

FINANCING INNOVATION IN INDIA: CHALLENGES AND OPPORTUNITIES

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India made significant progress in the last decade in building the country's innovation ecosystem. With around 50,000 start-ups, it is today the third-largest start-up economy, after the United States of America (U.S.) and the United Kingdom (U.K.). As per the Global Innovation Index (GII) in 2019, India was placed at the 52nd position, improving its ranking from the 57th position in 2018.¹ It is of interest to note that, according to StartupBlink, a Zurich-based global start-up ecosystem map and research center, India ranked 17th globally among 100 countries in 2019, based on the strength of its start-up ecosystem, having moved up 20 notches from the 37th rank in 2018.² The GI ranking is based on a set of 80 indicators classified into the Innovation Input Sub-Index, which has five innovation measures—Institutions, Human capital and research, Infrastructure, Market sophistication, and Business sophistication—and the Innovation Output Sub-Index, which is measured by Knowledge and technology outputs and Creative outputs. The Start-up Ecosystem ranking, on the other hand, focuses on innovation outputs and is derived from the number and quality of start-ups in a country and the business environment.

Performance of the Start-up Ecosystem of the top 100 countries was found to have a significant positive correlation with GI innovation rankings, as shown in Figure 11.1. A similar trend was noted in the innovation input to output performance in the GI 2019 report.³ Higher investments in research and development (R&D) and innovation infrastructure tend to result in more robust start-up ecosystems.

India, marked in blue in Figure 11.1, seems to beat the trend. In spite of inadequate investment in public R&D and innovation infrastructure, the country is the 3rd largest start-up economy.

In StartupBlink's 2019 ranking of the most entrepreneurial cities, six Indian cities made it to the top 100. Bengaluru was ranked the top start-up city in India at the 11th position globally, while New Delhi and Mumbai followed in the 18th and 29th spots, respectively. Chennai, Hyderabad, and Pune also made it to the top 100. As per the GI Innovation cluster/ city ranking in 2019, Bengaluru was placed in the 65th position, followed by Delhi at 70th and Mumbai at 97th.

While the end goal of the two ranking exercises is similar, the approaches are different. The first is built around innovation, with investment in R&D and associated needs as the engine of growth and development, and the latter is built on entrepreneurship as the driver of wealth creation. Hence, it is natural that the outcomes would not match perfectly. Comparing the two reports, however, compels one to go beyond the conventional measures and take a closer look at the various means of innovation financing. The following sections discuss the role played by governmental agencies, venture capitalists (VCs), and other ecosystem enablers in promoting and funding innovation in India.

FIGURE 11.1

Innovation and start-up performance by country, 2019



- ▲ StartupBlink rankings, 2019
- ▶ GII rankings, 2019

Sources: Author's analysis based on data from GII 2019 and StartupBlink website; Cornell et al., 2019; StartupBlink, 2019.

Public expenditure in R&D

Investment in research and development is not only critical to the growth of the Indian economy, but to the security, health, and well-being of its people, as became apparent in the wake of the coronavirus disease (COVID-19) pandemic.

India's investment in R&D has decreased over the last decade from 0.85% of GDP in 2008–2009 to remain stagnant at around 0.7% for the last several years. This is significantly lower than the top five R&D spenders globally in 2017—4.3% for the Republic of Korea, 4.2% for Israel, 3.3% for Japan, and 3.2% for both Switzerland and Finland—and lower than the R&D investments of other BRIC countries, which include Brazil, Russia, India, and China.⁴

Gross domestic expenditure on research and development (GERD) in India increased to US\$63.2 billion in purchasing power parity (PPP) terms in 2017–2018 from US\$50.3 billion PPP in 2014–2015 and accounted for 2.9% share in world GERD during 2017–18. GERD in India is mainly driven by the government sector, of which 45.4% is the Central Government, 6.4% state governments, 6.8% higher education, and 41.4% industry—with 4.6% from public sector industry and 36.8% from private sector industry during 2017–18.⁵ Figure 11.2 captures the share of industry investment in India's GERD over the last decade.

Twelve major scientific agencies accounted for 99.8% of the R&D expenditure incurred by the Central Government in 2017–18. Of this, 61.4% was spent on R&D in defense, atomic energy, and space, while the remainder was allocated as follows: 11.1% to the Indian Council of Agricultural Research (ICAR), 9.5% to the Council of Science & Industrial Research (CSIR), 7.3% to the Department of Science & Technology (DST), 3.7% to the Department of Biotechnology (DBT), 3.1% to the Indian Council of Medical Research (ICMR), and 3.7% to the Ministry of Earth Sciences, Ministry of Electronics and Information Technology, Ministry of Environment, Forest and Climate Change, and Ministry of New & Renewable Energy.

Several of these agencies undertake market-facing initiatives, developing technologies that are commercialized. The Technology Development Board (TDB) was set up within DST in 1995 to provide focused attention on commercialization of indigenous technologies. TDB is funded from the R&D tax collected by the government, until fiscal year 2016–2017, from industry on imports of technology, and provides financial assistance as soft debt or equity to small and medium-sized enterprises (SMEs) and start-ups for technology commercialization. TDB has also supported 11 venture capital funds with a total commitment of US\$38 million, leveraging total funds aggregating to over US\$350 million.

Low investment in R&D and translation capability and lack of investments of private players in innovation are major contributors to suboptimal innovation outcomes. India aspires to invest 2% of GDP in R&D by 2022. This would not only require a very substantial budget allocation for R&D investment by

the government but also increased contribution in R&D from industry so that the percentage of industry contribution is raised to at least 60% from the current 41%. In most developing and developed countries, industry's contribution to GERD is over 50%. Whether this would be feasible in the post-COVID scenario is too early to say.

Promoting an innovation culture

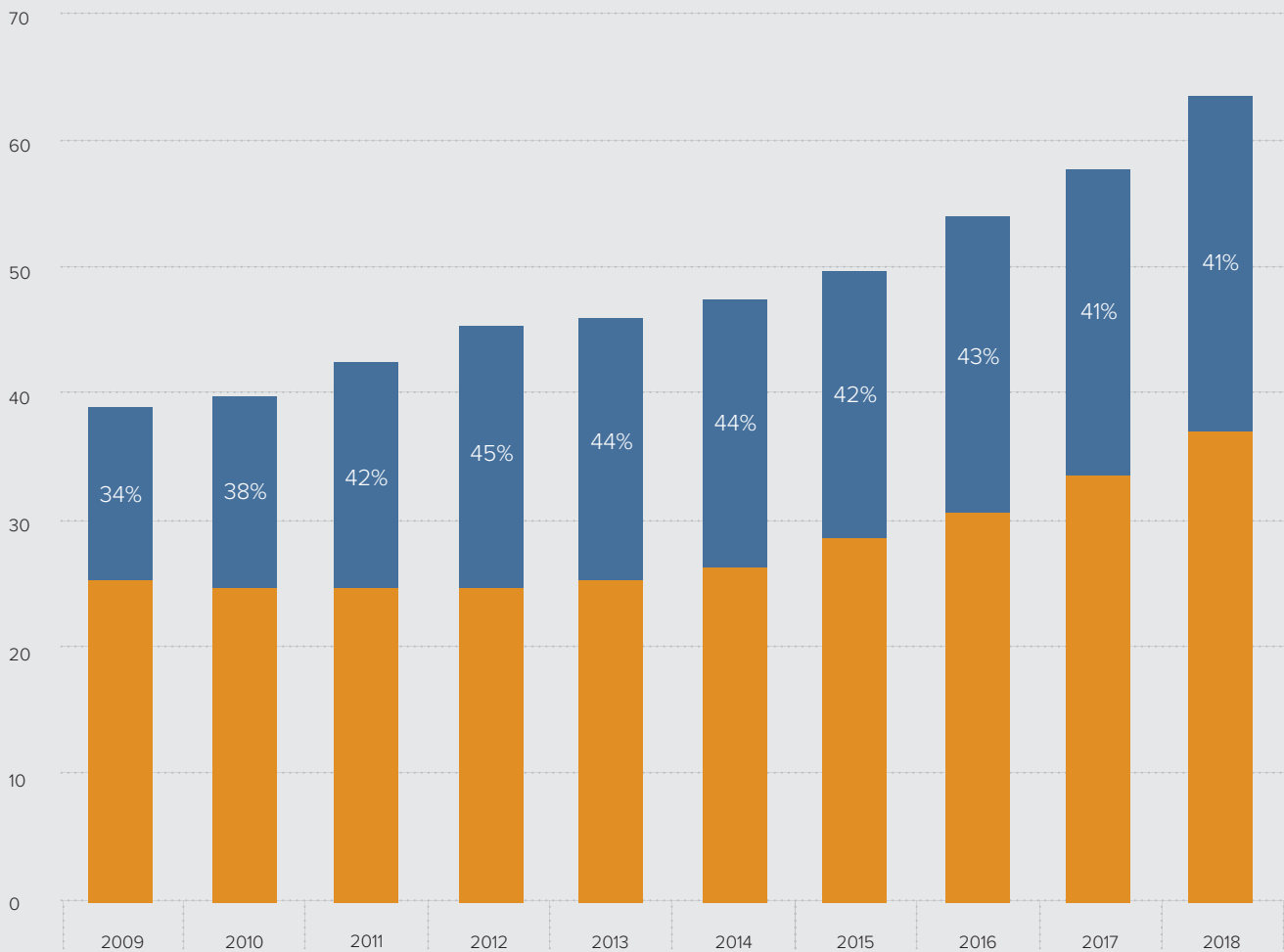
The National Science & Technology Entrepreneurship Development Board (NSTEDB) was established in 1982 by the Government of India under the aegis of the DST to promote knowledge-driven, technology-based companies. It was NSTEDB that spearheaded the science and technology parks and incubators movement in the country and established technology business incubators in academic institutions and as private non-profit companies. This was subsequently adopted by several other ministries and departments under the Central Government, including the Ministry of Electronics and Information Technology and the Ministry of Micro, Small and Medium Enterprises, as well as several state governments.

The Biotechnology Industry Research Assistance Council (BIRAC) was set up by DBT, Government of India in 2012 as an industry-academia interface agency to strengthen and empower the emerging life sciences sector and support relevant innovations. The Atal Innovation Mission (AIM) initiative by the National Institution for Transforming India, NITI Aayog (Hindi for Policy Commission) was set up in 2016 as the government's flagship initiative to promote a culture of innovation and entrepreneurship in the country for different sectors of the economy and across stakeholders—from school students to industry.

Today there are over 500 incubators in the country set up by these government agencies to nurture start-ups and build the innovation ecosystem. The agencies partner with these incubators to offer tailored grants, soft loans, and equity-linked investments to fund innovations right from the idea stage to commercialization. These government grants play a crucial role in sustaining start-ups during their establishment phase and at least partially absorbing the technology risk. The Biotechnology Ignition Grant (BIG) scheme of BIRAC, for example, provides up to US\$67,000 to life sciences and healthcare start-ups to establish the proof of concept for their ideas. BIG has supported over 400 start-ups and innovators in the last five years and encouraged thousands of researchers and individuals to pursue an entrepreneurial dream. Successful BIG grantees typically go on to raise follow-on grant or equity funding from BIRAC and other agencies, and this has proven to be one of the most impactful idea stage grants for the life science sector. NSTEDB's National Initiative for Developing and Harnessing Innovation program, PRomoting and Accelerating Young and ASpiring innovators & start-ups (NIDHI-PRAYAS), addresses the funding gap between idea to prototype. It has been hugely successful in supporting a large number of pre- and early-incubation ideas at incubators with fab labs and prototyping workshops.

FIGURE 11.2

Industry's share in GERD



- ▲ GERD in US\$ billion
- ▶ Year
- Industry investment, US\$ billion
- Public investment, US\$ billion
- % Industry Investment, % of GERD

Sources: Author's analysis based on GERD data from Research and Development Statistics at a Glance, 2019–20; DST, 2020; The World Bank, 2020.

The other grant instrument that has become popular with funding agencies is challenge grants, including Grand Challenges, that fund innovative solutions aimed at specific problems or challenges. Grand Challenges India, funded jointly by the Bill & Melinda Gates Foundation and DBT, and implemented by BIRAC, has spawned a large number of entrepreneurs working on healthcare solutions for the poor. NSTEDB has co-created and co-funded several large-scale innovative challenge programs in partnership with industry bodies and corporates. Some of the flagship programs that have generated tens of thousands of ideas include the Global Innovation Technology Alliance (GITA) in partnership with the Confederation of Indian Industries (CII), Power of Ideas with the Economic Times, and the India Innovation Growth Program in partnership with Lockheed Martin and Tata Trust. AIM funds Grand Challenges to scale and deploy solutions in partnership with several line ministries. State governments have started conducting challenge grants to seek solutions from start-ups, innovators, and individuals to solve local problems.

These funding initiatives have been catalytic in developing a robust pool of technology-driven entrepreneurs and innovators across various domains in the country. While only the most innovative and impactful ideas emerge and receive funding through the tiered selection process of these competitions, a culture of ideation and entrepreneurial aspiration is built during the process that percolates well beyond the recognized clusters of innovation.

Boosting investments through enabling policies

A reason for the low levels of innovation in a developing economy is the lack of incentives for private players to invest in innovation. Many fear that the benefits of their innovations will be shared by free riders who have not invested in the product innovation and development process. With state regulations and a robust intellectual property regime in place, these concerns have been addressed.

Concerted efforts of multiple government departments, notably the Department for Promotion of Industry & Internal Trade (DPIIT) under the Ministry of Commerce and Industry, Government of India, NITI Aayog, DST, and DBT have been instrumental in framing the policies and regulations for start-up investments. These are largely around innovation funding, tax rebate on R&D, innovation infrastructure and incubation, tax incentives to promote entrepreneurs, waivers of patent filing fees, and initiatives around ease of doing business. The government is also putting in place a wide range of policy reforms around public procurement rules for start-ups and micro, small, and medium-sized enterprises (MSMEs). It is time that the government evolves as a sophisticated consumer of innovation, including directly buying from start-ups.

One of the enabling policy interventions that is expected to boost funding of social entrepreneurs is built around unlocking the Corporate Social Responsibility (CSR) fund for innovation financing. In India, it is mandatory for a particular class of

profitable companies to contribute 2% of their annual profits for social activities, through a dedicated procedure prescribed by the CSR rules and regulations. The section on CSR in the Indian Companies Act 2013 was amended in 2019 to include contributions to incubators and research projects in publicly funded universities, Indian Institutes of Technology (IITs), and national laboratories eligible for CSR funding.

The Government of India launched a US\$1.5 billion fund of funds for start-ups in 2016. The Small Industries Development Bank of India (SIDBI), as the Fund Manager, was entrusted with allocating contributions to various venture capital funds (alternative investment funds). The process, however, has been slow, and so far only approximately US\$100 million has been disbursed. Government needs to hasten the deployment of the fund.

The other significant thrust is on focused investments in innovation infrastructure, including setting up regional tech transfer offices, biotech and medical technology parks, research parks in engineering college campuses, and centers of excellence in specific areas for technology development and commercialization.

AIM launched an innovation mapping exercise in 2018 and created the India Innovation Index as a tool to analyze and enhance the status of innovation at the state level, ranking the states on various input and output innovation parameters.⁶ This index offers an opportunity for states to analyze their absolute performance as well as relative performance to their peers at a similar level of income. This would enable local governments to frame policies that would boost regional efforts, thus contributing to building a nationwide innovation ecosystem.

Private capital for funding growth

India has started to witness rapid scale-up stories, large investment rounds driven by global venture capital firms, creation of unicorns in user-driven innovations, and a growing user community responding to and adopting innovations. Indian start-ups received a total of US\$58 billion over the last five years from 2014–2019 across 5,011 deals.⁷ In 2019, the total funding raised across 766 deals was US\$12.7 billion. The major share of investments was understandably in late-stage start-ups dominated by global VCs.

There were over 280 domestic investors in the country in 2017, around 150 of them being angel investors, 95 VCs, 15–20 corporations, 5–10 accelerators, and over 220 foreign investors.⁸ While Bengaluru, Delhi, and Mumbai are the clear winners as start-up destinations, 21 other cities have emerged as start-up hubs. The ecosystem is maturing with successful Indian entrepreneurs investing in start-ups. There is, however, a trend of start-ups moving to more mature global hubs in search of larger investments, markets, and mentoring. The policy environment, if made more transparent, predictable, and enforceable, could help attract more capital—including more domestic capital—into innovation activities in the country.

Leapfrogging with ecosystem enablers

Following the growth in the innovation ecosystem, the country is witnessing the emergence of a set of new age infrastructures, the “innovation commons”. These innovation commons are developed and evangelized with time, energy, and intellectual resources from groups of volunteers who take it on themselves to build these platforms as digital or cyber-physical highways for everyone to access—and then build their innovations on top of these layers. A case in point is India Stack, a set of application programming interfaces (APIs) that allows governments, businesses, start-ups, and developers to utilize a unique digital infrastructure to solve India’s grand challenge of digital and financial inclusion, through a movement towards “presence-less, paperless, and cashless service delivery”.⁹ India Stack, which includes the open API infrastructure of the Unified Payment Interface (UPI) platform that is used by banks for digital payments, has been developed by volunteers from iSPIRT, a think tank with the mission to make India a “product nation”. Another platform, called the National Health Stack, is being developed to serve as the digital backbone for transforming the country’s health systems.

This can only happen when the innovation system has a critical mass of expert ecosystem enablers wanting to give back to the society and rally to build solutions that could not possibly be accomplished by one institution or one company. This also cannot happen without academic excellence and the culture of innovation taking root and producing a critical mass of young and effective minds wanting to solve the hard problems. India seems to have reached the take-off point and, with the right policies in place, can get into the league of the top ten most innovative countries in the next five years. While we plan to leapfrog, one has to remember that the cumulative investment by these enablers into the innovation commons will be significant and should somehow be captured in the calculations on innovation financing.

An opportunity to rebuild the innovation ecosystem

The government has set a target of increasing the investment in R&D to 2% of GDP by 2022. Whether this would be feasible in the post-COVID scenario is too early to say. While one would expect the expenditure targets to get revised in the short term, R&D spending in specific domains like biopharmaceuticals, vaccines, biosecurity, One Health, digital health, and data science are expected to increase significantly both in the public and private sectors. Investments have to be made in areas where there are gaps in research capability and capacity. A lot more emphasis would also be expected on developing manufacturing capabilities of priority drugs and diagnostics across the value chain. This is not to imply that the existing strategies for funding innovations around the Sustainable Development Goals (SDGs) or developing deep science-based innovation capabilities will not be pursued. It will be imperative to fund all of the above in order to be an innovation-led economy.

The pandemic has clearly demonstrated the existence of a wide network of vibrant and agile innovation communities in the country. Start-ups and individuals were found to rise to the occasion to pivot and build COVID-relevant solutions. It is heartening to notice a surge in the number of ecosystem enabler groups from different streams of academia, industry, industry associations, and other networks collaborating to jointly develop platforms to combat the COVID-19 pandemic. There is also a significant rise in the number of strategic investments by Indian corporations into start-ups. The government needs to actively foster and finance these collaborations so that the ecosystem does not go back to its old normal of viewing others as competitors rather than collaborators once the pandemic recedes.

Notes:

- 1 Cornell et al., 2019.
- 2 StartupBlink, 2019.
- 3 Cornell et al., 2019.
- 4 EAC-PM, 2019.
- 5 DST, 2020.
- 6 NITI Aayog, 2019.
- 7 Data Labs by Inc42, 2019.
- 8 NASSCOM, 2017.
- 9 iSPIRT, 2015.

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