



# Indian industry needs to move up the value chain

**RESEARCH THRUST.** Mission-led research, academic collaboration and government support is the way forward

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**I**ndian gross domestic expenditure on research and experimental development (GERD) is 0.6 per cent, of which the Indian industry contributes only 0.2 per cent. The Indian industrial contribution to GERD is low compared to advanced economies, such as the US at 2.7 per cent, South Korea at 3.9 per cent and Japan at 2.6 per cent.

There is a consensus that R&D investment needs to be significantly increased for the industry to go up the global value chain, decrease high-complexity imports by indigenisation and boost exports.

While industry GERD is a useful indicator, it is a monolith providing little insight and is arguably suspect, given India's lack of proper R&D expense reporting.

A recent report on the State of Industry R&D in India by FAST India and IIFL Securities remedies some of these issues. They consider the top 10 companies in six sectors and compare them with their global peers on four parameters: R&D inputs, R&D intensity (i.e. R&D expenditure by revenue), the proportion of PhD qualified employees, and outputs, patents and publications per USD billion revenue.

This provides a robust picture of industry R&D. Firms and managements must use these ready numbers to benchmark themselves with Indian and global peers in their sector on various measures of R&D activity and plan corrective steps.

Boards are used to benchmarking their firms on various parameters and R&D indicators should be a welcome addition — once measured (ranked), there will be incentives to improve them.

The report finds that the median R&D intensity, ratio of R&D expenses to revenue, of top global firms was 2.9x Indian firms. Indian firms must increase and earmark spending for R&D-led product innovation and set targets for

revenue growth based on such innovation. This should be done through mission-driven R&D with clear product goals and the right combination of R&D and engineering.

We have seen several successful global examples such as Tesla electric cars, the creation of Covid-19 vaccines and the recent invention of LLM-based chatbots based on missions.

## INDUSTRY-ACADEMIA LINK

A recipe is to have research labs in Indian corporates working closely with products at end and with academic institutions at the other. Such research labs need to closely work with product and business to create a line of sight of revenue growth.

Global research labs have created sophisticated working models, where research managers intermediate conversations between product and research teams to produce striking research-led products and features. For example, Microsoft Excel's flagship FlashFill feature was built under an R&D project at Microsoft Research.

Lack of such collaboration in India is indicated by the second R&D input parameter — global firms documented 3.7x employees with PhD as a proportion of total employees compared to Indian firms.

There must be a concerted effort to employ PhDs in industry. At one end, the quality of PhDs programs has been questionable, while on the other, the lack of employment opportunities make PhD a low-aspiration career. This could be rectified by the industry working more closely with academic institutions and PhD students, like they did for management and engineering programmes. It will enhance student aspirations for doing a PhD, improve incoming talent and create a pipeline for the industry.

The industry and academia should leverage new technologies such as AI and

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GenAI to fundamentally transform research. Take, for instance, the recent collaboration between Microsoft and the US Department of Energy's Pacific Northwest National Laboratory, where they developed novel battery materials that are entirely new and not found in nature.

Joint research projects with academia help test bold ideas at lower risk. A speaker at the Indian Science Festival highlighted successful development of Sodium-ion battery and Hydrogen production technology indigenously by working closely with Indian academia. However, they faced bureaucratic hurdles related to contracts, procurement, and technology transfers.

Incidentally, the Ease of Doing Science Index, 2023 also rated the ease of commercialisation of research in top Indian academic institutions at 55 out of 100. As industry takes up working closer to academia, the government and institutions need to do their part in easing the process.

The IIT Madras Research Park model of "credit point system" for incentivising industrial research has been successful. For instance, Saint Gobain Research India has undertaken 22 R&D projects that have resulted in the launch of over 20 new products and 5 per cent of their patents. There is also an opportunity for the industry to work with the growing deeptech start-up ecosystem. It can be a win-win, where industry can tap into small, focussed teams with great talent and entrepreneurs can get go-to-market support in complex industrial ecosystems. This can be facilitated through industry-led funds and accelerators.

## RESEARCH OUTPUT

Regarding output R&D indicators, global firms published 1.3x research articles as compared to Indian firms and 13.1x more patents than Indian firms when normalised by revenue. While the difference in patents is large, India has seen 63.4 per cent increase in the number of patents filed and a 123.3 per cent increase in the number of patents granted between FY19 and FY23. These are very encouraging trends; however, the final test lies in shaping R&D-led product innovation for creating

best-in-class products from India and boosting exports. The IIT Madras Research and Digital reports on the Indian R&D landscape in AI/ML, Brain Science and Quantum Technologies identify how industry and academia can synergise their strengths to foster translational research develop an Indian capability in strategically important emerging technology domains.

For example, we need to identify national priority use-cases upfront to enlist industry partners from the initial stages of defining applications.

The government also has an important role to play. A ₹1 lakh crore fund to boost private investment in sunrise technologies announced recently by the government is a welcome step. This can be designed to lend debt to corporations to do a mix of building indigenous capacity and technology acquisition to go up the value chain quickly.

Some proportion of the fund could also be modelled as a demand side incentive, an extension of product-linked incentives (PLIs), where value-added products are subsidised, or bulk procured. The newly announced ANRF also has a big target to raise from the industry. The government must allow CSR money to be given to ANRF and government research institutions under ANRF rules.

In summary, Indian firms must invest in mission-style R&D-led product innovation programmes and create research labs that work with academia to enable this. Government must incentivise industry R&D and innovation and simplify the bureaucratic hurdles firms face in working with academic institutions.

The current macroeconomic conditions in India — including a large economy, thriving start-up ecosystem, large local markets and a network of research institutions are favourable for the industry to get high returns on their R&D investments. The Indian industry, government and academic institutions can come together to make India an innovation economy. The time is now.

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