Biotechnological Innovations: Paving The Way

Biotechnology, as its name suggests, is biology-based technology. It makes use of cellular and biomolecular processes to create goods and techniques. That's used to improve business operations, our quality of life, and the existence of a healthy environment. The employment of these biological processes by mankind is by no means new (National Academy of Sciences). We have been using biotechnological innovations for ions, to domesticate plants, make cheese, bread, and wine, as well as preserve food (Science Learning Hub, 2010).

How are Biotechnological innovations important for sustainable Growth and development?

The world economy faces many societal challenges. Our rapidly expanding population causes most of those, which we must feed and keep healthy. The pernicious effects of climate change and our massive overreliance on non-renewable resources are wholly unsustainable. In essence, the three main problems that biotechnological advances can aid in resolving include:

1. Feeding our growing population
2. Tackling disease
3. Reducing environmental damage

Cultivation of materials

Oil, coal, rare metals, and natural gas are crucial for the manufacturing of the majority of consumer goods, materials, chemicals, and energy (including transport, heat, and electricity). These materials were a major force behind the industrial revolution. The effects of their excessive use are proving to be exceedingly difficult to deal with (Ritchie & Roser, 2017). Environmentally hazardous procedures are used in the extraction process from the earth. These processes may not only cause harm when the minerals were extracted, but also

when they are transported in a dangerous manner to the industrial hubs. Traditional manufacturing techniques are bad for the environment because they use a lot of energy during production and shipping, causing greenhouse gas emissions (Nee & DaCunha, 2016)

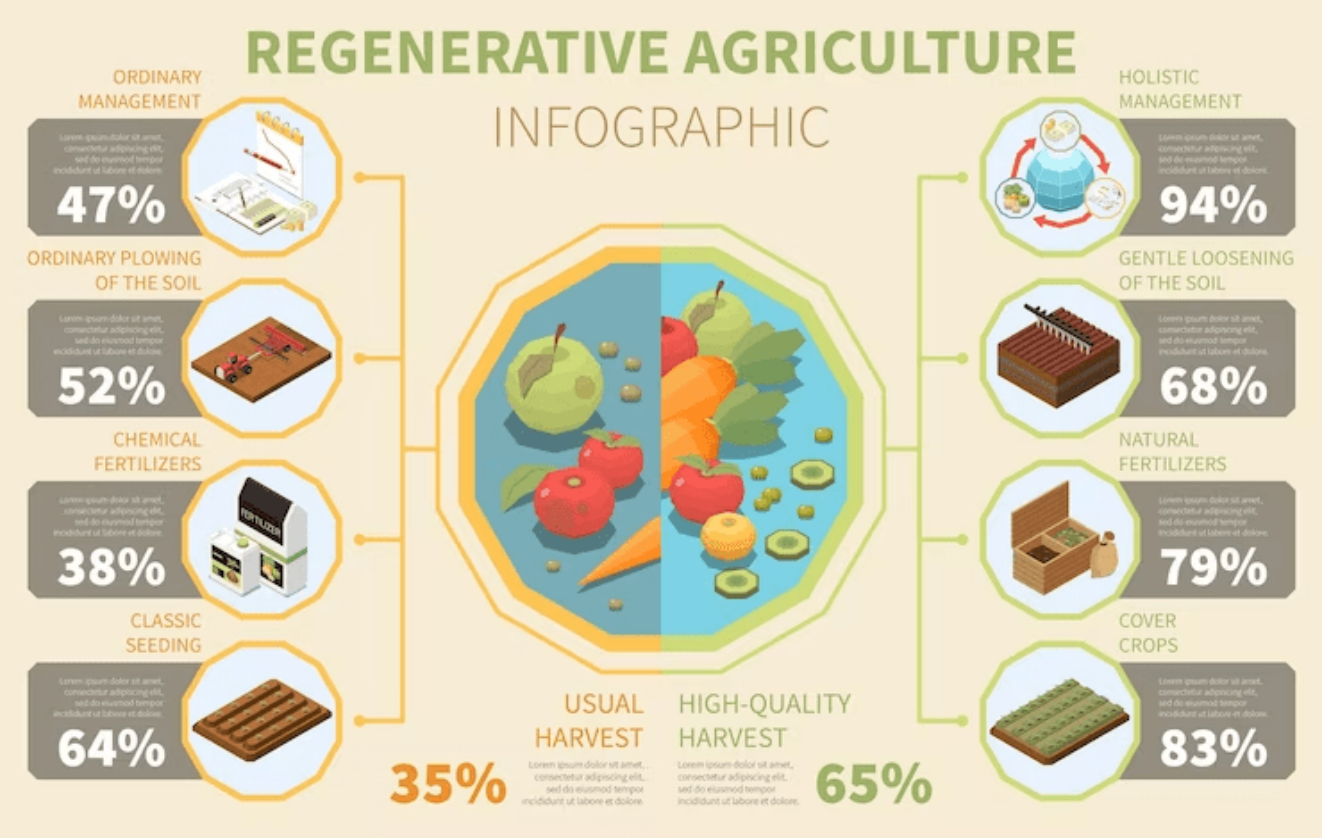
Additionally, they are accountable for the waste produced by inefficient material use, such as CNC milling. This can produce up to 95% trash and hazardous substances that impair the quality of the surrounding air, water, and land. Additionally, the finished items themselves are frequently designed inefficiently. This causes them to produce waste and pollution of their own. Additionally, many products that have reached their expiration date are difficult to recycle and take a very long time to degrade. As a result, they have a negative impact on the environment and high toxicity. One of the main causes of this harm is plastic, which takes up to a thousand years to degrade (LeBlanc, 2019).

How biotechnological innovations can provide solutions

Feeding The Growing Population

The World Bank estimates that by 2020, we will need to expand food production by another 50%. Although worldwide malnutrition rates are declining, this remains a significant issue. Even more troubling is that less than 5% of people in industrialised nations work in agriculture, and that climate change may cut production by 25% (Nee & DaCunha, 2016), problems that biotechnological innovations can help tackle. With the use of enzymes and fermentation, biotechnology already plays a significant role in the production of food.

This can, however, go a step further due to modern biotechnologies that now make it possible to choose advantageous agronomically advantageous features from a variety of plants. Transferring these qualities to transgenic plants enhances their viability and overall production (Borgen, 2018). Biotechnology can also be used to increase the yield of high-value compounds, such as pharmaceutical components, fragrances, food flavourings, and sweeteners, as well as reduce the environmental effects of their manufacturing.



Biotechnological innovations: regenerative agriculture for sustainable infrastructure.
Source: Freepik

Since biotechnology innovations demand significant financial inputs, accessibility and affordability are two of the main concerns facing agricultural biotechnology. Small farmers and people with modest incomes must be able to afford the technology in order for them to profit from it and realise its full potential. If they cannot afford to buy or maintain it, it will be impossible for them to do so. Additionally, goods like biofortified grains are clearly highly popular with customers, particularly the disadvantaged, who rely largely on staple foods (New Agriculturist, 2013

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). They are more expensive for farmers to produce, yield lower quantities, and do not attract high prices. Overall, developing a sustainable market where farmers can charge fair rates for their goods remains a difficulty (Garnett, 2013).

Reducing Environmental Damage

We use biological systems to make products that can't be made using traditional methods (such as bio-based materials and fuels). Said materials and fuels come with new properties and superior performance. Plastic is one of the most severe

environmental issues we are dealing with. Notpla is a ground-breaking, renewable, natural resource called brown seaweed.

> *"Growing up to one metre per day, it doesn't compete with food crops, doesn't need fresh water or fertiliser and actively contributes to de-acidifying our oceans."*
>
> *Notpla, 2020*

Oohos sachets are an edible and compostable alternative to plastic packaging, using Notpla. They have a wide range of applications, including the replacement of plastic cups and bottles at running events (Notpla, 2020). Another major problem is the chemical contamination of our planet, according to glacial records. This problem has existed for at least 2,500 years. The good news is that biotechnology can assist mitigation of this harm. For instance, organisations like Universal Bio Mining are working on enzymes that can break down chemicals using by-products of petroleum in the oil sands industry (Nee, 2016).

Although these alternatives to plastic and pollution seem highly promising. Their validity must frequently be questioned because some of these 'solutions' actually cause more harm than good (McCarthy & Sanchez, 2019). A notable example is the many plant-based, biodegradable water bottles we design to decompose. When disposed of in nature, they pose no health danger to animals. Responsible innovation is crucial, we must add depth and solve the underlying causes of environmental problems. Accordingly, reusable water bottles are more sustainable than "single-use alternatives" (Levey, 2019).

Environmental pollution causes so much damage.
Source: Freepik

Tackling Disease

Globalisation only accelerates the spread of disease, given the rapid increase in the global population (Ronald Labonté, et. al. 2011). 40% of humans who die (worldwide) do so because of parasitic and infectious diseases like Malaria and AIDS each year. Infectious diseases are a major global health problem (Afzal et al., 2016). Biotechnological innovations can significantly ease these worries by making it easier to diagnose, cure, and prevent numerous diseases over time.

Furthermore, with biotechnological innovations, it is now possible to diagnose a

patient quickly and accurately, which helps lower the death rate and allocate resources more effectively, preventing the use of ineffective therapies (Daar et al., 2002). We use gene therapy, microarrays, monoclonal antibodies, and polymerase chain reaction (PCR) most frequently in biotechnological diagnosis. We also use them to treat disease, because they are all highly accurate, specific, quick, and economical (Khan et al., 2015; Quigg et al., 2008).

Hope for Humans

Conversely, a breakthrough in biology called nanotechnology enables disease detection without the use of molecular amplification. A typical method uses two electrodes covered in gold nanoparticles as part of a DNA array detection method. The gold particles close the circuit to create a detectable signal if the virus is present in the blood sample. Instead of treating the effects with traditional approaches, we use gene therapy to prevent diseases or genetic defects. Cystic fibrosis and mitochondrial genetic diseases can be anticipated before they arise.

These biotechnology therapies are not without drawbacks. One such risk that could have highly negative effects involves mistakes made by researchers when testing for infectious diseases. Institutions that examine infectious diseases need to take extra precautions with monitoring and security technology in order to reduce such dangers.

With the advancement of biotechnological innovations, it is now possible to diagnose a patient quickly and accurately.
Source: Freepik

why Is it essential that we focus on biotechnological innovations and enhancing sustainable infrastructure?

Nowadays, innovation and sustainability are fundamental ideas for many entities. Sustainability, in the words of the United Nations (UN), is "meeting the needs of the present without compromising the ability of future generations to meet their own needs." Although this notion was debated in the 1980s, the need for changing the way we generate and consume new products has been highlighted by climate change and environmental issues. Social and economic challenges also plague many nations around the world, in addition to environmental issues.

The concept of sustainable infrastructure refers to equipment and systems that are designed to meet the population's essential service needs. This includes roads, bridges, telephone pylons, and hydroelectric power stations, based on all-around sustainable principles. This means the infrastructure is environmentally

friendly from end to end, and that includes economic, financial, social and institutional factors.

The concept of sustainable infrastructure refers to equipment and systems that are designed to meet the population's essential service needs.
Source: Freepik

urban growth

With urban areas growing exponentially, especially in emerging countries, sustainable infrastructure is showing its worth as a more efficient, productive and environmentally friendly option. Furthermore, according to the World Bank, these facilities prove more profitable as they make for more reliable services and greater resilience for extreme weather events. This also lessens the impact of natural threats to people and the economy.

Creating new technologies that address certain issues with new knowledge is one method to overcome these obstacles. In fact, WAITRO members, INECOL and TISTR, developed a project in 2020 to use phytotechnology to purify water in small settlements. The fact that water pollution is a major problem in many regions of the world means that using this technology helps manage water, health, and economic resources better. Innovation plays a key role in national and international markets. It provides creative solutions to critical problems while

contributing to economic growth.

achieving the United Nations Sustainable Development Goals (SDGs) and how they link to biotechnological innovations

Biotechnology is the blending of cutting-edge methods from contemporary biotechnology with tried-and-true strategies from conventional biotechnology. It is a collection of tools for permitting the introduction of particular human-made modifications to the DNA, or genetic material, of plants, animals, and microbial systems, resulting in valuable goods and technology. Better health care, increased food security, and increased access to potable water are essential. More effective industrial development processes for transforming raw materials, support for sustainable methods of afforestation and reforestation, and detoxification of hazardous wastes are just a few of the advancements that biotechnology promises to significantly facilitate. It presents fresh chances for international collaborations (Yanai et al., 2012).

The program areas discussed in said research aim to promote generally accepted principles that will be used to ensure the environmentally sound management of biotechnology. To foster public confidence and trust, to encourage the development of sustainable applications of biotechnology, and to establish suitable enabling mechanisms, particularly in developing countries. The 19th special session of the General Assembly and the third session of the Commission on Sustainable Development covered biotechnology.

The four sides to sustainable infrastructure.
Source: IBERDROLA

Advantages of Sustainable Infrastructure

Replacing old urban infrastructure with new, modern and sustainable elements

will make cities more habitable and inclusive. This would require a worldwide, multi-trillion-dollar investment over the next decade. If we do things right, it will also see us on the road to economic growth.

The Main Advantages of Sustainable Infrastructure:

- **Reducing our environmental and carbon footprints**: Better urban planning with more sustainable infrastructure would relieve the planet of 3.7 gigatons of CO_2 per year over the next 15 years, according to The New Climate Economy.
- **Fostering renewables**: Decarbonising the economy and developing a de-centralised and digitised electric grid could mean access to electricity, for the billion people who currently live without it.
- **Creating green employment**: In the renewable energy sector, we could see a rise from today's 2.3 million green jobs to 20 million by 2030.
- **Driving green economic growth**: Building sustainable infrastructure represents a key pillar in the new economy based on climate and sustainability action.
- **Evening out inequalities**: Present-day infrastructure doesn't cover even the most basic needs of emerging countries, such as access to clean, running water, sanitation, and transport networks, whereas the sustainable alternative could.

Sustainable infrastructure.
Source: Freepik

A Thrivable Framework

With respect to this overriding objective of thrivability, THRIVE Framework studies problems and assesses viable solutions. This involves performing predictive studies with the aid of contemporary technology to enable changes in social and environmental sustainability.

Innovators are, therefore, encouraged to look beyond traditional technologies and identify solutions to produce cost-effectively. Sustainable biotechnologies can reach out to communities in need. We encourage investors to look for and support talents that have the potential to bring about sustainable biotechnologies to achieve the 2030 goals and beyond, for better human and environmental impact.

THRIVE Framework continuously mitigates solutions geared towards environmental, social and economic sustainability through its diversified activities, involving webinars, blogs and an extensive podcast series. THRIVE invests in diversified activities engulfing meaningful global issues that include science-based targets, innovation, sustainability, society, human rights, world events and microbiological safety. Our newsletter endeavours to spread awareness about 'thrivability,' ahead of sustainability. Sign up for our

newsletter for regular updates on issues that concern us all.