

Agritech Startups: Pillars for reshaping the Indian Agricultural Sector

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Abstract: The future of Indian agriculture has always been a major concern to all its stakeholders. This sector has a herculean task to provide sufficient food and nutrition to the growing population. New- Age Technology and innovation are playing the role of a lever that can catapult Indian agriculture to unbelievable heights. Aspiring entrepreneurs and numerous agritech startups are entering the space that have the potential to disrupt the traditional agricultural system with innovative ideas and inexpensive solutions without compromising on the man-machine linkages. However, Agricultural start-ups are still at an embryonic stage in India. Agritech Startups are providing relevant solutions to a number of challenges faced across the agricultural value chain and have the potential to critically address the inherent issues faced by this sector which include low landholding, minimal return on investments, high production costs, losses in the agri and food supply chain, economic affordability amongst the target groups, longer gestation periods, as well as knowledge and skill gaps amongst farmers. This study is descriptive in nature, and aims to draw attention towards the enormous efforts being made to revitalize the agricultural industry through the use of cutting-edge technology that are being thrust by agricultural startups. The findings of the study will be useful for researchers, practitioners and policymakers engaged in the promotion of agribusiness, agri-startups as well as incubation centers. Agritech startups are leveraging technology in areas such as retail, B2B, B2C, marketplaces and digital agronomy platforms that are aimed to curb real time problems. Agritech startups have the potential to address a number of challenges faced by the sector and transform the agricultural practices as manifested by countries like the US, China and Israel. Nevertheless, the central and state governments have also stepped up to support agritech startups in order to give this sector a much needed boost. Transparency and operational efficiencies will help to transform this sector over time.

Keywords: - Agriculture, Technology, Startups, Agritech, Innovation

I. Introduction

India's digital transformation has slowly but surely transformed every sector of the economy, including the agricultural sector. Agriculture is the backbone of the Indian economy, with a goldmine of opportunities waiting to be tapped. India has seen a rise in the number of startups looking to solve grassroot level problems incorporating technology. Agritech startups are helping revolutionize the way agriculture has been done over the years, and bridge the gap between farmers and opportunities. The rise of agritech startups has made the agricultural ecosystem more advanced, organized, and has helped improve efficiencies and connectivity, all at the click of a button. From inputs retailing and equipment renting to selling fruits and vegetables online, from weather forecasting to usage of drones, from farm automation to protected cultivation, assaying and grading, agritech startups are providing relevant solutions across the agricultural value chain in the form of either a product, a service or an application without compromising on the man-machine linkages. These start-ups have become the missing link between farmers, input dealers, wholesalers, retailers, and consumers, connecting each of them with strong market connections and high-quality produce. AgriTech start-ups have been playing an important role in harnessing the potential of such disruptive technologies to support farmers in achieving scalability, systems and sustainability. The Indian agriculture industry must embrace smart farming if it hopes to remain competitive in the global marketplace.

II. Literature Review

In a report published by FICCI (2018), the majority of the population in India depends on agriculture for their living. Agritech startups can take the shape of a service, a product, or an application and thus are a significant solution for the entire agricultural value chain. Selling products and technologies to farmers is widely apprehended as a big challenge, where in many start-ups have not figured out a successful model.

Richa Bhatia (2018) highlighted that AgriTech in India is a flourishing field with diverse startups working with technologies such as data analytics, machine learning, satellite imaging and many more aimed at helping farmers to maximize the agricultural output since this sector has huge untapped potential.

Ekaterina Novoseltseva (2019) highlighted that to meet rising demand, global agricultural production will more than double over the next 30 years. The world's population is expected to exceed 9 billion people by 2050, while arable land is shrinking by 100,000 hectares per year. Data and technology have the potential to create new opportunities by assisting in the resolution of production, traceability, and natural resource preservation issues. Agri-food technology enables entrepreneurs with the opportunity to improve an industry that has a global impact.

According to Nagaraju L.G (2019), Agricultural start-ups in India are still at an nascent stage, with agripreneurs trying to solve problems in the Indian agribusiness ecosystem. Agri start-ups have received decent support from the government through its supportive policies.

G. P. Meena, R. L. Meena and Dinesh Kumar (2019) observed that agriculture is one of the important pillars of the Indian economy. In a bid to double the farmer's income by 2022, the Government of India is continuously looking for ways to boost agricultural production, food processing and marketing avenues through the integration of latest technologies and innovations; thus creating a huge scope for food and agritech startups in India.

As examined by Lutz Goedde, Joshua Katz, Alexandre Ménard, and Julien Revellat (2020), The agricultural sector is crippled by supply-side constraints with a rising demand for food, this sector, one of the oldest industries, must encompass the connectivity-fueled digital transformation. Agritech businesses are new market players in the agricultural sphere that are aiming to specialize in offering farmers innovative products fueled by the use of technology and data to enhance decision making, thereby boosting yield and profits.

According to a report published in IBEF (2021), More than half of India's population is dependent on agriculture as a primary source of livelihood. This sector contributes approximately 20% to the National GDP. This sector has shown a fast pace of development owing to the rise in the number of agritech start-ups and investments, exhibiting interest in the Indian agritech start-ups globally.

According to Amit Raja Naik (2021), For the majority of farmers in India, the agricultural sector has been loss-making. A few of the issues the sector faces include low landholdings, a lack of contemporary technology, and loans with exorbitant interest rates from the informal lending sector. Agritech businesses attempt to tackle these problems by utilizing cutting-edge techniques and technology.

Pankaj Tyagi (2021) highlighted that the ever-evolving startup ecosystem in India has disrupted the traditional agriculture sector. Agritech startups are functioning in a crucial market that holds a projected potential of US\$24b by 2025. India's digital sphere is impacting the connectivity and the ecosystem of the agricultural sector.

Ashok Gulati, Kavery Ganguly (2021) highlighted that India is competing with the US and China in the agri-startup space. Agritech startups-led e-commerce platforms have the potential to navigate the shift from government-controlled agricultural markets towards more demand-driven digital markets. The network of agritech startups, incubators, accelerators and investors needs to work closely with policymakers, academia, think tanks, and government departments to develop a more nuanced understanding of the dynamics of the agrifood sector.

As identified by Dr. Ashok P. Jadhav, Dr. Tejpal J. Moharekar, Dr. Tejashree T. Moharekar (2022), the Indian economy depends heavily on agriculture, a crucial socio economic sector that needs understanding and attention at all levels. The effects of climate change, however, are among the most significant problems this sector is facing. The government in particular is investigating ways in order to increase agricultural productivity and profitability along with helping farmers to double their incomes.

Anuj Kumbhat (2022) found that smallholder farmers face a variety of risks that make their productivity and income unpredictable and unstable. Various organizations as well as the government are aimed at helping the farmers to streamline the produce and earnings and transform the agricultural sector to a high-value one in India in terms of advancements and technologies.

According to Navneet Rai (2022), the Indian agricultural sector is experiencing a transformative phase. Various ecosystem players are attempting to solve the age-old problems associated with productivity and farmers' income. New-age agri-techs, on the other hand, are marching to align India's agricultural practices with global standards in critical areas such as climate change, food security challenges, and the adoption of sustainable agriculture practices.

As observed by Hemendra Mathur (2022), The emergence of agritech businesses was first noted in 2010, a year marked by experimentation aimed at addressing farmers' problems with respect to the availability of quality inputs, loans, insurance, and appropriate market access. The subsequent phase started in 2017, as venture capitalists' interests and innovation emerged as key aspects of the agritech startup ecosystem.

According to Jayesh Ranjan and Purushottam Kaushik (2022), The government of India's goal to provide farmers with agricultural technology services through public-private partnerships is anticipated to strengthen the nation's agricultural industry and address issues with sustainability, efficiency, and inclusion. Climate change is a serious danger to food and agricultural systems because 60% of India's agricultural area is rain-fed. Precision tools and agricultural technologies can reduce food wastage and fight hunger.

As highlighted by Pooja Malik (2022), The agritech market in India has the potential to reach \$24 billion by 2025, not even 1% of the total potential has been tapped. India is fundamentally an agrarian country with farmers continuing to be plagued by issues such as outdated equipment, poor infrastructure, and a lack of market access. Technological advances in every sector including the agricultural sector can help bring a revolution.

According to a report published by Startup India (2023), Agriculture has been a mainstay of the Indian economy since the Indus Valley Civilisation. AgriTech is an amalgamation of agriculture and modern technologies that generate yield efficiently that can prompt revenue to support the livelihoods of farmers.

Objectives

1. To emphasize on the current status of the agricultural sector in India.
2. To comprehend the challenges faced by the agricultural sector in India.
3. To determine emerging technologies that will help the agricultural sector flourish.

Need for the study

India is a significant player in the agricultural sector worldwide. This sector is the primary source of livelihood for the majority of the population. Rapid growth in population in India is one of the major factors navigating the agricultural industry. Indian agriculture is unorganized and fragmented coupled with challenges such as lack of infrastructure, supply chain inefficiencies and low digital adoption and many more such reasons that hold back this sector from performing to its full potential. This study aims at understanding the various technological know-hows and how it can change the life of the farmers and help transform the traditional way of doing things. A substantial part of our agricultural growth evolves through application of new technologies. This will certainly change the way agriculture is done in our country and ensure future growth without compromising on the man-machine linkage. However, innovation-led growth of agriculture in our country should ensure all stakeholders in the agricultural chain contribute and benefit, starting with the farmer. Countries such as the Netherlands, the US, Australia and Israel, have successfully adopted and exploited digital solutions to revolutionize agriculture, the adoption of the same in India is still in its infancy. A multi-stakeholder approach will be required for the wide-scale adoption of digital agriculture in India.

Scope of the study

This study is confined to secondary data due to time constraints which can be further extended to case studies, selective sampling, questionnaires, as well as face to face interviews to understand the agritech startups better. This paper only highlights the agritech startups and doesn't involve every startup that is a part of the agricultural ecosystem.

III. Research Methodology

India is a global agricultural powerhouse. Evidence suggests that technology has a potential to harness the potential offered by the Indian Agricultural Sector. Innovation will certainly change the way agriculture is done in our country and ensure future growth in the sector without compromising the man-machine linkage. A properly thought-out and well-documented approach serves as the researcher's torch as they move the investigation ahead. As this study is only focused on agritech startups in India, an overview of the challenges are pointed out in the agricultural sector and are prepared using secondary data. This study is based to understand the impact of technology in the agricultural sector which is descriptive in nature. Inferences were drawn from online newspapers, IBEF reports, blogs, discussion papers and research papers of national and international journals. An attempt is made to understand the role of technology in disrupting the age-old practices of agriculture and its adoption in the current scenario. Digital transformation is revolutionizing every sector of the economy, while the total potential in this sector remains untapped. This paper also aims at understanding the challenges faced by this sector and the role of technology in various areas within the agricultural ecosystem.

IV. Agriculture in India – Overview

India is one of the major players in the agricultural sector worldwide and it is the primary source of livelihood for about 58% of India's population. India is the world's largest producer of milk, pulses, and spices. It also has the largest herd of cattle (buffaloes).

It is the second-largest producer of wheat, rice, cotton, sugar, farmed fish, fruit, vegetables, and tea. About half of the population of India is employed in agriculture, which has the second-largest agricultural land area in the world. As a result, farmers play a crucial role in the industry that produces food for us. The Indian food industry is poised for huge growth, increasing its contribution to world food trade every year due to its immense potential for value addition, particularly within the food processing industry. One of the largest sectors in India, food processing contributes 32% of the nation's total food market and is rated fifth in terms of production, consumption, export, and expected growth.

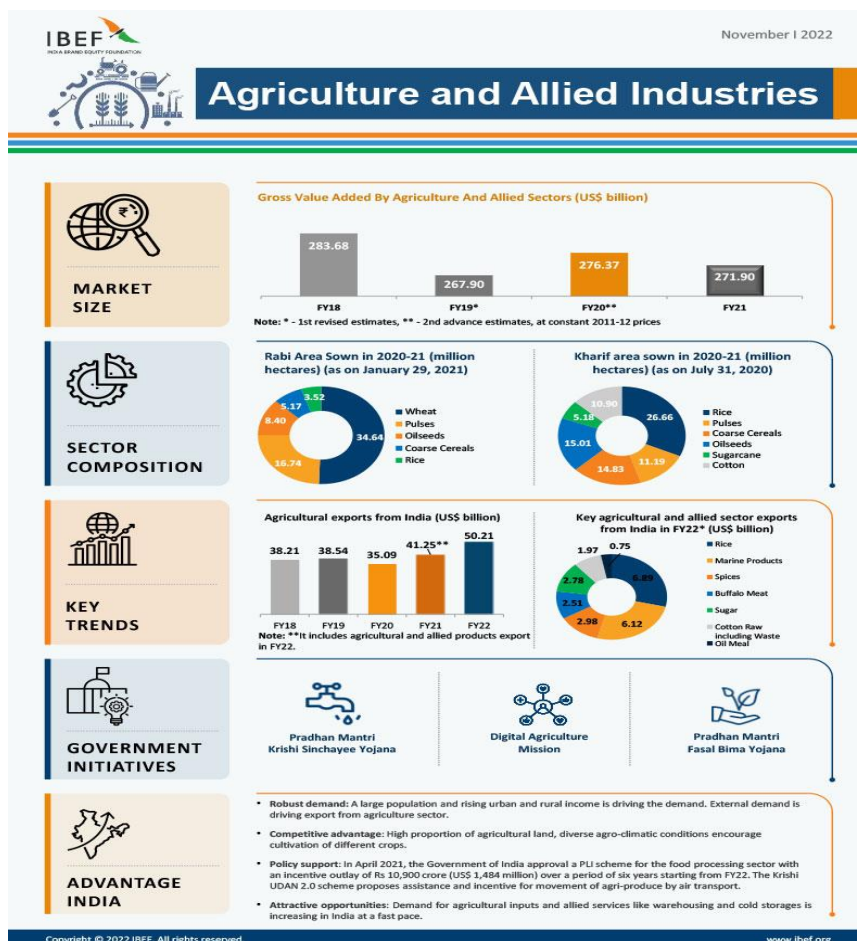
Market Size:

Between FY20 and FY21, India's exports of wheat and other commodities rose from \$505 million to \$799 million, a 727 percent gain. The global agritech market is anticipated to expand at a 12.1% compound annual growth rate (CAGR) between 2020 and 2027. India is a strong competitor in this market, with China and the US.

In the last two years, India's agriculture sector has grown at a rapid pace. The industry, which employs the majority of the country's workforce, accounted for 18.8% of the country's Gross Value Added (GVA) in 2021-22, growing at a rate of 3.6 percent in 2020-21 and 3.9 percent in 2021-22.

India's agricultural exports will reach \$50 billion between 2021 and 2022. According to the Fourth Advance Estimates, total food grain production in the nation is anticipated to hit a new high of 308.65 MT in 2020–21. Over the past six years, from 2015–16 to 2020–21, output of rice, wheat, and coarse cereals has expanded at compound annual growth rates (CAGR) of 2.7, 2.9, and 4.8 percent, respectively.

The CAGRs for cotton, oilseeds, and pulses were 7.9, 6.1, and 2.8 percent, respectively, for the same time frame. In 2020–21, cereals made up over 49% of all items (\$10,000 million), while fresh produce made up 6% (\$1342 million).



Challenges in the agricultural sector in India - Theoretical Background

1. **Inefficient Supply Chain:** - Supply chain in agribusiness is one of the major challenges in India. India loses around 20% of its agricultural production due to improper logistics. Shelf-life constraints of raw materials, intermediates and finished products as well as changes in product quality levels across the supply chain are key challenges ghosted up by lack of reefer tracks, manual process of loading and unloading of agricultural produce, shortage of weighing scales, and stocking space issues that lead to huge wastage being incurred in the process.
2. **Middlemen and Agents:** They have been described as the biggest obstacle in increasing farmers' income and the reason for high prices of agricultural and other commodities. Commission agents, traders and wholesalers take a major chunk of profit from farmers' produce and the middlemen don't provide a reasonable price to the farmers for their crops. Absence of mandi houses and proper market places serve as a challenge due to which a farmer is dependent on these middlemen.
3. **Lack of financing:** - Agriculture is a significant industry; unlike other industries, it requires funds to operate. Improving access towards finance can increase farmers' investment choices and provide them with much more effective instruments to mitigate risks. With the development of agricultural technology, the importance of capital input is growing. An agriculturalist is dependent on borrowed capital in order to increase the pace of agricultural output in order to reap the benefits of his lands and stocks. Money lenders, traders, and commission agents in the agricultural ecosystem charge exorbitant interest rates which affect the income of the farmer.
4. **Inadequate Irrigation:** - Irrigation is one of the essential steps for a crop to grow perfectly. But approximately only one-third of the total land in India has a proper irrigation facility. India has the second-largest irrigated land in the world after China, but still, India faces this problem. Proper irrigation facility helps the farmers to conduct the agricultural operations timely. In a country with a tropical monsoon like India, where rainfall is unpredictable, unreliable, and variable, irrigation is the most crucial agricultural input. India won't be able to make significant agricultural advancements unless and until more than 50 per cent of the planted area is covered by reliable irrigation. Due to this, farmers have to depend on the monsoon water for irrigation which is very uncertain.
5. **Seeds:** - A seed is an essential and fundamental ingredient to increase crop yields and maintain steady growth in agricultural output. Unfortunately, for the farmers, affording high-quality seeds associated with high costs is one of the major challenges of Indian agriculture. Due to this, farmers are bound to use the traditional seeds which are less productive and yield fewer crops.
6. **Small and Fragmented Land-holdings:** Most of the poor farmers have a very small portion of land which is fragmented in nature. It is extremely difficult for a farmer to irrigate and harvest in fragmented lands because a lot of time is wasted in moving the resources from one field to another. A farmer cannot practice effective cultivation methods such as inter-cropping, livestock farming, and commercial plantation, unless they hold a reasonably large piece of land.
7. **Fertilizers and Manures:** - Over the years, crops have been grown without any concern of replenishment. This has caused soils to become exhausted and depleted, which has decreased the yield. This problem can be addressed by the usage of more manures and fertilizers. According to estimates, increasing fertilizer application accounts for around 70% of growth in agricultural output. However, providing enough manures and fertilizers throughout the country is challenging. Chemical fertilizers are expensive and inaccessible to small-scale farmers.
8. **Lack of Mechanisation:** - Majority of Indian farmers use traditional tools such as plough, sickle, etc. The use of these tools leads to the wastage of energy, manpower and less yield per capita labour force. Despite modern equipment, many farmers are not using it due to lack of awareness, and affordability of such equipment as well as the lack of infrastructure such as electricity, etc required to run these machinery. Plowing, seeding, irrigating, thinning and pruning, weeding, harvesting, threshing, and transporting crops can be done through mechanizations. But, due to traditional methods, large amounts of human labour are wasted as a result, productivity per worker is low.
9. **Marketing:** In rural India, agricultural marketing is still in poor shape. The majority of the time, farmers are compelled by socioeconomic circumstances to continue selling their produce at a loss. Farmers typically trade their products to the moneylender from whom they borrow money in tiny settlements. Trading companies and middlemen predominate in the advertising and trading of agricultural products in the absence of a formalized marketing framework. The middlemen's compensation increases the consumer's burden for their services, but the farmers do not gain anything significant.
10. **Climate Change:**- Agriculture sector in India is vulnerable to climate change. Higher temperatures tend to reduce crop yields and favour weed and pest proliferation. Climate change can have negative effects on irrigated crop yields across

agro-ecological regions both due to temperature rise and changes in water availability. Climate is the most important determinant of crop productivity, particularly in countries like India, where about 2/3rd of the cultivated area is rainfed. It is manifested with increase in global temperature, increased intensity of rainfall, rising sea level, melting of glaciers, shifting of crop growing season and frequent occurrences of extreme events such as drought and flood.

Key Trends and Growth Drivers: Redefining Indian Agriculture through Technological Solutions

1. **Hybrid seeds:** The introduction of agritech has accelerated the development of hybrid seeds. Hybrid seeds are essential in order to combat issues like food scarcity, food waste, climate change, and declining food quality. Leading seed breeders have been utilizing cutting-edge digital technologies that offer instantaneous actionable insights to address issues related to commercial seed development, production, and distribution. Science on seed germination and machine learning techniques have been combined by technology to forecast and enhance the general pod outcome.
2. **Precision Farming:** Precision farming plays a significant role in the third modern farming revolution by leveraging advanced digital technologies. It helps reduce inputs, labour, and time along with promoting productivity and profitability, ensuring sustainability, and lowering environmental impact. There are tools to capture data related to moisture, soil conditions, weather, nutrients, pests, etc. at a very micro level so that farmers only have to use a very specific amount of fertilizers or agrochemicals in dedicated land areas as well as can take preventive measures even before a possible problem.
3. **Big Data Analytics:** Big data analytics allows farmers to track information regarding data points like water cycles, rainfall patterns and fertilizer requirements in order to increase yield. By making more informed decisions about what to plant, where to plant it and when to plant, farmers gain the ability to increase both profitability and output. The significance of this lies in the growing need to produce more food while using less land for it.
4. **Artificial Intelligence:** Artificial intelligence (AI) is a relatively new technology in agriculture. Agriculture has reached new heights owing to AI-based equipment and tools. This technology has improved crop production as well as real-time monitoring, harvesting, processing, and marketing. The most recent automated system technologies, such as agricultural robots, etc have significantly contributed to this sector. The agriculture industry is utilizing artificial intelligence (AI) to help produce healthier crops, control pests, monitor soil and growing conditions, organize data for farmers, reduce effort, and improve a wide range of agriculture-related operations along the food supply chain.
5. **Drones:** Drones, also known as Unmanned Aerial Vehicles (UAVs), can help assist farmers effectively. Drones acquire raw data, which is further transformed into valuable farm monitoring data. Drones equipped with cameras provide aerial imaging and surveying of both nearby and remote landscapes. Using GPS technology, drones are also used for livestock tracking, geofencing, and grazing monitoring. Drones fly over fields, taking photos ranging from simple visible-light images to multispectral imagery that aids crop, soil, and field research.
6. **Mobile Apps:** Farming apps are one of the most convenient and useful mechanisms to guide farmers. Mobile Apps provide guidelines to farmers for proper scientific techniques of farming, crop cultivation, sowing or harvesting of any crop. The use of mobile technology in agriculture is intensifying with time. Agricultural apps can become farmers' best friends where farmers can get access to best farming practices, market prices, sowing conditions, and a lot of related information. These apps allow farmers to identify agricultural problems and get instant solutions for them.
7. **Post Harvest Technologies:** Post-harvest loss reduction technology encompasses the use of optimal harvest factors, loss reduction in handling, packaging, transportation, and storage with modern infrastructure, machinery, processing into a wide range of products, and home scale preservation with low-cost technology. The capability of post-harvest technology lies in its ability to meet the food requirements of growing population by eliminating avoidable losses, producing more nutritive food items from low grade raw commodities through proper processing and fortification, diverting a portion of food material fed to cattle through the processing and fortification of low grade food and organic wastes and by-products into nutritive animal feed.
8. **Usage of Synthetic Fertilizers and Chemical Pest Control:** - Utilization of fertilizers helps increase the fertility of the land. Over the years, repeated uses of land led to a depleted plateau in the fertility of the land. Synthetic fertilizers give plants a quick boost but do very little to stimulate soil life, improve soil texture, or improve the soil's long-term fertility. They're highly water-soluble and can leach into waterways. Pests eat young vegetation. Pesticides used correctly can yield desired results that could reduce the invasion of vegetation by pests for the purpose of producing healthy, productive plants.

9. **Irrigation Technologies:** - Water supply is one of the most important factors in determining the survival of plants. Insufficient rainfall has a drift to be insufficient for crop production. Irrigation technologies and operation can be separated into gravity fed – surface (flood and furrow) and pressurized (sprinkler and drip) systems. Appropriate technology for irrigation will always be site and system (crop, economic, social, institutional) specific.
10. **Self-Driving Tractors:** - Modern tractors come with GPS guides that handle steering and turning to ensure optimum plowing, seeding, and harvesting. They also use real-time streams of data to make changes if needed because of soil conditions, the amount of fertilizer applied, or other factors. The autonomous tractor in the emerging days let farmers hook up a plow behind a tractor, start the machine with a swipe of a smartphone, and then leave it to rumble up and down a field on its own, thus reducing dependence on labour. The driverless tractors are equipped with six pairs of cameras that work like human eyes and can provide a 360-degree image.
11. **Fintech Platform:** - Agri-fintechs help amplify the sector's capacity and working capital needs, allowing producers to invest in new technologies and innovations which will directly contribute to a more efficient and sustainable agriculture industry. Some fintech platforms enable individual farmers and farming enterprises to purchase farming equipment at interest rates ranging from eight percent to 24 percent. Loans are provided only against productive assets which can be repossessed in case of a default. Data collected on farmers is used to build their credit score.
12. **Farming-as-a-Service (FaaS):** - FaaS start-ups connect farmers and equipment owners to address the market opportunity for mutual benefits. FaaS utilizes business models, ranging from farm-to-warehouse, mills, fork as well as linking farmers to the marketplace. The FaaS model brings all the participants, i.e., the farmers, the farm equipment manufacturers, the cooperative, and the government, onto a single platform. FaaS promises to supercharge sustainable food production to solve global food scarcity problems.
13. **Miscellaneous Agritech Startups:** - Startups across this category offer innovative and one-of-a-kind solutions in the development of agro-based products, improved dairy, poultry, or fish farming methods, advisory services, one-stop solutions for farmers involved in secondary agriculture, and many more.

V. Findings

1. The study examined the constraints in up-scaling technologies and analyzed the conditions under which the agricultural sector is unable to perform to its full potential.
2. The study attempts to emphasize the role of technology in farming and agriculture practices; Innovation in agriculture is leading an evolution in agricultural practices, which can help curb losses and increase efficiency. It has been observed that the solution to the challenges of Indian Agriculture can be found in a Tech-Enabled Multi-Stakeholder Community Approach.
3. The need of the hour is educating farmers on how to use modern technology and innovative approaches to increase productivity and profitability.
4. Technology has played and will continue to play an important role in agriculture and sustainable development in the future. The use of digital and analytic tools is driving continuous improvement in agriculture, and the trend will continue until no stone is left unturned.

VI. Discussion

The world's population is expected to reach 9 billion by 2050. The challenge is to figure out how to produce enough to feed it. The challenge of reducing agricultural acreage and food waste in production and distribution is having a significant impact on the world. Agriculture is in the early stages of yet another revolution, with data and connectivity at the centre. The increasing role of technology in addressing these issues is the only way forward to ensure global food security. India has a long way to go in terms of adopting modern farming practices via technology. The pace is slow, and pioneering efforts are needed to educate farmers about the benefits of technology. The challenge that must be overcome for a better tomorrow is breaking down the barriers of farming practices and medieval mindsets.

VII. Conclusion

The Indian agritech sector has huge untapped potential. Agritech seems to have reached an inflection point where it is gaining significant momentum among venture capitalists and the government. The agritech startups today have accelerated large-scale tech adoption and eliminated many bottlenecks by refining the supply chain. This has greatly benefitted the producers in optimum utilisation of their produce, expanded reach of their agricultural products and increased sales by taking them to a large customer base by connecting them to online marketplaces also. Agriculture is an important industry in India's economy, and start-ups are

playing an important role in relieving farmers' burdens through the use of new technologies. As these trends materialize, we may see a 'battle of platforms' as start-ups compete for farmer attention. We are already witnessing consolidation in the sector, which will likely continue. Agri-tech start-ups need a more acute focus on profitability and sustainable growth to survive. Traditional agriculture companies, too, must make calculated but swift decisions to keep pace with this rapidly evolving landscape. One of the oldest industries must embrace a digital, connectivity-fueled transformation in order to overcome increasing demand. Embrace of technology is going to happen at every level, whether they choose to deepen their expertise as specialized solution providers, or to expand into adjacencies, they must embrace technologies such as data analytics and digital networks. Based on their growth ambitions, these tech players can opt for capital investments, strategic partnerships, or corporate ventures in order to succeed across the agri-tech value chain.

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