

FOREWORD

FINANCING INNOVATION IN INDIA



India has embarked on a journey towards creating an enabling environment by putting in place an ecosystem that breeds innovation. The Government of India has launched several significant initiatives for propelling innovation, such as the Start-up India initiative, Accelerating Growth of New India's Innovations (AGNI),

Atal Tinkering Labs, new intellectual property rights (IPR) policy, Smart City Mission, Uchchar Avishkaar Yojana, etc. All these initiatives, coupled with phenomenal research and innovation from the institutions, industry, and society, are cementing India's position as an innovation and knowledge hub. However, the financial dimension plays a critical role in fructifying these innovation efforts.

Various fiscal incentives are offered by the Government of India's Department of Scientific and Industrial Research (DSIR) for R&D activities performed by institutions, academia, and industry for supporting, nurturing, and leading their innovations towards fruition. Technology Development Board (TDB), an important stakeholder in the Indian innovation ecosystem, provides soft loans and promotes the equity of Indian industry through the development and commercialization of indigenous technology and by adapting imported technology for domestic applications. Biotechnology Industry Research Assistance Council (BIRAC) supports high-risk, early starters from academia, start-ups, or incubators that have exciting ideas in the nascent or planning stage. In India, there has been phenomenal growth of the private and foreign-owned private equity/venture capital (PE/VC) industry. The government has also played an important role in establishing and nurturing the industry segment by various fiscal concessions.

Financial institutions such as the Industrial Development Bank of India (IDBI) and the Small Industries Development Bank of India (SIDBI) lend support for innovation and commercialization of innovative technologies, in addition to entrepreneurship. SIDBI manages the India Innovation Fund—a registered venture capital fund that invests in innovation-led, early-stage Indian firms.

Despite the availability of several instruments, many brilliant ideas from entrepreneurs—especially at the grassroots level—do not come to fruition due to their inability to access the appropriate level of funding. Therefore, it is imperative that all potential ideas, even from the remotest corners of the world, have the opportunity to be harnessed and fostered. This era of globalization calls for developing a robust technology screening and funding mechanism through which the top 5000 ideas across the globe could be selected and nurtured from concept to commercialization. In addition, there is an ardent need for a large-scale government grant for supporting high-risk innovations with strong business potential.

This year's Global Innovation Index (GII) report provides valuable insight into country innovation models and each country's position on various innovation indicators. The Global Innovation Index has been instrumental to India in shaping its policies and designing an actionable agenda for innovation excellence. Last year, it was both a privilege and honor for the Confederation of Indian Industry (CII) to host, for the first time, the historic global launch of the Global Innovation Index in collaboration with the Department for Promotion of Industry and Internal Trade, the Government of India, and the World Intellectual Property Organization. The worldwide launch of the GI in India was a significant milestone for the country and a phenomenal recognition of our standing in innovation.

The coronavirus disease (COVID-19) pandemic has caused widespread disruption by adversely impacting global businesses and economies. As the world adjusts to its new normal, business leaders need to harness the most innovative technologies to help drive resilience and emerge from the crisis stronger. Governments across the world are in overdrive, designing fiscal incentives by slashing interest rates, tweaking taxes, and offering a moratorium on credit periods. The Government of India is also busy devising incentives for start-ups, entrepreneurs, and other high-risk businesses to help ease the impact of the coronavirus outbreak. All such initiatives will go a long way in assuaging the disruption of the Indian innovation ecosystem.

The GI report could be India's one-stop reference to plan and accelerate our journey toward the future we imagine for our people. I encourage you to refer to this report, discuss it with others, and consider the ways we can improve as individual nations and as a global community.

Chandrajit Banerjee

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FOREWORD

BUILDING VIRTUAL INFRASTRUCTURES FOR THE AGE OF EXPERIENCE



Today, new categories of innovators create new categories of solutions for new categories of customers, citizens, and patients. *Industry Renaissance* is emerging worldwide with new ways of inventing, learning, producing, healing, and trading. It comes with a new logic for financing the economy and supporting

innovation. The large majority of investments are now intangible, in the form of intellectual property, data, and knowledge. Even tangible physical investments, such as bridges, buildings, factories, and hospitals, come with their *virtual twins*, opening new possibilities for the operations of these assets through their full lifecycle. Investments are shaping the unknown because the future is not just undefined: it has to become possible, we need to create it, and virtual reality is the key to it. The new assets for the 21st century are virtual ones because they connect the dots between domains and usages. Improving global health requires a holistic approach, which includes cities, food, and education. Developing global wealth in a sustainable manner involves new ways to connect data and territories. Dealing with ecological challenges requires an all-inclusive view of the balance between what we take (footprint) and what we give (handprint) to our planet.

Collaborative experience platforms are the infrastructures enabling this change. They provide a continuum of transformational disciplines to imagine, create, produce, and operate experiences from end to end. This is one of the primary values of Dassault Systèmes' **3DEXPERIENCE** platform. In addition to cross-disciplinary collaboration, the platform empowers teams to conduct in-silico 3D experiments, produce multiscale and multidisciplinary digital models, simulate scenarios, and turn big data into smart data. It connects biology, material sciences, multiscale, and multiphysics simulation with model data and communities. This translates into continuous improvements in industrial processes, enhanced and customized treatments, and the development of new services

from the lab to the hospital nearby or the street outside. For example, a city platform like *Virtual Singapore* is useful not only in city management but also in developing new approaches for healthcare or innovating transportation services. In the not too distant future, we will be able to create the virtual twin of the human body—not just any body, but each individual's own body.

In the 21st century, our societies can now leverage the tremendous power of virtual universes, empowering the workforce of the future with knowledge and know-how. Because they remove the gap between experimentation and learning, virtual universes give everyone access to actionable knowledge and skills. Virtual worlds are revolutionizing our relationship with science and industry, just as the printing press did in the 15th century. The new book is the virtual experience.

Therefore, investing in virtual universes is the most valuable way to create sustainable paths for the future. Virtual twins are generative. They provide human organizations with a new level of agility and fluidity. They are game changers in providing shared representations and supporting large-scale cooperative behaviors. While our societies often seem to face sacrificial dilemmas, such intangible assets allow for opening new possibilities—creating additional value in spaces that were constrained by zero-sum games. In front of increasing pressure, such as resource scarcity and climate change, our societies invent new solutions, caring for future generations.

This new economy develops on ecosystems in territories. Public authorities can help to regulate and set the right conditions—those that allow for efficient use of data and real-life testing while reinforcing trust. These are new responsibilities that industry must take on in accordance with societies and policymakers. Moving forward, governments and industry will have to work together to jointly invent a new way of living in the era of massive personal data, automated transportation, and virtual reality. A new public-private relationship will emerge, where “investing together” will be the keyword. New measurements will become more and more necessary, like the Global Innovation Index. In order to make the right investments and invest right in the age of experience, we need virtual universes to make the invisible become visible.

Bernard Charlès

Vice-Chairman & Chief Executive Officer
Dassault Systèmes

CHALLENGES AND OPPORTUNITIES IN FINANCING INNOVATION IN BRAZIL



Technology and innovation are among the primary engines of a nation's growth and economic development. To boost the development of countries that are distant from the technological frontier, such as Brazil, it is essential to count on the use of foreign technologies as well as on the development of endogenous ones.

The challenges for Brazil are large. We have a diverse and uneven economy. Historically, islands of efficiency and prosperity have existed side by side with poverty and other social problems, such as access to quality education, health, and several basic public services. In a country with these characteristics, science, technology, and innovation often are considered secondary issues.

However, it is precisely because of its shortcomings and weaknesses that the country should reinforce its bets on scientific and technological development. New technologies can reduce chronic problems by improving public services and allowing the more efficient use of natural resources, for instance.

For that to happen, the country must ensure expressive, stable, and continuous investments in science and technology (S&T). The private sector must expand its investments in research and development (R&D) as well. The creation of Entrepreneurial Mobilization for Innovation (MEI) in 2008, under the coordination of the National Confederation of Industry—Brazil (CNI), aimed to incorporate innovation in the strategy of companies operating in Brazil, as well as to improve the effectiveness of innovation policies.

In 2004, CNI—through the National Service of Industrial Training (SENAI) and the Social Service for Industry (SESI)—launched the Edital de Inovação para a Indústria (Innovation Call for Industry), which aims to finance the development of innovations and increase the performance of Brazilian industrial companies. In March 2020, CNI created new calls that allocated 30 million Brazilian reais (R\$) for solutions across categories, including problems generated by the coronavirus disease (COVID-19) pandemic.

Despite the importance of private investment, any country financing innovation demands direct and indirect participation of the public sector. Nations around the world invest public resources in research activities carried out by universities, research institutes, and companies. Public resources are essential to generate new knowledge and to share the risks of private research. In addition, there are also indirect mechanisms aimed to foster private R&D investment.

Over the past 20 years, Brazil has established several public policies and instruments for financing and supporting innovation. The government has created credit programs, tax incentives, grants for research projects in companies, seed capital lines, and equity investments in startups, in addition to traditional grants for research in universities and public institutes.

In health, for instance, Brazil has built a wide system of public research laboratories, such as the Oswaldo Cruz Foundation (Fiocruz), the Adolfo Lutz Institute, and the Butantan Institute, among others. This system has made the country an important center for epidemiological research, which has been critical in tackling the COVID-19 crisis.

Currently, the fiscal crisis jeopardizes the progress made by different governments in recent decades. The level of public investment in R&D is lower than it was 20 years ago, and many of the public policies for financing innovation are decreasing or at risk of suspension.

This year's Global Innovation Index has as its theme "Who will finance innovation?", which presents the current state and evolution of financial support mechanisms while exploring needed advances and remaining challenges. The discussion of the theme is of fundamental importance for business innovation efforts and for guiding public policies.

With the support of MEI leaders, CNI remains committed to ensuring resources for innovation and guaranteeing that public policies in the area are evaluated based on evidence and results. That is the only way to improve policies and make innovation the basis of the country's inclusive and sustainable development.

Robson Braga de Andrade
CNI President