

Technology transfer in the Indian public research system

Prabhu Ram outlines some of the current initiatives to develop capacity in technology transfer in India.

It is an accepted fact that innovations emerge from the university system, and are adopted by industry – a process referred to as ‘bench to bedside’. As government supported institutions, there is need to meet the expectations of the public, through new technologies and new improved processes and methods. The process through which these expectations are met is called ‘technology transfer’.

While new scientific discoveries have thrived in these institutions, there has been a lack of direction when it came to transferring these discoveries to the market. In the new life sciences era that is marked by the convergence of scientific disciplines such as computer sciences, engineering, life sciences, mathematics and statistics, technology transfer becomes an interesting challenge.

In 2005, India adopted a TRIPS-compliant product patent regime. Over the past three years, the focus in the public sector has been on patents and the need for IP protection.

In 2006-2007, the Council for Scientific and Industrial Research (CSIR) had a 20% share of the total patents granted to Indians – with 281 granted patents. These patents cover a broad spectrum – from drugs to traditional medicine to aerospace engineering. Some of the CSIR institutions were successful in transferring the technologies to the private sector. The Central Food Technology Research Institute (CFTRI), Mysore, has been a pioneer in technology commercialisation. In other CSIR institutions, the success has been pretty low, with occasional success stories emerging.

In 2006, the Indian Council for Agricultural Research (ICAR) adopted a new technology transfer/commercialisation policy and guidelines to support the same. As part of the new

policy framework, ICAR has established Institute Level Technology Management Units (ITMC) and Zonal Institute Technology Management Committees (ZITMC) to identify and nurture innovations at the grassroots level. Over the past three years, the focus has been on conducting sensitisation workshops for selected scientists. It is too early to talk about successful technology commercialisation stories in ICAR, except for the animal vaccines.

The Indian Council for Medical Research (ICMR) and the Department of Biotechnology (DBT) have technology commercialisation policies in place, and some success in transferring technologies.

In 2006, ICMR reported 46 technologies for commercialisation by the private sector. The partnerships with Therion Biologics and Shantha Biotechnics have already been recognised as case studies for encouraging innovative collaborations with the private sector.

The patent cell within the DBT has facilitated more than 100 Indian and foreign patents, of which 12 have now been granted.

Means for technology transfer and commercialisation

Knowledge transfer from the public research system to the private sector occurs through various means.

1. Public-private partnerships (PPPs) have become the new mantra for India. In the public sector, many new consortium-based approaches have been formulated post-2005. In the ICAR system, the National Agricultural Innovation Project (NAIP) has been actively involved with the private sector in taking innovations from the bench to the bedside, with each consortium addressing specific technology gaps in the entire value chain.

In the long term, this project is expected to yield many new success stories.

Under the USAID funded Agricultural Biotechnology Support Programme (ABSP II) programme of Cornell University in South Asia, one of the recent successes has been the development of the fruit and shoot borer resistant (FSBR) eggplant. The project involved Sathguru Management Consultants, the private sector company MAHYCO, and a host of public sector research institutions including the Tamil Nadu Agricultural University (TNAU). The FSBR eggplant has been recognised as one of the top 100 innovations for a better world by the Association of University Technology Managers (AUTM) forum in 2007.

2. Most commonly, knowledge transfer in the public sector occurs through publication of scientific papers by the academic scientists. Scientific research is communicated through conference presentations, interviews, and informal discussions. In India, this has been the most common route for knowledge transfers.
3. Technology commercialisation in the public research system is in a nascent stage. It is heartening to see that there are active steps being taken, through the creation of IP cells, appointment of IP personnel, and through intensive IP awareness programmes.

Opportunities for enhancing the discovery-to-commercialisation pathways

1. Structuring industry-academia relationships

In the emerging policy environment with its inherent challenges, there is a growing realisation on part of the academic and research community to collaborate more with industry, leaving aside the differences posed by culture and priorities.

In India, academic consulting has been the

simplest form of academia-industry linkage across the national R&D ecosystem. Industry is a good source to secure funds for research. However, in the absence of a formal legal framework for technology transfer at national level and institution level, there has been no proactive initiative from the



research institution end to woo industry. Industry occasionally approaches academics at research institutions for consulting. Relationships between private sector and research institutions are formalised through memoranda of understanding (MOUs), with no guidelines on IP ownership and transfer. Any knowledge generated in consultancy projects accrues to the private company sponsoring the project.

On the part of the public sector research system, IP management has not been considered a fundamental component of the overall project management, and not much thought has been given to priority research setting.

Over the past three years, much thought has been given to IP management in the public research system. This increased awareness has led to development of institutional IPR policies and guidelines at the key national research organisations – CSIR, ICMR, ICAR – and at key academic institutions such as the Indian Institutes of Technology (IITs) in Bombay and Delhi and the Indian Institute of Science (IISc) Bengaluru.

The IP policies at IISc Bengaluru and IIT Bombay have detailed guidelines on extramural consulting and have sections devoted to conflict of interest.

To promote entrepreneurship at the institution level, IISc Bengaluru and IIT Bombay have set up umbrella organisations. At IISc, the Society for Innovative Development (SID) is a forum that supports its faculty and students to incubate their technology ventures.

The Society for Innovation and Entrepreneurship (SINE), hosted by IIT Bombay, promotes entrepreneurship at the institute through a business incubator that provides support for technology based entrepreneurship.

At IIT Delhi, the Foundation for Innovation

and Technology Transfer (FITT) is engaged in commercialising IP emanating from academic and student research. Between January and July 2008, 17 patent applications were filed by academics through the FITT.

Some of the recent initiatives in India to facilitate greater academia-industry partnerships are elucidated below:

a. New Millennium India Technology Leadership Initiative (NMITLI)

This is one of the largest public-private partnerships in R&D in India, started by the Government of India, and monitored through the CSIR. NMITLI seeks to discover and harmonise the strengths of publicly funded R&D institutions, academia and industry, and through this process, catalyse scientific and technological innovation in some selected niche theme areas.

Under NMITLI, two types of projects find support – nationally evolved and industry originated projects. NMITLI funds the entire project (in most cases) as a grant-in-aid to institutional partners in the public domain (R&D and academic institutions) and as a soft loan (3% simple interest payable in 10 instalments) to private sector partners.

From 2000 to date, NMITLI has funded 42 projects with an outlay of INR 3000 million, involving 222 public-funded academic and R&D institutions, and 65 private sector companies. The projects have primarily centred on biotechnology; drugs and pharmaceuticals; and chemicals.

One of the success stories of NMITLI is the development of LLL-3348 (Desoris), a proposed oral treatment of moderate to severe chronic stable plaque-type psoriasis by Lupin Labs, a pharmaceutical company in collaboration with a national R&D lab, Central Drug Research Institute (CDRI) based at Lucknow and an academic institution, National Institute of Pharmaceutical Education and Research (NIPER), at Chandigarh. Desoris is currently undergoing Phase II clinical trials.

b. The Small Business Innovation Research Initiative (SBIRI)

The SBIRI is a scheme initiated by the Department of Biotechnology in 2005 to generate ideas through a unique process involving technology producers and users with the aim of generating products that could only be produced with the help of the private sector. The SBIRI scheme is modelled on the lines of the Small Business Innovation Research (SBIR) grants of the US that fund small business development of biomedical discoveries. Timely product development is the sole undeviating goal under this scheme, and this is facilitated through the active engagement of the private sector with the projects of the partnering research institutions.

The projects under the SBIRI cover all sectors of biotechnology, namely medical, agriculture, food, industrial and environmental, and biomedical devices and instruments.

From the time of its inception, the scheme has received a total of 398 proposals from around 250 private sector companies. Of the 398 proposals, nearly 75% can be categorised as early stage research (phase I); 20% of the proposals are for scale-up and late development of research leads in the phase II category; 5% of the proposals are a combination of early stage research and scaling-up. Approximately 155 projects are collaborative in nature involving two or more partners from public R&D institutions.

c. National Agricultural Innovation Project (NAIP)

The Government of India launched the NAIP, with support from the World Bank. This is a 6 year programme, initiated in 2006 and slated for completion in June 2012. NAIP is being implemented by the ICAR with an aim to accelerate the collaborative development and application of agricultural innovations between

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not alone be sufficient for research to develop (the recent example of large cut backs to the South African Research Chairs Initiative makes this clear), research and innovation cannot thrive in a negative policy environment. Gaining the support of Eastern African governments would be an enormous challenge given the comp-

lexity of issues each is currently addressing. However, successful advocacy would be fundamental to the long term survival of an Eastern African Research and Innovation Management Association.

The views expressed are not necessarily the views of Addis Ababa University. **RG**

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public research organisations, farmers, private sector and other stakeholders. The NAIP builds on the success of its precursor, the National Agricultural Technology Project (NATP). The NAIP accords high priority to the generation and transfer of innovative agricultural technologies. A key novel feature of NAIP is its use of competitive funds to establish consortia of research, enterprise and developmental organisations on selected themes, with actors engaged in all stages of a value chain, from supply of inputs to harvesting of a particular commodity.

While the above umbrella frameworks provide for increased academia-industry collaborations in a spectrum of research sectors, there is still a need for the public research institutions to enhance their learning curve. There is also a need for academia to understand that relationships with the private sector are dynamic in nature, and never static. Towards this end, it is imperative to ensure prompt reporting of research results and in adherence to the agreed milestones in collaboration programmes.

The private sector needs to understand the constraints under which academic scientists and research institutions work. They need to work on agreements that benefit both the parties, and work with the public sector in alleviating their fears of entering into relationships with the industry.

2. Encouraging research at public institutions

Over the past many years, there has been a recognition that India needs to enact a legislation that supports science commercialisation. India is currently taking steps to formulate a policy act on the lines of the US Bayh-Dole Act.

A draft bill, Public Funded R&D (Protection, Utilisation and Regulation of Intellectual Property) Bill

2007, has been prepared and is yet to be introduced into India's parliament.

While there is a debate raging on about the draft legislation and speculation on its contents, it is prudent to see how tech transfer in the US has increased since the 1980s. The Bayh Dole Act has been instrumental in contributing more than USD 40 billion to the US economy every year, and in creating more than 26,000 jobs.

However, the Indian institutional landscape (nature of institutional research, the culture in academic institutions and the particular nature of relationships with the industry) is completely different from that prevalent in the United States, and this tends one to reason that the Indian legislation should be properly framed with due attention given to the components of such a policy framework.

3. Facilitating Knowledge Transfers in India

In 2005, CSIR, ICAR, ICMR and DBT established a forum to engage in critical dialogue on technology transfer. The Society for Technology Management (STEM) has, over the past three years, seen more than 100 new members joining it. Apart from the Indian public research system, STEM today includes membership from public research systems from South-East Asia and the Middle East. It also includes membership from leading life science companies in the United States, Europe and India.

Many scientists from the public sector have acknowledged the role of STEM in enhancing their IP awareness and of their knowledge in technology licensing, licensing agreements, and dissemination of research results.

STEM is currently engaged in developing metrics for technology transfer in Asia, with a key focus on India.

Future Steps

Some key steps that need to be taken include:

- Generating a broad research dataset that establishes critical linkages along the discovery-to-commercialisation continuum for establishing critical benchmarks.
- Minimising bias in industry sponsored research, by prompt disclosure of the source of research support in scientific publications and conferences.
- Formulating conflicts of interest policies at the institution level. IISc Bengaluru and IIT Bombay have such policies in place, as part of their IPR policy.
- Identifying key issues and challenges around technology transfer and commercialisation, and helping define India's policy position.
- Active collaboration amongst the apex research organisations – CSIR, ICAR, and ICMR – to review their institutional policies and best practices, and identifying ways to enhance their impact in technology transfer.
- Benchmarking best practices, active processes and success stories will help make technology transfer and commercialisation happen better, faster, and with fewer obstacles.

For the benefits of academic-based life-sciences research to percolate to the public through effective knowledge transfer mechanisms, steps need to be taken to address concerns regarding: current scientific research priorities, structuring academic-industry relationships, and, above all, the policy initiatives to enable technology transfer. Addressing these concerns will ensure that public funded research realises its full potential, and justifies the huge public investment.

The views and opinions expressed here, and any errors therein, are solely those of the author and do not necessarily reflect the views of Sathguru. **RG**