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How India’s bioeconomy is faring, the road ahead

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A new government report has pegged the value of India’s bioeconomy in 2024 at more than $165 billion, accounting for over 4.2% of the country’s GDP.

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Utilising bioresources

Bioeconomy refers to the industrial use of biological resources (plants, animals, and microorganisms), and the replication of natural biological processes in the production of goods and services.

This is not new in itself. Biological resources and natural processes have been integral to the healthcare, pharmaceutical, and agriculture sectors for a long time. But their use is now expanding to many other areas. Bioresources like plants or microorganisms are renewable, relatively cheap, and locally available, while natural processes are more sustainable and eco-friendly.

A prime example of this is the growing use of ethanol, which is produced through fermentation of crops like sugarcane or corn by microorganisms, as a biological alternative to fuels traditionally derived from hydrocarbons. Modern biology offers sustainable alternatives to clothes, plastics, construction materials, medicines, and a wide variety of chemicals.

Even in traditional application areas of healthcare and agriculture, there is a push for greater use of biotechnology, which involves the manipulation of biological resources and processes to develop desired products or applications. Development of biomedicines, which are derived from bioresources rather than chemicals, and synthetic biology involving the growth of specially-designed microorganisms with desired traits are areas in which biotechnology is playing an increasingly bigger role.

That said, since the use of biology in economic processes is still limited, and the potential applications for it are many, there is scope for rapid growth. Significant growth is, in fact, taking place already.

Growing footprint

The report shows that the value of India's bioeconomy nearly doubled in the last five years, from around $86 billion in 2020 to $165 billion in 2024 (see chart).

The number of companies operating in the bioeconomy has gone up by almost 90% in the last three years, from 5,365 in 2021 to 10,075 in 2024. This number is projected to double again by 2030, by which time such companies would employ close to 35 million people, according to the report.

Nearly half the value of the bioeconomy (roughly $78 billion) was generated in the industrial sector, for the development and use of biofuels and bioplastics, among other things. The pharma sector accounted for another 35% of the total value, with vaccines the major contributor.

But the fastest growing segment in 2024 was research and IT, which includes biotech software development, clinical trials, and bioinformatics that helps in areas such as drug research.

The report showed that only five states — Maharashtra, Karnataka, Telangana, Gujarat and Andhra Pradesh — accounted for more than two-thirds of the value generated in the bioeconomy (see table). The entire eastern and northeastern region generated less than 6% of the total value.

Maintaining the high growth rates of the past five years in the future will not be easy, the report said. This would require greater innovation, incentives for scaling-up of bio-based solutions, and the removal of policy and infrastructure bottlenecks. Addressing the regional imbalance would also be crucial in sustaining high growth.

While the 4.2% share in the overall GDP was comparable to figures in the United States and China, the bioeconomy of countries like Spain and Italy accounts for more than 20% of their GDP.

BioE3 push

Realising the potential for greater use of biotechnology in economic processes, the government in 2024 unveiled the BioE3 policy (Biotechnology for Economy, Environment and Employment).

Its main objective is to establish India as a global hub for bio-manufacturing, and a major centre for research and development in biotechnology.

The policy is an attempt to prepare India for a future in which the control over, and capabilities in, cutting-edge technologies would be the main drivers of economic growth. The idea is to incentivise and promote the setting-up of a network of universities, research institutions, start-ups and industries to facilitate bio-manufacturing in key areas such as bio-based chemicals and enzymes, functional foods, precision biotherapeutics, marine and space biotechnology, and climate-resilient agriculture.

India already has fairly well-developed capabilities in some of these areas, which would be relatively easy to build upon in order to deliver commercially successful products.

The first proposals for setting up these projects are currently being assessed.

But there is much more that needs to be done. For example, there is a continued reluctance to allow genetically-modified crops that can have a significant impact on productivity and yields. The report calls for addressing this regulatory uncertainty in agricultural biotechnology.

The report also recommends the creation of a National BioEconomy Mission, and single-window regulatory mechanisms for biotech innovations.

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