. Likewise, the logistics industry is rapidly transforming by leveraging digital technologies like AI and ML, thereby pushing employees to upskill themselves every now and then to stay relevant in their jobs. When speaking of healthcare, the sector is already doing miracles by integrating robotics with medical practices. This upgrade has brought significant improvement in the precision scale and ramped up the success rate of surgeries. Leveraging other advancements like data analytics and big data, professionals in the healthcare sector are now able to store and analyse patient records anytime, which otherwise was a pressing concern for patients a few years ago. If we look at the Telecom Industry, Telecom Sector Skill Council (TSSC) has predicted that it will produce 14.3 million new jobs in the upcoming decade. In the automobile sector, AI and Internet of Things, IoT, are the biggest digital tools to bring large-scale transformation, augmenting vehicles with high-tech concepts from connected-mobility to self-driving cars. While the industry is at its

nascent stage when it comes to leveraging these technologies, the future is set to be a completely connected world. This will again need professionals who can handle such innovative technologies and bring concepts alive in the real world, giving customers innovative offerings like never before. While looking at the e-Commerce segment we find, from online shopping to digital payments, players in this space are consistently striving to create and offer seamless customer journeys while keeping their preferences and changing trends in mind. Currently, not only private but also public sector banks are associating with fintech companies to enhance their traditional mechanism and replace it with digital technologies to cater to the digital-first customers.

The instances evidencing the impact of innovation on employment growth are numerous. The country's first biotech startup Biocon was started in 1978 as a garage start-up, with just 03 employees in an era where innovation and entrepreneurship were unheard of. Today, it is an innovation-led global biopharmaceuticals company that is catering to the unmet global need for affordable life-saving medicines. Besides making a huge impact on global healthcare, Biocon has, over the years, created over 12,000 direct jobs besides having a multiplier effect on employment through the several ancillary businesses it relies on or supports. Similarly, Infosys sowed the seeds of India's US\$ 180 billion information technology industry that employs over four million people directly and has created 12 million indirect jobs. The industry today contributes as much as eight percent to the country's GDP. Companies like Biocon and Infosys have demonstrated how unleashing the power of entrepreneurship and innovation can bring multiple benefits to the country and usher in a better life for millions of Indians.

It is a matter of satisfaction that the prompt and timely realisation dawned upon Government of India that incentivising innovation and Intellectual Property (IP) creation is extremely important for India's future growth prospects. The faith that enabling entrepreneurs to propel ideas into sustainable businesses will add value to our economy in the long run and help the country achieve self-reliance, culminated into launching of the Government of India programme 'AatmaNirbhar Bharat', which undoubtedly is a laudable step in the right direction.

Now, let us discuss the initiatives taken by Government of India for promoting innovation so far: Various Government Ministries/Departments viz. Ministry of Education (MoE), Department of Science and Technology (DST), Department of Bio-technology (DBT), NITI Aayog and Ministry of Electronics and Information Technology (MeitY) have launched schemes for promotion of innovation. Make in India launched by Central Government in 2014 to attract foreign investors and Industrialists to manufacture here in India, represents a comprehensive and unprecedented overhaul of outdated processes and policies, especially a complete change of the government's mindset – a shift from issuing authority to business partner. The scheme aimed at creating an ecosystem and environment for Manufacturing with protection of Intellectual property and encourage innovation and skill development, gives tax benefits, lower excise duty, access to Indian Market.

Ministry of Electronics and Information Technology (MeitY) has approved a Technology Incubation and Development of Entrepreneurs (TIDE 2.0) Scheme being implemented by its Innovation and IPR Division with a budgetary outlay of Rs. 264.62 Crore as grant-in-aid over a period of five years. The Scheme will be implemented through 51 incubators at institutes of higher learning and premier Research and Development organisations, eventually leading to handholding of approximately 2000 tech start-ups. The major objectives of the scheme are:

- Setting up and strengthening Technology Incubation Centres in institutions of higher learning,
- Nurture Technology Entrepreneurship Development for commercial exploitation of technologies developed by them,
- Promoting product oriented research and development,
- Encourage development of indigenous products and packages and bridging the gap between Research and Development and commercialisation.

To support tech start-ups, seven select thematic areas were identified to address societal challenges based on national priorities particularly in the realm of:

- (i) Healthcare
- (ii) Education
- (iii) Agriculture
- (iv) Financial inclusion including digital payments
- (v) Infrastructure and transportation
- (vi) Environment and clean tech
- (vii) Clean Energy Solutions

Another scheme being implemented by them is Multiplier Grants Scheme (MGS) with a view to encourage collaborative Research and Development between industry and academics/ Research and Development institutions for development of products and packages. Further, Department of Science and Technology launched



a NIDHI programme in 2016 (National Initiative for Developing and Harnessing Innovations) under which programmes for setting up of incubators, seed fund, accelerators and 'Proof of concept' grant for innovators and entrepreneurs have been launched. Under NIDHI, PRAYAS (Promoting and Accelerating Young and Aspiring innovators & Startups) programme has been initiated in which established Technology Business Incubators (TBI) are supported with PRAYAS grant to support innovators and entrepreneurs with grants for 'Proof of Concept' and developing prototypes. A maximum grant of Rs. 220 lakh is given to a TBI for establishing a PRAYAS Centre which includes Rs.100 lakh for PRAYAS SHALA, Rs. 20 lakh for operational cost of PRAYAS Centre and maximum of Rs. 10 lakh to one innovator for developing prototype. Another milestone, Atal Innovation Mission (AIM), The Atal Incubation Centres (AICs) scheme supports setting up of green field incubation centres that nurture innovative start-up businesses in their pursuit to become scalable and sustainable enterprises. In both of these schemes, AIM is providing grants of upto Rs. 10 Crores over a period of 3-5 years. Last year only on 4th July 2020, the Prime Minister introduced the new Digital AatmaNirbhar Bharat App Innovation Challenge aimed at improving the Indian app ecosystem.

It becomes worthwhile here to discuss the impact of innovations on the growth of employment in our country. Six sectors illustrate the potential for new employment markets in this decade. Healthcare, business-services, leisure and hospitality, construction, manufacturing, and retail. They have a potential to generate up to 80 percent new jobs. The announcement that Rs. 102 lakh crore infrastructure projects will be implemented in the next five years as part of the government's spending push in the infrastructure sector, has a great potential for demand creation and consequently the economy-recover. Several structural reforms also must follow because the economic recovery cannot be either jobless or job lost recovery. Upskilling and Reskilling however must be the new mantra to meet the blues.

Coming to the implementation of Innovation Policies, we find that the road is infested with many thorns. No doubt, India has a reservoir of scientific talent but we do not have the deep

pockets and the enabling ecosystem that drives most of the innovation in the West. India spends less than one percent of its GDP on research and development, lower than most of its global peers. Often, we end up doing innovative research for global companies as contract research service providers, with no aim for breakthrough innovation. Resultantly, investors prefer predictable, imitative business models and me-too products, where they have the visibility of assured returns. Real innovation has an inherent element of high risk, which Indians are averse to. Even today, neither venture capitalists (VCs) nor the market, value innovation in India because there is no attractive exit route for them. Many VCs will invest in India if they can cash out of their start-up investments via the IPO route. However, exiting via the capital market route is uncommon in India. The last Indian start-up to list on the Nasdaq was Make My Trip in 2010. Some other barriers to innovation are: Skill deficiencies because of absence of in-house preparing, Excessive government regulation in Industry, Inability to move past first advancement and add to a manageable model for consistent Innovation, Failure to keep a pace with technological advancement, Problems in measuring development intensity, Insufficient business pressure to advance, Existence of conventional hierarchical progressive systems, Lack of authoritative concentrate on Innovation as a system for development and intensity, Lack of compelling collaboration with research in colleges and Research and Development organisations, Lack of accentuation on modern Innovation, critical thinking, configuration, experimentation, and so on in the education curricula, Cross-social issues and imperviousness to change among representatives and top administration, Inefficient learning administration frameworks inside of the organization, Poor comprehension of client needs, and business sector elements, Weaknesses in IPR administration, Long time taken for innovations to achieve market, Capital escalation of innovation, Fear of losing piece of the pie i.e. losing market.

On the other hand, the on-going transformation in the job sector has also raised concerns for Indian masses, especially among the labour community. It is observed that robotic automation has emerged as their biggest worry as it significantly replaces low-skilled jobs, mainly

consisting of simple assembly tasks. Automation is anticipated to execute over 40 percent of such jobs across the world in the coming years, as per the International Labour Organisation (ILO) report.

What India needs urgently, is the comprehension that in today's knowledge-driven economy, innovation is the primary driver of progress. India's ability to generate wealth and create social good will come to naught unless we monetise innovative ideas by unshackling our entrepreneurial spirit. For innovation to flourish, ideas must be funded and taken to market.

Without capital, even the most transformative ideas can die before they take flight. However, at the same time, it will be critical for the job providers to frequently update themselves and quickly adapt to the changing digital environment to give their best in their respective domains. To make this possible, several companies across India conduct weekly/monthly training sessions for their employees to help enrich skills and improve overall performances in the organization. Many of the them have already started investing in learning management systems by collaborating with skilling firms and online learning platforms. By aligning their talent retention and acquisition strategies with business strategies, organisations are ensuring that they are well prepared to take the global digital disruption head-on without diminishing the value of the country's human capital. The future indeed appears technologically-driven, where being digitally skilled will not only become a factor to excel but a necessity to survive too.

What actually required is, a national innovation ecosystem that puts in place a financing cycle-academia generating ideas, especially those based on science and technology, which are incubated to proof of concept through government-sponsored seed and incubation funding and then taken to market through business interventions backed by venture

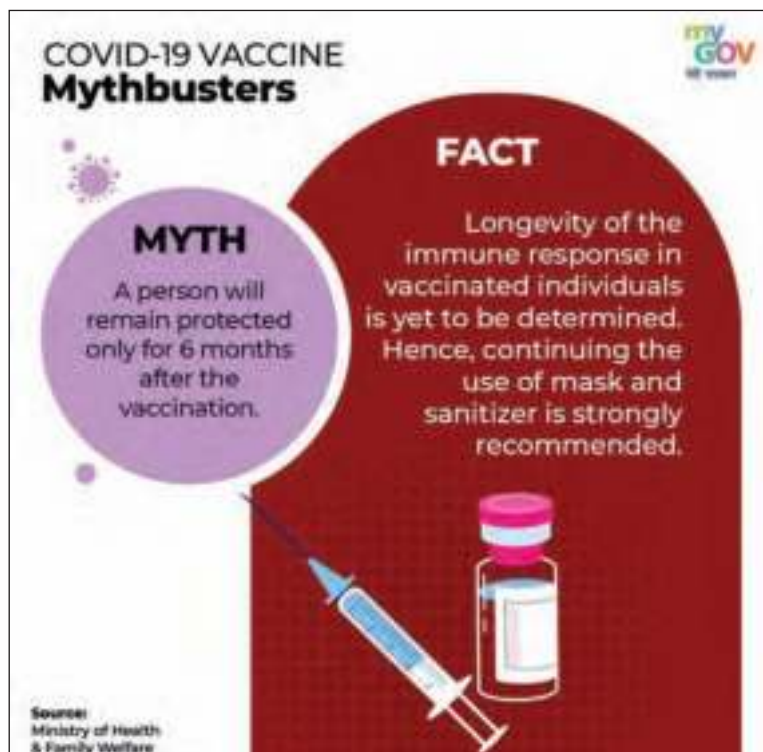
funding. The government must enable and support innovative startups and businesses that think locally but have the potential to make enormous global impact. By encouraging technopreneurs to grow from small and medium enterprises to large industrial scale operations, India will be able to create a compelling opportunity to take innovative ideas to global markets. In doing so, we will be able to garner a large share of the global value chain and combine both 'Make in India' and 'Innovate in India' to deliver an AatmaNirbhar Bharat.

To sum up, an active collaboration between the government, the private sector and civil society to understand the likely impact of innovations and technological changes and to respond with corresponding adjustments to the business, policy and educational landscape

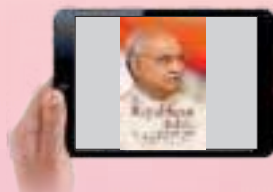
will be crucial. The opportunities presented by technological disruption are immense. Now is the time for India to harness them.

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By encouraging technopreneurs to grow from small and medium enterprises to large industrial scale operations, India will be able to create a compelling opportunity to take innovative ideas to global markets. In doing so, we will be able to garner a large share of the global value chain and combine both 'Make in India' and 'Innovate in India' to deliver an AatmaNirbhar Bharat.



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Taking Allied Sector to Newer Heights

Dr. Tasneem Q. Khan and Vishnu Sharma

More than half of the country's population is associated with agriculture and with the sectors interlinked with it. These interlinked sectors are known as allied sectors which include horticulture, sericulture, food processing and animal husbandry. The government aims to increasing productivity as well as to improve the income of the citizens associated with these sectors. The Government of India continuously reiterated that it wishes to increase the farmer's income to double and in the process it has launched several schemes which will benefit the farmers and the work force in the allied sectors to gain the same.

Agriculture plays a vital role in India's economy. More than half of the population depends on it and its allied sectors such as, livestock, fisheries, forestry and sericulture. According to the Economic Survey 2019-20, the share of agriculture and allied sectors in Gross Value Added (GVA) of the country at current prices is 17.8 percent for the year 2019-20. The same survey has noted that "India's agricultural sector has shown its resilience amid the adversities of COVID-19 induced lockdowns. The agriculture and allied activities clocked a growth of 3.4 percent at constant prices during 2020-21 (first advance estimate)."

The country through the decades has witnessed

many milestones in the agricultural development. This has been in the form of Green Revolution way back in 1968, followed by Blue Revolution, White Revolution, Yellow Revolution, Bio-Technology Revolution and the ICT Revolution (Information and Communication Technology).

Allied sector has a very important role in doubling farmers' income, a major promise of the current government. Time and again, the government has reiterated that doubling farmers' income is its biggest priority. As recently as in January this year, addressing an event in Karnataka

Allied sector has a very important role in doubling farmers' income, a major promise of the current government. Time and again, the government has reiterated that doubling farmers' income is its biggest priority.

Union Home Minister Amit Shah has said, "I want to say that if there is any big priority of the Narendra Modi government" it is

to double the farmers' income. Adding emphasis on increasing income is a shift from India's past strategy for developing agriculture and allied sector. For decades, country's agriculture policy and programme had remained production centric. The Government has sought to affect a paradigm shift in this regard. Previously, the focus had remained primarily on increasing agriculture output.

The government has advocated a seven point strategy for it that includes: special focus on irrigation with sufficient budget, with the aim of "Per Drop, More Crop"; provision of quality seeds and nutrients based on soil health of each field; large investments in Warehousing and Cold Chains to prevent post harvest crop losses; promotion of value addition through food processing; creation of a National Farm Market, removing distortions and e-platform across 585 Stations; introduction of a New Crop Insurance Scheme to mitigate risks at affordable cost; and promotion of ancillary activities like poultry, beekeeping and fisheries. Accordingly, it has launched various schemes and missions

which are divided broadly in seven heads such as: Input Management Schemes/ Programmes/ Missions; Production Management Schemes for Higher Productivity; Output Management Schemes-Post Production; Risk Management in Agriculture; Extension Management in Agriculture; Management of Allied Activities-Generation of Additional Employment and Income; and Sustainable Agriculture Management.

However, before we move on to discuss the schemes and missions the government has launched for betterment of allied sector, it is pertinent to have an idea of the status of some of the major allied sectors:

Horticulture

The cultivation of gardens or orchards leading to cultivation of fruit, vegetables, flowers and ornamental plants is known as horticulture. This helps in increasing the area and productivity of farming lands, bringing technological aspect in agriculture as well as being a source of employment opportunities. The productivity of horticulture has increased

Indian Horticulture sector contributes 33 percent share of total value of output in agriculture sector making very significant contribution to the Indian economy. Apart from ensuring nutritional security of the nation, it provides alternate rural employment opportunities, diversification in farm activities, and enhanced income to farmers.



from 8.8 tonnes per hectare in 2001-02 to 12.3 tonnes per hectare in 2018-19.

Indian Horticulture sector contributes 33 percent share of total value of output in agriculture sector making very significant contribution to the Indian economy. Apart from ensuring nutritional security of the nation, it provides alternate rural employment opportunities, diversification in farm activities, and enhanced income to farmers. India is currently producing about 306.82 million tonnes of horticulture produce, which has surpassed the foodgrain production which is 284.83 million tonnes. India has emerged as a world leader in the production of a variety of fruits like mango and banana and is the second largest producer of fruits and vegetables. Besides, India has maintained its dominance in the production of spices, coconut and cashewnut. Among the new crops, kiwi, gherkins, kinnow, date palm and oil palm have been successfully introduced for commercial cultivation in the country.

Food Processing Sector

This sector is involved in enhancing the shelf life of food along with making it more digestible and nutritious. As per the Ministry of Food Processing, Government of India following segments come

within the food processing industry: Dairy, fruits and vegetable processing, grain processing, meat and poultry processing, fisheries, consumer foods including packaged foods, beverages and packaged drinking water. The Indian food industry is poised for huge growth, increasing its contribution to world food trade every year. In India, the food sector has emerged as a high-growth and high-profit sector due to its immense potential for value addition, particularly within the food processing industry.

The Indian food processing industry accounts for 32 percent of the country's total food market, one of the largest industries in India and is ranked fifth in terms of production, consumption, export and expected growth. It contributes around 8.80 and 8.39 percent of GVA in Manufacturing and Agriculture respectively, 13 percent of India's exports and 6 percent of total industrial investment. The Indian gourmet food market is currently valued at 1.3 billion USD and is growing at a Compound Annual Growth Rate (CAGR) of 20 percent. India's organic food market is projected to increase by three times by 2020.

Animal Husbandry

This sector, dealing with animal production,



is largely a part of mixed crop livestock farming system. Animal Husbandry sector provides large self-employment opportunities. Animal husbandry deals with the agricultural practice of breeding and raising livestock. Products obtained from animal husbandry include broiler meat, eggs, buffalo meat, sheep/goat meat, pig meat, wool, animal skin, etc.

Fishing Sector

India contributes 7.73 percent of the global fish production. The export earnings from the sector was of 46,589 crores rupees in 2018-19. India today has attained the status of the 2nd largest aquaculture and 4th largest fish exporting nation in the world. The sector recorded an Average Annual Growth Rate of 10.88 percent during 2014-15 to 2018-19, 7.53 percent average annual growth in fish production and 9.71 percent average annual growth in export earnings, with 18 percent share in agricultural exports. The GVA of fisheries sector in the national economy during 2018-19 stood at 212915 crores rupees which constituted 1.24 percent of the total National GVA and 7.28 percent share of Agricultural GVA.

Sericulture

Sericulture refers to mass scale rearing of silk worms in order to obtain silk for weaving into clothes. Silk is part of only 0.2 percent of total

textile production in the world and India ranks 2nd major raw silk producer in the world. Sericulture involves: Cultivation of silkworm food plants; rearing of silkworms for the production of raw silk; reeling the cocoons for unwinding the silk filament; other post-cocoon processes such as twisting, dyeing, weaving, printing and finishing.

Each of the above mentioned sectors are supported by various schemes and missions. Below are some of the major schemes introduced by the government to support the activities in these fields in recent years:

Pradhan Mantri Matsya Sampada Yojana (PMMSY)

Prime Minister Narendra Modi launched 20,050 crore rupees Pradhan Mantri Matsya Sampada Yojana (PMMSY) to boost production and exports in the fisheries sector as part of the government's aim to double farmers' income. About 42 percent of the total estimated investment of 20,050 crore rupees, the PMMSY is earmarked for creation and upgradation of fisheries infrastructure facilities. On 10 September 2020, Shri Modi said that his government's "goal is also to double fish exports in the coming 3-4 years." The PMMSY aims at enhancing fish production by an additional 70 lakh tonne by 2024-25, increasing fisheries export earnings to 1 lakh crore rupees by



2024-25. PMMSY is designed to address critical gaps in fish production and productivity, quality, technology, post-harvest infrastructure and management, modernization and strengthening of value chain, traceability, establishing a robust fisheries management framework and fishers' welfare. The scheme aims to consolidate the achievements of Blue Revolution Scheme.

Silk Samagra

The Government of India through Central Silk Board has been implementing a Central Sector Scheme "Silk Samagra" an Integrated Scheme for Development of Silk Industry (ISDSI) during the year (2017-20) with aims and objective to scale up production by improving the quality and productivity and to empower down-trodden, poor and backward families through various activities of sericulture in the country. The scheme comprises four major components viz. (i) Research and Development, Training, Transfer of Technology and I.T. Initiatives, (ii) Seed Organisations, (iii) Coordination and Market Development and (iv) Quality Certification Systems (QCS) / Export Brand Promotion and Technology Up-gradation. The Ministry of Textiles, Government of India through Central Silk Board (CSB) has taken following steps to promote sericulture in the country:

- i. Implementing a restructured Central Sector Scheme "Silk Samagra" for development of sericulture in the country, which mainly focuses on improving quality and productivity of domestic silk thereby reducing the country's dependence on imported silk.
- ii. Under North East Region Textile Promotion Scheme (NERTPS), 38 Sericulture projects are being implemented in all North Eastern States.
- iii. Research and Development has been focused to evolve productive silkworm/host plant hybrids and package of practices to improve quality and productivity.
- iv. Automatic Reeling Machines (ARM)/Units have been established in the country to produce international standard silk of 3A-4A grade.

- v. Mobilisation of additional funds for sericulture development through convergence by availing the schemes such as Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) and Rashtriya Krishi Vikas Yojana (RKVY) being implemented by other Ministries of Government of India to create required infrastructure at stakeholder's level.
- vi. The basic customs duty of 10 percent and 20 percent is levied on raw silk and silk fabric import respectively to stabilise the domestic silk weaving segment and make Indian silk export sector highly competitive.
- vii. In order to protect the domestic sericulture farmers and silk reelers, anti dumping duty of US\$ 1.85/kg has been imposed on Mulberry raw silk of 3A Grade and below originating in or exported from China PR.

Rashtriya Gokul Mission

Rashtriya Gokul Mission has been initiated by Government of India in December 2014 with the aim of development and conservation of indigenous bovine breeds, genetic upgradation of bovine population and enhancing milk production and productivity of bovines

thereby making milk production more remunerative to the farmers. The objectives of the Scheme are a) to undertake breed improvement programme for indigenous cattle breeds so as to improve the genetic makeup and increase the stock; b) to enhance milk production and productivity of indigenous bovines; c) to upgrade nondescript cattle using elite indigenous breeds like Gir, Sahiwal, Rathi, Deoni, Tharparkar, Red Sindhi; and d) to distribute disease free high genetic merit bulls of indigenous breeds for natural service.

As a digital support to the mission, the government has also launched an app named e-Gopala. The e-Gopala app is an online digital medium that helps the farmers to choose better quality livestock and get freedom from middlemen. This app gives all the information related to cattle care, from productivity, to its health and diet.

Along with this, the government has also set up 15,000 crore rupees Animal Husbandry

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Infrastructure Development Fund under AatmaNirbhar Bharat Abhiyan. It has also launched Nationwide Artificial Insemination Programme and has also included animal husbandry and dairying farmers in its special drive to provide concessional credit to PM-KISAN beneficiaries through Kisan Credit Cards.

Also, Union Finance and Corporate Affairs Minister Smt. Nirmala Sitaraman announced various measures of AatmaNirbhar Bharat, to strengthen infrastructure, logistics, capacity building and administrative reforms for Agriculture and fisheries. The minister has announced the National Animal Disease control programme worth 13,343 crore rupees for 100 percent vaccination of cattle, buffalo, sheep, goat and pigs totalling to 53 crore animals and Animal husbandry infrastructure Development fund of 15,000 crore rupees. It aims to support private investment of dairy processing, value addition and cattle feed infrastructure. According to it incentives will be given for establishing plants for support of niche products.

Pradhan Mantri Kisan SAMPADA Yojana

The main objective of this scheme is creation of processing and preservation capacities and modernisation/expansion of existing food processing units with a view to increase the level of processing, value addition leading to reduction of wastage. The processing activities undertaken by the individual units covers a wide range of post-harvest processes resulting in value addition and/or enhancing shelf life with specialized facilities required for preservation of perishables. Under PMKSY, 32 projects have been sanctioned which are spread across almost 17 states. Schemes such as Mega Food Parks, Integrated Cold Chain and Value Addition Infrastructure, Creation/Expansion of Food Processing/ Preservation Capacities (Unit Scheme), Infrastructure for Agro-processing Clusters, Creation of Backward and Forward Linkages, Food Safety and Quality Assurance Infrastructure and Human Resources and Institutions are to be implemented under PMKSY.

This Yojana is expected to leverage investment of Rs. 31,400 crore for handling of 334 lakh MT agro-produce valued at Rs. 104125 crore rupees, benefiting 20 lakh farmers and generating 530500 direct/indirect employment in the country through the year 2019-20.

Mission for Integrated Development of Horticulture (MIDH)

MIDH is a Centrally Sponsored Scheme for the holistic growth of the horticulture sector. Under it, Government of India contributes 60 percent of total outlay for developmental programmes in all the states except states in North East and Himalayas, and its 40 percent share is contributed by State Governments. In the case of North Eastern States and Himalayan States, GOI contributes 90 percent. In case of National Horticulture Board (NHB), Coconut Development Board (CDB), Central Institute for Horticulture (CIH), Nagaland and the National Level Agencies (NLA), GOI contributes 100 percent. MIDH also provides technical advice and administrative support to State Governments/ State Horticulture Missions (SHMs) for the Saffron Mission and other horticulture related activities under Rashtriya Krishi Vikas Yojana (RKVY).

The various schemes launched and those which are running, aim to strengthen the population associated with agriculture and the allied sectors. The second half of the population which is out of these sectors as well as a large portion of the country's economy depends on the growth and prosperity of the production in this sector. At the same time, the prosperity of the people associated with these sectors is the concern of the present government. As for a nation to sustain and grow each sector needs its work force and a work force which is happy.

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Innovation: Key towards Making Youth and Women Empowered

Abhishek Mukherjee

Innovation helps in economic growth. It provides thrust to the economy. India's demographic dividend with majority of the population in the working age group calls for innovation to provide sustainable employment for the youth. Similarly, to address gender issues and empower the women population, it is imperative to promote innovation at grass root level.

Innovation holds the key to economic empowerment. It is a process for finding out solutions to make life easier. Innovation creates an ecosystem for improving the standard of living of people. It is essentially a multi sector approach where the improvement in living standards is an outcome of the symbiotic relationship across sectors. To put it more simply, innovation is the single most important ingredient for sustainable economic growth in the long run. Benefits of innovation cuts across society, culture, countries, religion, caste and creed.



Historically, products such as steam engines, aero planes, railways, electricity and many more have been the outcomes of innovation. Some of these have inter alia revolutionized transport, mass production, employability. In recent times, Information technology has been a major transformation. It has created opportunities for new production techniques, for opening up of new markets and also new business models.

In Economics, the concept of innovation was initially addressed by Adam Smith, the father of modern Economics, in his acclaimed book 'The Wealth of Nations'. He conceptualised output as a function of labour and capital. However, the economic growth or the growth in economic output could not be fully attributed to the proportional rise in labour and capital. In 1957, Professor Solow introduced a new concept of technological change. He opined that technological change is the key factor that enhances the productivity of

labour and capital which in turn leads to higher economic output or growth. However, Professor Solow, in his model, treated technological change as an exogenous variable i.e. which is determined from outside the model. Later, Professor Romer in his model brought in concepts such as Research and Development (R&D) and human capital as the main factors of technological change. So, economic growth was no longer a product of only labour and capital, but much more than that. Both Research and Development and human capital are identified as key enablers for innovation and economic growth.

One of the major benefits of innovation is its impact on economic growth. Rather, innovation results in virtuous cycle of growth. To put it simply, innovation leads to higher productivity. As productivity increases, more goods and services are produced which results in more economic activities, which in turn results in

higher wage rates, more purchasing power to the people resulting in greater demand for goods and services and finally higher economic growth. More often, invention and innovation are used interchangeably, however, there is a subtle difference between the two. While invention refers to the creation of a new product or device, innovation refers to the changes that are made in an existing product to make it more user-friendly. So, innovation is application of new ideas, new procedures to the existing product.

Innovation is catalysed through an innovative ecosystem which provides the environment for innovation and technological advancement. The innovation ecosystem runs on material capital and human capital. While material capital is the infrastructural support, human capital is the talent pool that is deployed. Innovation is essentially a two-pronged approach. At micro level, firms undertake innovation to expand its output and subsequent market share, while, at the macro level, the state encourages innovation for economic growth. A conducive innovation ecosystem is essential for innovation to reach across all sectors of the economy. Innovation also addresses the economic aspiration of the people of a particular country and at the sensitive to its social structure.

Technological Innovation: A crucial force that Drives Economic Growth

It is a proven fact that technological innovation is a key factor that drives economic growth. Technological innovation i.e. innovation driven by modern and new technologies aims at improving productivity and improved delivery of goods and services to the common people. However, technological innovation is often accompanied by long gestation period. The benefits of such innovation is seen after a certain period of time. The subsequent future generations become the true gainers of such innovation. Another important aspect of such innovation is its inclusivity i.e. the benefit is being enjoyed by the entire population. Innovation creates disruption, rather, short term disruption. These disruptions are initially discouraging since they challenge the existing system, which results in obsolescence of old business models. Loss of jobs may also occur at initial stages as adaptability to such technology takes time. However, the long term benefits of such disruption is unprecedented. Reduction of time and cost are other crucial advantages of technological

innovation. Cost and time reduction results in improved business efficiency.

India and Innovation

World Intellectual Property Organisation (WIPO) has recently released the ranking of Global Innovation Index 2020 (GII 2020). GI provides detailed analysis of innovation performance of 131 countries based on eighty major parameters. The GI 2020 sheds light on the state of innovation financing by investigating the evolution of existing mechanisms and by pointing to progress and remaining challenges. India has occupied 48th position and is among the list of 50 most innovative countries. In 2019, India had occupied 52nd position in the same index. India has been identified as one of the leading innovation achievers in the Central and Southern Asian region. The report also mentions that India has shown a consistent improvement in its innovation ranking in the last five years. In the report India ranks high in knowledge and technology outputs (27th) and market sophistication (31st). However, India has been assigned a relatively lower rank in infrastructure (75th). India has been ranked 2nd for the fifth consecutive year- with top positions in the quality of scientific publications (21st globally) and the quality of its universities (22nd). Indian Institute of Technology (Bombay and Delhi) and the Indian Institute of Science Bengaluru have been recognised as top 3 universities. Report recognized India for valuable brands and ranks 31st in the GI indicator on Global brands. India's 164 brands led by TATA Group feature in the top 5,000 brands globally. India has been recognised for a vibrant start-up ecosystem with 6 of the top 100 most entrepreneurial cities in the world. India has also been recognized for investing in Science intensive industries including medical sciences and biosciences as these instruments can effectively be used to foster investments. The report has also recognised efforts undertaken by Government Ministries/Departments like DPIIT and NITI Aayog in fostering research and innovation in the country.

As per UNESCO data on Research and Development expenditure as a percentage of GDP, global spending on Research and Development has reached nearly USD 1.7 trillion. The data also shows that only 10 countries account for nearly 80 percent of this spending. As a part of Sustainable



Development Goal (SDG), all the countries have committed to substantially increase public and private Research and Development spending by 2030. India spends around 0.7 percent of its GDP in Research and Development. This figure is very low when compared with other countries like China, Germany and United States. This report also shows that around 56 percent of Research and Development spending in India is being done by the Government and around 37 percent by the private sector. Further, the report also shows that there are only 156 researchers per million population in India which is abysmally low when compared to other major economies.

Innovation and Youth

India has one of the youngest population in the world. Since 2018, India's working age population has grown relative to its dependent population. This demographic dividend is expected to continue till 2055-56. Of course, having majority working age population is an advantage for India with increased labour force at its perusal which will contribute in enhancing the productivity of the country. Historically, it is seen that demographic dividend contributed up to 15 percent of the overall growth in major economies. However, there are challenges as well. The most important challenge is to provide gainful employment to the vast young population. To ensure gainful employment opportunities for the youth and prevent jobless growth, it is imperative to explore and open up other avenues for employment. This is only possible with innovation. The skill sets of youth needs to be enhanced and improved before they start searching for jobs, as such a step would improve their employment opportunities. A cross-country comparative study

by the National Center for Reading Education and Research of the University of Stavanger in Norway showed that basic skills and educational level are closely related, and both can affect employment. Besides skill set, proper education in itself is an important pillar for nurturing and promoting youth employment. As discussed, in a country like India, having large youth population, youth employment remains an important and essential component for sustainable development. It is widely accepted that innovation represents an opportunity for governments to ensure socioeconomic development. Innovation can help improve education, prepare youth with the skill sets to find employment in a knowledge-based economy and provide career opportunities across sectors.

Not only in enhancing career opportunities, innovation play active role in providing promising career in business and entrepreneurship for common people, especially for youth. Innovative tools, especially mobile technologies, digital innovations, fintech has helped to develop entire new business models. ICT innovation in the form of digital marketing further helps to connect local manufacturers of goods and services with global markets and enhance the export potential of the goods and services produced. More and more initiatives are combining micro financing, education, and digital tools to help entrepreneurs in emerging markets to create profitable businesses which can grow over time. An important aspect for entrepreneurship is access to finance. Innovation in the form of financial technology has been instrumental in providing easy access to finance for budding entrepreneurs.

Innovation and Women Empowerment

As per United Nations analysis, the economic impact of achieving gender equality in India is substantial and is estimated to be USD 700 billion of incremental GDP by the year 2025. In similar lines, the IMF in its study has estimated that equal participation of women in the labour force will increase India's GDP by 27 percent. However, more than 50 percent of India's female population do not have cellphones, and 80 percent don't have internet connectivity in their cell phones. Women spend 90 percent of their income on their families, and economically empowered women boost demand, have healthier and better-educated children, and

raise human development levels. In the recent report on Global Gender Gap Index 2021, India has secured an overall rank of 140 out of 156 countries. In economic participation and opportunity parameter India's rank is even worse and it stands at 151. In the health and survival parameter, India stands at 155. Even in South Asia, countries like Bangladesh, Nepal, Bhutan and Sri Lanka have fared much better than India in this particular index. In 2006, India's overall rank in the same index was 98 and in 2020, India's rank was 112.

The power of innovation in transforming the lives of women in the developing world and particularly in India is immense. In the latter half of previous century and in the first two decades of the present century, the world has experienced dynamic change in technologies, economies and societies. Innovation through emancipation of new ideas, newer products and practices is a powerful force which bring in social change. The current fusion of commitment, determination and shifting paradigms provides a never before prospect to unleash innovation to achieve women's empowerment and gender equality goals, which have otherwise proved difficult to realize.

As new innovations take place, new players come in the global domain with their multi-faceted but different approaches. Their individual approaches might not be woman centric or directly influence woman empowerment but nonetheless through innovation, women empowerment gets addressed by the linkages they happen to create. A striking example of the same is introduction of cell phones and their penetration in rural economy. While the cell phone penetration among female population is still less, their influence among female population cannot be denied. Virtuous circles of change and positivity can be enhanced by women's use of a simple technology; a shift in social attitudes about what is possible for women; or increased access for women to employment opportunities, financial opportunities, education and entrepreneurship.

Role of Innovation in challenging male centric social norms and eventually transforming them is catalytic as women's empowerment requires substantial change in inequitable gender attitudes, harmful or malpractices, which more often involves child marriage, female genital cutting, and

deprivation of education in female members of the family. Also, innovations address women's mobility and their rights to health, work, civic participation and financial prowess in a positive way. Innovations advance women's economic resilience and support women in overcoming livelihood barriers and produce a more equitable flow of financial and non-financial opportunities. These innovations include products and services such as micro finance, including credit, savings and insurance; legal and social strategies to increase women's access to productive assets; and viable employment opportunities.

Initiatives taken by Government of India to Promote Innovation

Government of India has taken several measures across sectors to promote innovation. The decade that went by i.e. 2010-2020 was identified as the decade of innovation. National Innovation Foundation is an autonomous body under Department of Science and Technology to strengthen grass root technological innovations. Atal Innovation Mission housed in NITI Aayog promotes innovation and entrepreneurship across the country. It has two core functions. Firstly, it promotes entrepreneurship through Self-Employment and Talent Utilisation through which innovators are supported and mentored to become successful entrepreneurs. Secondly, it provides a platform where innovative ideas are germinated and generated. Atal Tinkering labs at schools helps in creating innovative mindset and also helps in developing problem solving technique among students. Several Ministries and departments like DPIIT, MEITY, Ministry of Micro, Small and Medium Enterprises, MSME, have customised schemes for promotion of innovation and entrepreneurship in their respective fields. NITI Aayog has so far published two editions of India Innovation Index, the latest being India Innovation Index 2020 which ranks Indian States and Union Territories on the basis of their innovation ecosystem. It also identifies state level opportunities and challenges and aims to create a holistic tool for the policymakers to build effective policies.

India is an emerging global super power. The country regularly clocks one of the highest growth rates among major economies of the world. As

such, there has been a substantial thrust toward science, technology, and innovation in recent past, and many initiatives have been undertaken in that direction. However, there is still a long way to go, as the investments in science, technology, and innovation are yet to achieve the desired outcomes. The government has already taken major policy initiatives with a strong objective to promote innovation across all sections of the population to have an inclusive growth and sustainable development. The main aim of the policies that have been undertaken is to offer the citizens of the country especially the youth and women a vibrant innovation ecosystem where they can thrive. These initiatives reflect strong growth aspirations and rightly resonate with the zeal of the young population. The efforts undertaken by the country to provide an innovation driven economy will go a long way in cementing India's position from a regional power to an emerging world leader.

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Rural India's Innovation Pipeline

Hindol Sengupta

A surge of innovation is rippling through the countryside transforming the meaning of 'rural' in India forever. To fast-track the process of innovation in rural India, the Indian Council of Agricultural Research (ICAR) is setting up a Farmers Innovation Fund, and Innovation Centres across villages in the country to tap into the myriad innovations that are emerging from India's village economy. ICAR is also supporting more than one hundred start-ups in processing and marketing rural produce and has brought in the energies of more than five thousand young men and women to work on such projects.

In January 2020, for the first time in the 107-year history of the Indian Science Congress, a Farmers' Science Congress was organised to celebrate and promote innovations emerging from Indian farms and village life¹. The idea was to showcase the rural as a major source of innovation, as vital and important as the urban in India. Especially, since around two-third of the population and 70 percent of the workforce lives in rural areas².

To fast-track the process of innovation in rural India, the Indian Council of Agricultural Research (ICAR) is setting up a Farmers Innovation Fund, and Innovation Centres across villages in the country to tap into the myriad innovations that are emerging from India's village economy³. Such centres, and the Fund, would support a range of innovative work including further development in the forty-five kinds or types of organic farming that have been designed by farmers in the country in different locations. Such breakthrough work also includes research in nano-pesticides and non-fertilisers to support organic farming⁴. ICAR is also supporting more than one hundred start-ups in processing and marketing rural produce and has brought in the energies of more than five thousand young men and women to work on such projects.

According to latest data from Startup India, the startup initiative of the Indian government, there are more than five thousand six hundred agricultural startups in the country⁵. These include everything from processing and marketing companies to firms specialising in agritech and others working on



redefining farm machinery, or weather monitoring technology, cold chains, and warehousing.

As the use of new technologies like artificial intelligence flows in, new ideas of combining a host of existing technologies to create a unified India Agricultural Platform (IAP) is emerging⁶. As India AI, a collaboration between the Ministry of Electronics and Information Technology, the National e-Governance Division, and the apex IT (information technology) body Nasscom has noted, "There is a visible need for an open, scalable, integrating platform, that democratises access to Agri information, credit, insurance and markets; incubates innovative business models; and enables better decision making. The Indian Agricultural Platform (IAP) created by the eco-system, governed by the Government is envisioned as an 'enabling framework of Data and Services (applications) around a data exchange'.⁷"

As an example of what can be achieved using an IAP, India AI describes a farmer logging into the IAP platform (securely using retina scan), and the platform, using the digital Aadhaar identification system, geolocation and other such data metrics is able to evaluate the credit potential of the farmer,

connect the farmer to state and private credit agencies, and facilitate the loan – the entire process completed digitally without the agriculturist having to travel to various offices to pitch their case⁸.

An IAP brings together all the benefits of artificial intelligence and data analytics to help “tactical and strategic decision making, leveraging multi-year, multi-source information, aggregated from the farms to state/national levels. It processes huge data flows, and using tools like video, voice, vernacular translation, facilitate farmer engagement. The platform is hosted on a Cloud and reduces duplication by integrating data sources and a vast backend of new and existing applications: Government’s e-Nam, ITC’s e-Choupal, NCDEX’s NeML, APEDA’s TraceNet etc. related to logistics, weather, supply-chain, warehousing, assaying, recommendation engines, etc⁹”.

In essence, a platform like the IAP is likely to be the new frontier in fuelling rural innovation because it will transform the use of technology in agriculture like Aadhaar changed the identification process in the country, and UPI (United Payments Interface) transformed digital payments. An IAP is likely to assist in everything from real-time purchase and sale of raw materials, produce and equipment, provide real-time relevant information such as weather patterns and track a timeline of the consumption and production history of the farmer, and make the cultivation process more data-driven and accurate. Such a system would help farmers scale in a far more systematic fashion than current processes.

Whether it is in the use of solar power to provide electricity to rural households off-grid, or the use of renewable energy to filter water in villages, or novel ways of warehousing and weather monitoring, rural innovation is being driven by a host of exciting entrepreneurial ventures in the country.

In December 2020, a countrywide agri-hackathon¹⁰ led by Minister for Agriculture and Farmers’ Welfare Narendra Singh Tomar saw participation from more than one thousand startups, with more than three thousand ideas of rural innovation, and inputs from more than one hundred mentors¹¹. The two-month-long event was the biggest such programme in the history of Indian agriculture¹².

Twenty-four best innovations were awarded cash prizes of one lakh rupees each and the winning innovations received exclusive preference for

incubation support, pre-seed and seed-stage funding of five lakh rupees and twenty-five lakh rupees respectively and the opportunity of field trial and access to technology validation¹³.

There is a new energy in the Indian countryside as the mindset about the ‘rural’ is transforming swiftly in the country. The old rural-urban divide is being bridged as more and more people look beyond major cities to fulfil their dream of a better, more holistic and healthy life. The lockdowns from the COVID-19 pandemic have also further propelled this reimagination as many escaped the confines of the city to work from rural areas and discovered innovations waiting to be unfolded. Even leaders of major businesses like Sridhar Vembu of Zoho Corp have shown that a billion-dollar tech major can be run while living in a village. Vembu was awarded the Padma Shri in 2021. All of this is leading to a sea-change in rural areas as villages re-discover their latent potential for innovation and entrepreneurial energy.

Footnotes

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Date of Publishing : 26th April 2021
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