



Biotechnology Sector in India

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This article is based on **“Different peas in different pods”** which appeared in The Hindu on 26/09/2019. It talks about challenges pertaining to India’s biotech sector along with the possible solutions.

India is among the first countries to set up a specialized agency i.e. department of biotechnology under the Ministry of Science and Technology for the development of research and human resources in the biotechnology sector in 1986.

What is Biotechnology and its Applications?

Biotechnology harnesses cellular and bio-molecular processes to develop technologies and products that help improve our lives and the health of our planet.

Applications of Biotech

- **Heal the world**
 - Reducing rates of infectious disease.
 - Saving millions of children's lives.
 - Changing the odds of serious, life-threatening conditions affecting millions around the world.
 - Tailoring treatments to individuals to minimize health risks and side effects.
 - Creating more precise tools for disease detection.
 - Cleaning the ecosystem.
- **Fuel the world**
 - Reducing the use of and reliance on petrochemicals.
 - Using biofuels to cut greenhouse gas emissions.
 - Decreasing water usage and waste generation.
 - Tapping into the full potential of traditional biomass waste products.
- **Feed the world**
 - Generating higher crop yields with fewer inputs.
 - Lowering volumes of agricultural chemicals required by crops-limiting the run-off of these products into the environment.
 - Developing crops with enhanced nutrition profiles that solve vitamin and nutrient deficiencies.

Challenges faced by Biotech

- Biotechnology research often requires access to laboratories with high-end scientific infrastructure, the supply of expensive chemicals and reagents with minimum shipping time between the supplier and the user, and a disciplined work culture and documentation practice due to regulatory and intellectual property filing requirement.
- **Poor quality of research:** Biotech research paper is based “publish or perish” culture that incentivises numbers over quality.
- Over the years, the focus of research has slowly **shifted from fundamental to applied research.**
 - However, the fruits of applied research will only come if there is an investment in basic research without asking for quick returns.
- Compared to the developed economies (the United States), biotechnology research in India is mainly **funded by the public exchequer.**
 - Unless the private sector starts supporting applied research and engages with academic institutions, the innovation in applied and translational biotechnology will be minimal.
- **Low wages of scientists** (compared to the developed economies) and a few institutional research base have not helped create more jobs in biotechnology.

- Biotechnology products and solutions often require **ethical and regulatory clearance**, making the process long, expensive and cumbersome.
- As the nature of the **work in the biotechnology sector is specialised**, most jobs are filled with experienced and skilled scientists leaving the demand for young and inexperienced ones low.
- In terms of innovation, entrepreneurship, and technology creation, the biotechnology sector requires years of experience in the domain, access to labs with sophisticated instruments, sustained and long-term funding to innovate.

Learning from China

- China has many more labs with the best of scientific infrastructure; each with more number of skilled human resources trained in regimental work culture and trained to practise rigorous documentation.
- Higher science budget coupled with a flexible hiring system has made Chinese universities and research labs attract many overseas Chinese scientists.
- Due to all these advantages, Chinese students and scientists outnumber Indians by nearly 5:1 in most American universities in the life sciences/biology-related disciplines.

Way Forward

- While continuing and increasing the share of funding in basic research, the government **should encourage and incentivise the private sector** to invest substantially in applied research.
- In this context, initiatives like **Biotechnology Industry Research Assistance Council (BIRAC)**, which aim is to play a transformative and catalytic role in building a US\$ 100 billion Indian bio-economy, is a step in the right direction.
- There is a need for sustained **innovation and product development model** in the biotechnology, like the one followed by Boston and Silicon Valley in the U.S.
Along with the availability of funding, infrastructure and skilled workforce, the presence of top-notch research institutions and universities in the vicinity of the Biotech industry, makes these regions the most attractive locations for biotech startup companies.
- Therefore, India needs to provide an **academia-industry linkage** in the biotech sector.
 - It will require a flexible policy in the institutes to allow scientists incubate startup companies in their labs while retaining their positions.
 - Also, the government should let scientists from research institutions and universities take unpaid leave to join the industry for a fixed period.

India needs to go beyond the traditional indicators such as the numbers of institutions formed, students and scientists, trained, and the number of patents filed to judge the sector's performance, and its impact on the economy and society as a whole. The biotech sector needs to be **augmented through artificial intelligence-based tools, applications of big data in biology and India's strength in Information Technology.**

Drishti Mains Question

India needs to go beyond the traditional indicators such as the numbers of institutions formed, students and scientists, trained, and the number of patents filed to judge the biotechnology sector's performance, and its impact on the economy and society as a whole. Discuss.