

HARNESSING PRIVATE SECTOR INVESTMENT IN R&D



FOREWORD



Research and Development (R&D) plays a critical role in determining the productivity and economic growth of a nation. Empirical data underlines that a robust R&D infrastructure directly contributes to a nation's sustained growth and creates employment opportunities.

In comparison to other countries, India spends less than 1% of its GDP towards R&D. Israel and Korea are the biggest spenders on R&D at 4.21% and 4.15% of GDP respectively. Japan, Finland and Sweden complete the top 5. There is a strong thrust and commitment from the Government of India to double the R&D spends from the current level of just under 1% to a projected 2% of GDP over next five to ten years.

A large chunk of the total R&D spent is done by the government and there is a vacuum in private investment. There is an immense opportunity for the private sector to enhance its investments in the R&D sector in India as it provides a very diverse market for investments as compared to other countries.

India also provides a diverse talent pool whose full potential is yet to be leveraged. Increased investments in R&D both from the government and private sector will help in retaining this talent in the country.

The study highlights the challenges and opportunities to invigorate private sector investments in Research and Development sector, and provide recommendations to that effect.

A handwritten signature in black ink, appearing to read 'Nirankar Saxena', with a horizontal line underneath.

Nirankar Saxena

Assistant Secretary General
FICCI

FOREWORD



The relation between R&D and economic growth is well established and for a developing economy like India, sustained investments in R&D is an important means to achieve economic and social goals.

Identifying the need for increased investment in R&D, the government is proactively making policies to make India a leading R&D hub in Asia. The government has also announced numerous progressive initiatives such as “Make in India”, “Start-up India” and “Digital India” that would provide a huge impetus to the R&D sector.

Despite global headwinds, India has been able to maintain a steady growth rate and continues to be one of the fastest growing economies. This also provides an opportunity to the private sector to catalyze investments in R&D in India which in turn will stimulate 2% expenditure of GDP in R&D sector.

This study is an extensive work on the existing R&D ecosystem in the country and highlights the opportunities for private sector investments. Suitable government interventions that would stimulate the sector has also been captured in this study.

We hope that the recommendations of the study will enrich the existing discussions and allow the stakeholders to have a relook at the investment potential in R&D in India.

A handwritten signature in cursive script that reads "Medha".

Medha Girotra

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Executive Summary

As India continues on a sustained growth trajectory, the need for a robust R&D ecosystem coupled with an increased investment both by the private sector and the government in R&D gains significance.

The Indian government has been proactive in formulating several support programmes and acknowledging the importance of R&D. However, addressing bureaucratic and risk-averse nature of the government institutions as well as encouraging the private sector to invest more in R&D will lead to seamless alignment with the needs of the nation. To realize the potential and become a global R&D hub, India should address the 'legacy issues' that has played spoilsport in the growth of the economy.

A country of India's size should invest at least 2% of GDP on R&D, but this cannot be achieved without the private sector enhancing its investments in technology development. Furthermore, despite global economic turmoil, India remains one of the fastest growing economy. Thus, a huge opportunity lies for the businesses in India to enhance their R&D and commercial efforts. Incentivizing R&D will also lead to employment generation and creation of a knowledge economy. Therefore, development of technology parks, knowledge incubators and patent-management corporations should be encouraged as well.

India represents a very diverse market, even amongst Asian countries and there are numerous pull factors that make India a lucrative destination for R&D. Access to technical competencies, young talent pool, cost savings, proactive government support and presence of an indigenous market are some of the significant factors attracting multinational companies to expand their R&D and production operations in India. The global companies are starting to see this opportunity for improving their own growth by investing and creating a R&D centres in India.

Increasing investments in R&D investments would require focused and concentrated efforts from both the government and the private sector. Following are the recommended priority intervention areas:

- Strengthening Public-Private Partnership model for investing in knowledge parks, incubators, and improving academia-industry linkages through developing entrepreneurship cells.
- In addition to collaborating with specific companies, the government should also partner with countries that have truly been trailblazers in R&D in specific sectors. These collaborations shall give an access to global best practices which can then be customized to suit the Indian context.
- To boost private sector investments, the government should provide tax incentives to develop R&D parks. R&D parks can be created on the lines of a SEZ to offer incentives to investors thereby attracting both domestic and foreign investment.

- Strengthening the funding ecosystem for research based start-ups is imperative to effect sustainable growth in entrepreneurship based activities.
- Expenditure in R&D should be promoted as an investment that leads to positive returns on a long-term.
- Both private sector and government should develop specialized universities that promote R&D. This will go at lengths to develop a R&D culture in the country.
- Incentives for India centric R&D and innovation activities to multi-national companies can be provided. Appropriate Industrial Property Rights (IPR) measures can be established to make sure that the profits generated from such projects remain in India.
- CSR in niche sector such as R&D should be encouraged. Private companies can leverage CSR opportunities to invest in R&D.

Continued advances in R&D and technology are crucial to ensure and propel economic growth. Several studies show that while returns to a firm from investing in R&D are high, returns to society are even higher as new ideas are applied to areas far beyond what the innovator initially imagined. However, such spill overs imply that private firms will not invest in enough R&D from a national perspective. The government can step in to fill the gap between the private level of R&D investment and the level and types of R&D investment that are best for the nation. Moreover, the nation benefits not just from the results of government sponsored projects, but also because government R&D expenditures seem to stimulate additional private R&D expenditures.



1

INTRODUCTION



1. Introduction

A globally competitive and knowledge driven economy has a robust Research and Development (R&D) ecosystem as a backbone. Sustained growth specially in developed countries has been attributed to R&D by economists around the world and therefore, the relation between R&D and economic growth is a long-term, rapidly evolving relationship.

R&D and innovation can make significant difference in addressing urgent developmental challenges such as providing access to clean drinking water, low cost renewable energy solutions, eradicating neglected diseases or reducing hunger. The transfer and adaptation of technologies can often contribute significantly to these goals. Substantial research efforts are needed to find solutions that address other global challenges. Effective international cooperation that involves both public and private bodies is an important mechanism for finding these much-needed solutions.

Moreover, one of the important lessons of the past two decades has been the pivotal role of R&D and innovation in economic development. The R&D processes and their costs vary from industry to industry, from country to country and from year to year. R&D was mostly confined to developed countries in the past. However, in the last few years, the growth in global R&D is being driven by Asian countries, in particular, China.

1.1 Importance of supporting R&D

A crucial investment for long-term growth of economies: It has been seen that R&D has been a major determinant of economic growth in developed countries. This growth has been strongly linked to increases in public and private R&D. While government support is crucial for growth in R&D, it is important that research is also financed by the private sector to accelerate growth.

Contributes to a country's competitiveness: Multinational companies are increasingly internationalizing their R&D activities in order to gain advantage over their competitors. Supporting these R&D activities through R&D tax incentives can make a country a relatively more attractive location for R&D investments than its competitors.

Generates "public" goods: Knowledge is 'public' good – it spills over to other firms and organizations which did not bear the costs of this investment. There is also a risk factor involved

as few R&D generated products are likely to end up as marketable new products. However, support from the government to secure this knowledge and innovation will not just provide incentives to firms to invest in R&D and minimize the risk involved but also lead to generation of 'public' goods that will provide an edge to the country.

Creates and maintains jobs: Investing in research and providing adequate incentives leads to creation of jobs, especially for the pool of engineers and researchers in the society. R&D is the driver of economic growth and therefore, it is important to attract a highly skilled pool of talent with a high level of academic ability. Incentivizing R&D will create more opportunities, especially for graduates.

1.2 Global R&D Trends

Global spending on R&D has reached a record high of almost US\$ 1.7 trillion. About 10 countries account for 80% of spending. As part of the Sustainable Development Goals (SDGs), countries have pledged to substantially increase public and private R&D spending as well as the number of researchers by 2030.

Asian countries (including China, Japan, India and South Korea) now account for more than 40% of all global R&D investments, with North American investments now less than 30% and European R&D only slightly more than 20%. North America (and the U.S.) and Europe continue to lose global R&D share values on a yearly basis. China's R&D investments, until recently, had annual growth figures of more than 10% since the 1990s, but these have slowed to less than 7% for 2016. This slower growth, however, is still several times the growth rates of both the U.S. and Europe whose annual growth rates are in the 2% to 3% range. The rest of the world (ROW, Russia, Africa, South America and the Middle East countries) account for a combined 8.8% of the global R&D investments with combined average growth of only about 1.5% per year.

The value of R&D to economic growth sometimes is not visible especially in developing economies as more focus is given to conventional sectors to fuel economic growth. But many modern economists have emphasized that there is a co-relation between R&D and economy. R&D impacts society through its development of new knowledge, which generates new markets and new wage-earning opportunities. This stands true with developed economies that realize the importance and spend almost 2% of its GDP to R&D infrastructure.

Israel and Korea are the biggest spenders on R&D at 4.8% and 4.3% of GDP respectively and US at 2.81%. In comparison to other countries, India spends less than 1% of its GDP towards R&D. It is to be noted that the spent on GDP is mainly by the government and there is a vacuum in India for private R&D investments. The target now is to increase the GDP spending to about 2%.

Country wise data on Government Expenditures on R&D

Country	Government Expenditures on R&D (per capita)	Country	Government Expenditures on R&D (per capita)
Korea	\$1,995	Brazil	\$719
Israel	\$1,991	New Zealand	\$701
Finland	\$1,893	Spain	\$677
Sweden	\$1,884	Italy	\$656
Japan	\$1,844	South Africa	\$520
Slovenia	\$1,537	Lithuania	\$509
Germany	\$1,525	Malaysia	\$508
Denmark	\$1,493	Turkey	\$507
United States	\$1,471	Kenya	\$469
Austria	\$1,463	India	\$464
Singapore	\$1,410	Poland	\$455
Taiwan	\$1,312	Slovak Republic	\$454
Switzerland	\$1,311	Greece	\$404
Estonia	\$1,303	Latvia	\$394
Iceland	\$1,291	Bulgaria	\$380
Australia	\$1,221	Hong Kong	\$357
France	\$1,165	Argentina	\$342
China	\$1,127	Romania	\$301
Belgium	\$1,123	Costa Rica	\$237
Netherlands	\$1,088	Mexico	\$221
Canada	\$1,045	Peru	\$218
United Kingdom	\$972	Chile	\$213
Czech Republic	\$954	Indonesia	\$122
Norway	\$937	Thailand	\$109
Portugal	\$882	Ukraine	\$90
Ireland	\$835	Colombia	\$86
Russia	\$813	Philippines	\$43
Hungary	\$783	Vietnam	\$42

Source: Contributors and Detractors: Ranking Countries Impact on Global Innovation-Information Technology & Innovation Foundation

1.3 R&D Trends in India

Research establishment in India has been growing significantly from the past decade-and-a-half. Liberalization and subsequent opening of the Indian economy from 1991 onwards are beginning to make significant impacts. Lowering of customs duties has played a key role in this process of facilitating and encouraging investment in R&D. There has been a progress in building new institutions and established institutions are now expanding their research capabilities.



Source: UNESCO Institute for Statistics

It is to be noted that India has improved its rank in the Global Innovation Index (GII) by climbing 15 spots, from 81 last year, to 66 as well as maintained the top spot in the Central and South Asia regions. India has scored high on tertiary education and R&D, the quality of its universities and scientific publications, its market sophistication and information and communication technology service exports, where it ranks first in the world, according to the index.

The government in India is putting a lot of emphasis on the development of R&D and focus is on how R&D and innovation can be used to effectively tackle various problems that the country faces. So far, private organizations and individuals have driven R&D in India. Now the focus is on making institutions work together. This is likely to be the dominant trend for the years to come which would cause a positive disruption in the way science is used for economic and social development.

The need for focus on R&D has been highlighted under Sustainable Development Goals (SDG's). According to **SDG 9** highlights that '*Investment in infrastructure and innovation are crucial drivers*

of economic growth and development. With over half, the world population now living in cities, mass transport and renewable energy are becoming ever more important, as are the growth of new industries and information and communication technologies. Technological progress is also key to finding lasting solutions to both economic and environmental challenges, such as providing new jobs and promoting energy efficiency. Promoting sustainable industries, and investing in scientific research and innovation, are all important ways to facilitate sustainable development.'

SDG 9 calls on governments to promote sustainable industrialization and innovation by ramping up spending on R&D and increasing the number of researchers. The SDG agenda provides a country like India an excellent opportunity to further integrate R&D to deal with various developmental challenges.





2

R&D OPPORTUNITIES IN INDIA



2. R&D opportunities in India

India is fast becoming an attractive destination for investments particularly in Asia. India has also emerged as the most preferred destinations for innovation in Asia and the third biggest, globally, with Bengaluru leading the charge. The MNC R&D centers has seen a gradual growth over the years with 5.2 per cent of Compound Annual Growth Rate (CAGR) from 721 in 2010 to 928 in 2015 and are expected to reach 955 by end of 2016.

India's R&D ecosystem has grown at a phenomenal pace in the last ten years. 42 per cent of the Global 500 R&D spenders have centers in India, with the figure expected to reach 49 per cent by 2020.

2.1 Nature of incentives

The Government has been announcing a number of fiscal incentives for the private sector to increase R&D expenditure. These include:

- Finance minister Arun Jaitley in his budget speech (2016-17) announced the reduction of the weighted deduction from 200% to 150% from the financial year 2017-18 to financial year 2019-20 and from the financial year 2020-21 onwards the deduction will be restricted to 100%.
- Weighted Tax deduction on expenditure incurred in approved in-house R&D facility by companies. 10% rate of tax on income from worldwide exploitation of patents developed and registered in India
- Weighted Tax deduction for Sponsored Research Programmes in approved national laboratories, universities and IITs
- Customs duty exemption on goods imported for R&D and Central excise duty waiver for 3 years on specified goods designed & developed by a wholly owned Indian company
- National laboratory, public funded research institutions, or university and patented in any two countries from amongst India, USA, Japan and in any one country of the European Union.

- Exemption of service tax on services provided by biotechnology incubators approved by BIRAC.
- The Budget 2017-2018 proposed to repeal Research & Development Cess Act, 1986, from April 1, which would result in the simplification of tax regime and lowering of tax costs.

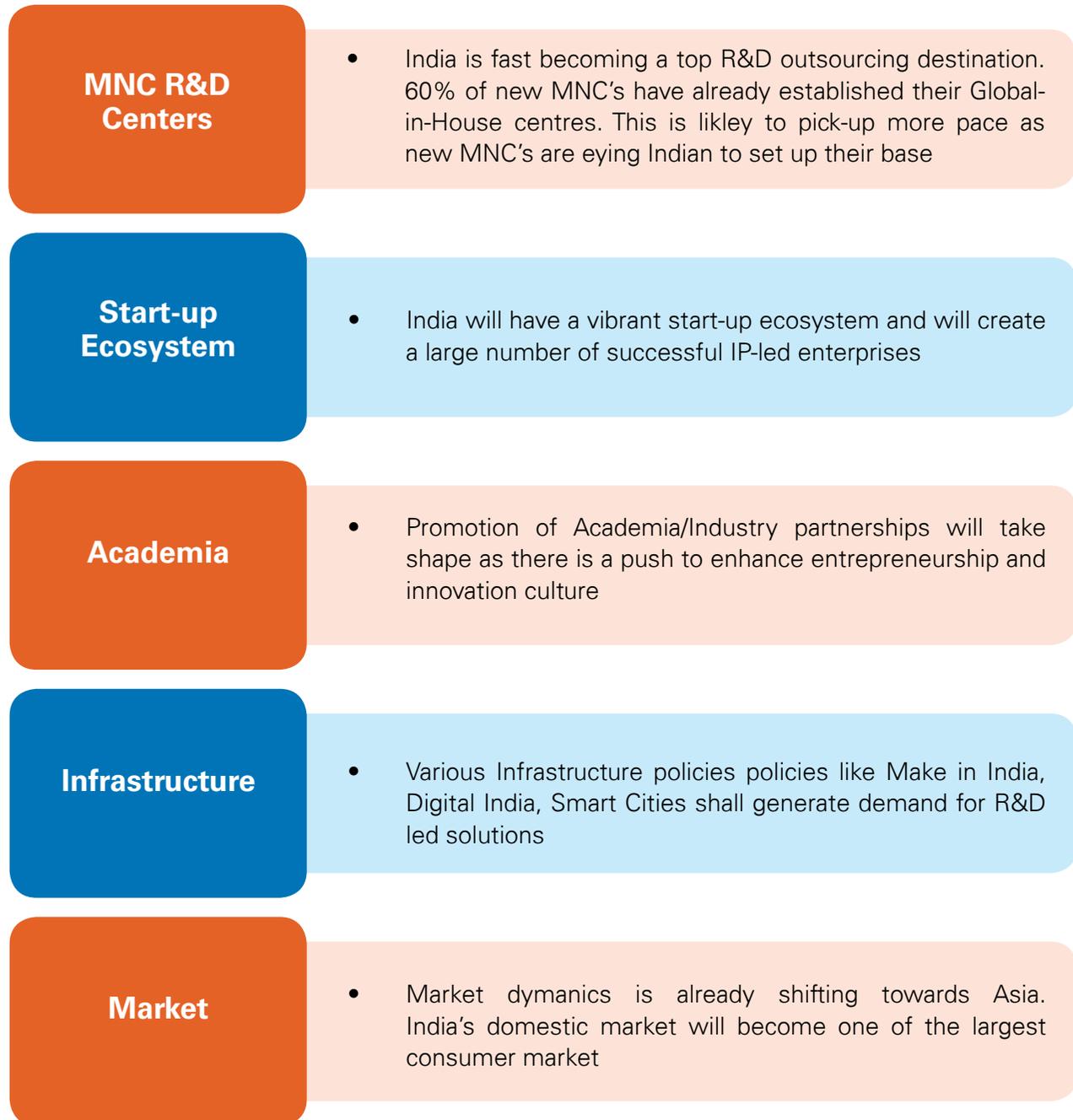
Incentives & Policies being provided by Key States:

State	Incentives/Policies
Gujarat	<ul style="list-style-type: none"> • The Gujarat government aims to establish 50 incubators to help as many as 2,000 startups over the next five years • The state has promised to allot 10 lakh sq ft of land and 50% capital investment assistance with a cap of Rs 50 lakh for the incubators. • Startups will get an interest subsidy of 9% each year within the limit of Rs 2 lakh and marketing assistance of Rs 1 lakh. • Other incentives include a corpus of Rs 1 lakh for product development and lease rental subsidy of Rs 15 per square feet each month. The government will also give Rs 2 lakh for domestic patent and Rs 5 lakh for international patent registration.
West Bengal	<ul style="list-style-type: none"> • The state promises to set up incubators and an Entrepreneurship Development Centre Network (EDCN) in association with educational institutions and universities. • The state government will facilitate creation of a network of kick-starter funds for monthly sustenance or early-stage funding to startups and will reimburse the cost of patent application. • The state has a venture capital fund, in which around 20% of the capital is earmarked for startups. Investment banks facilitating investments by venture capital and private equity funds in West Bengal-based startups will get a special fiscal incentive of 1% of the invested amount. • The government has also promised a special fiscal incentive to incubators, amounting to 2% of the investment received.
Telangana	<ul style="list-style-type: none"> • The youngest state of the country is striving to become a startup haven. • The state plans to bring on board 20 global accelerators and incubators to build plug-and-play workspaces in the public-private partnership mode. • It plans to support around 5,000 startups, including 1,000 tech startups, 400 clean-tech ventures and 300 electronics startups. • There is a separate provision of Rs 250 crore for seed funding. Startups, with annual turnover of up to Rs 50 lakh, and incubated with government support, will be reimbursed service tax.
Uttar Pradesh	<ul style="list-style-type: none"> • Uttar Pradesh government has set up an incubator named 'IT UPVAN' and set up E-skill Entrepreneurship Training Units in rural areas. • According to the 'Incubators-Fund of Funds-Startup Entrepreneurs' model adopted by the state, the government will give funds to incubators and venture capitalists to invest in startups.
Kerala	<ul style="list-style-type: none"> • As per the Kerala IT Mission policy, 1% of the state's annual budget will go to 'youth entrepreneurship activities' till 2019.

State	Incentives/Policies
Karnataka	<ul style="list-style-type: none"> • The state government seeks to make incubators a part of selected colleges. It has also set up a Karnataka Startup cell. • Under the state government’s rules, a startup should be technology-based, registered in Karnataka and should employ 50% of its total qualified workforce in Karnataka. • The startups in government-supported incubators with annual turnover less than Rs 50 lakh for the first three years will be eligible for reimbursement of service tax, value-added tax and central sales tax. • The state also reimburses 30% of the cost incurred on international marketing. Besides, it has the Karnataka Information Technology Fund to support startups and it has said that it will match the funds raised by the incubators from the central government.
Andhra Pradesh	<ul style="list-style-type: none"> • A single-window clearance unit is being set up to grant approvals and another for tax and registration. The state has a Rs 100 crore Initial Innovation Fund for entrepreneurs. • It is also setting up a joint incubation centre and smart city innovation hub in the coastal city of Kakinada in association with Chinese firm ZTESoft.
Tamil Nadu	<ul style="list-style-type: none"> • The Tamil Nadu government has signed an agreement with IT industry body Nasscom to set up the first startup warehouse in the state to house up to 50 startups.
Rajasthan	<ul style="list-style-type: none"> • Rajasthan aims to help incubate at least 2,000 technology startups. The incubation centre of RIICO at Jaipur called, ‘Start-up Oasis’ is the focal point of its startup policy.



2.2 Factors that will make India a Global R&D hub in the coming decades



2.3 Recent Investments and Developments

Both the private sector and the government have been active in making investment in the country. some of these are:

- US-based Mondelez International, a multinational confectionery, food, and beverage company which makes Cadbury chocolates and Bournvita, plans to invest US\$ 15 million to set up a global research, development and quality hub in Thane, Maharashtra.

- The Tata Group has entered collaborations with world's leading academic institutions, which include Harvard University, Yale University, the Indian Institute of Technology, Madras, and the Royal Society, United Kingdom, in order to fund research and development opportunities in those institutions.
- The United States and India have signed a US\$ 30 million agreement for a public-private five-year research initiative on smart grid and energy storage technology.
- The Government of India and the Government of the United Kingdom have signed an agreement to work together in the fields of Solar Energy and Nano Material Research, which is expected to yield high quality and high impact research outputs having industrial relevance, targeted towards addressing societal needs.
- The Indian Space Research Organization (ISRO) has successfully launched 20 satellites and injected them into the required orbit, launching the maximum number of satellites in a single mission ever. The launch took place aboard the Polar Satellite Launch Vehicle (PSLV-C32) at the Satish Dhawan Space Centre in Sriharikota.
- Boston Scientific Corporation plans to develop devices such as stents, catheters and pacemakers at its Gurgaon facility in India for the Asia Pacific, Middle East and African markets, which will make India its biggest R&D hub outside the US.
- India is becoming a innovation destination of choice, with Bengaluru been ranked fifth among the top ten destinations in the world to open innovation centres.
- Ford Motor Company plans to set up a new global technology and business centre in Chennai, which will host operations of Ford Global Business Services in areas of Information Technology (IT), product engineering, finance and accounting and data analytics.
- India's largest two-wheeler manufacturer, Hero Motocorp has set up an integrated R&D facility with an investment of Rs 850 crore (US\$ 126.74 million) on the outskirts of Jaipur.
- Informatica, a US-based cloud and data management company, plans to make huge investment in next four years to expand its Bengaluru R&D facility.
- QuEST Global, a pure-play engineering and research and development (R&D) services provider, has raised investment of around Rs 2,396 crore (US\$ 357.27 million) from leading global investors Bain Capital, GIC and Advent International for a minority stake in the company.
- The National Research Development Corporation (NRDC) has signed a Memorandum of Understand (MOU) with Indian Institute of Chemical Biology (IICB) which will give an impetus to the "Startup India" and "Make in India" missions of the Government of India by promoting entrepreneurs, incubation, Intellectual Property Rights (IPRs) and technology transfer.
- German automotive firm Bosch GmbH has signed a memorandum of understanding (MoU) with Indian Institute of Science (IISc), Bangalore with a view to strengthen Bosch's research and development in areas including mobility and healthcare thereby driving innovation for India-centric requirements.

- Chinese telecom gear maker Huawei has launched a Research and Development (R&D) campus in Bengaluru with an investment of US\$ 170 million. The campus, the first by any Chinese company, has a capacity to accommodate 5,000 engineers and is the largest R&D centre of Huawei outside China. At present 2,700 people are working here, with 98 per cent being local workers.
- American chipmaker Broadcom is betting big on developing solutions tailored to India and other emerging nations from its Bengaluru R&D unit. The key opportunities focused on are in the areas of Internet of Things and wearables market in India. Out of Broadcom's global headcount of about 11,000 people, the India R&D centre has about 1,500 people.
- Twitter Inc is planning to set up its first facility outside the US in the form of an R&D centre in Bengaluru to grow faster and accelerate user adoption in emerging markets. Twitter plans to use Bengaluru-based mobile marketing and analytics company ZipDial Mobile Solutions Pvt. Ltd's team to build this new R&D facility.
- California based Cohesity, a start-up involved in secondary storage space, has recently launched operations in India and is expected to invest US\$ 10 million in the country over the next two years in research and development.
- The Ministry of Environment, Forest and Climate Change (MoEFCC) has announced a R&D initiative to develop next generation sustainable refrigerant technologies as alternatives to the currently used refrigerant gases like hydrofluorocarbons (HFCs), in order to mitigate its impact on the ozone layer and climate.
- The Government of India plans to set up an Indian Council for Fertilizers Research, which would encourage development of new fertilizers and nutrients and thereby boost the growth of agriculture sector in the country.
- India and Japan are exploring ways to strengthen their collaboration in various fields of science and technology, such as artificial intelligence, energy, ocean sciences, marine instrumentation, high skill development and analysis of Big Data, research & development and bio information, while many projects are in the planning process.
- The Department of Industrial Policy and Promotion (DIPP) aims to lower the time taken to clear pending Intellectual Property Rights (IPR) applications to 18 months by March 2018 and those of trademarks to one month by March 2017, which is expected to encourage innovation and entrepreneurship in the country.
- The Union Cabinet has given an "in principle" clearance for the location of a Laser Interferometer Gravitational-Wave Observatory (LIGO) facility in India which will be the third in the world and will be set up and managed by the IndIGO Consortium (Indian Initiative in Gravitational-wave Observations).
- India's Steel Ministry has announced creating a fund of Rs 100 crore (US\$ 14.91 million) to help setting up R&D units with the participation from industries and the government to overcome the technological gaps.
- A team of scientists from India and Bangladesh will conduct for the first time, joint marine research within Bangladesh's Exclusive Economic Zone (EEZ), which is expected to help in understanding climate change and monsoon patterns in India.

The patent filing has also seen a gradual increase in India with private companies, government and academia filing for patents in various sectors. below stats show the latest data (available) on patents filed:

Top 5 Indian Applicants for Patents (Information Technology)		
S. No.	Company	Application Filed
1	Samsung R&D Institute India- Bangalore Private Limited	233
2	Tata Consultancy Services Limited	147
Top 5 Indian Applicants for Patents (Science and Research & Development Organizations)		
1	Council of Science & Industrial Research	315
2	Defence Research & Development Organization	98
3	Indian Council of Agricultural Research	68
4	G.H.R. Labs and Research Centre	31
5	Department of Biotechnology	23

Top 5 Indian Applicants for Patents (Information Technology)		
S. No.	Company	Application Filed
1	Council of Scientific & Industrial Research	66
2	Bharat Heavy Electricals Limited	56
3	Samsung R&D Institute India Bangalore Private Limited	56
4	Indian Institute of Technology (Combined)	30
5	Tata Motors Limited	26

S. No.	Company	Application Filed
1	Indian Institute of Technology (Combined)	337
2	Janardan Rai Nagar Rajasthan Vidyapeeth (Deemed) University	53
3	Indian Institute of Science	46
4	Amity University	43
5	Sandeep Foundation's Sandip Institute of Technology & Research Centre	33

Top 5 Foreign Applicants		
S. No.	Company	Application Filed
1	Qualcomm incorporated	1214
2	Koninklijke Philips N.V.	805
3	Telefonaktiebolaget LM Ericsson (PUBL)	449
4	Samsung Electronics Co. Ltd	379
5	BASF SE	297



3

CHALLENGES: WHAT IS HOLDING BACK GROWTH IN R&D



3. Challenges: What is holding back growth in R&D

Low investments and lack of integration within various organizations have primarily been at the reasons for R&D sector not picking the desired pace. Though it is fair to say that, India has not had a culture of investments in R&D but comparing it with other Asian countries who make adequate investments in the sector shows a dismal scenario. Although, India has no dearth of talent but it still lacks behind other nations in terms of contributions towards quality research.

3.1 Education System

Educational institutes develop students and engineers who are only equipped with identifying solutions to problems. However, another part of a successful innovation ecosystem is identifying and recognizing the problem in the first place. This requires laying a foundation at the primary and secondary learning stage to enable a culture.

Providing local opportunities to counter 'brain drain' is another challenge. Trend of students opting to go to other countries to pursue their careers has been on an increase. This is because large sums of grants are available for research which is attractive for students.

3.2 Risk-Averse Ecosystem

Greatest innovations come out of taking substantial risks. Risk taking is fundamental to a successful R&D ecosystem. However, in a country like India, career choices are mostly based on quick returns on the investments made.

3.3 Investments

Historically, India has not invested in R&D as it has not been given primacy due to various factors. Investments in conventional sectors have been made though the importance of R&D has been realized over the years. Currently, India performs substantially low on both government funding of university research (51st out of 56 countries) and government spending on R&D (38th out of 56 countries).

3.4 Taxes & Incentives

Structure of taxes in any country has a long-term effect on R&D sector fulfilling its potential. Higher taxes like Corporation tax reduce the amount available for companies for funding and investing in R&D. The government has taken cognizance of this and has been taking initiatives to reduce corporation tax and increase tax incentives that will have desirable effects in the coming years.



4

ENABLING THE NEXT INDUSTRIAL
REVOLUTION: HOW R&D CAN HELP
INDIA REALIZE ITS GOALS



4. Enabling the next Industrial Revolution: How R&D can help India realize its goals

The build-up of R&D and innovation capacities has played a significant role in the growth dynamics of successful developing countries such as China. These countries have recognized that R&D is not just about high-technology products and that R&D capacity has to be built early in the development process in order to possess the learning capacities that will allow “catch up” to happen. They also need research capacity and local innovations to address challenges specific to their local contexts (e.g. tropical diseases). Ultimately, a successful development strategy must build extensive innovation capacities to foster growth.

While R&D is important at all stages of development, different types of innovation play different roles at various stages.

4.1 R&D for ‘Make in India’ and ‘Start-up India’

Under the ‘Make in India’ program, the government has targeted to create 100 million jobs from the manufacturing sector by 2022. To deliver manufacturing excellence and global competitiveness under the ‘Make in India’, developing a robust R&D and innovation ecosystem will be critical.

The government has identified 25 sectors of various industries that show tremendous potential to grow including automobile, food processing, and chemicals. While several Original Equipment Manufacturers (OEMs) are keen to enter the market, some are already setting up their Research and Development (R&D) base in India.

The National Research Development Corporation (NRDC) has signed a Memorandum of Understand (MOU) with Indian Institute of Chemical Biology (IICB) which will give an impetus to the “Startup India” and “Make in India” missions of the Government of India by promoting entrepreneurship, incubation, Intellectual Property Rights (IPRs) and technology transfer.

R&D is one sector for which India is swiftly developing into a hub. With the large quantum of skilled workforce in India, numerous multinational companies are turning to India to set up their research and development units.

It is very clear though that the private sector in India is not necessarily investing in R&D, with the government of India remaining the largest spender in the sector.

FAVOURABLE SITUATION FOR INDIAN MANUFACTURING

- Despite global headwinds, India continues to be one of the fastest growing economy
- Sustained availability of workforce with relatively low cost of manpower
- Stable financial markets open to foreign investors
- Strong consumerism in domestic market

For the “Make in India” vision to be realized and for India to become a manufacturing hub, it is vital that India innovates. Innovation is an outcome of research and development and to that end it would be necessary to promote education and training in R&D.

Universities and colleges can help to create a conducive environment for R&D and innovation. State Governments are also promoting R&D and innovation by setting up start-up funds and offering incentives.

Despite restricted budgets / budget constraints, start-up India is investing in R&D to constantly improve their offering and evolve to meet the needs of the target audience/group. For companies to invest in Research and Development a firm infrastructure and suitable environment is essential.

Dr. Harsh Vardhan, Union Minister of Science & Technology and Earth Sciences has also stressed on the linkages between Research and Development and manufacturing and has pointed to its importance for Make in India to be a success. He was quoted as saying “‘Make in India’ campaign is going to be one of the key areas on which our laboratories and research institutions are going to work by finding out what are the problems of the country and solve those problems with technology”.

Under ‘Start-up India’, the government shall set up 7 new research parks with an initial investment of INR 100 crore each. The Research Parks shall be modeled based on the research park setup at IIT Madras. Barring IIT Madras, which has been successfully managing a research park that has incubated many start-ups only few institutions across the country have been able to get their research parks off the ground.

R&D & innovation will be the key to sustained industrial growth and for competitive advantage in global market. It is to be noted that the idea for ‘Make in India’ is not just about making India a manufacturing hub for the world but also companies taking the opportunity for ‘making in India for India’.

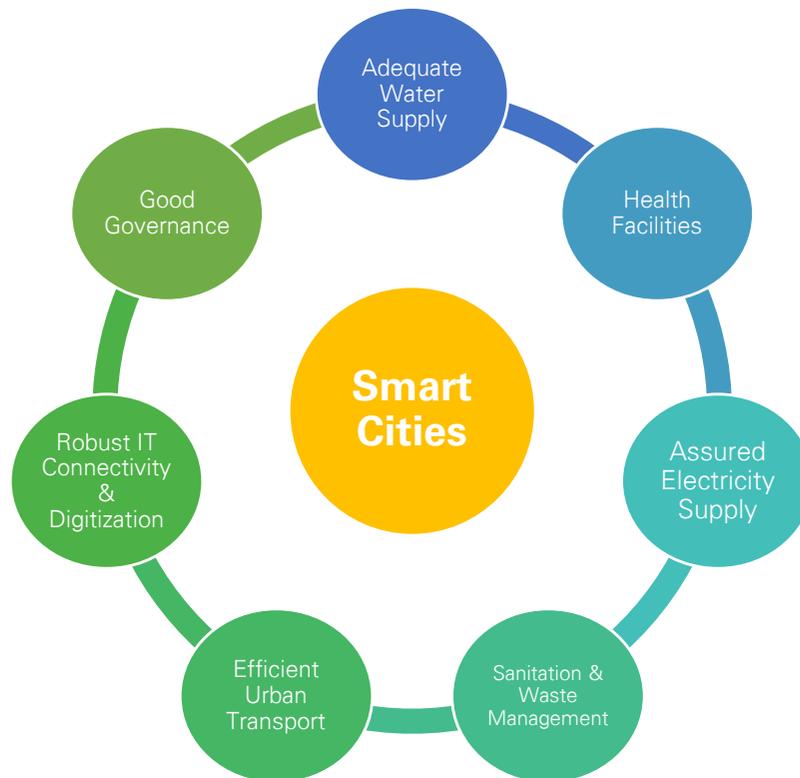
Another aspect is the employment generation. R&D focus for manufacturing innovation is not to replace manual labor but using technologies to make people more productive by making processes, safer, faster and better.

4.2 Smart Cities and R&D

The smart cities mission is a much needed and progressive initiative of the Government of India to drive economic growth and improve the quality of life of people by enabling local development and harnessing technology as means to create smart solutions for citizens.

India is now being talked about at the global level for development of smart cities under PM Narendra Modi’s vision “Digital India”. The Government plans to build 100 smart cities across India in the period of five years and foresee India as a digital leader of services in various sectors including healthcare, education and finance. To revive the urban landscape of the country, to make

them more livable and inclusive, besides driving economic growth, Government of India has embarked on an ambitious Smart Cities programme.



India is anticipated to witness a rise in urban population from 377 million in 2011 to 600 million in 2031. By 2031 India is also expected to have grown its economy by five times, sustained largely by the country's urban centers. Given this rapid rate of urbanization, India is likely to have around 68 cities with population of more than 1 million by 2030.

Technology will play a crucial role in meeting the urban infrastructure goals in the long term. The urban migration challenge in India is far more unprecedented than anywhere in the globe and hence India needs to innovate and develop its unique smart cities programme enabled by information and communications technology (ICT). The solution is to develop new cities and modernize existing Indian cities leveraging the efficiencies and effectiveness enabled by implementing city specific ICT solutions. The smart city transformation would be fueled by advance technology and the deployment of intelligence & information management systems.

4.2.1 Technologies that will provide a base for Smart Cities

Dream of Smart cities can be achieved at accelerated pace with higher reliance on ICT (information and communications technology). Digital disruptions including social media, mobility, Machine-to-Machine (M2M), Internet of Things (IoT), Big Data, and Cloud Computing will become the backbone of next generation smart cities.

Machine-to-Machine Technologies (M2M): M2M technologies enable devices to communicate with each other over wired or wireless ICT systems. Without this technology, the sensors, smart grids, monitors and other technologies in use in these cities would not be able to function properly. M2M becomes even more significant and important in the context of Smart Cities considering the burgeoning urban population and their strain on natural resources such as water, electricity, fuel, etc.

Data Security: Access and control standards for ICT networks within the Smart City are imperative for both data and human security, the lack of which can cause serious threats and vulnerabilities to all who live and operate in such cities.

New Storage Technologies: Increase of information gathered and stored for analysis and record will grow parallel with the growth of Smart cities. Prompted by the requirement of high availability of data and reliability of storage and datacenter systems, these advanced storage technologies will be expected to greatly enhance the productivity and efficiency of Smart Cities and to help manage growth in data volume without large spends. Software-defined storage solutions can increase automation in smart plants and factories and reduce management time and costs.

Technologies for Renewable Energy: Smart cities require large amounts of energy supply that can only be achieved through recycling, effective management and new sources of energy. This technology would be imperative if India wants to achieve environmental sustainability with rapid industrialization, urban population growth and increased use of resources.

Disaster Management Technologies: Information and Communication technologies can greatly help in predicting, preventing, and managing these disasters, ensuring that economic loss and loss of life is avoided or minimized.

Core technologies would also play a crucial role in improving basic infrastructure and necessities in a smart city. Smart street lighting initiatives will need to be developed by a robust R&D structure that provides adequate and affordable electricity. This will also help in reduction of crime rates. Today, buildings in India account for nearly 40% of the total energy consumption, which will reach 50% by 2030. McKinsey estimated in India that 700 million to 900 million square metres of new residential and commercial space would need to be built every year from 2010 to 2020. Increase in energy consumption will be tackled when buildings are outfitted with intelligent sensors and networked management systems collect and analyze energy-use data.

Reducing traffic congestion will also need a new and innovative approach in smart cities. One of the reasons for congestion is non-easy availability of parking spaces. If cities are embedded with networked sensors into parking spaces that relay to driver's real-time information about-and directions to-available spots. This could reduce congestion, pollution, and fuel consumption as well as generate more revenue for cities through dynamic parking fees for peak times. Smart traffic lights is another example where a R&D and innovation can play a vital role by innovating smart traffic lights that will regulate traffic by sensing real time traffic conditions.

Underwater availability, smart solutions will be required for real time analysis of water availability patterns and water consumption patterns to ensure sustained availability.

There is an immense opportunity for private players to support the initiative through R&D investments and provide innovative solutions that will play a key role in developing 'Smart cities'.

Potential is there in India to build an effective ecosystem to enable the burgeoning urban areas to become smart by using digital technology. This in turn will create employment opportunities and contribute to economic growth through innovation. Cities are fast becoming the defining units of human habitation and how smartly these cities are build, managed and operated will be imperative for India's future.

4.3 Skills and R&D

The accelerated economic growth has increased the demand for skilled manpower that has highlighted the shortage of skilled manpower in the country. India's 'demographic dividend' presents a unique opportunity to capitalize on this as compared to western economies where there is a burden of an ageing population

The following table presents the projected employment in the various sectors of economy for diverse growth scenarios till 2017.

Year	GDP growth rate	Projected employment (in million)			
		Agriculture	Industry	Services	Total
2011–12	9%	229.2	105	153.5	487.7
	7%	225.4	102	149	476.4
	5%	221.5	99.1	144.6	465.2
2016–17	9%	240.2	126.2	189.5	555.9
	7%	232	116.8	174.8	523.5
	5%	224	108.1	161.2	493.3

Source: NSDC

Development of skills especially in R&D in manufacturing will be imperative for the success of 'Make in India' as well. Under the 'Skill India' initiative, the National Skill Development Corporation has established councils such as 'Strategic Manufacturing Sector Skill Council'. The aim is to develop necessary frameworks for standards, curriculum, and quality assurance at all levels in vocational / technical programs to meet the needs of the industry. The coordinated efforts of councils with various stakeholders viz industry, educational bodies, training institutes and HR function shall narrow the existing gap between demand and supply of skills.

At present, R&D activities in India are not as productive as compared to other large economies. India has not been able to increase the number of PhD's in science and engineering significantly and lags behind most major economies in converting its R&D investments into high quality research. More than 25% of investment is directed at basic research, against China's 5% and U.S.'s 17%. A disproportionately low spend in the advanced stages of the research implies that few ideas translate to a commercial success as well.

The Government has targeted to create 100 million jobs from the manufacturing sector by 2022 under the Make in India programme. To achieve economic and social goals, more than 75% of all new job opportunities would have to be "skill based". Skilling the workforce for a more integrated R&D ecosystem will be critical for a competitive manufacturing sector at a later stage. In tandem, India needs reforms at multiple levels of the innovation development chain. This extends from basic and advanced research (in academic institutes) to the proof-of-concept stage (with the active support from public and private financing) and finally as research enters the market at a competitive scale.

Being the major job creator in the country, the private sector – which includes an amalgam of big corporates and MSMEs – has huge potential to influence the scale, and quality and sustainability of skill development programs in R&D sector through various ways as well.

Opportunity is also there for collaboration with Sector Skills Council set up as autonomous industry-led bodies by National Skill Development Corporation (NSDC). They create Occupational Standards and Qualification bodies, develop competency framework, conduct Train the Trainer Programs, conduct skill gap studies and Assess and Certify trainees on the curriculum aligned to National Occupational Standards developed by them.

Participation from the private sector will be important to the success of any skilling initiative as it can significantly impact the reach and quality of skilling programs thereby accelerating the overall economic growth.

 <p>ASDC AUTOMOTIVE SKILLS DEVELOPMENT COUNCIL</p>	<p>Automotive Skills Development Council</p>
 <p>ESSCI</p>	<p>Electronics Sector Skills Council</p>
 <p>Healthcare Sector Skill Council</p>	<p>Healthcare Sector Skill Council</p>
 <p>IT - ITES SSC NASSCOM</p>	<p>IT/ITes Sector Skills Council</p>
	<p>Security Sector Skill Development Council</p>
 <p>Telecom Sector Skill Council</p>	<p>Telecom Sector Skill Council</p>

4.4 R&D opportunities in various sub-sectors in India

Pharmaceuticals & Health Care

- “Pharma Vision 2020” is to make India a global leader in end-to-end manufacture. India’s overall pharmaceutical market size stands at U.S. \$20 billion

Manufacturing Technologies

- Automation and environment sustainability are the key focus areas for manufacturing companies
- Planned expenditure in R&D in manufacturing sector is estimated to increase by 63 percent in 2016-17

ICT & Wireless Technologies

- National Policy on IT aims to make India emerge as global hub for IT by 2020

Nano-Technology

- In 2011, nanotechnology-enabled products contributed nearly USD 1 trillion in a total global industrial value add of USD 22 trillion. This is expected to rise to a whopping figure of USD 4.4 trillion by 2018

Bio-Energy

- Bio-Energy has emerged as a promising alternative to meet rural energy needs in India

Water Technologies

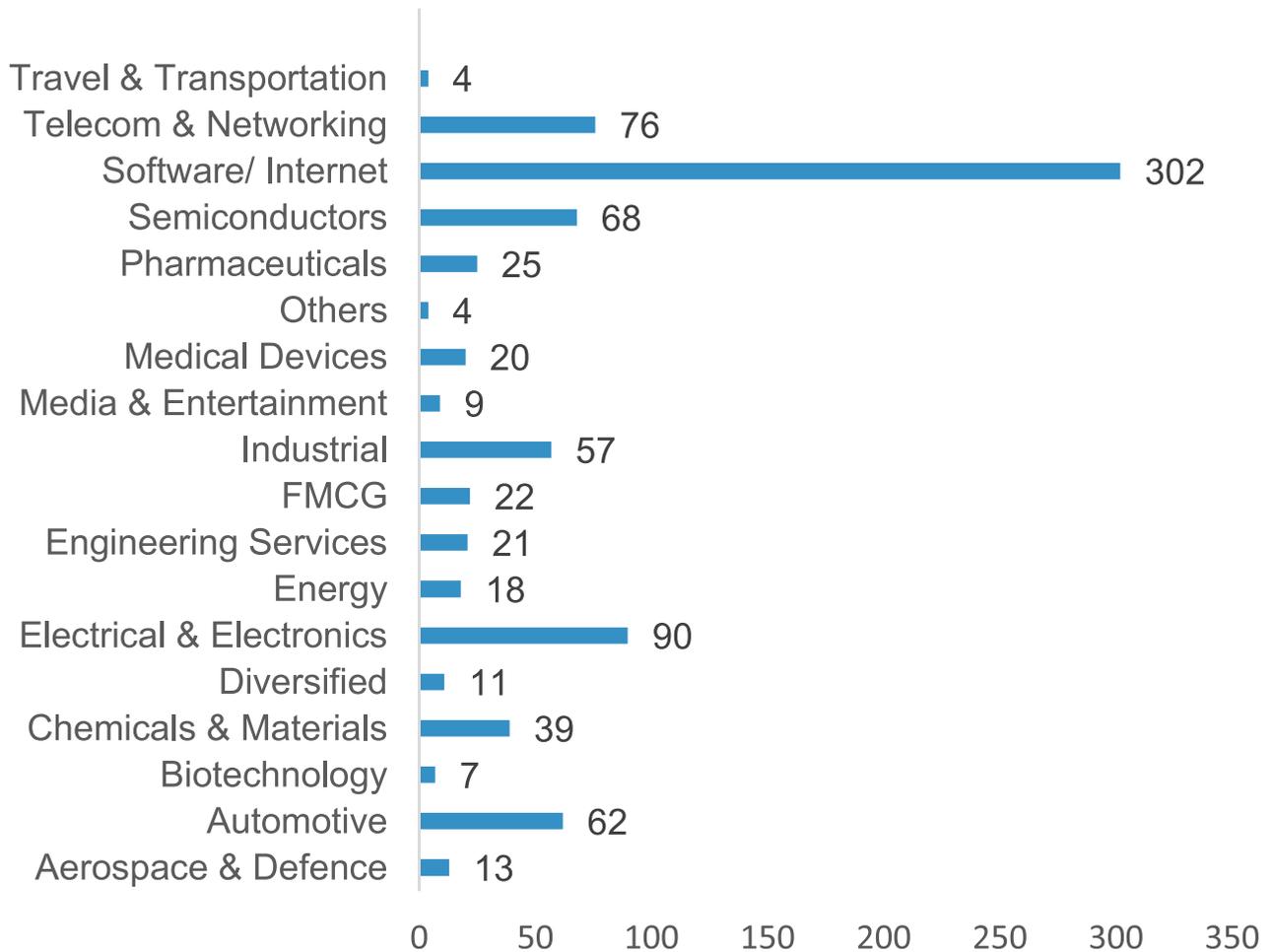
- R&D efforts would concentrate on developing technologies for treatment, recycling, recovery, reuse and efficient use of water

Infrastructure

- With the launch of ‘Smart Cities’ initiative, R&D in this sector will prove to be vital for its success. R&D will provide innovative approach in developing the infrastructure.

To achieve rapid growth, India needs to view its many economic and social challenges as opportunities for growth and renewal. Companies need to challenge conventions, invest in innovation and R&D, and unlock vested interests embodied in the antiquated infrastructure, which continues to hamper India's growth.

Vertical-wise distribution of R&D centers in India (2015)



Source: Zinnov Consulting Report 2015



5

CREATING AN R&D ECOSYSTEM



5. Creating an R&D Ecosystem

Key Features of a Successful Ecosystem

- **Investments in Human Capital:** Close attention given to encouraging a talent pipeline in science, technology, and engineering skills, along with basic base of product design, management, sales, finance, and entrepreneurship to ensure commercial success.
- **Collaborating science with Commercialization and Entrepreneurial Efforts:** Basic research is an essential starting point. However, when seeking maximum economic impact, close collaborations with entrepreneurs are in place to advance their commercialization.
- **Capital Available for all Stages of R&D:** All levels of funding are encouraged, from small-scale grants for early stage proof-of-concept research to large-scale commercially focused equity investment.
- **Government Support is Established & Responsive:** Policies, regulations, incentives, and taxes are in place to support the formation and growth of R&D ecosystems. Industry is offered opportunities to give input on the changing needs of ecosystems.

Source: *Maximizing the Economic Value of R&D: The Role of Ecosystems*, RDMAG

5.1 Role of Government

It has been established that innovations are prepared and nurtured within a robust ecosystem. There are key components for any ecosystem to thrive. These are: investments in human capital; collaborating science with entrepreneurship; easy availability of capital and government's support in cultivating policies and entrepreneurial culture.

Absence of any of these, substantially disrupts the value chain and hinders the ecosystem's capability to successfully provide returns on investments made.

India needs research and innovation in virtually all areas including energy, consumer electronics, pharmaceuticals, food processing, bio-technology and automotive. Governments can choose among various tools to leverage business R&D. A favorable R&D ecosystem also includes policies, institutions and capabilities that impact the creation and absorption of knowledge with the enterprises at the centre. Most of these entities already exist in India and putting them all together in a coherent form will further boost innovation in the country.

The R&D structure in India is currently fragmented with many government structures, organizations and programmes existing in India. The responsibility of increase in GDP spent to 2% will also lay with various states in the country. A systematic approach of collaboration is needed between centre and state governments in bringing out policies favorable for developing R&D centers by giving ready access to lands. The development of these centers will create employment opportunity, develop areas, and increase economic activity. Realizing the potential of start-ups and R&D in catalyzing economic change, many states in India are working on policies that will scale up the sector significantly. They can offer direct support via grants or procurement or they can use fiscal incentives, such as R&D tax incentives. Direct R&D grants/subsidies can target specific projects with high potential social returns while tax credits reduce the marginal cost of R&D spending and allow private firms to choose which projects to fund.

While the role of the government in supporting basic research, technology development and application should continue and be considerably enhanced, efforts need to be made to prompt support and financial resources from the private sector.

5.2 Role of Private Sectors

Building an ecosystem with the key components requires a systematic approach to involve primarily private entities, and academia with various roles. The private sector has an important role to play in the development of the sector. Investments made today will have an impact in the coming decades on the share of R&D output towards economic growth. India's target of spending 2% of GDP on R&D may not be possible without the private sector investing in the technological development.

The previous decade has laid a decent foundation for re-inventing the country's academic environment. Several new institutions will develop new scientists and entrepreneurs for the decades to come who will play a major role in identifying problems and innovate solutions for country's developmental challenges. Take the recent growth of App-based cab services as an example. It has not only in India but in the world changed the way the world uses local transportation with minimal fares making convenient for low-income families to use the services. Success of government's initiatives such as 'Digital India' and of digital payments will also depend on innovations making a mark in the cheap smartphone market that is affordable to very-low income population. This kind of innovation will be possible when the government and the industry partner with academic institutions to open entrepreneurship centers that promote risk taking and creative enthusiasm for finding solutions.

For private sector, their Corporate Social Responsibility (CSR) can play a vital role as well. Most of the CSR activities are towards popular sectors like child and women welfare, sports, and education etc. There is a scope for the government to promote such CSR activities in niche areas like R&D. This will also help in identifying local talents which do not have access to higher education and promote skill development in innovation sector.

Setting Industry Benchmarks: The private sector can contribute immensely by investing in research, analysis and setting quality standards for training courses through National Occupation Standards (NOS) with performance criteria, or linking productivity with technological interventions.

Collaboration with Training Providers: Having a strategic collaboration with training providers would be ideal as not every private companies are equipped to do in-house design, and development and delivery of training to suit their productivity requirements.at different stages. This would help in creating a talent pipeline for their needs would improve the success rate of connecting the right skills with the right people and the right job roles.

Co-investing in Training Infrastructure: Actual delivery of training would require planning for training–sites on their work premise. Private companies can fund/subsidize specific training labs/equipment which might otherwise be too expensive for training partners to invest in.

Provide Industry Expertise: The private sector can encourage and support willing employees to take up roles as subject experts, practical guides and mentors through various train-the-trainers programs or guest lectures which will go a long way in ensuring better training outcomes.

Source: Ways the Private Sector Can Accelerate Skill-Development in India, Gayathri Vasudevan





6

OUR RECOMMENDATIONS



6. Our Recommendations

India is amongst the lowest spenders on R&D as compared to the other BRICS nations. We spend less than one percent of our GDP on R&D and the bulk of this spending is attributed to government spending.

The various actors in the R&D ecosystem must re-define their roles and synergize their efforts to build robust frameworks to foster a R&D culture in the country.

Though there is an evident need for India to enhance its spending on R&D to be able to encourage innovation across sectors, with a Government already reeling under fiscal debt a more viable solution would be to turn to the private sector.

Actors	Desirable Roles
Private Entities/ Businesses	<ul style="list-style-type: none"> • Anticipate market demand and conceive innovation • Explore opportunities of innovation in social sector
Financial Institutions	<ul style="list-style-type: none"> • Provide investment funds with low interest rates as 'innovation funds' or 'risk money' • Provide easy access and procedures to access funds
Higher Educational Institutions	<ul style="list-style-type: none"> • Provide a portal to the global pool of academics and stock of knowledge • Provide large facilities and research equipment
Policy makers & Regulators	<ul style="list-style-type: none"> • Define public research and innovation budgets, and determine policy priorities and balance of funding for innovation support • Set wider framework conditions for innovators, from education policy to fiscal rules and tax

Promote and Strengthen Public-Private Partnership (PPP) Models

The private sector must explore newer avenues of PPPs and strengthen the existing ones to create opportunities in the R&D sector. With the government's focus on Make in India and Startup India, there exists PPP opportunities in areas like setting up knowledge parks and incubators. There is a growing need to implement models that brings the best of global learnings and customize it to local conditions to create a win-win formula. The private sector, particularly,

the MNCs, with their breadth of knowledge and best practices are best placed to work together with the government to bring R&D to the forefront corporate strategy.

Increasing R&D Partnerships with other Countries

In addition to partnering with specific companies the government must also partner with countries that have truly been trailblazers in R&D to help innovate in particular sectors. In so far as the S&T Parks are concerned, India is in the right direction and is at par with the developed countries. Such parks have been established in premier institutes of India and many technologies have emerged as a result of the activities in these parks. However, efforts need to be strengthened on clusters, regional technology development, Technology Transfer Organizations (TTOs) and Discussion Forum for identifying future areas of importance.

India in 2016 joined hands with UK to work as R&D partners in Solar Alliance and Nano Material Research. At the 2015 EU-India Joint Steering Committee meeting both sides agreed to continue and explore cooperation in the following areas: health, water, energy, smart cities, food security, sustainable agriculture and forestry, marine, maritime and inland water research and the bio economy, nanotechnologies, and advanced materials.

These partnerships should be further explored with other countries to leverage and promote India's 'High-innovation at low-cost' advantage'. The government could also explore partnerships with countries of strategic importance to establish bi-national/multi-national funds for investing in product ideas in designated areas of mutual importance.

Strengthening Funding Ecosystem

Funding in R&D activities is a risky proposition, even for the most capital-rich corporations. For SMEs and startups, it gets all the more tough to invest in research. The venture capitalists and angel investors are also wary of putting their money into a research led enterprise. This status quo must change to bring in more private sector players in the R&D fold. One way of achieving this is to incentivize the VCs and angel investors when they invest in a R&D enterprise. The government has brought in fiscal incentives for VCS when they invest in startup. A similar provision may be extended to investments made in R&D enterprises.

Industry body such as FICCI should play a key player to further to facilitate greater interaction amongst alternate sources of public and private funds.

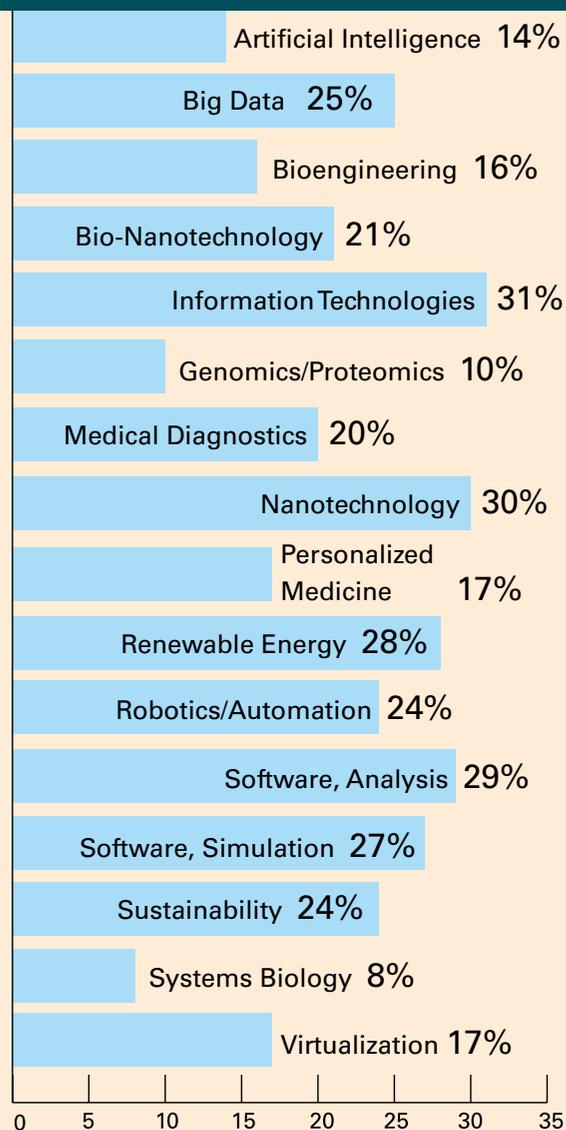
Increase Investments in Education

India can also look to build its expertise in R&D through enhanced investment in research based education. Both the government and the private sector can invest in specialized universities and better research infrastructure as well as offer scholarships in an effort to attract the best minds.

Tax Incentives

The Central government provided a weighted tax deduction of 200% for any capital and revenue expenditure incurred on in-house R&D by a company, excluding expenditure on land and buildings. However, in his 2016 -17 Budget Speech the Finance Minister announced: the benefit of deductions for Research would be limited to 150% from 1.4.2017 and 100% from 1.4.2020.

Most Important Technologies by 2018



A wide range of technologies are considered to have relative importance to researchers over the next next three years.

Source: *Global R&D Funding Forecast; Industrial Research Institute; 2016*

providers. They are now not only providing employment opportunities but giving affordable transport to communities all over the world.

A recent economic report about the investment trend analysis in the United Kingdom estimates that a one percent increase in public expenditure on R&D will lead to 0.48 percent to 0.68 percent increase in private expenditure on R&D.

To compensate for the reduction, in weighted deduction India can look to develop infrastructure in the form of a R&D parks which would function as a hub for research and innovation. These parks can be modeled on the Shenzhen SEZ in China. Such parks can offer fiscal incentives to both domestic and foreign investment in R&D.

It may however be worth while for the Central government to offer sector specific tax incentives to encourage investment in R&D. One such sector could be the biotechnology / lifesciences sector which requires a higher gestation period for return on investment. This step could also provide the impetus to start ups to invest in technology development. The tax benefits should expand the scope to include R&D expenses incurred outside the facility like bio-equivalence studies, clinical studies, patent filings and product registrations

With an aim to make MSME companies more viable and to encourage firms to migrate to company format, the Finance Minister in his budget speech 2017-18 proposed to reduce the income tax for smaller companies with annual turnover up to INR 50 crores to 25%. It may be worth the while for the government to offer a further tax deduction to start ups to encourage private sector spending on R&D.

Promote Expenditure on R&D as Investments

Expenditure in R&D should be promoted as an investment that leads to positive returns on a long-term. One of the best examples of this is how the GPS which started long back is now being leveraged by App based transportation

Develop Incubators on PPP model

The government role is essentially to develop the technical infrastructure, policy framework and initial finance and to help catalyze the venture creation process, but experience shows that the establishment of public private partnership (PPP) based incubators contributes to maximizing the positive effects of the incubation experience.

Currently, there are several incubators such as the Center for Innovation, Incubation, and Entrepreneurship (CIIE) at the Indian Institute of Management in Ahmedabad; Society for Innovation and Entrepreneurship (SINE) at the (Indian Institute of Technology in Bombay; Cell for Tech Innovation, and Entrepreneurial Training Society (TIETS) at IIT Kharagpur which are supported the government. Government and private sector companies should enhance their collaboration to establish incubators on PPP model. This would ensure that the R&D and innovation activities at the incubation centres are in line with the industry demand and market needs.

Private Sector Should Focus on India Centric R&D

Multi-nationals have a large resource of talent pool. The Government should provide incentives for India centric R&D and innovation activities to multi-national companies. The Government of India should relax its policies allowing MNCs to bid on India centric projects supported by government funding.

Develop Sector Skill Council for R&D

The National Skills Development Corporation (NSDC) has currently set up various Sector Skill Councils in place. A special R&D sector skill council should be initiated with private partnership that will provide a special focus on R&D skills.

Promote R&D Investments as CSR

The government's recent mandate on company's contribution to CSR activities is already defining new paradigms and forcing companies to re-strategize their priority areas in terms of CSR spend. There is an opportunity to recommend to the government to extend the CSR mandate to include supporting research in niche, high-impact sectors. This will encourage the private sector to spend the CSR money to bring affordable, accessible solutions to the bottom of the population.

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A non-government, not-for-profit organisation, FICCI is the voice of India's business and industry. From influencing policy to encouraging debate, engaging with policy makers and civil society, FICCI articulates the views and concerns of industry. It serves its members from the Indian private and public corporate sectors and multinational companies, drawing its strength from diverse regional chambers of commerce and industry across states, reaching out to over 2,50,000 companies.

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