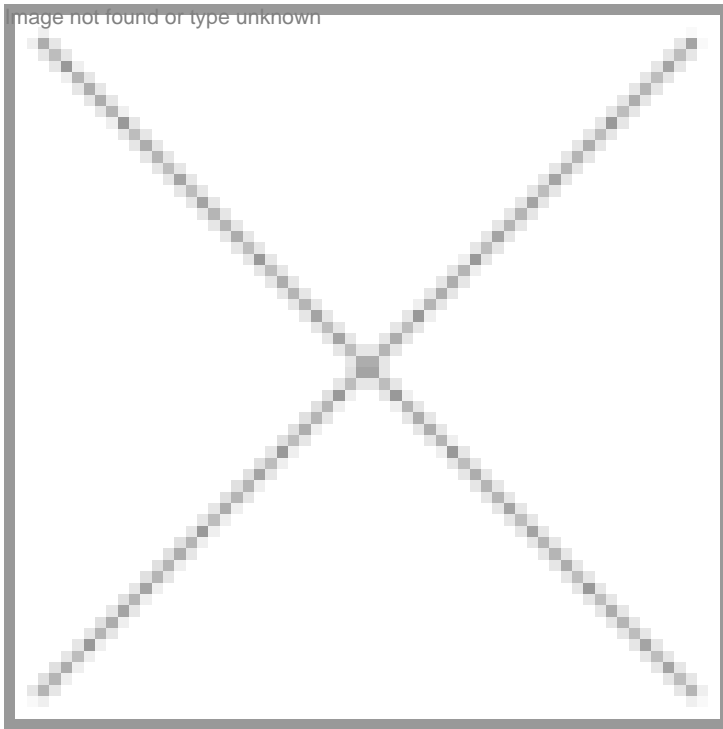


PPP plays research catalyst

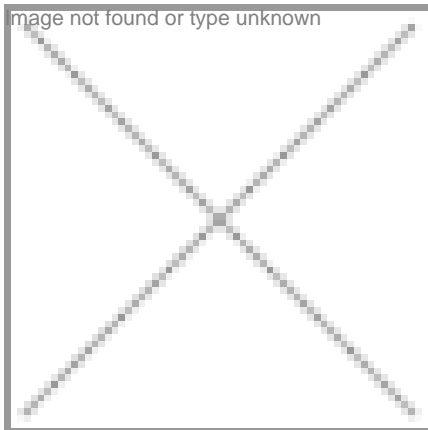
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As public private partnerships (PPP) form the backbone of Indian biotechnology industry - leveraging them further can act as a catalyst to boost the product outcome and commercialization

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Having crossed the \$3 billion mark in 2009-10, the Indian biotechnology industry is prepped to achieve significant growth in the future. For this, the industry is heavily dependent on the country's innovation infrastructure, and on the significant role of

In this regard, Government of India, along with the Department of Science & Technology has launched various initiatives like INSPIRE (Innovation in Science Pursuit for Inspired Research), to attract talent into science. The government is also embarking on a major multi-billion dollar-initiative model to harness India's innovation capability. Fifty percent of this is being funded by public private partnership (PPP). The vision is to catapult the country to one of the top five pharmaceutical innovation hubs by 2020, with d worldwide, coming from India.

The Department of Biotechnology (DBT) has fostered PPPs to lay their own infrastructure. Some noteworthy examples of such initiatives are the Biotechnology Industry Partnership Programme (BIPP) and the Small Business Innovation & Research Initiative (SBIRI) - that have been a motivating factor for many small and medium enterprises (SMEs).

Says Dr Purnima Sharma, managing director, Biotech Consortium of India, "SBIRI has opened new opportunities for innovation in the biotechnology industry. Through this program, many successful examples of R&D and commercialization of

products have been witnessed.â€?

Further, the Indian Council for Medical Research (ICMR) has actively supported clinical research, through its various initiatives and facilities for microbial containment, pre-clinical toxicology units. The Department of Pharmaceuticals (DoP) has initiated efforts to establish a large animal facility, compliant with good laboratory practices (GLP), through the PPP route.

Besides these central government initiatives, various state governments are promoting and providing incentives for the creation of biotech parks.

R&D as a driver for PPP

In India, R&D retains its position as a key driver of the biotechnology industry's success. Therefore, there is a strong need for public private partnerships for nurturing and catalyzing R&D.

To provide an impetus to PPPs, the government has directed considerable efforts, by supporting upstart firms with seed funds, through the New Millennium Indian Technology Leadership Initiative (NMITLI) and Special Drug Development Research Initiatives (SDDRI). This is, specifically, to promote the flow of knowledge from national laboratories and institutes to industry - for the development and commercialization of technology. A total of six biotech parks are operational in various states under the public private partnership, and 10 parks are in different stages of development across the country.

Focus on commercialization

"Image not found" enterprise partner public science and the institutions in their translation and the national efforts. Let them join hands with commercial institutions, in creating new research strategies for both strategic and non-strategic applications. Let there be publicly-owned and privately-operated world class R&D facilities.â€?

- Dr Manmohan Singh, Prime Minister of India, on participation of private sector in research

The sharing of ideas, facilitating technology transfer and technical expertise, form an important part of public private partnerships in R&D. The CSIR-led institutes like National Chemical Laboratory (NCL), Pune; Centre for Drug Research Institute (CDRI), Lucknow and Institute of Microbial Technology (IMTECH), Chandigarh - are all at the forefront of

IMTECH has collaborated with 32 companies including Ranbaxy, Cadila Pharmaceuticals, Lupin and Panacea Biotech for various contract research projects. Recently, CDRI, Lucknow has entered into a contract research collaboration with Bangalore-based

Biocon.

â€œThere are many success stories related to drug development in CDRI, with pharmaceutical industries in private and public sectors. Out of the 16 new drugs/products developed in India, CDRI alone has a share of 11, which shows our important role,â€? says Dr Rajendra Prasad, head, CDRI.

Innovation cannot be successful unless knowledge and information in any R&D project are effectively shared. In this direction, virtual teams provide an environment for flourishing innovation in R&D; and bring about knowledge spillovers within enterprises, bridging time and place; therefore, making them not a choice, but a requirement. The Open Source Drug Discovery (OSDD) project by CSIR has been the biggest initiative in this direction so far.

â€œThe PPP remains one of the important needs of current times, and there is a need for the industry to come forward and recognize the potential of Indian scientists and their capabilities in R&D,â€? says Dr Rajesh Gokhale, Director, Institute of Genomics & Integrative Biology (IGIB).

A public private partnership can play a vital role in addressing issues during a pandemic; to make sure that innovations in biotechnology reach the masses, when critically needed

At the onset of influenza A (H1N1) pandemic, Department of Biotechnology (DBT) took a unique initiative to nurture R&D and innovation in biotechnology industry, under Biotechnology Industry Research Assistance Programme (BIRAP).

DBT invited proposals from Indian biotechnology companies for indigenous development of a vaccine against influenza A (H1N1), under the Biotechnology Industry Partnership Programme (BIPP).

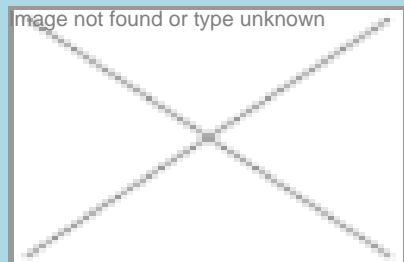
Of the many applicants, New Delhi-based Panacea Biotec was awarded the financial assistance of 10 crore for the

development of a vaccine. The Pandylflu vaccine is all set to be launched soon.

Objectives: This pact and financing assist regulatory requirements, tax and grant benefits; additionally, knowledge sharing in research and innovation between industry and public institutes. The issue (Medium) was given to Panacea Biotec to encourage development, manufacture and supply of Pandylflu - a vaccine of paramount national

Bt Brinjal to tackle pesticide bullets

The development of Bt Brinjal has been an important achievement for the science community, but what it also stands for, is a harmonious PPP



The Bt Brinjal was developed by the Maharashtra Hybrid Seeds Company (Mahyco). The company used a DNA-construct containing the cry1Ac gene, a CaMV 35S promoter, and the selectable marker genes nptII and aad, to transform young cotyledons of brinjal plants. A single copy elite event, named EE-1, was selected and introduced into hybrid brinjal in Mahyco's breeding program. Mahyco then donated the Bt brinjal technology to Tamil Nadu Agricultural University (TNAU), and University of Agricultural Sciences (UAS), Dharwad. Later, the event EE-1 was back-crossed into

Objectives: To create insect- and insecticide-free brinjals for the benefit of farmers and consumers in India. Also to foster collaboration between private sector and public institutes, for cooperation in sharing of technological knowledge.

Success factors: Bt brinjal was found to be effective against Fruit and Shoot Borer (FSB), with 98 percent insect mortality in Bt brinjal shoots; and 100 percent in fruits, compared to less than 30 percent mortality in non-Bt counterparts. The Multilocation Research Trials (MLRTs) confirmed that Bt brinjal required, on an average, 77 percent less insecticides than non-Bt counterparts, for control of FSB, and 42 percent less, for the control of all insect pests of brinjal.

Key Takeaways: The benefits of Bt brinjal, translate to an average increase of 116 percent in marketable fruits over conventional hybrids, and a similar increase over popular open-pollinated varieties (OPVs). Furthermore, the significant decrease in insecticide usage reduced the farmers' exposure to insecticides, and results, in a substantial decline in pesticide residues in brinjal fruit (yield). The scientists have estimated that Bt brinjal will deliver farmers a net economic benefit ranging from **IN 16,299 to IN 19,744 per acre** — with national benefits to India exceeding **IN 1700 crore per year**.

Bt brinjal has enormous potential to benefit both farmers and consumers. The results of the studies submitted to regulatory authorities in India confirm that Bt brinjal offers the opportunity to provide effective control against FSB, and decrease insecticide input by as much as 80 percent. Bt brinjal also yields significantly more marketable fruit (yield) than conventional hybrids and open-pollinated varieties.

Way Forward: The development of Bt brinjal, the first biotech-vegetable crop in India, is an appropriate and timely step, because it will further demonstrate the significant benefits that biotechnology offers farmers, consumers and India as a nation. The insect-resistant Bt brinjal hybrids and varieties were developed through close and harmonious cooperation between public and private research institutions. The joint contribution of the two sectors is of critical importance, given that national food security is a strategic issue. The adoption and acceptance of Bt brinjal by farmers and consumers in India, will be a highly significant event, that will enormously benefit the country and the world.

One of the main barriers to PPP are apprehensions about the misuse of proprietary material or knowledge, by the collaborators in a partnership.

The high transaction costs of operationalization and coordination of partnerships, mutual mistrust and negative perceptions have been major hiccups for the collaborators. The inter-sectoral partnerships have been able to deliver anticipated results in the form of advanced researches, and acceptability by companies worldwide.

Future outlook

The PPP will play a fundamental role in the advancement of biotechnology in the near future. Therefore, the hurdles coming in the way of partnerships need to be addressed, mutually by industry leaders and heads of public institutes. The sharing of knowledge is a necessity, and more platforms should be built for successful interaction and exchange of information between both sides. However, it goes without saying that it is not only the duty of government agencies to take this forward, but a larger participation of the private sector is also essential.

Some of the Public Private Partnerships in India

S No.	Company	Public Institutes
1	Serum Institute of India, Pune	? World Health Organization (WHO)
		? Health Protection Agency (HPA)
2	Panacea Biotech, New Delhi	? National Institute of Immunology (NII)
		? Jawaharlal Nehru University (JNU)
		? Biotech Consortium of India Ltd (BCIL)
		? National Institute of Health, USA (NIH)
3	Avesthagen	? National Centre of Biological Sciences (NCBS)
		? University of Agricultural Sciences (UAS)
		? ICRISAT
		? Imperial College, London, UK
4	Shantha Biotechnics, Hyderabad	? Center for Cell and Molecular Biology (CCMB)
		? Indian Institute of Science (IISc)
		? Bhabha Atomic Research Centre
		? National Institute of Immunology (NII)
		? Institute of Chemical Biology (ICB)
		? Jawahar Lal Nehru University (JNU)
5	Rallis India, Mumbai	? International Centre for Genetic Engineering and Biotechnology (ICGEB)
		? Indian Institute of Science (IISc)
		? University of Madurai
		? World Health Organization
6	Strand Life Sciences, Bangalore	? Indian Institute of Science (IISc)
		? Council for Scientific and Industrial Research (CSIR)
		? Center for DNA Fingerprinting & Diagnostics (CDFD)
7	Syngene	? Indian Institute of Science (IISc)
		? Indian Association of Cultivation of Sciences (IACS)
8	Bharat Biotech, Hyderabad	? Department of Biotechnology (DBT)
		? International Centre for Genetic Engineering and Biotechnology (ICGEB)
		? All India Institute of Medical Sciences (AIIMS)
9	Bangalore Genei	? Center for Cell and Molecular Biology (CCMB)
		? Indian Council for Agricultural research (ICAR)
10	Monsanto , Bangalore	? Indian Institute of Science (IISc)
		? The Energy & Resource Institute (TERI)
11	Wockhardt, Mumbai	? International Centre for Genetic Engineering and Biotechnology(ICGEB)
12	Biocon, Bangalore	? Central Drug Research Institute(CDRI)
		? Karolinska Institute, Sweden
13	Life Care Innovations	? Lucknow Biotech Park
		? Punjab State Technical Council
14	Transgene Biotek	? Council for Scientific & Industrial Research (CSIR)
		? Indian Universities

Rahul Koul in New Delhi