

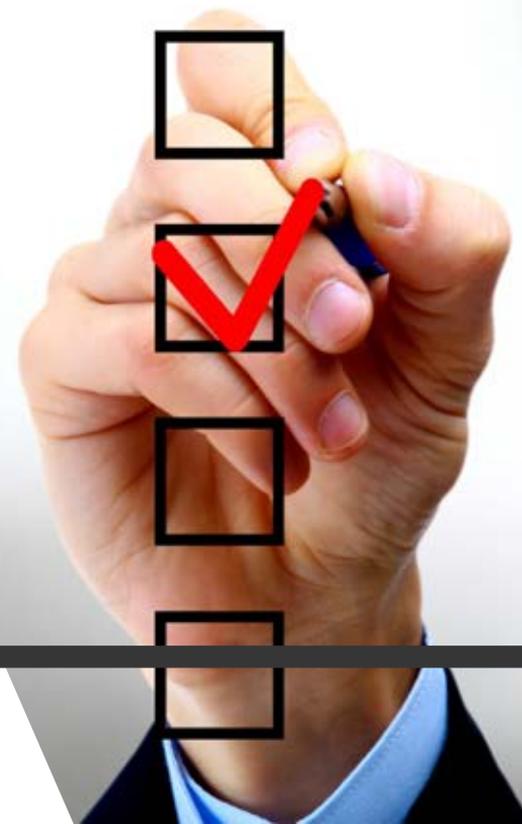


# SCIENCE AND TECHNOLOGY



# Table of Contents

- ▶ Executive Summary.....3
- ▶ Advantage India.....4
- ▶ Market Overview .....6
- ▶ Growth Drivers.....18
- ▶ Opportunities.....27
- ▶ New Developments.....32
- ▶ Industry Organisations.....34
- ▶ Useful Information.....36



# EXECUTIVE SUMMARY

## Huge talent pool

- Third largest technical manpower in the world.
- As of August 2020, there were ~950 universities in the country.
- India ranks 8<sup>th</sup> in the world in terms of number of students graduating in science and engineering stream.
- India stood at third spot in the number of science and engineering publications in the world.
- Between January 2019 and June 2020, there were ~1,006 R&D projects, 406 fellowships, 691 publications, 7,059 ongoing projects and 311 innovations.

## Policy framework

- Policies aimed at projecting India as a Science and Technology powerhouse and promoting both public and private sector involvement in the R&D practice.

## Rising investment

- With more and more multinational companies setting up their R&D centres in India, the sector has seen an uptrend in investment in recent years.
- Under Union Budget 2020-21, the Government announced the largest ever allocation of Rs 6,302 crore (US\$ 901.70 million) to the Ministry of Science and Technology, Rs 2,787 crore (US\$ 398.77 million) to the Department of Biotechnology and Rs 5,385 crore (US\$ 770.50 million) to the Council for Scientific and Industrial Research.

## Large consumer base

- With a Rs 203.85 lakh crore (US\$ 2.91 trillion) economy in FY20SAE and per capita income of over Rs 134,432 (US\$ 1,923.47) in FY19SAE, India presents a unique opportunity for companies to tap the huge consumer base demanding technologically advanced products.
- Demand for cheap and durable products that could meet local requirements will drive the need for innovation.

*Note: SAE – Second Advance Estimates  
Source: RBI, India Budget*

COMPLETE

# ADVANTAGE INDIA



- Rising income and evolving lifestyles have led to higher demand for aspirational products.
- India's gross expenditure on R&D (GERD) has been consistently increasing over the years. India's GERD as a percentage of GDP remained at 0.7% between 2018 and 2019.
- Indian players are set to benefit from expiration of patents.
- Expanding middle-class and increasing affordability are demand drivers for technologically advanced products.

**Robust demand**

- India's medical technology (MedTech) sector is forecast to reach US\$ 7.8 billion in 2020 and US\$ 9.6 billion in 2022.
  - India is the top exporter of IT products and has the third largest pharma sector and a fast-growing contract research segment.
    - Third largest technical manpower in the world.
    - For designing and testing the product, Government is setting up high-tech R&D facility by bringing together scientific research and commercial activities under one roof.

**Attractive opportunities**

- Establishment of CoEs in various areas. NMITLI initiative on PPP basis.
- Increased investment by private players. setting up of R&D centres.

**Rising private activity**

**Policy support**

- PPP for promoting exchange of scientific knowledge and R&D.
- The Patent Prosecution Highway programme was adopted on a pilot basis for three years.
- Amendment of the Patents Act (1970) to make it TRIPS-compliant.
- The government aims to formulate a new national Science Technology and Innovation Policy (STIP 2020).

## ADVANTAGE INDIA

**Notes:** CoE - Center of Excellence, PPP - Public Private Partnership, TRIPS - Trade Related Aspects of Intellectual Property Rights, NMITLI - New Millennium Indian Technology Leadership Initiative, NIC - National Innovation Council; Figures mentioned are as per latest data available

**Source:** IPI India Annual Report, PWC report

# MARKET OVERVIEW



# EVOLUTION OF SCIENCE AND TECHNOLOGY POLICY FRAMEWORK IN INDIA

2013

- **Science, Technology and Innovation Policy** aims to develop synergies between science, technology and innovation. Ethnic diversity and varying demographics attracted investment from various players

2014

- **New Initiatives** such as SWAYAM (Study Webs of Active-Learning for Young Aspiring Minds), etc. have been taken to support young talent and attract innovation
- "Innovation of Science Pursuit for Inspire Research (INSPIRE)" initiative was launched to communicate with the youth population and attract talent to the scientific field
- The total plan outlay allocated under the Union Budget 2015-16 for the Department of Science and Technology is around US\$ 557.1 million

2015

- **Scientific and Technological (S&T) Activities Survey 2015-16** aims to collect data on resources devoted to R&D in science and technology. The information is collected from about 5000 R&D organisations present across the country

2016

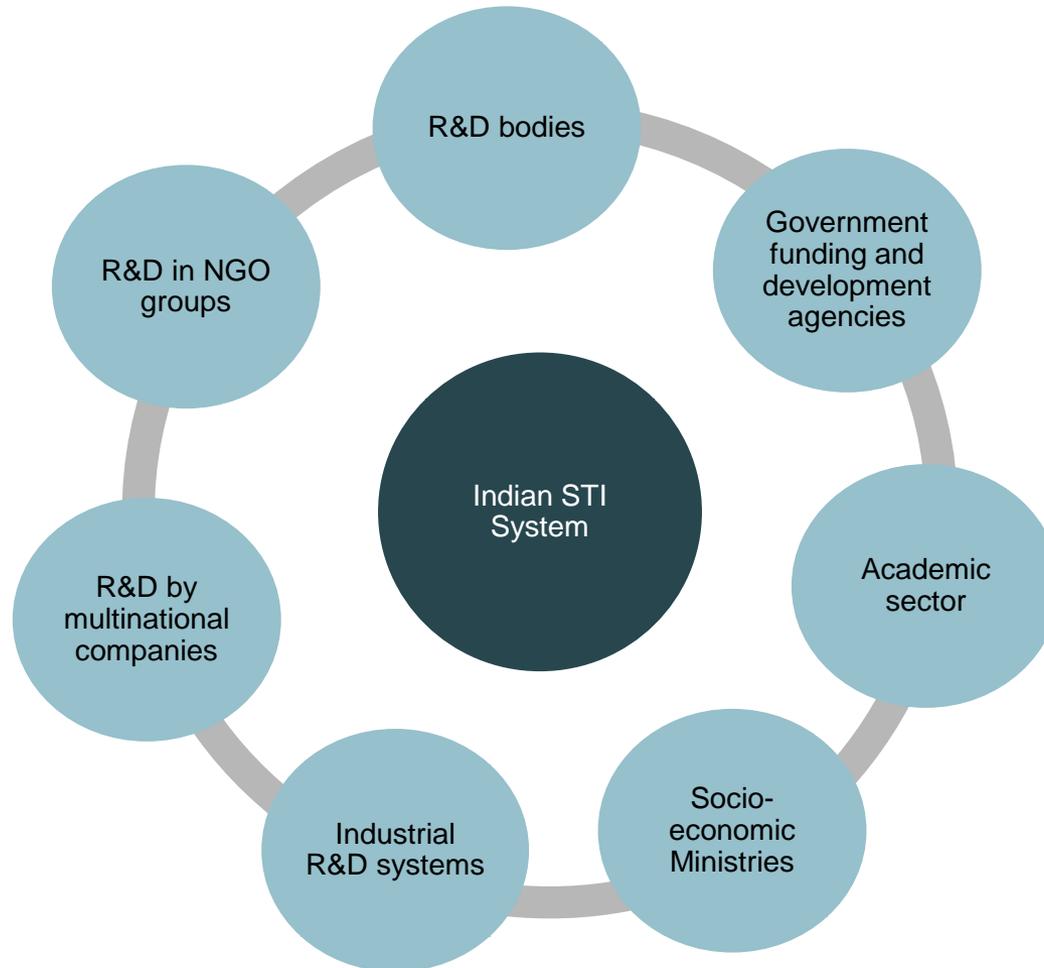
- **New Initiatives** such as the Science, Technology, Innovation and Creation of Knowledge (STICK) framework has been taken by the Indian Government to support innovation

2017

- **Achievement:** Indian Space Research Organisation (ISRO) made history after placing 104 satelIBPM into space in a single mission through its Polar Satellite Launch Vehicle (PSLV)

Source: Department of Science and Technology, Ministry of HRD, Government of India, Union Budget 2015-16

# INDIAN SCIENCE AND TECHNOLOGY SYSTEM



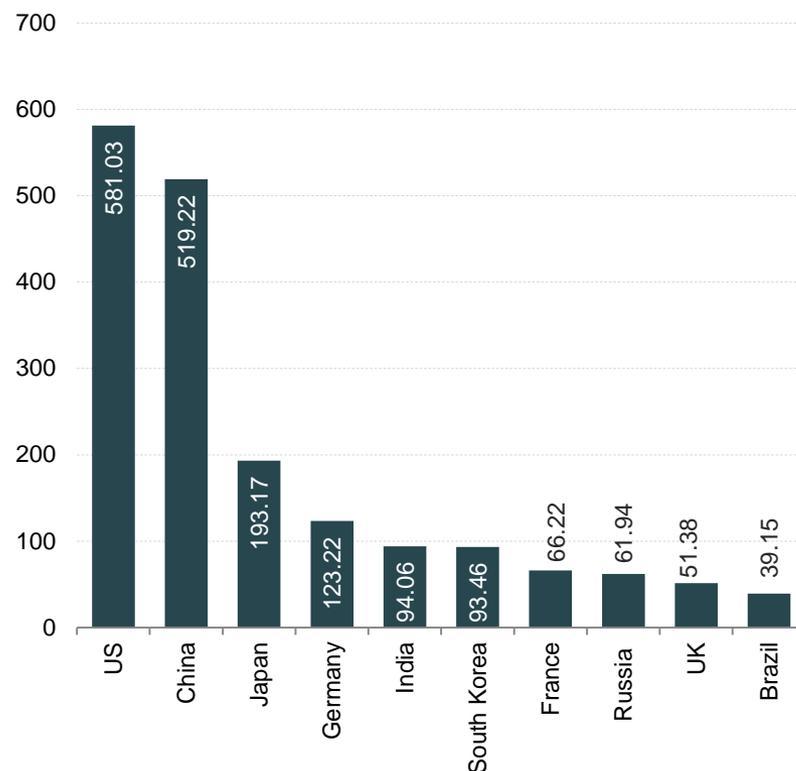
*Note: STI refers to Science Technology and Innovation*

*Source: Changing Indian STI Landscape Presentation, Department of Science and Technology*

# INDIA AMONG THE WORLD'S LEADING R&D INVESTORS

- India's R&D investment was forecast to reach US\$ 94.06 billion\* in 2019 from an estimated US\$ 86.24 billion in 2018.
- R&D investment has helped Indian companies to overcome tight competition with affordable products internationally.
- Indian Robot Mitra, designed in Bengaluru and made in China, which can recognise people by their nationalities and guide customers in a bank, has attracted the attention of Chinese manufacturers at an information technology (IT) event held at Dalian, China.

Expected expenditure of world's leading R&D investors in 2019F (US\$ billion)



**Notes:** R&D - Research and Development, F – Forecast., \* in Purchasing Power Parity terms

**Source:** Nature Magazine, Battelle, R&D Magazine

## India has a strong network of science and technology institutions and trained manpower

- India is among the top-ranking countries in the field of basic research.
- It has the third largest scientific and technical manpower in the world.
- 162 universities award 4,000 doctorates and 35,000 postgraduate degrees annually.
- The Council of Scientific and Industrial Research runs 44 research laboratories.
- India ranks 7<sup>th</sup> among highly productive countries in science and technology research.
- Britain and India's research partnership will reach GBP 400 million (US\$ 544 billion) by 2021, which include 175 different UK and Indian research institutions and more than 100 industry partners.
- TechnoPro, a Japanese tech firm, plans to hire 10,000 engineers and researchers in India by 2022-23.
- HCL Technologies plans to hire 10,000 freshers in FY20.
- Similarly, in February 2020, Capgemini announced plans to hire 30,000 employees in the country by 2021.

## Strengthening India's position in research through investment

- India's R&D investment was forecast to reach US\$ 94.06 billion in 2019 from an estimated US\$ 86.24 billion in 2018.
- India ranks third in global research publication output.
- A series of new investments were recently announced by Cisco India to enhance cyber security infrastructure in India. It will enable to build transparent and secure digital infrastructure environment for accelerating India's digital transformation.
- Cisco India has signed a memorandum of understanding (MoU) with Indian Computer Emergency Response Team (CERT-In) to establish a threat intelligence sharing programme.
- Under the National Initiative for Developing and Harnessing Innovations (NIDHI) programme, Indian Government plans to invest US\$ 29.75 million for setting up 100 incubators across the country in the next 4 years to support start-ups.
- In December 2019, Council of Scientific & Industrial Research (CSIR), India and the National Centre for Scientific Research (CNRS), France signed a MoU for cooperation between the two towards promotion and support of scientific and technological research.

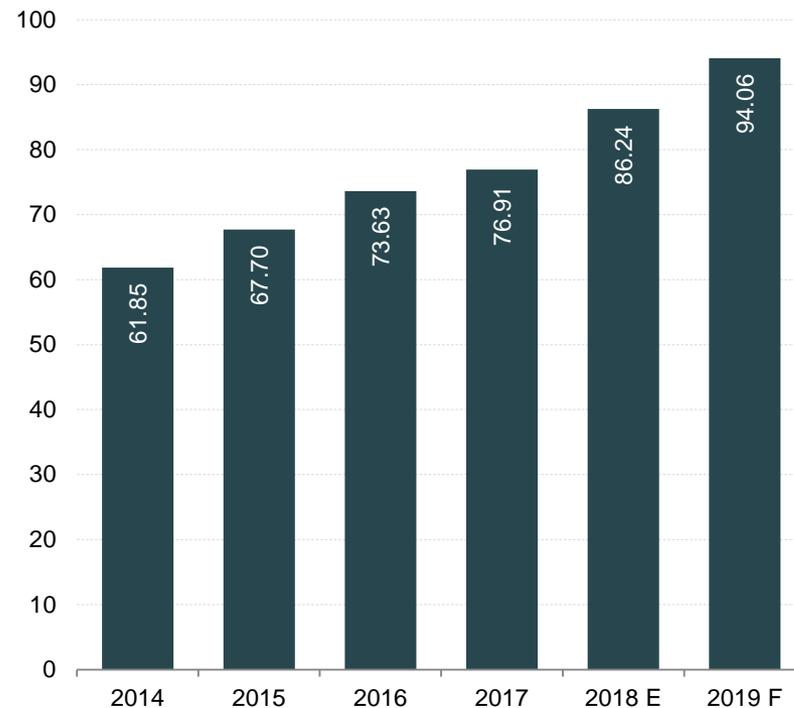
*Notes: R&D - Research and Development, \* in Purchasing Power Parity terms*

*Source: R&D Magazine*

# STRONG GROWTH IN R&D INVESTMENTS IN INDIA OVER THE YEARS

- By 2022, R&D expenditure is targeted to reach at least 2 per cent of the GDP by 2022.
- To facilitate protection and commercialising of IPRs, these schemes will be providing access to high-quality intellectual property services and resources. Moreover, under these schemes, the central Government will bear the fees for facilitators for patents, trademarks or designs that a start-up may file. Start-ups will only bear the cost of the statutory fees payable.
- As per Union Budget 2019-20, the Government set up National Research Foundation for R&D.
- India ranked 52 in Global Innovation Index (GII) 2019.

R&D spending in India (US\$ billion)

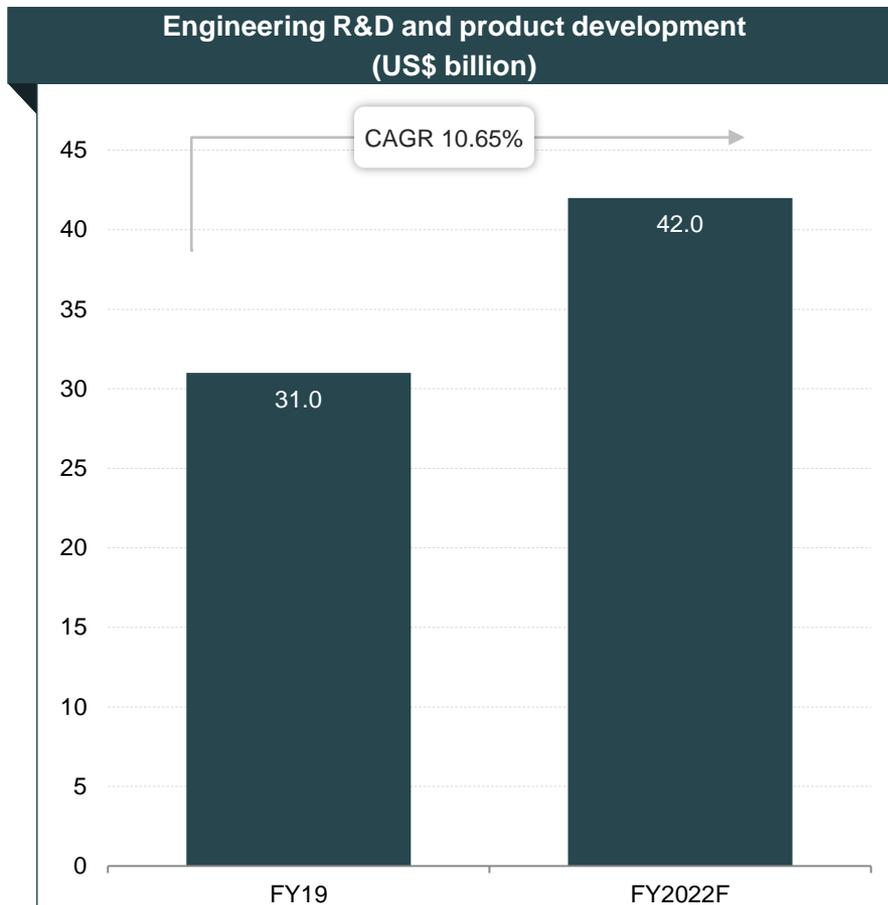


*Notes: R&D – Research and Development, E – Estimate, F – Forecast, in Purchasing Power Parity terms*

*Source: R&D Magazine, International Monetary Fund, World Bank, CIA Fact Book, OECD, Department of Science and Technology, WIPO*

# INDIA IS ALSO GARNERING THE BENEFITS OF R&D OUTSOURCING

- India has become one of the most preferred location for engineering offshoring. Companies across sectors (such as IT, consumer electronics, personal devices, medical electronics, telecom and automobiles) are now offshoring complete product responsibility.
- Engineering R&D products and services are growing at the fastest rate in the technology sector in India.
- The engineering R&D and product development market in India is forecast to grow at a CAGR of 10.65 per cent to reach US\$ 42 billion by FY22 from US\$ 31 billion in FY19.
- Newer capabilities such as supply chain, regulatory compliances and manufacturing engineering are being developed by Engineering R&D service providers.
- Service providers in Europe are scaling up and setting offshore operations in India to access cost effective large talent pool.



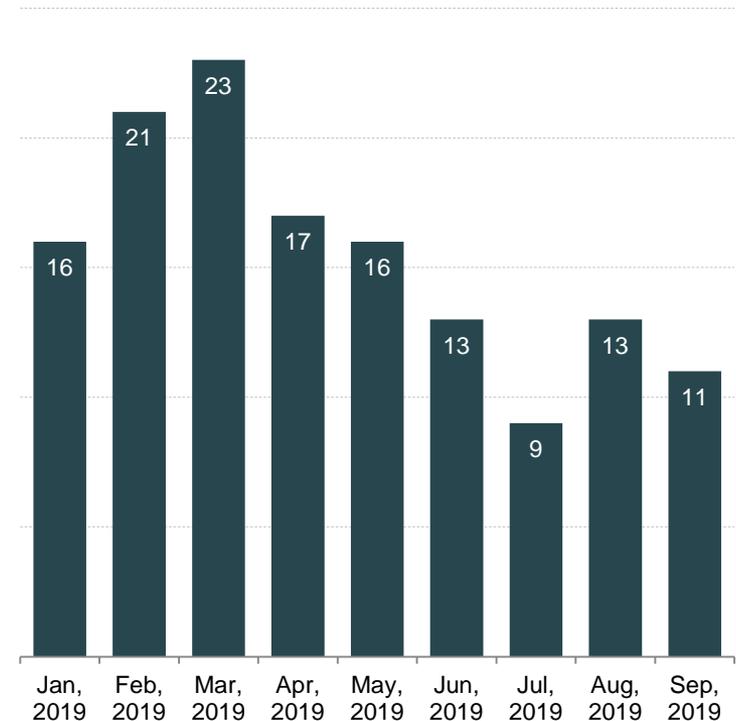
**Notes:** R&D - Research and Development, IT - Information Technology; Figures mentioned are as per latest data available

**Source:** The IT-BPM Sector in India 2020 report by NASSCOM

# GLOBAL 500 COMPANIES PRESENCE IN INDIA

- Top 500 R&D spenders contribute over US\$ 614 billion the global R&D spend with top 100 R&D spenders alone contributing 66 per cent to it.
- In India, TVS Motors, Bosch, Tata Motors and Mahindra and Mahindra have topped the list of R&D innovators in the automobile industry. India, being ahead of China, South Korea and Japan, is generating huge opportunities for Indian automobile brands.
- In February 2020, Capgemini announced plans to hire 30,000 employees in the country by 2021.

## Promotion of in-house R&D units



Source: Zinnov – Crossing the value chasm

## Organisation

## Business description



### Council of Scientific and Industrial Research (CSIR)

- CSIR is India's largest R&D organisation, with 38 national laboratories, 39 outreach centers, 3 Innovation Complexes, 5 units, 4600 active scientists supported by about 8000 scientific and technical personnel. On an average, CSIR files about 200 Indian patents and 250 foreign patents per year. About 13.86 per cent of CSIR patents are licensed, a number which is above the global average.
- CSIR is ranked 84 among 4851 institutions worldwide and was the only Indian organisation among the top 100 global institutions in 2014.
- In April 2020, Institute of Genomics and Integrative Biology (CSIR-IGIB) and TATA Sons signed a MoU for licensing of KNOWHOW for FNCAS9 Editor Linked Uniform Detection Assay (FELUDA) for rapid diagnosis of COVID-19.



### Defence Research and Development Organisation (DRDO)

- DRDO is engaged in design and development of weapon systems and equipment in accordance with the requirements of the military services.
- DRDO has a network of 50 labs and establishments to carry out research. As of FY20, it had over 7,410 personnel in Defence Research and Development Services (DRDS) and about 25,000 other scientific, technical and supporting personnel. DRDO offered around 450 patents for free access to industries in 2019.
- Its research areas include aeronautics, armaments, combat vehicles, electronics, instrumentation engineering systems, missiles, materials, naval systems, advanced computing, simulation and life sciences
- In May 2020, Hyderabad based DRDO's premier lab, Research Centre Imarat (RCI), developed an automated contactless UVC sanitisation cabinet called Defence Research Ultraviolet Sanitiser (DRUVS).



### Indian Council of Agricultural Research (ICAR)

- ICAR is one of the largest national agricultural organisations in the world. It consist of 69 institutes and 63 agricultural universities across India.
- It is the apex body for coordinating, guiding and managing research and education in agriculture, including horticulture, fisheries and animal sciences in India.

Source: Organisational websBPM

## Organisation

## Business description



### India Space Research Organisation (ISRO)

- The organisation has 19 centers across India to pursue R&D activities. ISRO currently has a constellation of 9 communication satellite, 1 meteorological satellite, 10 earth observation satellite and 1 scientific satellite.
- Its research area include communication satellite for television broadcast, telecommunications and meteorological applications and remote sensing satellite for management of natural resources.
- ISRO has planned 36 missions including satellite and launch vehicles for FY21.
- Radar imaging satellite RISAT 2BR1 was to be launched by end of May 2019.
- In January 2019, Polar Satellite Launch Vehicle (PSLV-C44) successfully inserted two satellite, Microsat-R and Kalamsat-V2, into their orbits.
- In April 2019, Polar Satellite Launch Vehicle (PSLV-C45) launched EMISAT and 28 satellite from international customers.
- India's largest liquid hydrogen storage tank was shipped in May 2019.



### Indian Council of Medical Research (ICMR)

- ICMR is the apex body in India for the formulation, coordination and promotion of biomedical research and one of the oldest medical research bodies in the world.
- The council has a fleet of 21 institutes (mission oriented national institute), 6 regional medical research centres and 5 units engaged in medical research.
- The council's research priorities encompass the areas of communicable diseases, fertility control, maternal and child health, nutritional disorders and non-communicable diseases such as cancer, cardio-vascular diseases, blindness and diabetes.
- In May 2020, ICMR-National Institute of Virology (NIV) at Pune developed and validated the indigenous IgG ELISA test "COVID KAVACH ELISA" for antibody detection for COVID-19.



### Centre for Development of Advanced Computing (C-DAC)

- C-DAC is a premier R&D organisation of the Department of Information Technology (DIT).
- It is engaged in research in the areas of supercomputers, applied electronics, technology, applications and health informatics.

*Note: R&D - Research and Development*

*Source: Organisational website*

## Organisation

## Business description



### Indian Institute of Technology (IIT)

- It is a group of autonomous engineering and technology-oriented institutes of higher education.
- IITs have been planning to monetise intellectual properties (IPs) by exploring tie-ups with firms that invest in "inventions".
- Indian Institute of Technology (Guwahati, Kanpur, Madras) and Germany's Heidelberg University are collaborating for the research training and setting first Joint Indian-German Research Training Group.



### National Dairy Research Institute (NDRI)

- NDRI is engaged in research, teaching and extension activities in areas of dairy production, processing, management and human resource development.
- Its research activities focus on improving dairy productivity, innovating milk processing technologies and disseminating information to the various stakeholders in dairy business to make dairying a self-sustaining business.



### Indian Institute of Science (IISc)

- IISc is one of the earliest instances of PPP for a research institute in India.
- It is engaged in research in various departments of science such as biological, chemical, electrical, mathematical, physical and mechanical sciences. A new center for Brain Research is expected to contribute to future growth.

*Note: R&D - Research and Development, IP - Intellectual Property*

*Source: Organisational websBPM, IP India*

## Organisation

## Business description



Hindustan Unilever Limited

### Hindustan Unilever Limited

- HUL is credited with innovations in product areas such as structured bar soap, fairness cream, zero alcohol soap, poly-coated scouring bar for dishwashing, fortified salt, instant tea, critical components for a water purifying device, and value-added (nature care) tea.
- Worldwide, HUL has over 20,000 registered patents and patent applications.



### Tata Steel Limited

- Tata Steel undertake research in areas such as raw materials and coke, iron and ferro alloys, steel making, coated products, materials characterisation and joining, materials modelling and product design and refractory technology.
- The total value of patents and trademarks stood at Rs 46.5 million (US\$ 0.72 million) in FY19.



### Cipla Limited

- Cipla's R&D division focuses on new product development and new drug delivery system across a range of therapies
- It is among the top companies domestically in R&D spending.

*Note: R&D - Research and Development, ANDA – Abbreviated New Drug Application*

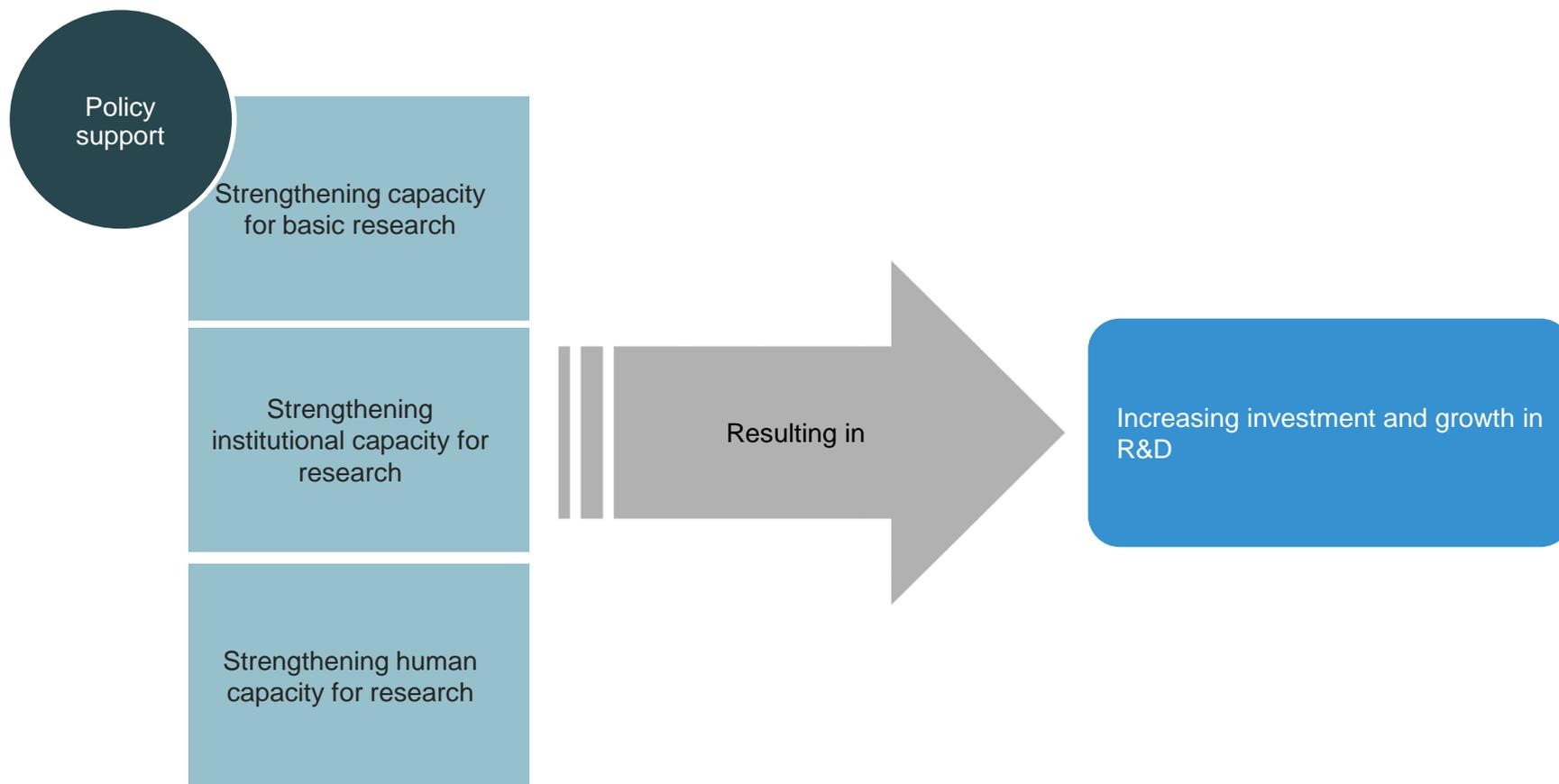
*Source: Organisational websBPM*

COMPLETE

# GROWTH DRIVERS



# STRONG POLICY FRAMEWORK TO PROMOTE INDIA AS A R&D HUB



*Note: R&D - Research and Development*

*Source: ICRA, Deloitte, PWC*

# KEY GOVERNMENT INITIATIVES...(1/3)

National Knowledge Network	<ul style="list-style-type: none"><li>▪ A state-of-the-art multi-gigabit (multiples of 10 Gbps) pan-India network is planned to link some 5,000 nodes in India. It will be the sole vehicle for international connectivity in future.</li></ul>
National Innovation Council	<ul style="list-style-type: none"><li>▪ 2010–2020 has been declared the 'Decade of Innovation' to stimulate innovations and produce solutions for societal needs such as healthcare, energy, infrastructure, water and transportation.</li></ul>
Improving Academia	<ul style="list-style-type: none"><li>▪ Innovation universities will be set up under PPP to develop new hubs of education, research and innovation</li><li>▪ The educational market in India has the potential of reaching US\$ 180 billion by FY20 with an increasing demand for quality education.</li></ul>
MSME development	<ul style="list-style-type: none"><li>▪ In August 2020, CAWACH, was launched as Department Of Science &amp; Technology (DST) programme to support start-ups, which have developed indigenous products/solutions across various domains such as ventilators &amp; medical devices, disinfectants, PPE kits, diagnostic kits and informatics. Out of the 826 applications received, 51 start-ups have been extended for the first round of funding.</li><li>▪ Modulus, a start-up in IIT Madras research park, signed an MoU with Sree Chitra Institute for Medical Sciences and Technology (SCTMIST) for a collaborative effort to develop deployable field hospital structures to combat COVID-19.</li></ul>
Technology department	<ul style="list-style-type: none"><li>▪ In August 2020, the International Advanced Research Centre for Powder Metallurgy and New Materials (ARCI) and Las Engineers and Consultants Pvt. Ltd. signed a know-how transfer agreement for synthesis of electrocatalysts for use in PEM fuel cells.</li><li>▪ A single window web portal is being developed by the Centre for Development of Advanced Computing (CDAC), NOIDA, to highlight achievements of State S&amp;T Councils.</li></ul>

*Source: Department of Science and Technology, Government of India, and Other Government websBPM*

## National Council for Science and Technology Communication (NCSTC)

### Key focal points include:

- Aims at promoting scientific thinking.
- Communicating science and technology to masses using digital media, folk media and digital media.
- Focus on training in science and technology communication, incentive programmes, production and dissemination of S&T software, development and research in S&T.
- Some of the important initiatives under NCSTC include Mathematics Awareness Resources and Initiatives (MARI), the National Science Day, the National Children's Science Congress, Science Express, etc.

## SERB-POWER (Promoting Opportunities for Women in Exploratory Research)

- In August 2020, SERB approved implementation of a Scheme - SERB-POWER (Promoting Opportunities for Women in Exploratory Research), to mitigate gender disparity in science and engineering, research funding in various S&T programmes in Indian academic institutions and R&D laboratories.

## Interdisciplinary Cyber Physical Systems (ICPS)

- To promote R&D in this emerging field of research, Department of Science and Technology (DST) launched Interdisciplinary Cyber Physical Systems (ICPS) with an outlay of Rs 3,660 crore (US\$ 507.28 million) in 2019.
- Under the mission, 15 technology innovation hubs, six application innovation hubs and four technology translation research hubs are going to be established in the next five years.

Source: News articles, Government websBPM, swissnex India

# KEY GOVERNMENT INITIATIVES...(3/3)

## Other initiatives

- The Government of India has plans to launch National Artificial Intelligence Centre under the Ministry of Electronics and Information Technology in 2019.
- In January 2019, the Government of India launched two science communication initiatives, DD Science and India Science by Department of Science and Technology along with Doordarshan and Prasar Bharti to enhance science communication and develop scientific knowledge.

## Development initiatives in rural areas

- The benefit of section 80-IB has been extended to new hospitals with 100 beds or more that are set up in rural areas. Such hospitals are entitled to 100 per cent deduction on profits for 5 years.

## Science, Technology and Innovation (STI) Policy, 2013

- This initiative aspires India to become one of top five global scientific power by 2020.
- It is developed to boost India's global share of scientific publications to 7.0 per cent from present 3.6 per cent.
- It aims to promote international participation, establish world class infrastructure, create attractive opportunities in the field of science, research and innovation.
- To also enable high risk innovation and boost private sector participation in the field of science and technology.

Source: News articles

# POLICY SUPPORT AIDING GROWTH IN THE SECTOR

## PPP in R&D

- Exchange of scientific knowledge between research centers, national laboratories, institutes of higher learning and the industry.
- The Indian Government plans to involve the private sector in R&D, mainly for sectors like vaccines, drugs and pharmaceuticals, super computing, solar energy and electronic hardware. The Government has announced to create a US\$ 16 million fund for setting up R&D units with the help of industries.
- The Government has created a US\$ 1.1 billion PPP fund to support R&D in India.

## Funded institutions and foreign universities

- Government has announced to set up five new All India Institute of Medical Sciences in Jammu and Kashmir, Punjab, Tamil Nadu, Himachal Pradesh, Assam and set up IIT in Karnataka and Dhanbad.
- Foreign universities permitted to enter the higher education system in India by establishing their own campuses or joint ventures (JV) with existing universities.
- Atal Innovation Mission with a budget allocation of US\$ 24.84 million will boost academicians, entrepreneurs and researchers to work towards innovation.
- The Government of India and Government of Canada signed a MoU to encourage cross-border partnerships in the areas of research and industry academic collaboration..

## Union Budget 2020-21

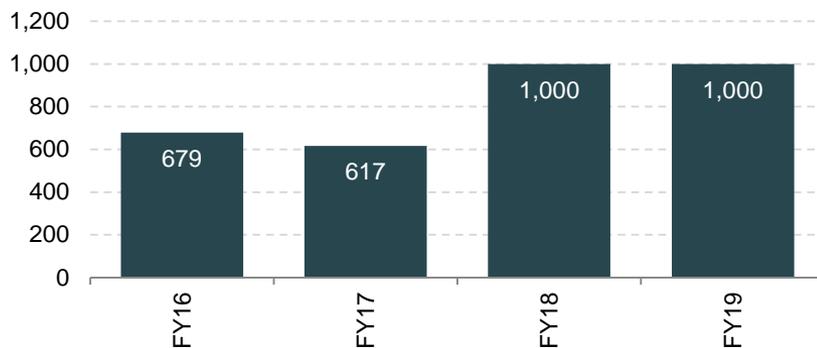
- The allocation to the Department of Science and Technology (DST) has been increased to Rs 6,302 crore (US\$ 901.70 million) against the previous budget.
- Under Union Budget 2020-21, the Government of India announced the largest ever allocation of Rs 4,473 crore (US\$ 2.07 billion) to the Ministry of Science and Technology. The Department of Atomic Energy has been allocated Rs18,229 crore (US\$ 2.61 billion).
- The Ministry of Earth Sciences was allocated Rs 2,070 crore (US\$ 296.18 million).

*Note: PPP - Public Private Partnership*

*Source: Battelle, Electronics for You, Organisational websBPM*

# STRENGTHENING HUMAN CAPACITIES FOR GROWTH

### INSPIRE fellowship growth profile



### Number Students Enrolled in the Council of Scientific and Industrial Research (CSIR)



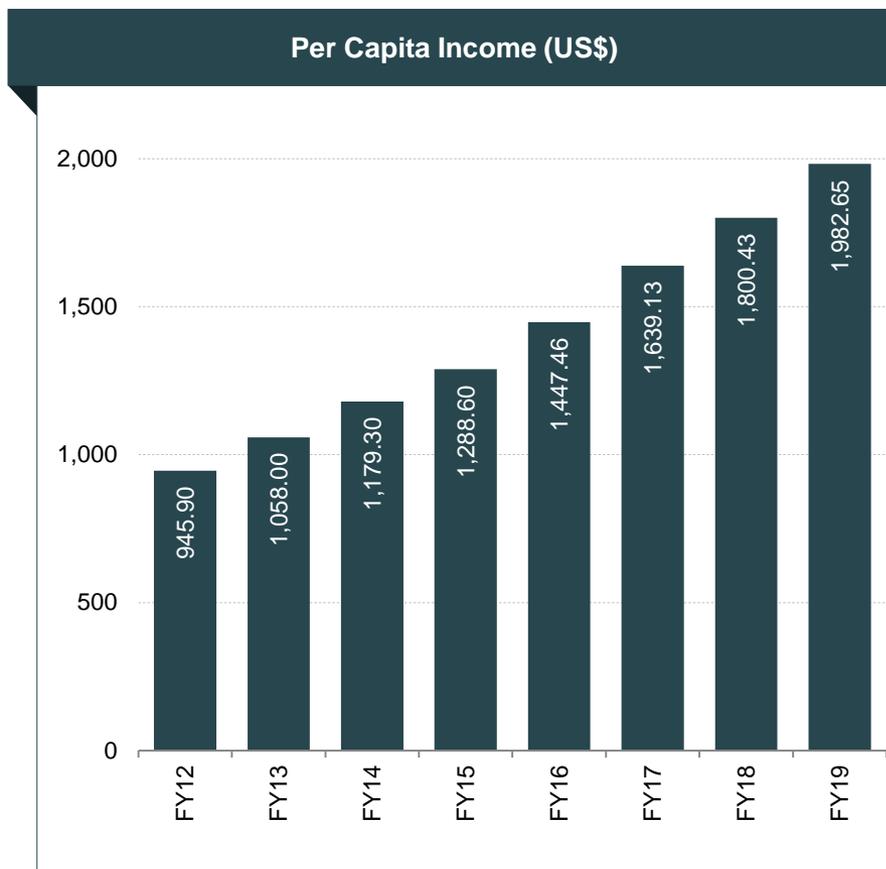
- In recent years, the Indian Government has implemented several fellowship schemes to nurture human capacity for advanced research in the country.
- The number of students enrolled in the various constituent laboratories of Council of Scientific Research and Industrial Research (CSIR) increased to 1,967 in FY19 from 1,526 in FY16.
- The period between 2010-20E has been declared as the 'Decade of Innovation' by the nation and the need for the establishment of National Innovation Council has been emphasised. To fuel growth, innovation in science and technology STI (Science, Technology and Innovation) Policy 2013 was formed.
- A total of 1,000 students were enrolled under Science Pursuit for Inspired Research (INSPIRE) scheme in FY19.

**Note:** Pursuit for Inspired Research (INSPIRE),<sup>^</sup> - Figures mentioned are as per latest data available, , SERB - Science and Engineering Research Board, DST - Department of Science & Technology

**Source:** NSTMIS, Department of Science and Technology

# LOCAL DEMAND ATTRACTING INVESTMENT FROM MNCs ... (1/2)

- India presents a unique opportunity for companies manufacturing technologically advanced products, registering per capita income of Rs 143,048 (US\$ 1,982.65) in FY19SAE.
- An expanding middle-class and rise in purchasing power of rural residents have boosted demand for innovation and development of cheap and durable products that could meet the local requirements.
- Rising per capita income in India will bring boom in R&D investment in the country with more and more of foreign players shifting R&D bases to India.
- Qualcomm plans to invest US\$ 8.5 million on design initiatives in India, which would include funding its innovation labs at Hyderabad and Bangalore, for R&D.
- During 2019-20, the country's per capita monthly income rose by 6.8 per cent to Rs 11,254 (US\$ 159.29).
- In March 2020, Agnikul Cosmos Pvt Ltd, an IIT Madras incubated space tech start-up developing low-cost satellite launch vehicles, raised Rs 23.4 crore (US\$ 3.35 million) in a pre-series A funding round led by pi Ventures.

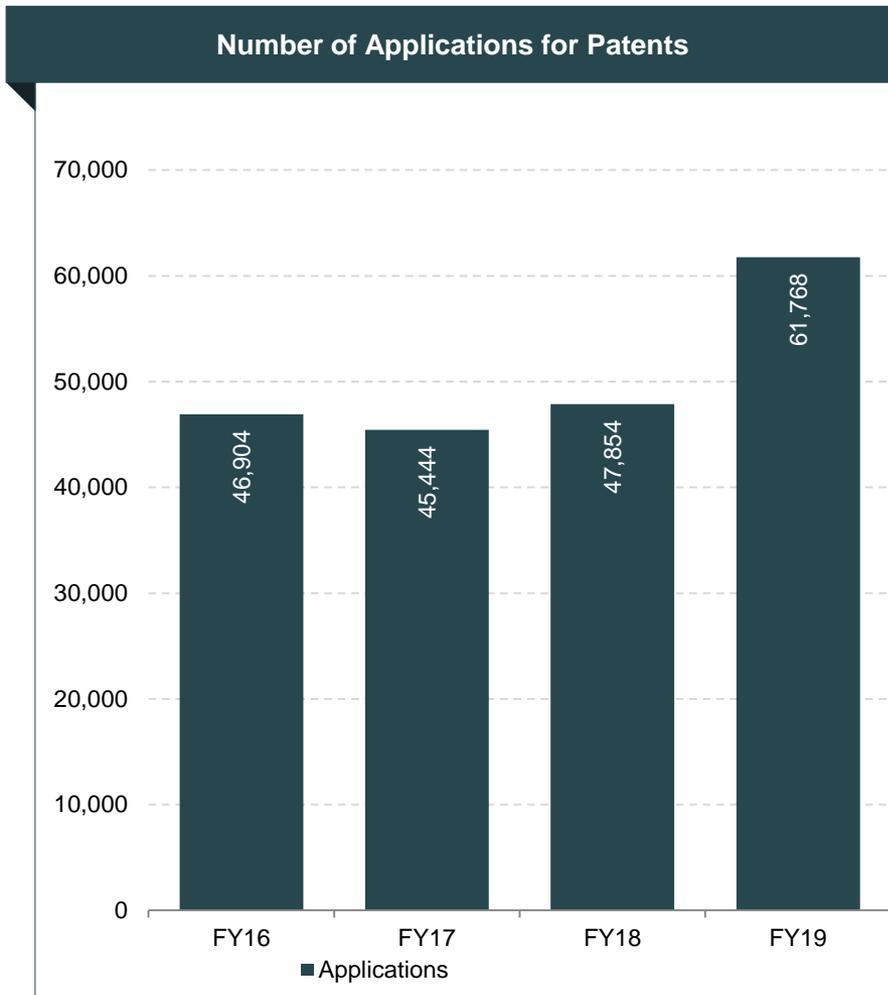


**Note:** PE – Provisional Estimates, SAE – Second Advance Estimates

**Source:** IMF, World Bank, India Budget, Government of India Press Information Bureau Government of India, Ministry of Statistics and Programme Implementation

# LOCAL DEMAND ATTRACTING INVESTMENT FROM MNCs ... (2/2)

- Lower development cost, rising technology intensity and growing local demand for top of the line unique technology products have attracted R&D investment from foreign companies in India, making it one of the largest outsourcing provider in R&D segment.
- India ranks second on scientific publications among BRICS nations
- India ranks 6th for scientific publications and 10th for only resident patent applications.
- The total number of patent applications filed by scientists and inventors in India increased to 61,768 in FY19 from 47,854 in FY18.



Source: Lok Sabha

COMPLETE

OPPORTUNITIES



# R&D OPPORTUNITIES IN VARIOUS SUB SECTORS IN INDIA

## ICT and wireless technology

- Establishment of Software Technology Parks of India (STPI).
- National Policy of IT aims at bringing the power of ICT within the reach of all its citizens to enable India to emerge as a global hub for IT by 2020.
- Cloud computing presents endless opportunities in wireless technologies.

## Pharmaceuticals and Health Care

- Third largest pharmaceuticals market by 2020.
- A new Health Policy 2015-2025 to focus on healthcare for all holistically.

## Manufacturing technologies

- Automation and environmental sustainability are the key focus areas for manufacturing companies.
- The National Manufacturing Policy targets at creating 100 million additional jobs in the sector by 2025.

## Material energy

- Multi-disciplinary research to combine emerging concepts in nanotechnology with fundamental metallurgical chemistry is the way forward.

## Bio-energy

- Bio-energy is emerging as a promising alternative to meet rural energy needs in India.
- Target set by Bio-energy Programme: By 2020, 20 per cent blending of fossil fuels will be done through a cost effective production system for algal biofuel and next generation biofuels from agricultural waste.

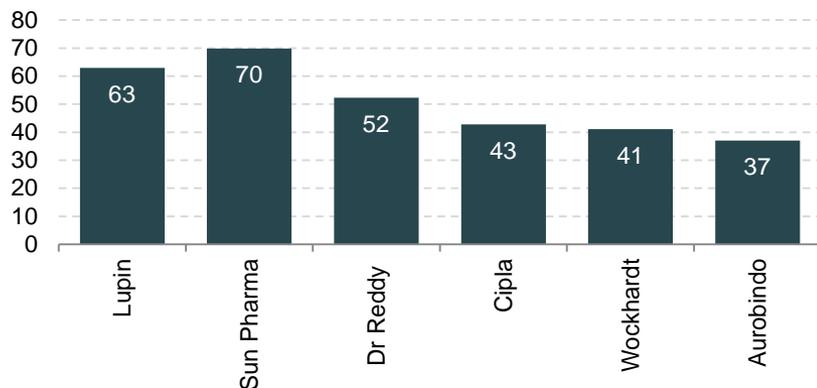
## Water technologies

- The water demand of industry will account for 8.5 per cent and 10.1 per cent of the total fresh water abstraction in 2025 and 2050, respectively.
- R&D efforts should concentrate on developing technologies for treatment, recycling, recovery, reuse and efficient use of water.

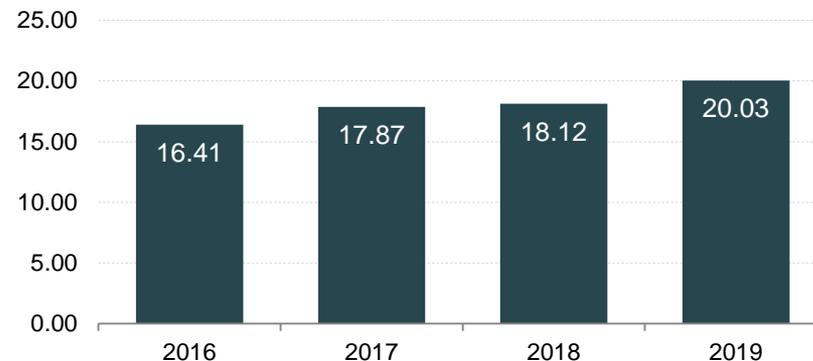
Source: Make In India, FICCI

# RISING R&D ACTIVITIES IN THE INDIAN PHARMACEUTICAL SECTOR

**R&D spending by top pharma companies in FY20 (US\$ million)**



**Annual Turnover of Indian Pharmaceutical Market (US\$ billion)**



- India's domestic pharmaceutical market turnover reached Rs 1.4 lakh crore (US\$ 20.03 billion) in 2019, up 9.8 per cent y-o-y from Rs 129,015 crore (US\$ 18.12 billion) in 2018.
- Medicine spending in India is projected to grow 9-12 per cent over the next five years, leading India to become one of the top 10 countries in terms of medicine spending.
- India's cost of production is significantly lower than that of the US and almost half of that of Europe. It gives a competitive edge to India over others.
- The Ayurveda sector in India reached US\$ 4.4 billion by 2018 end and is estimated to grow at 16 per cent CAGR till 2025.
- In May 2020, the Indian pharmaceutical sales grew 9 per cent y-o-y to Rs 10,342 crore (US\$ 1.47 billion).

*Note: F denotes Forecasted*

*Source: Make in India, FICCI, Ministry of Chemicals and Fertilizers- Department of Pharmaceuticals, PWC report*

# THE WAY FORWARD ... (1/2)

India Innovation Growth Programme	<ul style="list-style-type: none"><li>▪ The aim is to accelerate innovative Indian technologies into the global market.</li><li>▪ This programme is a JV of FICCI, Department of Science and Technology, Government of India and others.</li><li>▪ Government's focus is on using world class commercialisation strategies and business development assistance to expand in the global market.</li></ul>
Human capital development	<ul style="list-style-type: none"><li>▪ Special incentive mechanisms are being developed to stimulate research in universities and develop young leaders in science and engineering.</li><li>▪ The policy framework is being devised to enable school science education reforms by improving teaching methods and science curricula.</li></ul>
Investment to promote research	<ul style="list-style-type: none"><li>▪ Government is promoting investment in basic research to improve research quality to meet global standards and to address national challenges.</li><li>▪ Leveraging international S&amp;T co-operation, the Government has planned co-investment of resources for joint initiatives with Australia, Canada, and Germany among others.</li><li>▪ The Government has its focus on investing in R&amp;D for technologies that address the need of rural India.</li></ul>
Attracting investment from private sector	<ul style="list-style-type: none"><li>▪ Through Science, Technology and Innovation Policy, the Government is promoting the establishment of large R&amp;D facilities in PPP model with provisions for benefits sharing.</li><li>▪ Promoting multi-stakeholder participation in the Indian R&amp;D system.</li></ul>
Recent development	<ul style="list-style-type: none"><li>▪ Indian Space Research Organisation (ISRO) will launch its first Indian human mission by 2022.</li><li>▪ On August 06, 2020, scientists from the Institute of Nano Science and Technology (INST) developed an equipment-free fluoride ion detection and quantification in drinking water with the naked-eye.</li></ul>

*Source: Science, Technology and Innovation Policy 2013; Department of Science and Technology*

## Promoting innovation

- In August 2020, Raman Research Institute, an autonomous institute under the Department of Science & Technology, Govt. of India, found a new way for quantum state estimation, 'Quantum State Interferography', to make crucial quantum operations simpler.
- On July 03, 2020, Government of India launched Drug Discovery Hackathon, a first of its kind National initiative for supporting drug discovery process, to attract participation from professionals, faculty, researchers and students from varied fields like Computer Science, Chemistry, Pharmacy, Medical Sciences, Basic Sciences, and Biotechnology.

## Attracting investment from private sector

- The Indian Institute of Science Education and Research (IISER), which served as a part of a global team of scientists, has proposed to set up a LIGO (Laser Interferometer Gravitational Wave Observatory) detector in India. LIGO will help in detection and observation of gravitational waves.
- GridRaster Inc, working in the virtual and augmented reality space, has raised US\$ 2 million in seed funding to be used for marketing and product development.
- As of March 2020, Agnikul Cosmos Pvt Ltd, an IIT-Madras incubated space tech start-up developing low-cost satellite launch vehicles, raised Rs 23.4 crore (US\$ 3.35 million) in a pre-series A funding round led by pi Ventures.

## Artificial Intelligence in India

- India's National Artificial Intelligence Strategy prepared by NITI Aayog outlined a way forward to harness the potential of Artificial Intelligence (AI) in different fields. Accenture offers a framework for assessing the economic effect of AI for selected G20 countries in its latest AI research studies and forecast that AI will raise India's annual growth rate by 1.3 percentage points by 2035.

*Source: Science, Technology and Innovation Policy 2013, News Articles*

COMPLETE

# NEW DEVELOPMENTS



# SEPTEMBER 2020 NEW DEVELOPMENTS IN THE SCIENCE AND TECHNOLOGY INDUSTRY

## Collaboration

- In September 2020, according to the US–India Science and Technology Endowment Fund, a team of 11 members (India–US scientists) will be collaborating to propose new innovative ideas to address coronavirus challenges.
- In September 2020, the US–India–Israel announced to collaborate on a trilateral partnerships focused on developing a next-gen technology (5G communication network).

## Market Recognition

- In September 2020, India moved four places up to reach the 48th rank and made to the top 50 countries in the global innovation index for the first time. India ranks in the top 15 for indicators such as ICT (Information and Communication Technology) services exports, graduates in science and engineering, government online services and R&D-intensive global companies.

## Technology Development

- In September 2020, Sree Chitra Tirunal Institute for Medical Sciences and Technology developed a technology to safely manage/handle the infected respiratory secretions via canister bags containing an effective disinfectant to safeguard health workers who are at high risk due to contagious diseases such as influenza, COVID-19 and tuberculosis (TB).

## Blockchain technology

- In September 2020, Tech Mahindra announced a strategic collaboration with Amazon Web Services (AWS) to build Blockchain technology solutions across verticals, including telecom, healthcare, aviation and aerospace.

## Hypersonic technology

- In September 2020, India successfully flight-tested its hypersonic technology demonstration vehicle (HSTDV) and joined the list of few countries having capabilities for next-generation hypersonic cruise missiles.

*Source: Science, Technology and Innovation News Aricles*

# INDUSTRY ORGANISATIONS



## National Academy of Sciences

Address: 5, Lajpatrai Road, New Katra  
Allahabad - 211 002, India  
Tel: 91- 532- 2640224  
Fax: 91- 532- 2641183

## Indian Science Congress Association

Address: 14, Dr Biresw Guha Street  
Kolkata – 700017, India  
Tel: 91- 33- 22474530  
Fax: 91- 33- 2402551  
Email: [iscacal@vsnl.net](mailto:iscacal@vsnl.net)

## Indian National Science Academy

Address: Bahadur Shah Zafar Marg,  
New Delhi – 110002, India  
Tel: 91- 11- 23221931  
Fax: 91- 11- 23235648  
Email: [esoffice@insa.nic.in](mailto:esoffice@insa.nic.in)

## Indian National Academy of Engineering

Address: 117 Nalanda House, IIT Campus,  
Hauz Khas, New Delhi 110 016, India  
Tel: 91- 11- 26582475  
Fax: 91- 11- 26856635  
Email: [inae@nda.vsnl.net.in](mailto:inae@nda.vsnl.net.in)

## Indian Academy of Sciences

Address: C. V. Raman Avenue, Post Box No 8005  
Sadashivanagar, Bangalore 560 080  
Tel: 91- 80- 23612546  
Fax: 91- 80- 23616094

## Department of Science and Technology

Address: Technology Bhavan, New Mehrauli Road  
New Delhi – 110016, India  
Tel: 91- 11- 26567373  
Fax: 91- 11- 26864570  
Email: [dstinfo@nic.in](mailto:dstinfo@nic.in)

COMPLETE

# USEFUL INFORMATION



- CAGR: Compound Annual Growth Rate
- GDP: Gross Domestic Product
- FDI: Foreign Direct Investment
- FY: Indian Financial Year (April to March)
  - So FY12 implies April 2011 to March 2012
- GOI: Government of India
- MNC: Multinational Company
- GERD: Gross Expenditure on Research and Development
- STI: Science Technology and Innovation
- Y-o-Y: Year on Year
- Rs: Indian Rupee
- US\$ : US Dollar
- LCV: Light Commercial Vehicle
- PPP: Public Private Partnership
- Wherever applicable, numbers have been rounded off to the nearest whole number

# EXCHANGE RATES

## Exchange Rates (Fiscal Year)

Year Rs	Rs Equivalent of one US\$
2004-05	44.95
2005-06	44.28
2006-07	45.29
2007-08	40.24
2008-09	45.91
2009-10	47.42
2010-11	45.58
2011-12	47.95
2012-13	54.45
2013-14	60.50
2014-15	61.15
2015-16	65.46
2016-17	67.09
2017-18	64.45
2018-19	69.89
2019-20	70.49

## Exchange Rates (Calendar Year)

Year	Rs Equivalent of one US\$
2005	44.11
2006	45.33
2007	41.29
2008	43.42
2009	48.35
2010	45.74
2011	46.67
2012	53.49
2013	58.63
2014	61.03
2015	64.15
2016	67.21
2017	65.12
2018	68.36
2019	69.89

Source: Reserve Bank of India, Average for the year

# DISCLAIMER

“India Brand Equity Foundation (IBEF) engaged Sutherland Global Services private Limited to prepare/update this presentation.

All rights reserved. All copyright in this presentation and related works is solely and exclusively owned by IBEF, delivered during the course of engagement under the Professional Service Agreement signed by the Parties. The same may not be reproduced, wholly or in part in any material form (including photocopying or storing it in any medium by electronic means and whether or not transiently or incidentally to some other use of this presentation), modified or in any manner communicated to any third party except with the written approval of IBEF.

This presentation is for information purposes only. While due care has been taken during the compilation of this presentation to ensure that the information is accurate to the best of Sutherland Global Services' Private Limited and IBEF's knowledge and belief, the content is not to be construed in any manner whatsoever as a substitute for professional advice.

Sutherland Global Services Private Limited and IBEF neither recommend nor endorse any specific products or services that may have been mentioned in this presentation and nor do they assume any liability, damages or responsibility for the outcome of decisions taken as a result of any reliance placed on this presentation.

Neither Sutherland Global Services Private Limited nor IBEF shall be liable for any special, direct, indirect or consequential damages that may arise due to any act or omission on the part of the user due to any reliance placed or guidance taken from any portion of this presentation.”