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Can Covid-19 spark deep-tech innovation?

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Govt-university-industry interface has historically driven innovation. The Biotech Dept, IITs, start-ups and other firms can show the way

Vaccines are in the headlines now. India has a good track record in vaccine development and production — for example, Rotavac was developed in India under the leadership of MK Bhan from the All India Institute of Medical Science (AIIMS) to address rotavirus infections that cause severe diarrhoea among young children. This vaccine, licensed in 2014, was a collaborative effort between academia, government and industry. But its

development was a long-drawn affair that would have stalled along the way without the persistence of Bhan.

The Covid-19 pandemic has brought a new sense of urgency to innovation efforts. We seem to have the different elements needed for such innovation but we need to find ways of orchestrating these elements for quick results. And, this success needs to be carried beyond vaccines to other deep tech domains as well.

Covid-19 provides a unique opportunity to institutionalise a blueprint for such deep-tech innovation in India. This requires a tango of government, universities and industry. The key lies in matching national priorities with capabilities, funding projects without the usual red-tape, facilitating collaboration, and easing barriers to licensing of intellectual property.

Other countries have done this before. After the Second World War, the US made a serious endeavour to institutionalise its successful experience during the War in the form of a coalition between government, universities and industry, now known as the “Government-University-Industry complex”. Jonas Salk of the polio vaccine fame spent about half a decade developing a successful flu vaccine in the 1940s. What is interesting is that this research was largely funded by the US Army, carried out in a university and licensed to industry.

Many technologies that we take for granted today are outcomes of deep-tech projects of this complex. The most famous is probably the Internet, which had its origins in the Arpanet project in the 1960s. Agencies like DARPA (Defense Advanced Research Projects Agency, an agency of the US Department of Defense), NSF (National Science Foundation) and NIH (National Institutes of Health) have provided the underlying institutional framework for the Government-University-Industry complex to become successful in the US. Not surprisingly, this is one of the important reasons why the US has been the global leader in deep tech and its applications since World War II.

Distinct role

Each member of the complex has a distinct role. The government provides the institutional framework that identifies national priorities, matches these with capabilities, and provides risk funding for projects that aim to solve wicked problems. This is an important catalyst that makes the complex succeed. The universities provide top-notch human resources to build a solution for the problem. The industry provides the

capability to productise, scale and commercialise the solution.

India has a mixed experience in building its own Government-University-Industry complex. We have had some success in highly vertically integrated and strategic deep-tech areas, like space exploration. But we have seen limited success in deep tech that horizontally cuts across different science and technology domains and application sectors.

The race to detect and test at low cost, treat patients, prevent through a vaccine, and ultimately find a cure for Covid-19 are national priorities today. This quest cuts horizontally across multiple domains. Under the leadership of the Principal Scientific Adviser (PSA), organisations across the spectrum including the Council of Scientific and Industrial Research (CSIR), Department of Biotechnology (DBT) and its consortium-friendly arm Biotechnology Industry Research Assistance Council (BIRAC), Indian Institutes of Technology (IITs), start-ups (Mylabs, Agva, etc.) and established companies (Mahindra, Maruti, etc.) have jumped into the fray. So have innovation catalysts such as the Marico Innovation Foundation.

Early results are encouraging with several prototypes ready. These will hopefully result in much better outcomes for India. Is there anything we can do to

ensure this spirit endures and thrives beyond the Covid-19 crisis?

To start with, it is important to match national priorities with the science and technology capabilities. For example, India has rightly asked the office of the PSA and DBT, including BIRAC, to take the lead in combating Covid-19. We suggest that the Office of the PSA should take an even more proactive role in identifying national priorities and matching these with capabilities in the post-Covid future. Once the national priorities and the capabilities required to meet them are identified, projects to develop solutions are commissioned in either universities, government labs or start-ups. However, funding projects is a tricky issue. Government organisations have a preference to provide grants to government-funded universities and labs rather than private enterprises or start-ups. There are successful exceptions within the government.

Extend BIRAC model

BIRAC's flagship scheme BIG (Biotechnology Ignition Grant) provides a grant of up to ₹5 million to start-ups and individuals. BIRAC also supports innovation and commercialisation of deep-tech biotech through different schemes. This well-established BIRAC model needs to be extended to other sectors.

Simultaneously, universities and government labs need to make their internal governance structures more conducive to high-end problem solving. IIT-Madras has become a hot-bed for faculty and student-led deep-tech ventures as well as intellectual property (IP) licensing. This is thanks to its faculty start-up policy that explicitly recognises faculty involvement in start-ups as a legitimate and useful contribution to the Institute, and its commercialisation-friendly business incubation and licensing policies. The IIT-Madras policy can become a role model for an institutional framework around entrepreneurship and IP licensing. The government should also simplify its IP licensing policies from government-funded projects.

India is placing its bets on the Government-University-Industry complex to find a solution to the wicked problem of Covid-19. The Office of the PSA and DBT were quick in drawing up a blueprint in response to the pandemic. India needs to take this model beyond the current context. This approach along with the creation of BIRAC-like programmes in sectors other than biotechnology, and conducive institutional policies for faculty start-ups and IP licensing as in IIT Madras need to be replicated for a number of national priorities before the next crisis comes along.

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