

R&D push holds key to self-reliance

This can be fostered by bringing tech universities and national labs to collaborate with industry on applied R&D projects

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The dream of the earlier 'Make in India' programme and the current quest for an Atmanirbhar Bharat is the manufacture of products which are 'Made in India for the world'. An important, yet under-rated, dimension of an effective Atmanirbhar Bharat is technology.

Consider the case of the Indian motorcycle industry. For almost 25 years, Hero Honda was the undisputed leader based on Honda's highly fuel efficient four-stroke engine technology. When this joint venture came apart in 2011, Honda was able to rapidly build up its independent two-wheeler business in India. Hero had to not only quickly search for alternative technology partners, but increase its R&D spend from under 0.5 per cent of sales in 2013 to about 3.5 per cent in 2016. Earlier, another prominent Indian company, Bajaj, became a significant player in this industry only after it developed the Pulsar which was centred on its proprietary DTSi engine technology.

Smartphone market

What happens when you don't invest in or keep abreast of technology? The experience of Indian companies in the smartphone business is instructive. At one-point in 2015, Indian companies Micromax, Lava and Intex had a combined market share of over 30 per cent of the domestic smartphone market. But, by 2019, their combined market share was less than 10 per cent. The significant gainers were Chinese handset makers Xiaomi, Vivo, Oppo and Realme with over 60 per cent market share.

As these Chinese companies controlled the technology, and the technology supply chains, they could not only produce cheaper due to their global economies of scale, but also provide extreme value to the discerning Indian cus-

tomers for a budget smartphone. Today, one Chinese smartphone manufacturer, BBK Electronics, selling under the Vivo, Oppo, OnePlus and Realme brand-names, dominates the entire value chain — from technology to channels — in the India smartphone market.

While the percentage of R&D spend of Indian companies has increased in general, in most cases it is still much lower than that of global competitors in the same industry. Indian companies often claim that they need to capture a larger share of the domestic and global markets to increase R&D spend, and to capture this market share may require a higher investment in R&D. How do we break this loop?

Government's role

Government is one important player in this context. Fortunately, the government is cognisant of the need for enhanced indigenous R&D and realises the limited resources available with industry to invest in R&D. For the automotive industry, the government has set up the National Automotive Testing and R&D Infrastructure Project (NATRIP). It received government grant of around ₹300 crore in 2017-18.

NATRIP brings together multiple automotive R&D labs of the government under a single umbrella and is a collaborative effort of the Centre, States and the automotive industry. This builds on the Collaborative Research Programme (CAR) of the government that was active between 2003 and 2010, where teams from India's technology universities and institutions received grants of about ₹35 crore to work on ten applied R&D projects for the Indian automotive sector.

One of the projects in CAR was the development of a low-cost engine management system for petrol-powered small vehicles by an IIT Bombay professor, Shashikanth



Collaborative research is a better option in the Indian context ISTOCK

Suryanarayanan. A prototype engine management system was developed, but was not commercialised by the industry partners. To overcome this, Suryanarayanan turned entrepreneur and founded Sedemac Mechatronics in 2007; he is still a faculty at IIT Bombay and Sedemac's Chairman.

Sedemac is an R&D-focussed company which specialises in manufacturing controls for small powertrains. The technology developed in Sedemac is monetised either by licensing to clients or by building a product. Sedemac's products have been used in over 15 million two-wheelers. Sedemac now plans to enter the lawnmower market in the US.

Suryanarayanan's experience points to an important takeaway — bringing technology universities and national labs to collaborate with industry on applied R&D projects will work only if companies develop the absorptive capacity to leverage this collaboration. Absorptive capacity is the ability of companies to recognise the value of R&D from outside, assimilate and internalise this R&D, and finally productise it. Indian companies that can't invest too much in R&D can internalise and productise technology developed by Indian

technology universities and national labs.

But sourcing technology from outside does not eliminate the need for internal R&D. Research indicates that absorptive capacity of a company is directly proportional to the intensity of internal R&D. This is an important reason for Indian companies to stay invested in internal R&D, and the government to continue its policy support for internal R&D investments.

Success stories

Can the collaborative technology development model work? The Swaraj tractor, originally developed by Chandra Mohan and team at the CSIR's Central Mechanical Engineering Research Institute, was successfully developed by Punjab Tractors which was set up in 1970 to manufacture these tractors. It had an annual revenue of about ₹969 crore by the time it was sold to Mahindra in 2007.

A recent blockbuster success of the collaborative research model is the ROTAVAC vaccine. In 2016, more than 200,000 children less than five years of age died of rotavirus infection, and India contributed to 22 per cent of this number. A new strain of rotavirus 116E was isolated from an Indian child at AIIMS New

Delhi in 1986 by Dr MK Bhan and his team. The vaccine that was developed in collaboration with 16 Indian and foreign labs and funding organisations was launched as ROTAVAC in 2015 by Bharat Biotech, an Indian vaccine company with a strong internal R&D practice at one-fifteenth the cost of existing vaccines.

How can Indian technology universities, national labs and companies come together to jointly develop technologies? For technology that is well understood, companies should engage with Indian technology universities and national labs on a 'research services for a fee' model or a collaborative joint-research model.

For example, one of the CAR projects on acoustics diagnostics for two-wheeler engine assembly line was installed and demonstrated at TVS Motor. This led to the development of a PC-based system for engine testing at the end of the assembly line using acoustic and vibration inputs which helped match the speed of engine testing to the production output.

For technology that is still nascent, companies should help Indian technology universities and national labs with requirements and use-cases. The universities and labs can work on developing and licensing production-ready prototypes, and in some cases, spinning-off ventures to productise and commercialise technology.

Enhancement of production engineering capabilities and improvement of market connect are needed to make this happen. Initiatives such as the programme launched by the Gopalakrishnan Deshpande Centre for Innovation at IIT Madras to build a lab-to-market capability in Indian universities with special focus on customer development need to be expanded.

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