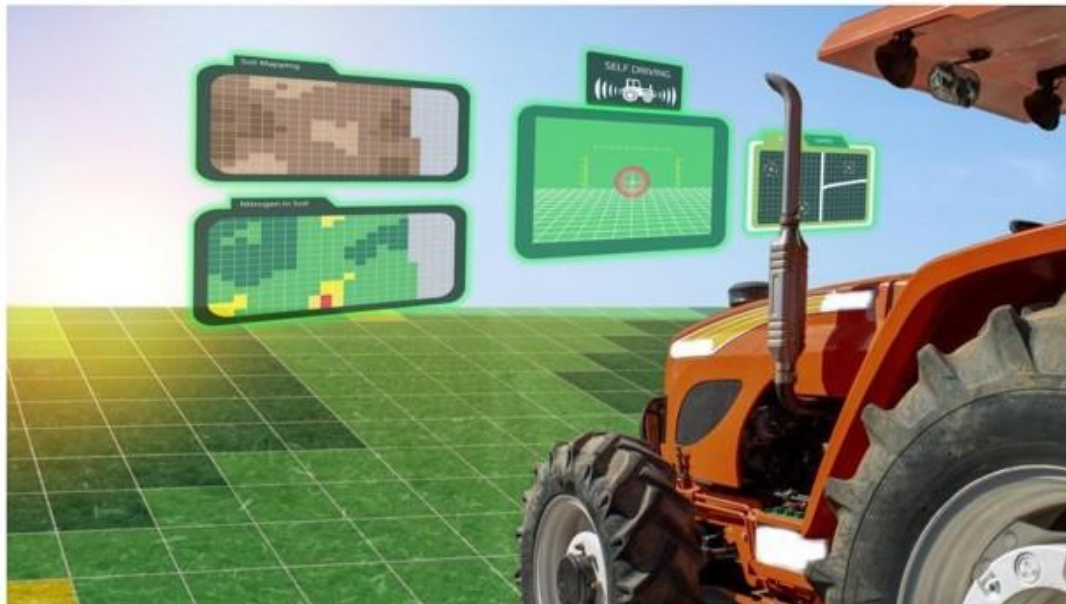# Great boon. Reinventing Indian agriculture throught IoT and AI

November 26, 2022 - Updated 01:26 pm IST

Conducive policy environment, advanced technology can help agriculture as climatic conditions have turned unpredictable

BY SANDEEP SABHARWAL

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Over the last decade, the Indian agri ecosystem has gone through a rapid transformation, made possible due to the emergence of agtech segment, which has created investment opportunities. It has resulted in production increasing and logistics turning efficient. Advances in agtech are hugely relevant to the country's economy today. The agriculture sector, which is worth $370 billion, continues to remain the primary source of livelihood for more than 40 per cent of the population while contributing 19.9 per cent (FY 2021) to the national GDP. The agtech segment, in particular, has attracted a surge of start-ups that are offering technology-based solutions, thereby allowing large-scale traditional enterprises to focus on increasing operational efficiencies.

Surge in funding

As on March 2022, according to industry estimates, India is said to have over 1,000 agriculture start-ups in agtech, employing artificial intelligence (AI), machine learning (ML), internet of things (IoT), etc. India has received total funding of $1.6 billion in agtech startups till 2021, making it the third largest in the world with regard to such funding. The Confederation of Indian Industry (CII), in collaboration with Bain & Company, jointly prepared a report in March 2022 which indicates that private equity (PE) investments are primarily focused on systemic issues in agtech industry and its sustainable development. Private equity investments in agtech startups between 2017 and 2020 amounted to ₹66 billion, with a growth rate of over 50 per cent.

While the Covid-19 pandemic hampered business dynamics across industries, the agriculture sector remained largely unaffected, rather putting them on an upwards growth trajectory. The consistently growing demand for food has further improved the potential for expanding market reach for farmers and agribusinesses in the country.

Reforms and government initiatives

Both Union and state governments are working in tandem to promote agtech in the country. The Digital India initiative has helped the rural economy connect globally. Various reform initiatives have been launched to boost farm revenue in the country, including National Agriculture Market (eNAM - a pan-India electronic trading platform); India Digital Ecosystem of Agriculture (IDEA - an Agristack system for growing farmer income); National Mission for Sustainable Agriculture (NMSA – aimed at increasing Agri output by integrating sustainable technologies) and National e-Governance Plan in Agriculture (NeGP A – for funding modern technologies including AI, ML, drones and Blockchain).

Agritech Business Models

Driven by increasing internet penetration in rural India, India stands at the forefront of changing methodologies in agriculture while transitioning from conventional business models to various innovative business models driven by agritech. Emerging business models across the agriculture value chain can be broadly classified into the following three categories.

→ **Margin-based:** Players create market linkage on inputs or output side, earn margins on buy or sell side

→ **Subscription-based:** Players offering a mix of hardware, software, and services to help farmers improve crop yield, and track the quality of produce while tracing the produce across the value chain

→ **Transaction-based:** Players charge on number of transactions served such as a loan and insurance policies

Broad Categories of agtech applications

Application of AI, ML, IoT and Blockchain in Indian agriculture may be classified into three broad categories:

→ **Crop and soil health monitoring:** Businesses that are leveraging sensors and various IoT-based technologies to monitor crop and soil health

→ **Predictive analytics:** Several AI and machine learning tools are used to predict the optimal time to sow seeds, get alerts on risks from pest attacks, etc.

→ **Supply chain efficiencies:** Businesses that are using real-time data analytics from multiple sources to build an efficient and smart supply chain

Smart application for better monitoring

The use of smart applications in agriculture helps in the better utilisation of resources. With the use of applications, we can easily check the quality and quantity of the crops and enable Digital Professional Warehouse Management Solution with instant, transparent, and auditable agri quality as well as supply chain reports. In addition, data about crop health, including types and extents of disease manifestations, can also be tracked. A number of factors contribute to irrigation and fertilizer decisions. In this way, farmers can mitigate damage and subsequent costs in a timely manner.

Starting point

Considering the impact of agtech and its tremendous growth potential in India's overall economy, it can help further the development of farmers, consumers and enterprises. We are witnessing a huge surge in the emergence of agtech start-ups in India, driven by advanced technology penetration coupled with a conducive policy environment. This can only be seen as a starting point for the penetration of advanced technologies like AI, ML, IoT and Blockchain in the agriculture ecosystem. These collective technologies come as a great boon to the agricultural sector which is heavily reliant on unpredictable climatic conditions. More cases of AI, ML, IoT and Blockchain in agriculture are likely to show up in the coming decades due to their immense value addition.

(The author is CEO, SLCM Group)

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How Agritech Startups Are Leveraging AI & IoT To Reinvent Agricultural Sector
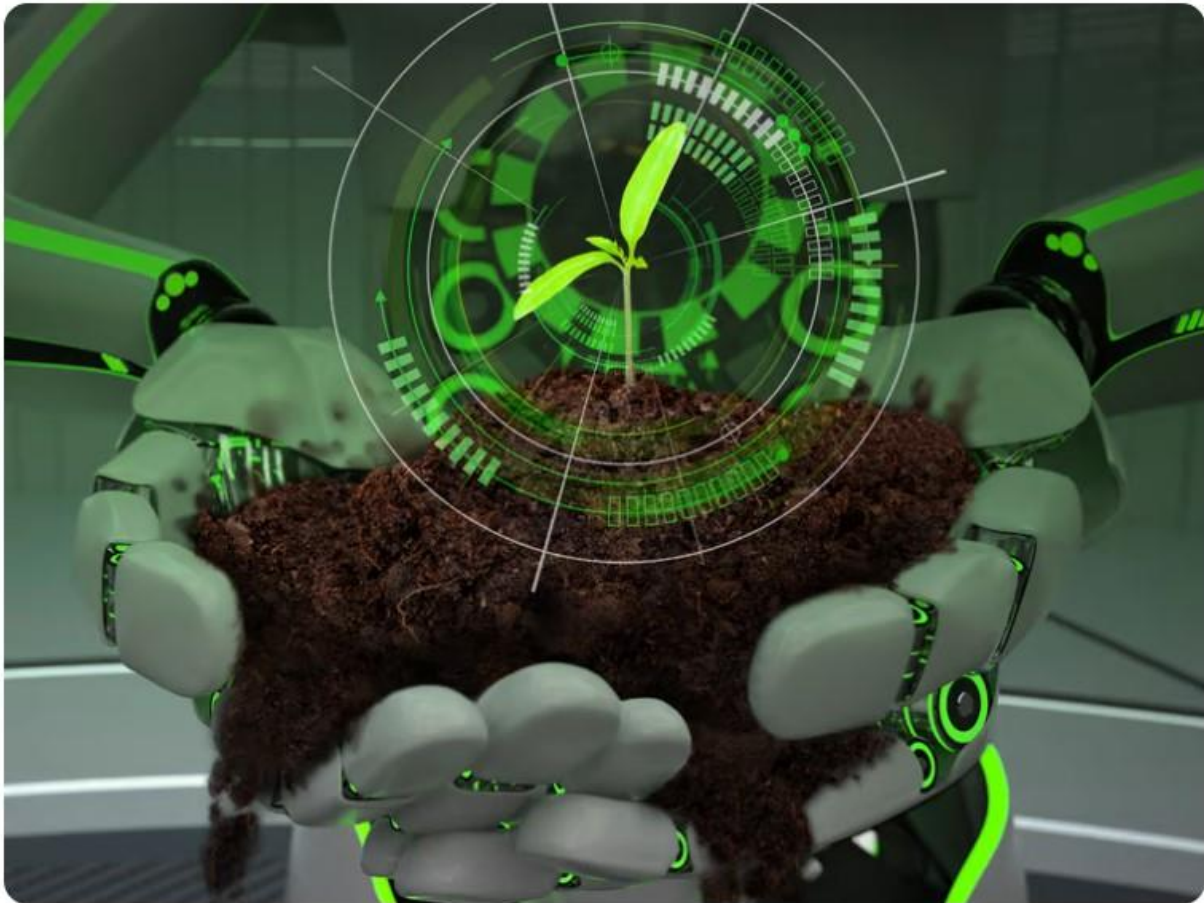
- Over the last decade, the Indian agri ecosystem has gone through a rapid transformation

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Over the last decade, the Indian agri ecosystem has gone through a rapid transformation. This feat was made possible due to the advent of the agritech segment, by creating investment opportunities and increasing production and logistics efficiencies.

Advances in agritech are hugely relevant to India's economy today. The agriculture sector, which is worth $370 Bn, continues to remain the primary source of livelihood for more than 40% of the population while contributing 19.9% (FY 2021) to the national GDP.

The agritech segment in particular has attracted a surge of startups that are offering technology-based solutions thereby allowing large-scale traditional enterprises to focus on increasing operational efficiencies.

A Surge In Agritech Startup Funding

According to industry estimates, India is said to have more than 1000 agritech startups employing artificial intelligence (AI), machine learning (ML), and internet of things (IoT) as on March 2022.

India has received a total funding of $1.6 Bn in agritech startups till 2021, making it the third largest country in the world with regard to agritech funding.

The Confederation of Indian Industry (CII) in collaboration with Bain & Company jointly produced a report in March 2022 which indicates that private equity (PE) investments are primarily focused on systemic issues in the agritech industry and its sustainable development. PE investments in agritech startups between 2017 and 2020 amounted to INR 6.6 Cr, with a growth rate of over 50%.

While the pandemic hampered business dynamics across industries, the agriculture sector remained largely unaffected, rather putting them on an upwards growth trajectory. The consistently growing demand for food has further improved the potential for expanding market reach for farmers and agribusinesses in the country.

Reforms & Government Initiatives

Both central and state governments are working in tandem to promote agritech in the country. The Digital India initiative has helped the rural economy connect globally. Various reform initiatives have been launched to boost farm revenue in the country. A few prominent ones are:

- National Agriculture Market (eNAM): A pan-India electronic trading platform
- India Digital Ecosystem of Agriculture (IDEA): An agristack system for growing farmer income
- National Mission for Sustainable Agriculture (NMSA): Aimed at increasing the agri output by integrating sustainable technologies
- National e-Governance Plan in Agriculture (NeGPA): For funding modern technologies including AI, ML, drones and blockchain

Agritech Business Models

Driven by increasing internet penetration in rural India, India stands at the forefront of changing methodologies in agriculture. Indian agritechs are transitioning from conventional business models to innovative business models. Emerging business models across the agriculture value chain can be broadly classified into the following three categories.

- Margin-based: Players create market linkage on the inputs or output side, and earn margins on the buy or sell side
- Subscription-based: Players offering a mix of hardware, software, and services to help farmers improve crop yield, and track the quality of produce while tracing the produce across the value chain
- Transaction-based: Players charge on a number of transactions served such as a loan and insurance policies

Broad Categories Of Agritech Applications In India

Application of AI, ML, IoT and blockchain in Indian agriculture may be classified into three broad categories:

- Crop & Soil Health Monitoring: Businesses that are leveraging sensors and various IoT-based technologies to monitor crop and soil health

- Predictive Analytics: Several AI and ML tools are used to predict the optimal time to sow seeds, get alerts on risks from pest attacks, and the likes
- Supply Chain Efficiencies: Businesses that are using real-time data analytics from multiple sources to build an efficient and smart supply chain

Smart Application For Better Monitoring

The use of smart applications in agriculture helps in the better utilisation of resources. With the use of applications like "AgriReach", we can easily check the quality and quantity of the crops. Additionally, we can also enable digital professional warehouse management solutions with instant, transparent, and auditable agri quality as well as supply chain reports.

Further, data about crop health, including types and extents of disease manifestations, can also be tracked. A number of factors contribute to irrigation and fertilizer decisions. In this way, farmers can mitigate damage and subsequent costs in a timely manner.

Conclusion

Considering the impact and tremendous growth potential, agritech has a huge potential to significantly improve the end-user experience for farmers, consumers and enterprises.

We are witnessing a huge surge in the emergence of agritech startups in India, driven by advanced technology penetration coupled with a conducive policy environment. This can only be seen as a starting point for the penetration of advanced technologies such as AI, ML, IoT & blockchain in the Indian agriculture ecosystem.

These collective technologies come as a great boon to the agricultural sector which is heavily reliant on unpredictable climatic conditions.

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IoT and AI are going to revolutionise agriculture in India.

Thanks to the development of the Agritech sector over the past decade, the Indian agricultural ecosystem has undergone a dramatic change, with new avenues for investment and improved production and distribution capabilities. Agritech innovations are critically important to India's economy right now.

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Emergence & Growth of Agritech in India

In the past ten years, the agricultural ecosystem in India has seen a rapid transition that has been made possible by the emergence of the agritech sector. This has been accomplished by expanding the number of investment options as well as the production and logistics efficiencies. Recent developments in agriculture technology have a significant impact on India's economy. More than forty percent of the population relies on agriculture as their primary source of income, and the agricultural industry will continue to contribute 19.9 percent (FY 2021) to the GDP of the nation. The agriculture industry is currently valued at 370 billion US dollars. Large-scale traditional businesses are now able to concentrate on improving their operational efficacy thanks to the proliferation of startups in the agritech sector, which in particular has seen an uptick in the number of companies offering technology-based solutions.

Surge in Agritech Funding

Artificial intelligence (AI), machine learning (ML), internet of things (IoT), and other technologies are being utilised by more than one thousand agriculture companies (Agritech) in India, as of March 2022, according to estimations provided by the industry. It is estimated that India would receive a total of $ 1.6 billion in funding for agritech businesses through 2021+, which will place it as the third largest country in the world in terms of agritech funding. Another research was created in March 2022 by the Confederation of Indian Industry (CII), in partnership with Bain & Company. This analysis reveals that private equity (PE) investments are mostly focused on systemic difficulties in the agritech industry and its sustainable development. With a growth rate of over 50 percent, private equity investments in agritech firms are expected to amount to 66 billion Indian Rupees (INR) between 2017 and 2020.

While the COVID-19 pandemic disrupted economic dynamics across businesses, the agriculture sector remained mostly unscathed, which actually put them on an upwards growth trend. Farmers and agribusinesses around the country now have an even better opportunity to broaden their market reach because to the persistently rising demand for food.

Reforms & Government Initiatives

The federal government and individual state governments are cooperating to advance agricultural technology throughout the nation. The Digital India programme has made it easier for rural economies to connect with the rest of the world. In order to increase farm income across the nation, a number of different reform projects have been begun. The National Agriculture Market (eNAM), which is a pan-India electronic trading platform; the India Digital Ecosystem of Agriculture (IDEA), which is an Agristack system for increasing farmer income; the National Mission for Sustainable Agriculture (NMSA), which aims to increase agricultural output by integrating sustainable technologies; and the National e-Governance Plan in Agriculture are the most prominent initiatives (NeGP A – for funding modern technologies including AI, ML, drones and Blockchain).

Agritech Business Models

India is at the forefront of changing agricultural practises as the country transitions from traditional business models to a variety of creative business models powered by agritech. This change is being driven by the increasing penetration of the internet in rural areas of India. The following three categories are broad classifications that can be applied to emerging business models that are found across the agriculture value chain.

- Players create market linkage on inputs or output side, earn margins on buy or sell side - Players offering a mix of hardware, software, and services to help farmers improve crop yield, and track the quality of produce while tracing the produce across the value chain - Based on margin: Players create market linkage on inputs or output side, earn margins on buy or sell side

- Based on subscription: Players create market linkage on inputs or output side, earn margins on buy or sell side -

- Players base their fees on the amount of transactions they complete, such as loans and insurance policies.

Broad Categories of Agritech Applications in India

It is possible to divide the applications of AI, ML, IoT, and blockchain technology in Indian agriculture into three main categories:

- Crop and Soil Health Monitoring: Companies that are utilising sensors and various Internet of Things-based technologies to monitor the health of their crops and soil
- Predictive Analytics: A collection of artificial intelligence (AI) and machine learning tools that can, among other things, determine when the best time is to plant seeds, warn of potential damage from pests, and so on.
- Supply Chain Efficiencies Businesses that are using real-time data analytics from numerous sources to develop an efficient and smart supply chain are referred to as "supply chain efficiencies."

Smart Application for better monitoring

The application of artificial intelligence in agricultural settings enables more efficient use of available resources. We are able to simply monitor the quantity and quality of the crops by utilising software such as "AgriReach." These applications also provide digital professional warehouse management solutions with instant, transparent, and auditable agri quality reports and supply chain reports. In addition, it is possible to track data regarding the health of the crop, including the various indications of disease and their extents. The decisions about irrigation and fertiliser are influenced by a number of different circumstances. Farmers will be able to limit damage and consequent costs in a timely manner if they do it this way.

In Conclusion

Taking into consideration the influence of agritech and the immense growth potential of agriculture in India's entire economy up to this point, it possesses a huge potential to significantly improve the end-user experience for farmers, consumers, and businesses. We are observing a significant increase in the number of agritech firms in India, which is being driven by the widespread adoption of cutting-edge technology in conjunction with a legislative climate that is encouraging. This can only be viewed as a starting point for the infiltration of modern technologies such as artificial intelligence, machine learning, internet of things, and blockchain into the agricultural ecosystem of India. The agricultural industry, which is highly dependent on the unpredictability of the weather, stands to benefit tremendously from the collective application of these technologies. Because of the tremendous value they provide, it is likely that we will see an increase in the number of use cases including AI, ML, IoT, and Blockchain in agriculture over the next few decades.

Written by the CEO of SLCM Group, Sandeep Sabharwal

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IoT & Artificial Intelligence to reinvent Indian Agriculture

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Emergence & Growth of Agritech in India

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In Conclusion

Considering the impact of Agritech and the tremendous growth potential of agriculture in India's overall economy so far, it has a huge potential to significantly improve the end user experience for farmers, consumers and enterprises. We are witnessing a huge surge in the emergence of Agritech startups in India, driven by advanced technology penetration coupled with a conducive policy environment. This can only be seen as a starting point for penetration of advanced technologies like AI, ML, IoT & Blockchain in the Indian agriculture ecosystem. These collective technologies come as a great boon to the agricultural sector which is heavily reliant on unpredictable climatic conditions. More and more use cases of AI, ML, IoT & Blockchain in agriculture are likely to show up in the coming decades due to their immense value addition.

Written by Sandeep Sabharwal, CEO, SLCM Group