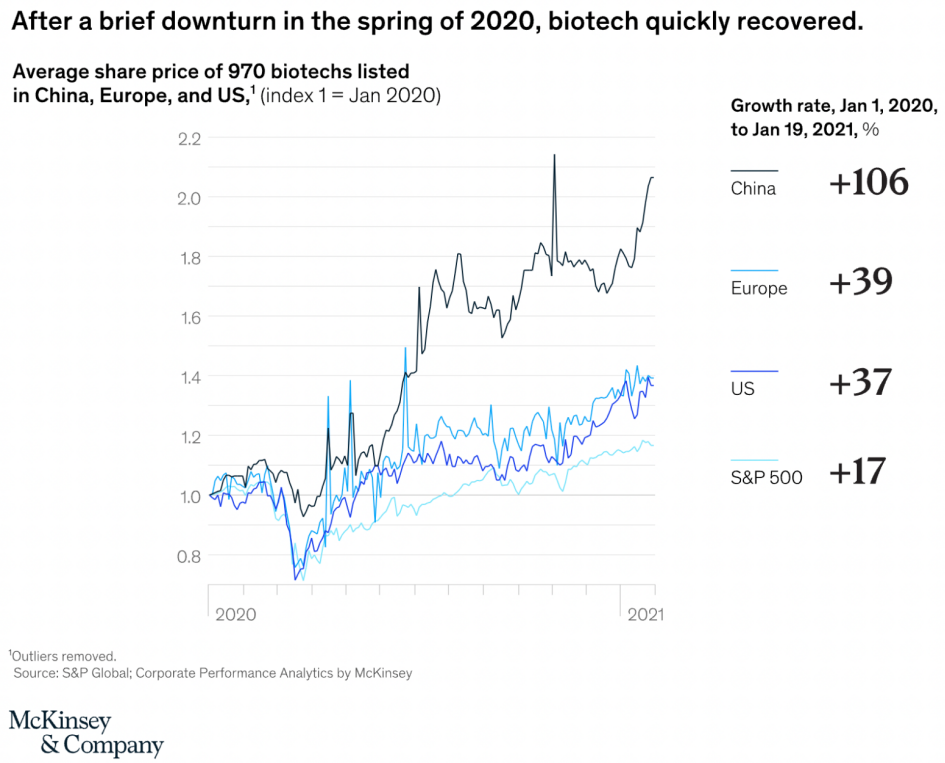
Biotechnology and Geopolitics

Shambhavi Naik

I. Introduction:

In the recent past, countries have begun to recognise the importance of biotechnology to national power. In addition to being an important contributor to economic growth, biotechnology can also be used as a geopolitical tool. A key determinant of the role that biotechnology can play is its definition. The biotechnology sector could be defined "as all those potentially commercializable technologies that are based on the life sciences." Defined as such, biotechnology can be seen as one of the first players to underpin global geopolitics – first through the trade of cotton, silk, spices and tea and then through the use of petrol and diesel. Emerging biotechnology has been defined by the U.S. Department of Commerce as "technologies that manipulate cellular, subcellular, or molecular components in living things to make products, discover new knowledge about the molecular and genetic basis of life, or modify plants, animals, and microorganisms to carry desired traits".

When viewed through this lens, the products that can be counted under the biotechnology umbrella change. For example, under the first definition cotton would be counted as part of bioeconomy; under the second definition Genetically modifed (GM) cotton seeds would fall in its purview. Recent advances has also created an avenue for creating new bioweapons – another application of biology that has also been used in ancient times, but with caution because of fear of repercussions. With emerging technologies, bioweapons more amenable to control can be created.



Adapted from "What's ahead for biotech: Another wave or low tide?"

However, even as our knowledge of fiddling with biology increases, the sectors which will impacted – trade, food security, energy security and health – will largely remain similar. Growth in these areas confers national power and this makes biotechnology as a critical, though currently undervalued geopolitical tool.

The next section will briefly discuss the peaceful uses of biotechnology.

II. Biotechnology for Peaceful Purposes

Biotechnology can be used to strengthen national interests in three ways:

1. To nearshore critical supply chains: A consequence of COVID-19 on global supply chains has renewed interest in countries to near critical supply chains that feed into health products such as vaccines, pharmaceuticals, etc. For example, the US has committed to invest "$40 million to expand the role of biomanufacturing for active pharmaceutical ingredients (APIs), antibiotics, and the key starting materials needed to produce essential medications and respond to pandemics."

2. To create intellectual property: Research in biotechnology is essential to create novel products or solutions to address outstanding issues such as health security, energy security and biosecurity. For example, with the advent of COVID-19, US-based companies were the first to patent the mRNA-based vaccines, leading to the US getting the first access to these vaccines.

3. Accelerating economic growth: Biotechnology has been seen as a key contributor to economic growth. According to an OECD report, over 50 countries have dedicated biotechnology policies aimed at shaping the bioeconomy. The US Bioeconomy is valued at US$ 1 trillion, while Japan's Bioeconomy Strategy aims to achieve 92 trillion yen (US$ 700B) market size by 2030. Australia's life sciences industry is valued at over AU$100B. India aims to achieve US$ 300 billion by 2030. The below table shows the economic impact of biobased industry from 2016.

Fact Sheet: An Economic Impact Analysis of the U.S. Biobased Products Industry: 2016 Update
The report demonstrates the biobased industry is a substantial generator of economic activity and jobs. In 2014, the industry:
• Supported a total of 4.2 million American jobs through direct, indirect and induced contributions
• Contributed a total of $393 billion value added to the U.S. economy
• Generated 1.76 jobs in other sectors of the economy

Additionally, 1.53 million jobs directly supported the biobased product industry resulting in 2.7 million spillover jobs- the indirect jobs in related industries and induced jobs produced from the purchase of goods and services generated by the direct and indirect jobs. The industry also has generated:
• $127 billion in direct sales
• $266 billion in spillover sales

The next section will describe the potentially harmful applications of biotechnology.

III. Biotechnology for biowarfare

The potential use of bioweapons and their uncontrollable nature has been so alarming that in a global first, 194 countries agreed to not only ban the development and creation of new bioweapons, but even disband existing bioweapons programmes. Israel remains the only notable absentee from this multilateral treaty. Yet, the Bioweapons Convention (BWC) remains mired in controversy, as it is poorly funded, lacks implementation support and does not have a verification mechanism. So while the absence of use of bioweapons over the past few decades in a major international event has given the appearance of the Convention's success; this success is not the result

of the Convention by itself. The new biotechnology tools behoove a revisit to the Convention to strengthen its provisions in preventing, detecting and penalising the potential use of bioweapons.

In addition to using biotechnology to create bioweapons, the investigation of a potential attack is also mired in geopolitics. This has been evident with the investigation for the search of COVID origin - Australia had to move the World Health Assembly to start an investigation process and this required further approvals from China. This resulted in significant delays in the study. As a consequence, the world is bereft of an opportunity to understand the origin of this devastating virus and cannot take public health measures to prevent a recurrence.

IV. Instruments used to wield power:

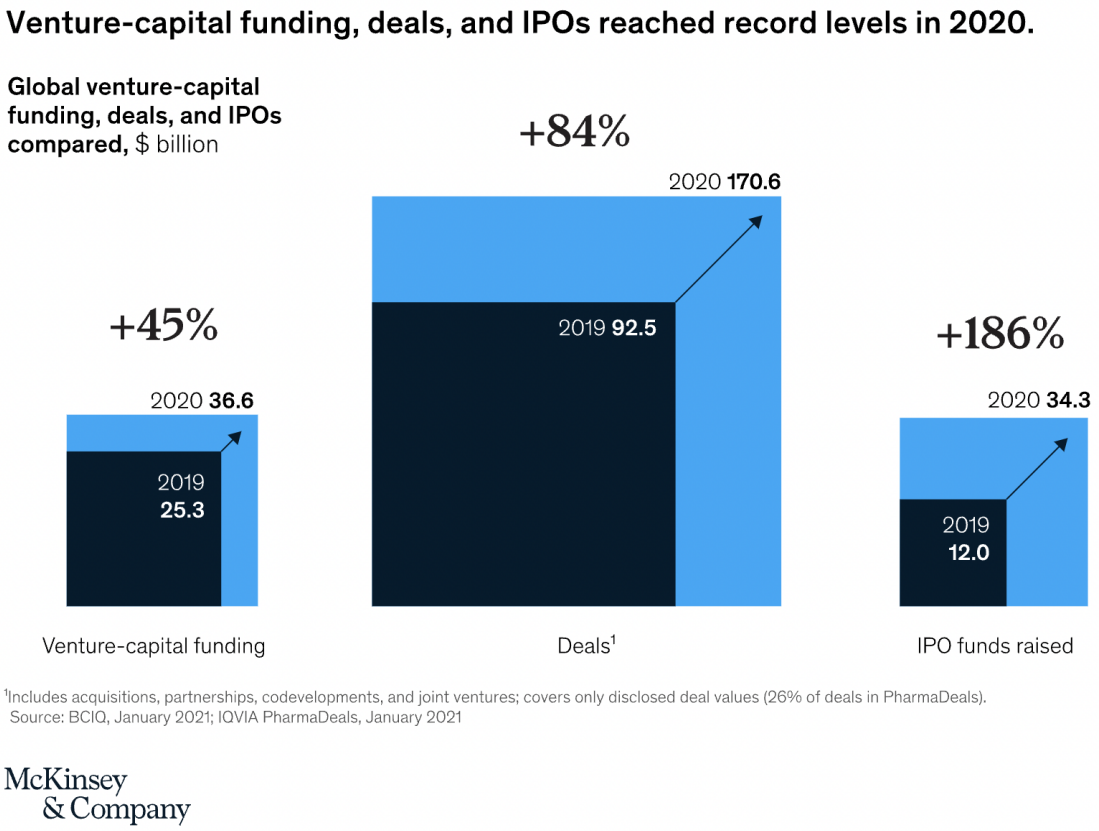
1. Intellectual property:

Trade-Related Aspects of Intellectual Property Rights (TRIPS) establishes minimum standards of protection and enforcement that each government has to give to the intellectual property held by nationals of fellow WTO members. It creates a mechanism for creators of biotechnology products to license their products and control access to their technology.

2. Financing:

Funding for biotechnology has been traditionally led by government funding. Long gestation times, uncertainty of success and heavy capital investment are among the challenges that deter the influx of private funding. The presence of a well resourced ecosystem can attract private investors - this can be seen in countries such as the US.

The past two years have seen an increase in private investment in biotechnology-led companies, with a renewed interest attributed to the emergence of COVID-19.



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3. Ethics:

Emerging biotechnology applications are considered controversial as they transgress into an area typically considered as "nature" or "God's work". These applications include changing genes, creating artifical cells, etc. However, the ethical perspective on these applications are not universally shared and may be rooted in faith/religion. Indeed, several studies have shown that those who identify highly with their religion are less likely to accept gene editing in babies, even for disease alleviation. However, since countries where this perspective may be strongly endorsed are also important participants in multi-lateral fora and can dictate ethics to other countries.

4. Conventions and embargoes:

The BWC bans the use, development and research on bioweapons. The Australia Group is an informal forum of countries which, through the harmonisation of export controls, seeks to ensure that exports do not contribute to the development of chemical or biological weapons. WTO governs the administration of TRIPS.

5. Publications:

Publishing houses can deny publication of controversial research, including those that can be used for creating bioweapons. This is a gatekeeping function that can be used to control the universal access to knowledge.

V. Challenges for India

1. **Weak funding** - India's funding in biotechnology sector is abysmally low - the entire Ministry of Science and Technology receives only 0.05% of GDP as funding from the Government of India. Private funding in India is low.

2. **Weak regulatory mechanisms** - India's regulation of biotechnology products including pharmaceutical products is not transparent and of global standards. The opacity with which approvals for Bharat Biotech's Covaxin, Delhi University's GM mustard and the recent issues with throat syrups and eye drops raise serious concerns of using biotechnology made products in India.

3. **Lack of state capacity** - India's policy making is distributed across various departmants and ministries. The Department of Biotechnology does not have capacity to think through domestic and international avenues for collaborations and funding. A whole-of-government approach is required to create end-to-end policy for biotechnology products.

VI. Conclusion

The use of biotechnology as a geopolitical tool is a understated, since it is unclear what exactly the sector constitutes. Products of biotechnology may fall under commerce, agriculture or related industries. However, from a research perspective, biotechnology will have a significant impact on three key things- health (includes pharmaceutical, gene editing and nutrition), energy and bioeconomy. India needs to strengthen its position in the field to ensure its geopolitical interests are safeguarded.