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The Symbiotic Relationship: Agri-Tech Startups, Farmer Producer Organizations (FPO), and a Brighter Agricultural Future

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The agriculture industry in India is still an unorganized sector categorized by fragmented landholdings, unpredictable monsoons, inadequate credit and financial cover for farmers, and poor infrastructural facilities. However, the agricultural sector is on its way to becoming more organized, owing to technology and processes being integrated by entrepreneurs of leading agri-tech startups. Rural India, the backbone of the nation's economy, is undergoing a significant transformation. The agricultural sector, once a traditional and often stagnant industry, is undergoing a digital revolution. Agri-tech startups and Farmer Producer Organizations (FPOs) are playing a crucial role in empowering rural communities and driving sustainable agricultural practices. Agri-tech startups, armed with innovative technologies, are transforming the way farming is done. Simultaneously, Farmer Producer Organizations (FPOs) are empowering farmers by pooling resources and collectively addressing challenges. The synergy between these two entities is creating a powerful ecosystem that promises to revolutionize agriculture.

Understanding the Players

Farmer Producer Organization (FPO): A Farmers Producers Organization (FPO) is a registered body with the producers as the shareholders in the organization. FPO is the emerging paradigm for social engineering of farmers into an organized group, so that they can be collectively involved in agricultural supply and value-chain operations (Venkattakumar et al 2017). It is a legal entity formed by primary producers, primarily farmers, to collectively address their agricultural and economic needs. It provides a platform for farmers to pool their resources, share knowledge, and collaborate on various aspects of farming, from production to marketing. These organizations bring together smallholder farmers to collectively market their produce, negotiate better deals, and access resources and training.

Despite being one of the largest employers in the country, and seeing accelerated progress on the back of the introduction of agri-tech, farmers have often been seen expressing their woes of low income and pricing of products, lack of direct market access, and the presence of middlemen in the past. One of the key challenges for agriculture has been the informal nature of the sector. Farmers do not see farming as a business but as a way of life. This prevents farmers from maximizing the output from their farms. This is where FPOs come into the picture. One of the key factors expected to play a major role in the progress of the agriculture sector, Farmer Producer Organizations (FPOs) have been instrumental in driving the change in the agri-tech sector and helping it progress.

Role of FPOs: Farmer Producer Organizations (FPOs) play a pivotal role in empowering farmers by increasing their bargaining power, enabling collective negotiation for better prices and access to broader domestic and international markets. They promote economies of scale,

reduce costs, and enhance efficiency through resource pooling. FPOs also drive value addition by facilitating processing, packaging, and branding, which increases product value. Moreover, they provide farmers with access to finance and credit, enabling investment in farm improvements. Through training and technical support, FPOs assist in knowledge and technology transfer, helping farmers adopt modern practices. Additionally, FPOs help manage risks associated with weather and market fluctuations by implementing mitigation strategies, and they foster social and economic empowerment by involving farmers in decision-making processes, ultimately improving their livelihoods.

Agri-Tech Startups: The Indian Agriculture sector is now witnessing an increased interest from the agri tech startups who are working on multiple fronts to enhance the sector. From developing the farm to fork model, to offering advanced logistics to consulting the farmers on various fronts, Indian agri-startups are sensing a boom in the industry (Anand and Saravanan, 2019). The government's primary focus is on enhancing the agricultural industry while encouraging the expansion of Startups. Startup sector has become more profitable for ambitious entrepreneurs as a result of infrastructural development, financial allocations, regulatory reforms, ease of doing business, and specialized plans and initiatives (Deshmukh and Raj, 2021). One of the biggest Startup ecosystems in the world is in India, which supports about 226644 Startups in industries like IT, banking, and services (Startup India, 2022). With a business-focused approach, Agri-Startups are taking advantage of opportunities in areas like boosting crop production, enhancing the nutritional value of crops, lowering input costs for farmers, enhancing the supply chain's overall process-driven nature, and decreasing distribution system waste, among others.

The start-up strategy of delivering technology to Indian farmer collectives

According to Inc42 Plus report (2021), despite the lockdown due to pandemic crisis, the Agritech start-ups sector made remarkable growth and pushed the farmers towards modernization, especially by adopting the digital platform for getting access to the market place. Covid-19 seems to have unleashed the potential of Agritech start-ups by making farmers aware about the need for technology as they became more open to innovation and digitization. (Gulati et al., 2022).

An important area where FPOs and Agri-tech companies have started converging is the ability to formalize the farm economy and bring benefits of formal scaled up businesses to farmers. FPO provides the legal and operational structure to help farmers get benefits of a scaled-up business. Agri-tech companies can provide the technology backbone to make this effective. Agri-tech companies are partnering with FPOs to provide effective ways of integrating the farmers into the FPO system and help them get benefits of scale as envisaged in its formations.

Key Challenges for FPOs and Solutions from Agri-Tech Startups: Farmer Producer Organizations (FPOs) play a pivotal role in empowering smallholder farmers by collectively addressing their challenges. However, they encounter numerous hurdles, including limited access to inputs, inefficient supply chains, and low market connectivity etc. Agri-Tech startups are emerging as transformative players, providing innovative, tech-driven solutions to tackle these problems. The details are as follow in table below:

| S. No | FPO Issues/Problems | Agri-Tech Startup Solutions |
|-------|---|--|
| 1 | Access to quality inputs | Startups offer digital input marketplaces where FPOs can access certified seeds, fertilizers, and nutrients at affordable prices, eliminating the need for long-distance travel. |
| 2 | Lack of real-time crop health monitoring | Using satellite imagery and drones, startups provide timely data on crop health, pest infestations, and nutrient deficiencies, helping FPOs make informed decisions. |
| 3 | Unpredictable weather and sowing challenges | Startups create mobile applications that provide weather-based advisories and suggest the best sowing times, reducing risks due to erratic climate conditions. |

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|----|--|--|
| 4 | Dependence on middlemen | Platforms for farm-to-retail linkages enable direct connections with buyers, ensuring better profit margins and reducing exploitation by intermediaries. |
| 5 | High costs of advanced agricultural machinery | Startups promote farm equipment rental services, allowing FPOs to access modern machinery without heavy investments. |
| 6 | Lack of transparency in supply chains | Smart supply chain solutions ensure traceability, quality assessment, and reduce issues of counterfeiting in agricultural inputs and produce. |
| 7 | Difficulty in accessing financial services | Fintech platforms provide tailored financial solutions, including loans, credit, and crop insurance, improving financial security for farmers. |
| 8 | Limited data-driven decision-making | Through big data analytics, startups help FPOs gain insights into farming practices, market trends, and productivity enhancements. |
| 9 | Low market linkages and poor price realization | E-marketplace platforms connect FPOs with buyers and markets, enhancing market reach and price discovery. |
| 10 | Labor shortages and farm management challenges | Startups deploy automation technologies like IoT sensors and robotics to optimize farming operations and mitigate labor shortages. |

Agri-Tech Startups and FPO Integration: Bridging the Gap Between Agribusiness Corporates and Farmers

Farmer Producer Organizations (FPOs) have emerged as key vehicles for collective action, aiming to empower smallholder farmers by reducing transaction costs and increasing market participation. The most common entry-point activity for FPOs is input supply to members, a practical starting point but one with limited growth potential due to slender profit margins. Input business alone does not significantly strengthen the financial health of FPOs or their balance sheets. Instead, agricultural produce marketing holds the potential to serve as the growth engine for FPOs.

However, most FPOs, lack the business acumen required to compete in modern agricultural markets. This is where Agri-Tech startups can play a transformative role, acting as intermediaries to bridge the gap between producers (FPOs) and consumers (agribusiness corporates). While some partnerships between startups and FPOs have already emerged, the scale of need calls for many more players to enter this space.

Challenges Faced by FPOs in Collaborating with Corporates: Despite the willingness of corporates to partner with FPOs, certain concerns hinder direct engagement:

1. **Quantity:** Corporates require large volumes, while FPOs often supply only a fraction of the needed quantity due to limited member output.
2. **Timeliness:** Farmers hold their produce individually, and decisions on when to sell rest with the farmers. This makes it difficult for FPOs to aggregate adequate quantities on time. Procuring from non-members or traders to meet orders in a timely manner also remains a challenge.
3. **Quality:** FPOs rely on a limited pool of produce from their member farmers, which may not always meet the quality specifications required by corporates.

Additionally, corporates fear the reputational risks of failed partnerships with FPOs, which could lead to public backlash, as seen in previous controversies such as the potato seed issue in Gujarat.

How Agri-Tech Startups Bridge the Gap: Agri-Tech startups act as mediators, addressing both the concerns of corporates and the operational limitations of FPOs. Their ability to seamlessly align the expectations of both parties makes them indispensable in this ecosystem. Startups can:

- Facilitate end-to-end value chain integration, from input supply to market linkage.
- Enable real-time data-driven decisions using technology like IoT, AI, and blockchain to ensure traceability, quality assurance, and inventory management.

- Aggregate produce from multiple FPOs to meet corporate demands for quantity and quality.
- Offer platforms for efficient logistics and timely delivery, reducing the friction in supply chains.

Conclusion

Agri-Tech startups and FPOs represent a powerful partnership capable of transforming Indian agriculture. Together, they can create a more efficient, equitable, and sustainable food system. By leveraging technology and collective action, FPOs can overcome operational challenges and scale their operations, while startups can unlock new market opportunities and drive rural development. While the ecosystem for Agri-Tech startups in India shows immense promise, there remain challenges to address. These include enhancing access to financing, fostering deeper collaborations with FPOs, and improving infrastructure in underserved regions. By addressing these gaps, we can unleash the full potential of technological innovations, accelerating the growth of Indian agriculture and ensuring a prosperous future for its farmers.

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