

Impact of Agricultural Engineering & Technology on India's Growth Story

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Agricultural engineering and technology have significantly contributed to India's growth story by boosting crop yields, improving food security, increasing farmer income, promoting resource efficiency, and enabling economic development, particularly through the Green Revolution, by introducing advanced irrigation systems, high-yielding crop varieties, and mechanization, which reduced manual labor and increased productivity across the agricultural sector; this has been crucial in transforming India from a food-deficient to a food-surplus nation.

ECONOMIC CONTRIBUTIONS

The agricultural sector remains a cornerstone of India's economy, employing nearly 60% of the population. Technological interventions have not only increased productivity but also contributed to rural prosperity and poverty alleviation. By 2030, agriculture is projected to contribute around \$600 billion to India's GDP, marking a 50% increase from its contribution in 2020.

India is now the third largest start-up destination in the world and has witnessed significant growth, particularly post-pandemic. There are



over 99,000 DPIIT-recognised start-ups in India as of 31 May 2023, and this continues to attract investor interest globally.

The rise in internet users, expected to reach 900 million by 2025 from 759 million in 2022, primarily from rural areas, is also propelling the technology industry's growth. Likewise, the rise of fintech firms and the expansion of digital payments have played a pivotal role in driving the industry. FY23 recorded a substantial leap, with 134.6 billion digital transactions, up from 20.7 billion in FY18, according to the Ministry of Electronics & Information

Technology.

We are also witnessing the growing emergence of Generative AI, which is expected to disrupt the existing delivery model. Global and Indian tech companies have started investing in technology to change how they currently operate. We expect this to be a pivotal change in the technology industry.

EMERGING TECHNOLOGIES AND INNOVATION

The adoption of emerging technologies is reshaping India's economic landscape:

- **Artificial Intelligence (AI):** India is positioning itself as a significant player in the global AI arena, with the AI market projected to reach \$17 billion by 2027.
- **Domestic Language Models:** Industry leaders emphasize the necessity for India's IT sector to develop its own language models amid the rise of AI technologies, aiming to reduce dependency on external models and mitigate geopolitical risks.

KEY IMPACTS OF AGRICULTURAL

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TECHNOLOGY ON INDIA'S GROWTH:

• Increased Productivity:

The introduction of new crop varieties, improved irrigation methods, and mechanization have significantly increased crop yields per unit area, leading to higher agricultural output and food security.

• Economic Growth:

Higher agricultural production has contributed to GDP growth, generating employment opportunities in rural areas and boosting the overall economy.

• Income Enhancement for Farmers:

Improved yields and better market access due to technology have led to increased income for farmers, improving their livelihoods.

• Resource Conservation:

Precision agriculture techniques enabled by technology help optimize water and fertilizer usage, leading to more sustainable farming practices.

• Post-Harvest Management:

Advanced storage and processing technologies reduce post-harvest losses, ensuring better quality and value of agricultural produce.

Examples of impactful agricultural technologies in India:

• Green Revolution Technologies:

High-yielding wheat and rice varieties, improved irrigation systems like tubewells, chemical fertilizers, and pesticides.

• Precision Farming:

GPS-aided systems for precise application of inputs like fertilizers and water, optimizing resource use.

• Farm Mechanization:

Tractors, Harvesters, Hydraulic Reversible MB Ploughs and other



machinery for efficient land preparation, sowing, and harvesting. The use of machinery has enhanced efficiency in farming operations, reducing labor costs and time.

• Digital Agriculture Platforms:

Mobile apps and online platforms provide weather updates, market information, and expert advice to farmers. The adoption of digital platforms has improved market access for farmers, enabling better price realization and reducing intermediaries. Initiatives like "Digital India" have facilitated the development of robust digital infrastructure, including internet access, mobile banking, and e-governance platforms, improving citizen services.

Technology companies are actively investing in digital solutions to gain a competitive edge. The industry is projected to derive a substantial portion of its revenue from digital streams in FY23, estimated at around 32-34%.¹ Centres of excellence are being established to promote expertise in emerging fields such as quantum computing, AI, and internet of things (IoT), which are revolutionising industries by enabling advanced

data analysis, automation, predictive modelling, and optimisation.

• Biotechnology:

Development of pest-resistant and drought-tolerant crop varieties

CHALLENGES AND CONSIDERATIONS:

• **Access to Technology:** Ensuring equitable access to modern technologies for small and marginal farmers across different regions.

• **Skill Development:** Providing training to farmers on proper use of new technologies.

• **Infrastructure Development:** Improving irrigation facilities, cold storage, and transportation networks to minimize post-harvest losses.

• **Innovation and Entrepreneurship:**

The tech ecosystem in India has fostered a thriving startup culture, with numerous tech companies developing innovative solutions in sectors like fintech, Agriculture, healthcare, e-commerce, and artificial intelligence.

Overall, agricultural technology has played a crucial role in India's economic progress by enhancing agricultural productivity, improving food security, and empowering farmers, making it a vital component of the country's growth story.

