

Editorial Note

INDIA NEEDS TO BOOST INVESTMENTS IN RESEARCH AND DEVELOPMENT (R&D) TO INCREASE ITS GLOBAL MIGHT

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ABSTRACT

Over the course of history, innovation and research have greatly influenced economic progress. In India, businesses and governments have mostly invested in R&D to promote innovation and create new goods or services. R&D investment as a percentage of Gross Domestic Product (GDP) is quite low, notwithstanding India's ambition to have a \$5 trillion economy in the near future. Consequently, this paper aims to shed some light on R&D investments in India in terms of need and significance, including reasons for low investments, some increasing efforts, specific industries that need these investments, top R&D spending companies in India, tax benefits that are available for such investments in India, and concluding remarks.

1. R&D AND ECONOMIC GROWTH

Supporting R&D has long been seen as essential to the progress and prosperity of industrialised countries because it is one of the main forces behind long-term productivity increases. Empirical data show that a strong R&D infrastructure significantly adds to a nation's ongoing growth and expands employment opportunities. It can be observed that R&D, which contributed about 15% of all productivity increases during this time period, was responsible for 67% of economic development in Europe between 1995 and 2007 (Sharma, Chakki, & Varmani, 2020). In a similar vein, compelling data suggests that the US businesses are better able to translate R&D into productivity gains (especially in high-tech sectors), which helps to account for the higher productivity of the US businesses (Castellani, Piva, & Vivarelli, 2016). In a study published in 2019, it was found that R&D expenditures in high-tech and then medium/high-tech industries have the most positive and significant effect on productivity growth

(Soltanishat, Alizadeh, & Mehregan, 2019). Additionally, when R&D efforts increase, so does production. Continuous investments in R&D are required for a developing country like India to achieve its economic and social goals because the relationship between R&D and economic growth is widely understood. R&D, additionally, promotes national security, service exports, capital formation, and foreign direct investment (FDI) (Sharma, Chakki, & Varmani, 2020). The US, Japan, and Germany serve as the best examples in this regard because they have held positions of leadership in numerous technological fields since 1960, making them the actual leaders of the modern era.

The purpose of this paper is to analyse a number of pressing concerns pertaining to R&D investments in India, which are still not in an excellent form but are a crucial sector for modern India, which is moving towards self-reliance and a \$5 trillion economy in the near future.

2. R&D INVESTMENTS IN INDIA

The developed countries of the United States, Sweden, and Switzerland spend 2.9%, 3.2%, and 3.4%, respectively, of their gross domestic product (GDP) on R&D. Israel has the highest global R&D spending rate at 4.5 percent. According to the data, India has a lower rate than the other BRICS nations. Accordingly, spending ranges in Brazil, Russia, China, and South Africa between 1.2%, 1.1%, over 2%, and 0.8%. The average rate across the world is roughly 1.8%.

Figure 1 below shows India's R&D spending from 1996 through 2022 as a proportion of the GDP. The average R&D spending over the twenty years has been 0.74 as a percentage of GDP (Anand, 2022). The only years that stood out were 2005 and 2010, when it exceeded 0.8 percent of the GDP. One intriguing finding is that the average percentage was 0.79 during the UPA administration (2004–2013) as opposed to 0.69 during the NDA administration (2014–2022). Interestingly, as per the UNESCO evaluation, India's investment in R&D is underwhelming because it has stayed constant at 0.7% of GNP over the years.

The entire level of R&D spending in India is quite low, as indicated by the Innovation Index for 2021, and it was \$43 per capita.

Therefore, India's Gross domestic expenditure on R&D (GERD) needs to significantly rise in order for the country to reach its \$5 trillion economic growth target. Spending on R&D should be at least 2.0% of GDP.

Figure 2 shows the important scientific organisations to which the majority of the central government's R&D spending is directed. The DRDO takes the lion's share of R&D spending, followed by DOS, ICAR, DOE, CSIR, etc.

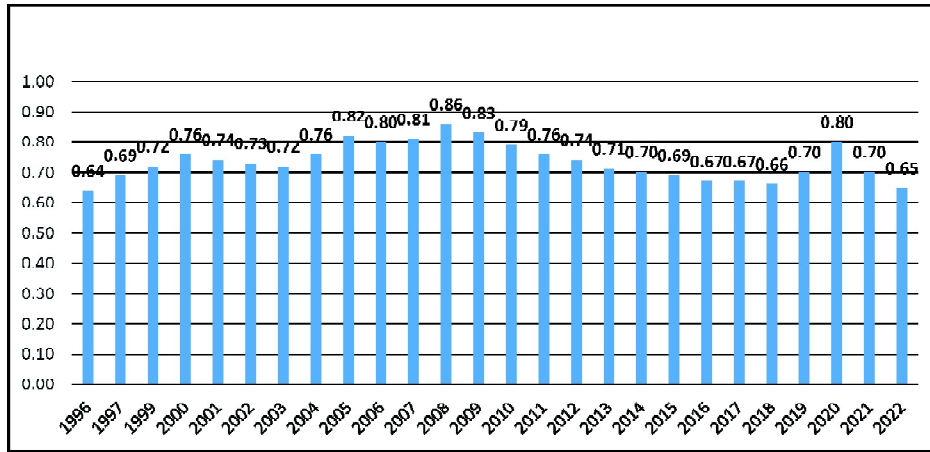


Figure 1: R&D expenditure as a percentage of GDP in India

Source: Compiled by the author

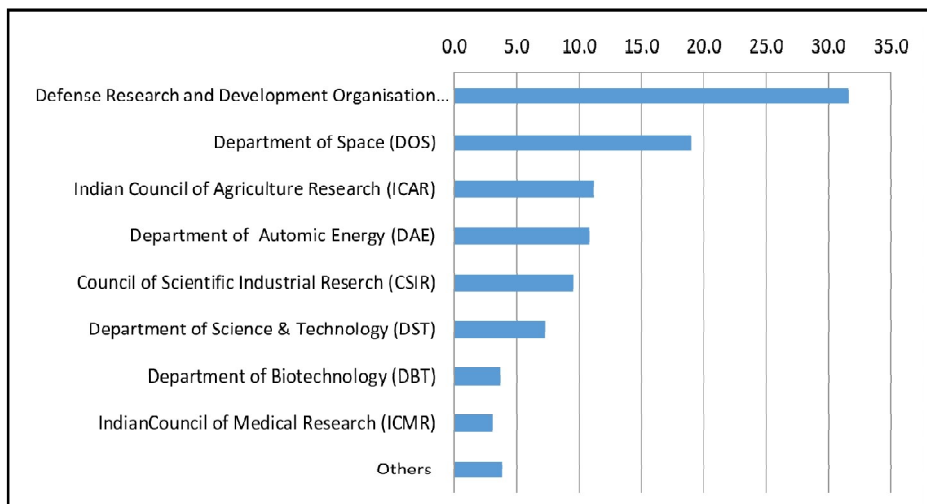


Figure 2: Channelization of Central Govt. R & D expenditures (2017-18)-% Share

Source: Money and Control, India

2.1. Reasons for low R&D investment

The low R&D spending in developing nations like India is attributed to the fact that R&D investments take time to provide returns. NITI Aayog pointed out that authorities direct resources towards addressing these concerns since they are more prevalent in nations like India, where they include reducing hunger,

preventing disease, and improving quality of life. Some experts comment that in the 2023 finance budget, a 25% allocation of the R&D budget, or \$310 million, to the private sector, start-ups, and university institutions is not only worrisome but also comically meager. This sum, together with the whole R&D budget, is viewed as a significant threat to Atamnirbhar Bharat and the country's projected \$5 trillion economy by FY 2025.

Additionally, the Department of Science and Technology (DST) has only received Rs14,217 crore (0.3%) of the total Union Allocation of Rs 39,44,908 crore for 2023–24, a decrease of 3.9 percent from the previous year. This is an unimpressive budget. The DST, Department of Biotechnology (DBT), and Department of Scientific and Industrial Research (DSIR) will receive Rs6,000 crore, Rs2,581 crore, and Rs5,636 crore, respectively. Some observers stated that the recurrent budget cuts for DST and the low allocation reflect India's pitifully low support for science and technology, which also has an impact on R&D expenditures throughout the nation. According to experts, the support for basic research is declining, even though basic research is the foundation for even start-ups and the "Make in India" programmes (Krishnamurthy, 2022).

In the Indian context, for a long time, the perception for R&D was rejects and dejects. Only tested technology was used in manufacturing facilities. Indian businesses that neglect R&D are to blame for this. Even Reliance has a significant issue with innovation. For them to stay competitive, economies of scale are usually very important. In fact, this is the reason we are the sole manufacturers of electrical, chemical, and pharmaceutical products, as well as large CAD. Additionally, for many years, previous governments and corporate executives had a short-term vision and neglected R&D investments. In this backdrop, NITI Aayog notes that R&D performance is stagnating due to low contributions. Additionally, according to NITI Aayog, the government spends more than 55% of its total R&D budget. As a result, this practise has to be modified because, in most countries, the private sector carries out most of the R&D. Therefore, India should locate the turning point where the private sector may take over (FortuneIndia.com., 2022).

In this regard, Infosys co-founder Gopalakrishnan recently suggested that more private businesses and organisations boost their R&D budgets (Economic Times, 2022). Family management supports R&D investments in India. Singh and Kaur's (2021) report that family-held businesses should be encouraged to invest more and more in R&D and innovation projects.

2.2. Increasing efforts towards R&D investments

Despite two years of the COVID-19 pandemic, India has managed to keep its economy growing steadily and has one of the fastest growth rates in the world. India needs to spend more money on R&D if it wants to lead the globe. Technology breakthroughs that support the preservation of India's natural environment, including its air, water, and land, are essential. Numerous industries, such as the industrial, agricultural, and defence sectors, need these advancements. Now that India presides over the G20 for at least the upcoming year, this gives it an opportunity to set the global agenda. But it needs a real leader. It must meet a large set of difficult standards. The Modi administration has consistently increased its efforts and made advancements in R&D by putting a strong emphasis on science and technology (PTI, 2022). As a result, India's private and governmental sectors have the chance to promote R&D investments, which will in turn promote spending 2.0% of GDP on R&D.

Furthermore, it requires substantial expenditures in R&D to change its industrial ecosystem and compete with China, Japan, and Germany. R&D operations are beneficial to businesses because they give access to the necessary knowledge needed to increase productivity, lower operating costs, and successfully compete in the brand market. India's corporate partners would be propelled by innovations and patent improvements. Industry 4.0 can speed up the design cycle, improve time to market, and link design to smarter in the manufacturing value chain's first stage, where R&D and design are the primary areas of focus (Venktakuppuswamy, (2022).

While government funding is crucial for R&D expansion, private sector support for research is just as important for accelerating growth and boosting the country's capacity for competition. The business enterprise sector accounted for the majority of R&D spending during this time, and its R&D spending increased overall by 18.11%, from 1.27% of GDP in 2011 to 1.5% of GDP in 2021 (FortuneIndia.com., 2022).

While multinational firms are quickly internationalising their R&D activities in order to outperform their competitors, a country may differentiate itself from its competition as a more appealing location for R&D investments by promoting these activities through R&D tax incentives. Government assistance will help businesses in more ways than just higher R&D spending and lower risk. It will lead to the creation of "public" commodities that will provide the nation with a competitive advantage. Jobs are created and maintained. Since

R&D is the driving force behind economic growth, it's crucial to tap into a talent pool of highly qualified people with solid academic credentials. Encouragement of R&D will lead to more opportunities, especially for graduates.

In 2013, a government panel proposed a number of initiatives to increase private sector investment in R&D activities, including guidelines allowing micro, small, and medium-sized enterprises (MSMEs) to use intellectual property as a source of funding. This was done on the theory that there wasn't enough private sector involvement in scientific research and development.

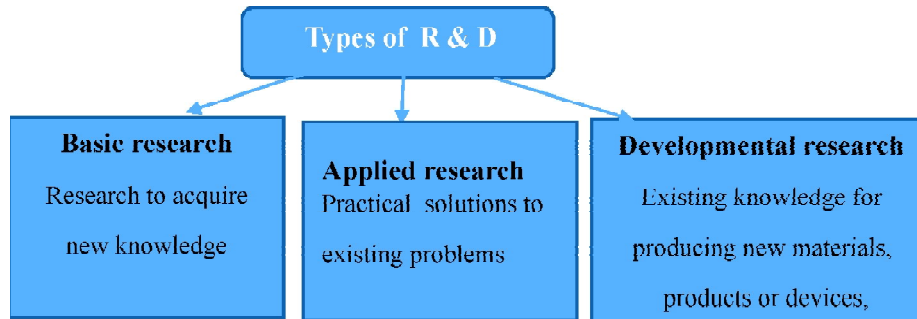
The Modi administration is proactively taking steps to establish India as a major R&D centre in Asia after realising the necessity for increased investment in R&D. The government has also introduced a number of innovative programmes that would support the R&D industry, such as "Make in India," "Start-up India," and "Digital India." It's interesting to note that, according to the most recent statistics from FDI markets, where India attracted 225 FDI projects in R&D activities in the first 10 months of 2022, with 152% more than in the entire year 2021 and more than in any other full-year period ever recorded. Estimates of their reported capital expenditures (capex) show that a third of the global total for 2022 has been invested in these projects, which is more than double the capex announced in Canada, the second-ranked country (Irwin-Hunt, 2022).

On March 3, 2021, while addressing a webinar on the effective implementation of Union Budget 2021 provisions, Prime Minister Modi commented on the significance of the establishment of the National Research Foundation (NRF):

"NRF is being built for the first time in the country. This will strengthen the governance structure of the research-related institutions and improve linkages between R&D, academia, and industry." A funding provision of Rs50,000 crore was allocated for NRF in the Union Budget for 2021-22 year for five years (Basu, 2021).

3. TYPES OF R&D

Projects that businesses do in order to learn more about their industry are referred to as research and development (R&D). Research is generally divided into three categories: basic research (learning new things), applied research (learning new things to create goods and services that may be sold for a profit), and developmental research (developing a new product, service, or method using information that has already been discovered through research or actual experience).



Several industry experts believe that the following major industrial sectors need huge R&D investments in India in order to be a global economic leader:

- Automotive industry
- Software and Information Technology
- Semi-conductors
- Healthcare
- Nanotechnology
- Aerospace and defence
- Digital engineering
- Pharmaceutical
- Optical
- Telecommunication
- Electronics
- Chemical industry
- Energy-producing companies
- Renewable energy

3.1. Four leading companies as R&D spenders in India

Tata Elxsi, one of the world's leading providers of design and technology services, collaborates with clients in the automotive, media, communications, and healthcare industries. It is utilising a number of cutting-edge technologies, including artificial intelligence (AI), the Internet of Things (IoT), big data analytics, the cloud, mobility, virtual reality, driverless cars, electric vehicles (EVs), and semiconductors, as well as their megatrends.

Hindustan Aeronautics is the biggest defence PSU and the unquestioned pioneer in the aerospace and defence sectors (HAL). In addition to being a

large supplier of aircraft, helicopters, engines, avionics, and accessories, the company also plays a vital role in providing maintenance, repair, and overhaul services to the Indian armed forces. HAL spent a significant amount on R&D for the fiscal year that ended in March 2021—a total of Rs 16,874 million. About 12.4% of its revenue comes from this.

Lupin concentrates on a small number of high-quality goods where it can establish a sizable market share, unlike other pharmaceutical companies that aim for a big volume of product launches. Whether it is through acquisitions or increased R&D spending, the corporation has continually kept ahead of the curve. Spending on R&D at Lupin increased from 8% of net sales in fiscal 2013 to 11.5% of net sales in fiscal 2021.

A worldwide company with a strong focus on R&D, Tejas Networks creates and manufactures high-performance optical and data networking equipment for telecom service providers, utilities, governmental, and defence networks. During the fiscal year 2021, the firm spent 1.1822 billion rupees, or 23.1% of its entire revenue, on research and development. Since it was listed in 2017, the expenses related to research and development have risen annually.

4. FOREIGN DIRECT INVESTMENT FOR R&D

In the R&D industry, foreign direct investment (FDI) is allowed on a 100% automatic route, subject to any applicable laws, rules, and security. There was a \$235 million inflow of FDI in R&D in 2015–16, which increased to \$344 million in 2020–21. R&D-intensive FDI is anticipated to supplement domestic technology and knowledge and increase economic growth and development.

Furthermore, a government report titled “*The Case for Foreign Direct Investment in Research and Development in India*” has mentioned that there are only 26 Indian companies on the list of the top 2,500 global R&D spenders, compared to 301 Chinese companies (Jayakumar, 2020). Interestingly, 19 out of these 26 firms represented just three sectors: pharmaceuticals, automobiles, and software. Therefore, there is tremendous space for more industries to expand their R&D investments in the country by attracting foreign collaborations.

5. TAX INCENTIVES ON R&D INVESTMENTS IN INDIA

The tax incentives offered on R&D expenditures in India should also be known by the foreign companies providing FDI for R&D purposes. Some of the tax

incentives under Section 35 of the Income Tax Act, 1961 for scientific research are outlined below (India Law Offices LLP, 2023):

- In-house revenue expenditures: If the revenue expenditures are made for conducting scientific research on the entity's property or developing a scientific facility for the growth of its own business, then a full tax deduction is permitted.
- Capital expenditures incurred internally: If capital expenses are incurred internally (not for the purchase of property), they are 100% deductible from income.
- Similar to this, internal revenue and capital expenses other than acquisition of any land incurred within three years immediately preceding the commencement of business shall be allowed as full deduction in the year in which business is commenced. However, in terms of revenue expenditure, the deduction is restricted only to the salary of an employee engaged in such scientific research or the purchase of raw materials for scientific research. Additionally, a 100% tax deduction is available for expenses paid to a scientific research company that has been approved.
- 100% of the expenditure is deductible as a contribution to an authorised university, college, or other institution for the purpose of funding scientific research (regardless of whether it is connected to the entity's business).
- 100% of the cost of payments made to a national laboratory, university, Indian Institute of Technology (IIT), or other specific individual and authorised by a certain authority may be deducted from income.
- One of the most popular and widely used programmes nowadays is the registration of an entity as a start-up under the Department of Industrial Policy and Promotion's (DIPP) Start-up India Action Plan. In addition to meeting certain other requirements, a start-up as a company or limited liability partnership that is working to innovate, develop, or improve goods or services, or if it has a scalable business model with a high potential for creating wealth or jobs, is eligible to apply for tax exemption under Section 80IAC of the Income Tax Act, claiming up to 100% of profits and gains derived in three consecutive years out of the start-up's operations.

- When anyone invests money in R&D and creates a valuable asset like a patent, Section 35 allows them to deduct expenses. In contrast, if they give it to someone else in addition to using it for their own business, they will also profit from royalties. Under Section 115BBF, this royalty is taxed at a special rate of 10%.
- A corporation involved in the biotechnology industry or the manufacture or production of any good or service may deduct 100% of its revenue or capital investment in internal R&D from its taxes.
- Accelerated depreciation allowance of 40% for investment in plant and machinery and indigenous technology as against 15% for normal depreciation as per Rule 5(2) of Income Tax rules.
- Customs duties, concessional GST, and other incentives for in-house R&D units are also provided.
- The Finance Bill 2023 proposes to amend the provisions of Section 80-IAC of the Act to extend the deadline for the incorporation of qualifying start-ups to April 1, 2024. This will help further foster the growth of start-ups in India and give them a competitive platform.
- The 2023 Union Budget proposes research-related incentive programmes for businesses investing in the development of new pharmaceuticals, novel chemical compounds, and/or novel biological entities (NBEs) to fight outbreaks. It also looks into the possibility of offering a 200% weighted deduction for businesses engaging in such.

The stakeholders believe that, despite being a large-scale initiative, the 2023–24 budget speech by Union Finance Minister Nirmala Sitharaman, announcing that a new programme to promote research and innovation in pharmaceuticals will be taken up through centres of excellence, will encourage skill development and innovation, leading to the production of indigenous versions of medical devices (Sohini Ghosh, 2023).

6. CONCLUDING REMARKS

For India to develop its ecosystem for scientific innovation and reach the \$5 trillion goal, R&D spending must increase to 2.0% of the GDP. India has the know-how and resources to support this expansion, with over 7,000 R&D institutions, 1,140 facilities, and over 9,00,000 employees working there already (GDI, 2021). India is the second-best nation in the world and the top innovation destination in Asia in terms of new innovation centers. Of Asia's

new innovation hubs, it represents 27%. In India, more than 7,000 PhDs in science, including agricultural sciences, are added every year, according to Goenka (2018) while 700 plus are added every year in engineering. Each IIT also produces, on average, about 400 M.Tech. students and roughly 50 PhDs. Additionally, given that the nation still has a shaky relationship with universities, institutes of higher learning, and industry, experts have advised improving students' math and cognitive skills, encouraging investigator-led research, and creating links between national labs and universities in order to strengthen the R&D ecosystem in the country.

It is necessary to take additional measures to increase this investment, including increasing gross economic research and development (GERD), encouraging private sector investment in R&D, forming strategic alliances, implementing programmes for scientific collaborations with international partners, increasing state participation in increasing the volume of R&D share, fostering connections between multinational corporations and local businesses, and encouraging and holding research institutions more accountable. Additionally, a variety of options are already available to both reduce taxes and make the best use of revenue and expenditures related to research and development. R&D-focused organisations must take advantage of these opportunities in order to achieve their goals.

Last but not least, India's only hope to avoid the pain of low R&D investments is to strategically invest in science and research activities. To support firm-level R&D, governments may also use a direct funding or financing strategy depending on the merit of scientific research in the private sector. In light of this, India's corporate sector needs to step up and significantly increase its gross R&D spending to a level commensurate with its position as the fifth-largest economy.

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Conflict of India

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