

Be it the idea of zero, decimal systems, binary digits, wootz steel, plastic surgery, cataract surgery, Ayurveda, defence, the Indian civilisation has been one of the most active contributors to the global science and technology.

India's Position in Innovation

- 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 2019.

Radical Technological Advancements and Need for Holistic Innovative System

- The **Internet of Things (IoT)** links cutting edge sensor technologies to conventional industries. It has found applications in different sectors such as- precision farming, 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 complex decisions. All these technologies are accessible today and are affordable.
- Unless our children in the schools have access to and become familiar with these technologies, we will all be far behind.
- 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.
- This can be done by **creating a holistic innovation ecosystem** that allows the employees to express themselves as scientists and innovators.

Opportunities

India's science and technology sector will benefit from the following factors:

1. The increase in income leads to an **increased consumption of suction products**.
 2. The **increasing affordability of Indian SMEs** is likely to be a key driver of demand for highend technology products.
- India, as a country, is surrounded by challenges that **demand innovative non-linear solutions for challenges** such as poverty, education, healthcare, and the environment.
 - In order to tap these opportunities govt. has launched the flagship initiative **Atal Innovation Mission** to help transform a *nation of job seekers to a nation of researchers, innovators, and job creators*.

Changing Trends and Challenges

- **Rapidly Evolving Ecosystem** – This necessitates quick adaptability resulting in acquisitions and restructuring.
- **Focus on Futuristic Deep Techs** - To derive high value, focus of corporates has been shifted towards next-gen technologies like genetic engineering, IoT, 5G, quantum computing, etc.
- **Digitisation and Democratisation of Information** - A huge volume of data is 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**– The requirement of the workforce is shifting from having nonskilled labour to someone specialised in next-gen technologies.

Impact of Changing Trends in the Field of Science and Technology

- **Business:** Business leaders have started challenging their assumptions to innovate relentlessly and continuously.
- **Government:** Government and regulators have also started to **be up-to-dated with changing environment** and trying to understand what they are regulating to attain a worldwide competitive position.
- **People:** Some fundamental issues on **data privacy** are being raised. 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**.

Atal Innovation Mission

- 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 Govt setup the **Atal Innovation Mission (AIM)** to **promote a culture of innovation and entrepreneurship** in the country.
- This initiative played an important 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.

Activities Carried Out Under AIM:**1. Atal Tinkering Labs (ATL) - At School Level**

- To enable students from grade 6 to grade 12 to have *access to and tinker with innovative tools and technologies like 3D printers, robotics etc.*
- AIM has launched a first of its kind **Artificial Intelligence Do-It-Yourself learning module** in a partnership with NASSCOM.

Activities Related to ATL Operational Excellence

- ATL Student Innovator Program and Student internship and ATL Student Entrepreneur Programme have been conducted
- **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 interacted with 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.

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

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

- To create product and service innovations **having national socio-economic impact**. 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**, to launch innovation challenges to spur innovation and entrepreneurship.
- 5. Applied Research and Innovation for Small Enterprises (ARISE) – To stimulate MSME industry innovation**
- 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**

Conclusion

- The remarkable growth of IT/ITES and biotech industry in India over the past decade has showed the world India's scientific, engineering and technological prowess.
- **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.
- With one of the fastest-growing start-up ecosystems (over 30,000 start-ups and 250 incubators), India can surely position itself as one of the leading innovative nation.
- 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.**
- 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.

INDIA: GROWING MARKET OF INNOVATIONS

- With each passing day innovations are bringing positive change to the people and is fostering the new age progress of the society. However, the human race keeps 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's Position

- India is home to around **17 percent of the world population.** 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.**

Importance of Innovation

- With every innovation, technology is becoming independent and efficient, having an **impact on social structure, breaking the walls of economic and social differences.**

- Innovation can be a high-end research or 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.
- The ability to **adapt to the changing markets remain to be at the core** of the industries today. It has become inevitable to offer cutting edge technologies at affordable prices, thus leading to the economic competitiveness.
- However, the **thin line between affordability and aspiration** must be maintained. This was the **lesson we learned from Tata**. They were trying to **sell the Nano car as the cheapest in the market** as against selling the features of the car. This eventually led to diminishing the brand value of Nano.

Frugal Innovation

- One specific phenomenon in the Indian Innovation ecosystem has been that of “**Jugaad**”, or “**frugal Innovation**”. 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**.
- The need to promote innovation, which serves the poor must be pivotal to this entire process. Therefore, there is need to **promote the R&D in the field of social sector**.
- 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.

National Innovation Foundation

- It was setup in March 2000, under the aegis of **Department of Science and Technology**. It aims to strengthen the grassroots technological innovations and traditional knowledge, across the country.
- National Innovation Foundation has so far **filed about 1182 patents**. NIF succeeded in commercializing products across the countries in six continents.

Challenges:

- The frugal innovations in India are crucial in promoting the culture of innovation in the rural spaces and small markets. However, **most of them have not been able scale-up** and does not match the aspirations of the mainstream Indian consumer.
- One of the major barriers to innovation, is the financial barrier, even in the frugal innovations. The **diffusion of the various innovations** that already exist and have scale-up potential to reach the mainstream also remain to be a challenge.
- The **non-availability of institutional support to create prototypes** of the products often push these to the idea warehouses.
- There are **certain imbalances in the eco-system** created among various states. States like Delhi, Kerala, Karnataka doing much better as compared to the other states such as North-East and Jammu and Kashmir.

Steps Taken by the Govt.

- **Make in India**, launched in 2015, aims 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.

- **Ministry of Electronics and Information Technology (MeitY) has taken various initiatives to improve innovation-led ecosystem** with a scheme such as Technology Incubation and Development of Entrepreneurs, theme-based incubation centers and also to support start-ups and MSMEs protect IPRs nationally and internationally.
- **Department of Science and Technology** launched **NIDHI program** (National Initiative for Developing and Harnessing Innovations) under which grant of around Rs. 10 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 centres.

Silver Lining

- India has established close to 7,000 Research and Development institutions. Among its Asian counterparts, **India has been ranked as the top innovation destination in Asia.**
- Today, India also has major multinational companies having established their research and development centres in India.
- Private players are also playing an important role in this regard. One of the major examples in this sector is **Jio GenNext**, an accelerator operated by Reliance Jio for launching in the Jio ecosystem.

Way Forward:

- One of the **major indicators** of the growing innovation culture is the **patent filing**. This is the area in which India still lags behind. As on date **China and United States are the two countries leading the number of patent filings.**
- The need to bring 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.**
- The **imbalances** that exist within the framework of different states/UTs in the country are an immense challenge to be worked out.
- The **Cultural challenges**, such as risk aversions and the fear of failures loom larger on the mindset, are still persistent. These challenges will have to be dealt with extreme caution.
- 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.

EMPOWERING THE NATION THROUGH NARI SHAKTI

Improvement of women's status in sectors like health, education, political sphere etc. is especially important as these are directly associated with India's efforts towards achieving the Sustainable Development Goals under the Agenda 2030.

Political Representation

- Gandhi ji, in his book *Constructive Programme*, laid out vision of a free India in which **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.**

- Despite the Constitution providing equal rights to women, **social barriers** like child marriage, dowry, widow remarriage etc. creates obstacles in their path towards equality. **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.
- This culminated into the landmark policy change in 1992, the **73rd Amendment** to the Constitution, that **reserved 33 percent of seats** in Panchayati Raj Institutions for women to ensure their participation at grassroot.
- As per NITI Aayog report, currently, **15% states/UTs** have 50% or more female elected PRI representatives with a **national average of 44% representation**.
- Over the years, **female voter turnout and their presence in central and state level governments has also improved**.
- 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) etc.
- According to data from the Inter Parliamentary union, on an average, **globally 25.5% of parliamentarians are female**. Countries like *Rwanda, 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 9% and State Legislative councils have 5% 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**.

Health

- Female life expectancy at birth has increased from 40.5 years in 1960 to 70.6 years in 2019. Similarly, Maternal Mortality Ratio steeply declined from 2000 in the 1940s to **145 in 2017**.
- **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.
- Several initiatives such as the **Poshan Abhiyan** was launched to improve the nutritional outcomes of children, pregnant women and lactating mothers.
- 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**.
- The government also introduced **cash incentive schemes** like the *Maternity Benefit Programme, Pradhan Mantri Matru Vandana Yojana*.
- While the government programmes have helped in improving outputs like number of institutional deliveries, both **antepartum and post-partum care of mothers remain a challenge** that must be addressed.

Education

- The ***Right of Children to Free and Compulsory Education 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.
- All 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. By 2011, the female literacy ratio had increased to **65.46 percent**.
- There is a **gender divide in education in India**. Reasons for this divide include:
 - women are expected to play a secondary role in society;
 - a mindset where marriage and childbirth are considered more important,
 - limited household investments are directed towards the well-being and education of the male child etc.
- To address these issues, the **National Programme for Nutritional Support for to Primary Education was launched in 1995**. It provided cooked, mid-day meals in government and government aided schools. This programme had a major impact on improving nutrition outcomes and reducing gender gap in school participation.
- Another significant initiative in the recent years has been the **Beti Bachao, Beti Padhao campaign**. This scheme not only targets the declining trend of child sex ratio; but also aims to eliminate postbirth discriminations by encouraging education and economic participation for the girl child.
- The **Total Sanitation Scheme** and the **School Sanitation and Hygiene Education Programme** were introduced to increase the number of gender-segregated toilets in government schools in late 1990s.
- However, gender equity in education is still a challenge. Making a girl's education affordable and accessible will **yield higher economic outcomes** only when issues around social preferences are also addressed actively.

Towards Empowering Indian Women and India

- There were some positive developments in this regard in pre-independence years. These included - **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*.
- In Post-Independence era, govt. enacted several legislations such as: 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
- **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 labour force participation rates and empower Indian women. As per ILO report, **the female labour force participation rate 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 stood at 76 percent in 2019.

- **Access to financial services** has been a major impediment towards the **economic empowerment of women**. They face income inequality, unequal burden of division of labour at home; and poor control over household finances. **Transferring money directly to women is a way of improving their financial autonomy**.
- During the months following the Lockdown in 2020, the central government 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**. Similarly, the **Pradhan Mantri Mudra Yojana (PMMY)** also provides credit to non-corporate, non-farm, micro and small enterprises.
- As of February 2021, **81% loans** were sanctioned to female borrowers under the Stand-Up India scheme while the PMMY scheme had **68%** female borrowers.
- **Security is a major issue** associated with empowering women. The government has introduced **One-Stop Centres** 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.
- **Social protection through employment programs** like MNREGA and the **National Social Assistance programmes** have helped Indian women significantly. For instance, MNREGA 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.
- **Skill development schemes** and **peer group support** have a huge impact on women empowerment. Between 2014 and 2018, there was a 97 percent increase in the female enrolment 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**, were women.
- Presence of a female peer provides a social support network that encourages women to borrow formally and expand their businesses.
- NITI Aayog's **Women Entrepreneurship Platform** connects aspiring and established female entrepreneurs in a digital ecosystem that supports them through skilling, marketing assistance, compliance support, and funding among other services.

ENSURING EMPLOYMENT GROWTH THROUGH INNOVATIONS

- **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, Innovation can be understood as a new or changed entity creating or redistributing value.

, *"Innovation is the specific instrument of entrepreneurship. The act that endows resources with a new capacity to create wealth"* - Peter Drucker

Emerging Technologies and Changing Environment

- The new-age jobs are believed to be generated in emerging technology areas such as the Internet of Things (IoT), Artificial Intelligence (AI), Machine Learning (ML), big data, blockchain etc. 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 benefits to people across the country. Social media has emerged as a **great job searching platform**. The **logistics industry** is rapidly transforming **by leveraging digital technologies like AI and ML**.
- Healthcare sector is already doing miracles by integrating robotics with medical practices. Leveraging other advancements like data analytics and big data, professionals in the healthcare sector are now able to **store and analyse patient records anytime**.
- **In the automobile sector**, AI and IoT, are the biggest digital tools to bring large-scale transformation, augmenting vehicles with high-tech concepts from **connected-mobility to self-driving cars**.
- 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.
- Incentivising innovation and Intellectual Property (IP) creation is extremely important for India's future growth prospects.

Initiatives

- **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** was launched to attract foreign investors and Industrialists to manufacture here in India.
- MeitY has approved a **Technology Incubation and Development of Entrepreneurs (TIDE 2.0)** Scheme. 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**.
- Another scheme being implemented by them is **Multiplier Grants Scheme** with a view to **encourage collaborative R&D** between industry and academics/ Research and Development institutions for development of products and packages.
- DST launched a **NIDHI programme** in 2016 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 are **supported with PRAYAS grant** to support innovators and entrepreneurs with grants for 'Proof of Concept' and developing prototypes.
- **Atal Innovation Mission (AIM)**, The Atal Incubation Centres (AICs) scheme supports setting up of green field incubation centres.
- In July 2020, the Prime Minister introduced the new **Digital AatmaNirbhar Bharat App Innovation Challenge** aimed at **improving the Indian app ecosystem**.

Challenges

- **India spends less than one percent of its GDP** on R&D, 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.

- Neither venture capitalists nor the market, **value innovation in India because there is no attractive exit route for them.**
- Skill deficiencies because of absence of in-house preparing; Excessive government regulation in Industry; Failure to keep a pace with technological advancement; Lack of compelling collaboration with research in colleges and R&D organisations; Weaknesses in IPR administration; Long time taken for innovations to achieve market; Capital escalation of innovation; etc. are **few other challenges.**
- 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.

Conclusion

- In today's **knowledge-driven economy**, innovation is the primary driver of progress. For innovation to flourish, ideas must be funded and taken to market. It will be critical for the job providers to frequently update themselves and quickly adapt to the changing digital environment.
- We need a **national innovation ecosystem** that puts in place a financing cycle-academia generating ideas, 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.

TAKING ALLIED SECTOR TO NEWER HEIGHTS

- According to the Economic Survey 2019-20, the share of agriculture and allied sectors in Gross Value Added of the country at current prices is **17.8%** for the year 2019-20.
- 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.

Increasing Farmers Income

For decades, country's agriculture policy and programme had remained **production centric**. Now the **focus is on increasing income**. The government has reiterated that doubling farmers' income is its biggest priority.

Seven-point Strategy for Increasing Income:

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.

Horticulture

- The cultivation of gardens or orchards leading to cultivation of fruit, vegetables, flowers and ornamental plants is known as horticulture.
- The productivity of horticulture in India has increased to **12.3 tonnes per hectare in 2018-19**. Indian Horticulture sector **contributes 33 percent share of total value of output** in agriculture sector.
- 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. 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**.

Food Processing Sector

- This sector is involved in enhancing the shelf life of food along with making it more digestible and nutritious.
- The Indian food processing industry accounts for **32 percent of the country's total food market**, 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.

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.

Fishing Sector

- India contributes **7.73 percent of the global fish production**. India today has attained the status of the **2nd largest aquaculture** and **4th largest fish exporting nation** in the world.
- This sector has 18% share in agricultural export. The GVA of fisheries sector during 2018-19 constituted 1.24% of the total National GVA and 7.28% 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.

Pradhan Mantri Matsya Sampada Yojana (PMMSY)

- It has been launched to boost production and exports in the fisheries sector **as part of the government's aim to double farmers' income**.
- The goal is also to **double fish exports in the coming 3-4 years**. It 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.
- The scheme aims to consolidate the achievements of Blue Revolution Scheme.

Silk Samagra

- The Government through Central Silk Board has been implementing a Central Sector Scheme "**Silk Samagra**" an Integrated Scheme for Development of Silk Industry during the year (2017-20).
- It aims to scale up production by improving the quality and productivity and to empower downtrodden, poor and backward families through various activities of sericulture.

Rashtriya Gokul Mission

- Launched in 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.
- As a digital support to the mission, the government has also launched an **app named e-Gopala**. It helps the farmers to choose better quality livestock and get freedom from middlemen.

- The govt. has also set up **Animal Husbandry 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.
- Govt. has announced the **National Animal Disease control programme** for 100 percent vaccination of cattle, buffalo, sheep, goat and pigs.

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.
- 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, Food Safety and Quality Assurance Infrastructure** etc. are to be implemented under PMKSY.

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.
- 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)**.

INNOVATION: KEY TOWARDS MAKING YOUTH AND WOMEN EMPOWERED

- Innovation is the single most important ingredient for sustainable economic growth in the long run.
- Historically, products such as steam engines, aero planes, railways, electricity and many more have been the outcomes of innovation. In recent times, Information technology has been a major transformation.
- Different economist established that economic growth was no longer a product of only labour and capital, but much more than that. Both **R&D and human capital are identified as key enablers for innovation and economic growth**.

Benefits of Innovations

- Innovation results in **virtuous cycle of growth**. Innovation leads to higher productivity. As productivity increases, more goods and services are produced.
- This 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.

Invention and Innovation

- 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.
- 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.

Technological Innovation: A crucial force that Drives Economic Growth

- Technological innovation 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**.
- 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. Loss of jobs may also occur at initial stages as adaptability to such technology takes time.

India and Innovation

- **World Intellectual Property Organisation (WIPO)** has recently released the ranking of **Global Innovation Index 2020**. India has occupied **48th position in the index**.
- India has been identified as one of the leading innovation achievers in the Central and Southern Asian region. In this 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**.
- India has been recognised for a **vibrant start-up ecosystem** with 6 of the top 100 most entrepreneurial cities in the world.
- As a part of 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 R&D. 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 R&D spending in India is being done by the Government and around 37 percent by the private sector.

Innovation and Youth

- Since 2018, India's working age population has grown relative to its dependent population. This **demographic dividend is expected to continue till 2055-56**.
- Historically, it is seen that demographic dividend contributed up to **15 percent of the overall growth in major economies**.
- The most important challenge is to provide gainful employment to the vast young population. This is only possible with innovation.
- The skill sets of youth needs to be enhanced and improved before they start searching for jobs. Besides skill set, proper education in itself is an important pillar for nurturing and promoting youth employment.

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**.

- 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.

Women Empowerment Through Innovation

- A striking example of the same is introduction of cell phones and their penetration in rural economy. 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.

Initiatives taken by Government of India to Promote Innovation

- The decade that went by i.e., **2010-2020 was identified as the decade of innovation.**
- **National Innovation Foundation** was established 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.
- **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 MSME, have customised schemes for promotion of innovation and entrepreneurship in their respective fields.

RURAL INDIA'S INNOVATION PIPELINE

- 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 life.
- The idea was to showcase the rural areas as a major source of innovation, as vital and important as the urban areas in India.

Innovation in Rural India

- The **Indian Council of Agricultural Research (ICAR)** is setting up a **Farmers Innovation Fund**, and Innovation Centres across villages. It 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.
- ICAR is also supporting more than one hundred start-ups in processing and marketing rural produce.
- According to latest data from Startup India, **there are more than five thousand six hundred agricultural startups in the country.**

- 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 emerging.

India Agricultural Platform (IAP)

- The 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.
- 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.
- 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.
- 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 etc.

Agri-Hackathon:

- In December 2020, a countrywide **agri-hackathon** led by Minister for Agriculture and Farmers' Welfare saw participation from more than one thousand startups with more than three thousand ideas of rural innovation, and inputs from more than one hundred mentor.
- Twenty-four best innovations were awarded cash prizes of one lakh rupees.

Conclusion:

- 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.**
- The lockdowns from the COVID-19 pandemic have also 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.