



Science Diplomacy and Its Role in Boosting Biotechnology Development in Peru



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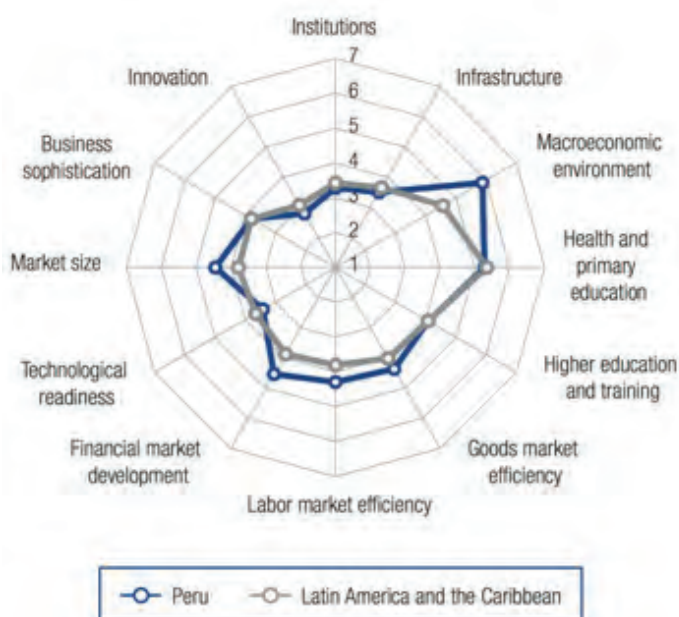
Introduction

The new Peruvian approach considers Science, Technology and Innovation (STI) as the fundamentals to increase national competitiveness and to pursue national developmental goals. According to the reports, the investments of the country in R&D were around 0.10 per cent of the national GDP during the last few years; revealing R&D indicators as compared to the rest of the world, and in particular, to its own region (UNESCO, 2007) (Figure 1). As a result, the STI system in the country remained laggard for many decades affecting its competitiveness and indigenous innovative capabilities. The Peruvian Government deployed strong efforts to reverse its negative STI indicators and to repositioning science and research in the socio-political and economic agenda. The National Council of Science, Technology and Technological Innovation (CONCYTEC) is the leading Governmental institution responsible for providing direction, guidance, coordination, supervision and evaluation of public activities (STI) in Peru.

The new strategy of CONCYTEC proposes to focus national efforts on the areas, which due to their defined characteristics, may have a strategic potential for development (CONCYTEC, 2014). Recently, CONCYTEC has generated participative spaces for academia, public and private sectors, to identify essential programmes and projects that would evolve strategies on the lines of action and investment in STI. Biotechnology (BT) is a potential growing sector which would have a direct impact on many areas such as human and animal healthcare, agriculture, environment and industry. Thus, the development of the modern biotechnology in Peru is considered a priority area.

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Figure 1: Peru, Global Competitiveness Index



Source: World Economic Forum, 2015

Strategy for Development of Biotechnology

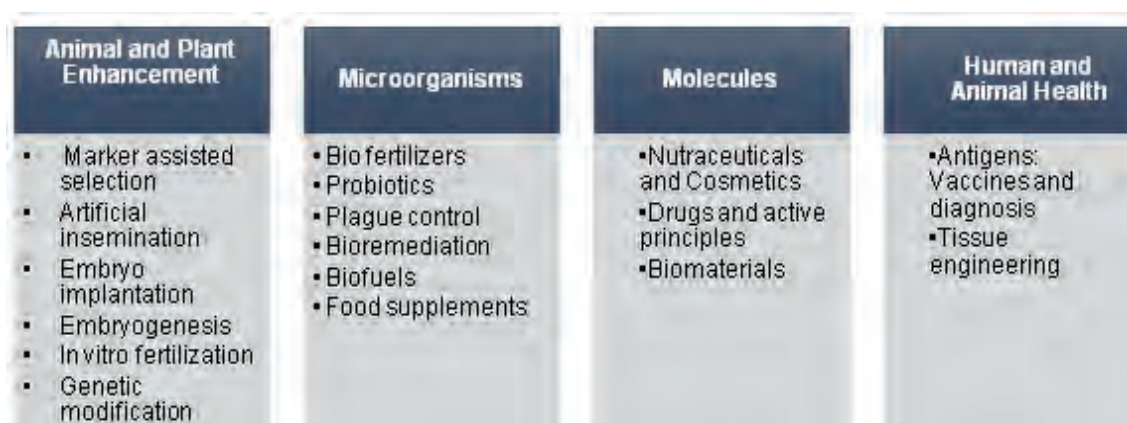
BT has been included among the five main national STI programmes due to its potential use as a tool to improve national competitiveness and to bring in innovative solutions. The CONCYTEC in 2016 announced the launching of the National Transversal Biotechnology Programme (PRONBIOTEC 2016-2021) which aims to promote application of biotechnology

as a strategic transversal technology to address the constraints of the country’s economic development and national challenges (Consejo Nacional de Ciencia y Tecnología, 2016). This is the first document developed under the stakeholder consultancy that details the Peruvian vision for its BT sector and establishes its goals for the next five years.

Peruvian biotech system

The document reports a deep diagnosis about

Figure 2: Focus areas in research in Peru



Source: PRONBIOTEC, 2015

the current situation of the national innovation system in biotech; and concludes that the country has a weak system in this emerging technology owing to many factors. The Peruvian biotech system has many challenges. The first of the four identified was scarce highly qualified human resource in different areas of BT. Peru can only count on 104 PhDs; 64 per cent of them in health biotech. Also there is a poor indication among academia-government-private sector. There have also been insufficient incentives for innovation in BT. In conclusion, there is a weak BT system in Peru, and it would be a long way to transform this.

Core areas

PRONBIOTEC's envisions that modern biotechnology would be adopted and applied as a driving force for sustainable economic development in Peru. The national efforts need to be focused on four thematic areas: (i) animal enhancement, (ii) microorganisms, (iii) molecules and (iv) human and animal health (Figure 2).

PRONBIOTEC suggests that development of modern BT in Peru would demand specific efforts directed to overcome bottlenecks which restrains the country in reaching its STI goals. The strategy sets up the actions to be implemented around four following important areas:

- Increasing number of highly qualified manpower in biotechnology;
- Improving interaction among government-enterprise-academia in the biotech sector;
- Improving incentives for innovation in biotech; and
- Increasing results of scientific research in biotech.

According to CONCYTEC, the country would have to invest around US\$ 162 million during 2016- 2021 for leveraging biotech sector.

Lessons from India's Experience

The early stage

India started visioning its national biotechnology system more than thirty years ago. In 1986,

the creation of a separate Department for Biotechnology (DBT) was the first remarkable milestone of the Government to foster national capabilities in this field. It is important to mention that the BT growth has been due to major efforts by the Government. The political decision to allocate biological sciences for catching up with this technology with the rest of the world was timely and it was accomplished with an investment of USD 210 million (Chakraborty & Agoramorthy, 2010) to fund policies for (i) development of human resource, (ii) creation of appropriate infrastructure, (iii) research and development, and (iv) creation of a regulatory framework (Ministry of Science and Technology, 2016). Afterwards, various institutions in biological sciences for R&D were set up like the National Institute for Plant Genome Research (NIPGR), National Brain Research Centre, the Centre for DNA Fingerprinting and Diagnostics, Institute of Bioresources and Sustainable Development and the Institute of Life Sciences, the Translational Health Science and Technology Institute (THISTI), Institute for Stem Cell Biology and Regenerative Medicine (INstem), National Agri-Food Biotechnology Institute (NABI) and National Institute of Biomedical Genomics (NIBM) (Ministry of Science and Technology, 2016). Also, schemes were mainly centred on manpower development, including training of researchers abroad; creation of the BCIL (Biotech Consortium India Limited) to promote industry interaction; generation of R&D incentives, and development of guidelines and regulations in BT according to the international standards (Padmanaban, 2015).

New biotech frontier

In the past, India was successful in BT to create technologies for addressing issues concerning population and for providing affordable solutions for social welfare. India has been one of the 12 top countries in terms of number of BT enterprises in the world, especially within the health care sector. Some achievements in Indian health biotech include the development of a recombinant Hepatitis B vaccine by Shantha Biotechnics, a local enterprise; synthesis of various human biomolecules for protein

therapy; and development of bioinformatics software (Parveen Arora, 2005). Also there are many biological products under development, including inexpensive vaccines against rotavirus. Indian infrastructure, endogenous innovative capabilities and increased investment gave the country positive results to be a key player in global scenario of BT.

The Government of India has launched the novel National Biotechnology Development Strategy (NBDS) 2015-2020, which has been elaborated by the DBT in consultation with the stakeholders (Department of Biotechnology & Ministry of Science & Technology Government of India, 2015). The strategy include guiding prospects, and ten key elements towards transforming India in a world-class bio-manufacturing hub in the areas of health care, food and nutrition, energy and education. The strategy envisions global leadership of India for using biotech to reach social and market interests, supported by a strong infrastructure for cutting-edge R&D and increased skilled manpower. The NBDS also outlines interdisciplinary research in basic as well as translational research in some frontier areas. It prioritizes attraction of global and national alliances and exchange of knowledge among many international institutes. The Government is planning to invest US\$ 100 billion in this industry by 2025 to implement the policies and programmes at the NBDS.

Science Diplomacy for STI

Science Diplomacy as a tool to enhance STI capabilities has also captured attention of developed and developing countries. SD is an umbrella term that, according to Dr Nina Federoff, Science and Technology Adviser to US Secretary of State, includes use of scientific interactions among nations to address common problems facing humanity and to build constructive, knowledge based international partnerships (The Royal Society, 2010). SD can be expressed in three dimensions: As contribution of science to foreign policy objectives; Use of science to facilitate international science cooperation; and science cooperation to improve relations among

countries. International experiences on SD and strategies for implementation of SD in the foreign policies of countries are well documented. However, the approach of SD among developed and small economies may be contrasting. In emerging economies, aspiration to reach a well-developed innovation system to become a higher value producer contrasts with poor set of advanced skills. Therefore, efforts to strengthen national science and innovation system would require identifying synergistic relationships with regional and international partners to address domestic deficiencies.

Peru aims to construct a knowledge-based economy through intensive use of science and technology and better performance in innovation. Due to the existing gaps in knowledge, funding and infrastructure in fields like biotechnology, there is a need to redesign national strategies to build indigenous science capacity. More sophisticated SD strategies should be considered as mean to boost achievements in STI, and they cannot be separated from broader diplomatic agenda.

India is keen to cooperate and share with developing countries. India established diplomatic relations with Peru way back, and there are increasing economic and business interests between both the nations and they are expected to escalate in the next three to four years by exploring signing of a Free Trade Agreement (FTA) (Sooraj Aurora 2016). Currently diplomatic interests of both rely on trade agreements but there are plenty of opportunities which need to be explored, especially in scientific and technology capabilities. Peru can gain substantially from India's experience in biotechnology and new emerging technologies. Moreover, both countries can mutually collaborate in health, agriculture and biodiversity also.

Conclusion

In order to empower its own National System in biotechnology and take advantage of its natural resources and biodiversity, Peru can turn its current landscape using Science Diplomacy as a mechanism for integration, cooperation

and development. The strategy designed by PRONBIOTEC for the next five years can be boosted if it includes alliances with partner countries and increase its scientific cooperation in prioritized areas, especially in capacity-building. In this context, the outstanding performance of India in biotechnology and its desire of helping developing countries would be a unique opportunity that need

References

- Chakraborty, C., & Agoramoorthy, G. (2010). A special report on India's biotech scenario: Advancement in biopharmaceutical and health care sectors. *Biotechnology Advances*, 28(1), 1-6. <https://doi.org/10.1016/j.biotechadv.2009.10.007>
- CONCYTEC. (2014). *Crear para Crecer. Estrategia Nacional para el Desarrollo de la Ciencia, Tecnología e Innovación*. Retrieved from http://portal.concytec.gob.pe/images/stories/images2014/mayo/crear_crecer/estrategias_crear_crecer_ultima_version_28-5-2014.pdf
- Consejo Nacional de Ciencia y Tecnología. (2016). *Programa Nacional Transversal de Biotecnología*. Retrieved from https://portal.concytec.gob.pe/images/noticias/PRONBIOTEC_FINAL.pdf
- Department of Biotechnology, & Ministry of Science & Technology Government of India. (2015). *National Biotechnology Development Strategy 2015-2020*.
- Ministry of Science and Technology. (2016). *Department of Biotechnology*.
- Padmanaban, G. (2015). *Growth of Biotechnology in India*. Retrieved from <http://www.shriraminstitute.org/51st-founder-memorial-lecture.pdf>
- Parveen Arora. (2005). *Healthcare biotechnology firms in India: Evolution, structure and growth*. *Current Science*, 89(3), 458-463.
- Sooraj Aurora. (2016). *India's Next Free Trade Partner: Peru?* Retrieved from <http://thediplomat.com/2016/08/indias-next-free-trade-partner-peru/>
- The Royal Society. (2010). *New frontiers in science diplomacy*. Retrieved from https://www.aaas.org/sites/default/files/New_Frontiers.pdf
- UNESCO. (2007). *The Science and Technology System of the Republic of Perú*.