ThinkAg

AGFOODTECH IN INDIA

Innovation and Investment Report 2025

Part II

Knowledge Partner

About Rabo Foundation
Rabo Foundation, the foundation arm of Rabobank, invests in the self-sufficiency of smallholder farmers and farming communities through access to financing, knowledge and innovation. The impact financier works in 23 countries across the globe.

In India, Rabo Foundation takes an enabling role in the smallholder ecosystem when it comes to access to finance and mainly unlocks capital through working with local financial institutions. Borrowing clients of these banks usually are farmer producer organisations, agri enterprises and AgTech start-ups.

About ThinkAg

ThinkAg is India's first collaboratory Ag-Food-Tech platform, bringing together entrepreneurs, investors, financial institutions, corporates, incubators, producer collectives, foundations, policymakers and other members of the ecosystem to accelerate innovation and improve outcomes in Indian Food & Agriculture.

As this ecosystem addresses the barriers of a traditionally sub-optimal agriculture sector and evolves in the face of ever-changing consumer patterns, globalized approaches, climate challenges, technological developments bringing disruptive changes and the imperatives of long-term food security – opportunities for innovation abound. While many entrepreneurs and innovators are using cutting-edge technologies and contemporary business models to address these challenges, existing players are also looking to adopt smart approaches to old businesses. Winning partnerships between stakeholders (existing entities, new entrants, innovators, and investors) to accelerate these innovations through rapid prototyping can transform the AgFoodTech landscape in India.

ThinkAg was originated with a mission to enable and facilitate just this - the rapid scale-up of AgFoodTech solutions by building multi-stakeholder networks, nurturing partnerships and creating knowledge assets, that will accelerate innovation, investment and adoption of technology solutions in India's agri-food ecosystem.

To this end, ThinkAg's programming includes:

Knowledge Series - Platform for thematic dialogue on the opportunities and challenges facing the agri-food ecosystem as well as practitioner-informed insights and knowledge sharing.

Curated Partnerships - Facilitated engagement between AgFoodTech startups and corporates, financial institutions & public sector entities through pilots, knowledge-exchanges and commercial partnerships.

Research Reports - Quantitative & qualitative analysis of the sector featuring innovation & investment trends afoot, expert insights and on-ground voices, perspectives on the sector's evolution, an outlook for its future.

Ecosystem Connect - Event series assembling diverse members of the ecosystem and featuring topical discussions, stakeholder-specific roundtables and curated networking opportunities, including our flagship annual conference, the ThinkAg Harvesting Tomorrow Summit

Startup Acceleration - Acceleration programs for startups, offering strategic support, mentoring, pilot opportunities, and industry connections.

Cross-border Initiatives - Facilitating curated cross-country partnerships, research reports, and program design for AgFoodTech initiatives and business opportunities.

Contents

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Abbreviations

B2B	Business-to-Business
B2B2C	Business-to-Business-to-Consumer
BC	Business Correspondent
CBBO	Cluster Based Business Organizations
CBG	Compressed BioGas
CHC	Custom Hiring Centre
CSR	Corporate Social Responsibility
D2C	Direct-to-Customer
DFI	Digital Financial Identity
ECP	Equated Cycle Payments
FLDG	First Loss Default Guarantee
FPC (L)	Farmer Producer Company (Limited)
FPCL	Farmer Producer Company Limited
FPO	Farmer Producer Organizations
HDFC	Housing Development Finance Corporation
KCC	Kisan Credit Card
KiVi	Kisan Vikas
KYC	Know Your Customer
MFI	Microfinance Institution
MSME	Micro, Small, and Medium Enterprises
NAFED	National Agricultural Cooperative Marketing Federation of India Ltd
NAFED	National Agricultural Cooperative Marketing Federation of India Ltd
NBFC	Non-Banking Financial Company
NPA	Non-Performing Assets
NTC	New-to-Credit
ONDC	Open Network for Digital Commerce
PSL	Priority Sector Lending
QR	Quick Response
ROAS	Return on Assets
ROI	Return on Investment
SBI	State Bank of India
SELCO	Solar Electric Light Company
SHG	Self-Help Group
TAT	Turn-Around-Time
VAS	Village Level Aggregators

Introduction

This is ThinkAg 'AgFoodTech in India: Innovation and Investment Report 2025' Part II, that covers ground reports and ecosystem insights, 'Technology Adoption by Farmer Collectives' and 'Unlocking Innovations in AgriFinTech' respectively.

Innovation in precision agriculture, biotechnology, and climate-resilient solutions can create meaningful impact only when they are effectively adopted at the farm level. Farmer collectives have the potential to serve as powerful conduits for awareness creation, capacity building, and last-mile technology adoption at scale.

This report presents insights from primary research with a cohort of farmer collectives, examining their technology adoption lifecycle—from initial perception to scaled penetration. The analysis highlights how adoption is shaped by a mix of intrinsic organizational factors, external ecosystem conditions, and influences that innovators themselves can strategically address.

By mapping these drivers and frictions across the stages of adoption, the study surfaces actionable insights for ecosystem actors, farmer collectives, and technology innovators to accelerate and deepen technology absorption across India's smallholder systems.

Over 80% of India's farmers are smallholders with less than 2 hectares of land. Rising tenancy due to urbanization and migration, combined with increasing climate variability, has intensified the need to rethink how farm and farmer finances are assessed, underwritten, and delivered. These financial gaps directly influence the adoption of new technologies and inputs—an essential requirement for improving farm efficiency, productivity, and climate resilience.

AgriFinTechs have emerged as next-generation financial innovators, designing products attuned to the unique realities of agriculture while keeping the farmer at the center. This report profiles the diverse farmer segments they serve and examines how leading AgriFinTechs are driving value creation, strengthening risk management, and building scalable models tailored to the agricultural economy.

ThinkAg Ground Reports

Technology Adoption by Farmer Collectives

Executive Summary

Technology Adoption by Farmer Collectives
This empirical study on 64 farmer collectives (FPOs/CBBOs)[1] across seven states establishes a mean technology adoption rate of 20–40% among their farmer cohorts. The research validates a holistic adoption framework based on critical dimensions like Feasibility, Viability, and Contextuality, and classifies the journey of technology adoption into a six-stage life-cycle.

Sustained technology adoption is achieved through a synergistic strategy across three major spheres of influence:

Extrinsic Factors:

Subsidies, grants, and exemptions are vital for democratizing access to high-cost technology. Systemic support is crucial for resolving infrastructural gaps and certification requirements. transparency, and building deep community trust.

Innovators' Sphere:

Innovators' influence peaks during implementation and adoption stages by embedding finance (e.g., rental models), providing sustained technical assistance, and establishing strong market linkages for value-realization.

Intrinsic Factors:

Internal success is anchored by strong governance, democratic decision-making, financial transparency, and building deep community trust.

Key Insights

The long-term success of technology adoption by farmer collectives is built on a human-centric foundation of trust and practicality. Internal success is anchored by strong governance, financial transparency, and building resilience against market shocks through income diversification, processing, and leveraging existing community structures.

This internal strength must be supported externally, like government subsidies are vital for democratizing access to high-cost technology, but policy must also resolve critical infrastructural and systemic gaps.

Crucially, innovators must drive 'process innovations'—like affordable rental schemes and sustained technical support—to ensure the technology is contextual for small farms, delivers measurable value (increased income, better efficiency), and avoids being a complicated, "tech-pushed" mandate.

India's agritech ecosystem is experiencing unprecedented innovation—yet technology adoption among smallholder farmers remains slow, uneven, and often misunderstood. The gap is not in the availability of solutions, but in the ability of farmers and institutions to absorb, trust, contextualize, and sustain them. Technology in agriculture succeeds only when it aligns with the economic, social, and institutional realities of those it intends to serve.

Farmer Producer Organisations (FPOs) as one of the most promising platforms for scaling meaningful agricultural innovation. But their adoption journey is influenced by far more than the intrinsic quality of technology. It is shaped by governance capacity, financial constraints, behavioural dynamics, market incentives, and the readiness of the broader ecosystem. Adoption is not an event—it is a lifecycle. And it cannot be driven by a single stakeholder.

[1] FPO- Farmer Producer Organization; CBBO- Cluster Based Business Organization

Technology Adoption by Farmer Collectives

This study presents an empirical analysis of technology adoption across a cohort of 64 farmer collectives (Farmer Producer Organizations / Cluster Based Business Organizations), spanning seven states: Bihar, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Tamil Nadu, and Uttar Pradesh. Data was systematically collected via a mixed-method approach utilizing survey forms and long format interviews with over 23 farmer collective representatives.

The majority of these organizations are small to medium-sized. Specifically, 72% have between 300 and 1,200 members. Only a small portion, 10%, have more than 2,000 members. Baseline data establishes a mean technology adoption rate of 20% to 40% within the FPO farmer cohorts, comprising all associated (non/ registered) members. FPOs from Maharashtra and Madhya Pradesh reported highest technology adoption rates by their farmer cohorts, of over 40%.

Empirically, a strong positive correlation is observed between landholding size, organizational turnover, and the propensity for adopting multiple technologies, confirming that technological integration scales with economic capacity.

The study validates a comprehensive adoption framework categorized by four critical dimensions:

Feasibility

Ensuring sustained adoption through core support elements, including established trust, data-backed technical support (awareness, capacity building, and demonstrations), availability of a skilled workforce, and robust operational and maintenance support.

Contextuality

The degree of farmer centricity, ensuring the technology offers an intuitive design, operational ease, is need-based, and appropriately scaled for small-farm focus.

Viability

The economic and financial workability of the technology, evaluated by Return on Investment (ROI), analysis of upfront and recurring costs, access to financial incentives and assistance, and clear impact tracking mechanisms.

Other factors

External and systemic variables, including adherence to data privacy, local weather and logistics, availability of access to service centres, and necessary certifications/licenses.

Framework: Life-Cycle of Technology Adoption by Farmer Collectives

STAGES:

The technology adoption life-cycle for farmer collectives, has been classified into six stages:

1. **Perceived Relevance & Awareness:** The initial phase where farmer collectives gauge the necessity, complexity, and contextual fit of a technology.
2. **Evaluation & Decision Making:** The process of formal assessment where the farmer collectives determine the strategic alignment and financial justification for adoption.
3. **Implementation Preparation & Trial:** The phase focused on deployment and initial testing.
4. **Barriers & Adaptation:** The critical period where operational and systemic obstacles are encountered and managed.
5. **Early Use and Adoption:** The stage of primary integration and validation where success is proven through tangible results.
6. **Institutionalization & Reinforcement:** The final phase where the technology becomes a standard operational practice, leading to sustained and systemic impact.

SIGNIFICANCE:

Reported factors influencing technology adoption, along with the observed intensities, have been documented under each stage

High — Critical influence on technology adoption

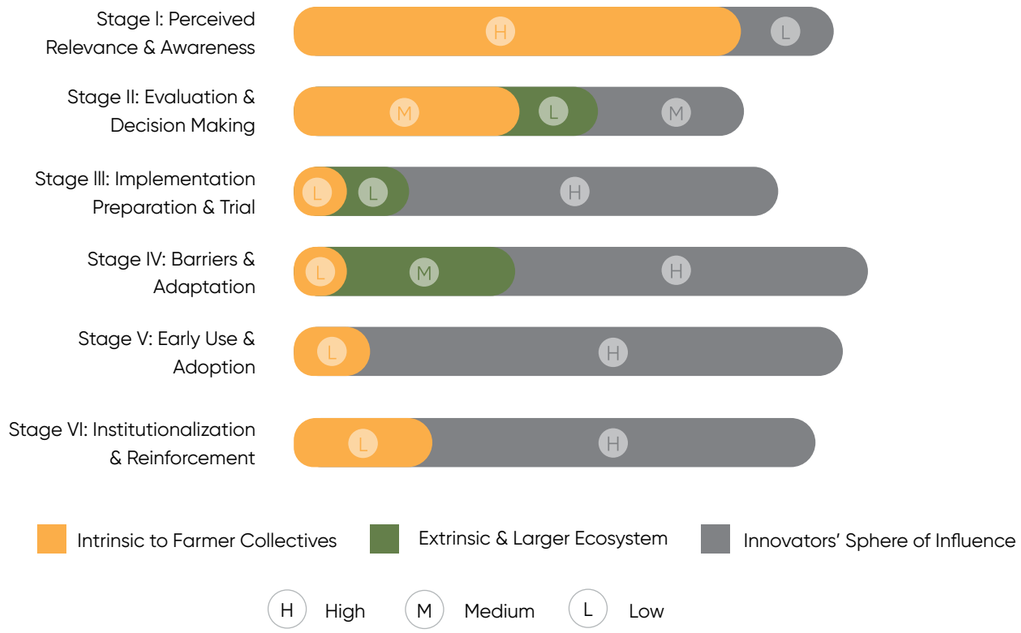
Medium — Moderate influence on technology adoption

Low — Minimal influence on technology adoption

SOURCE:

Additionally, the influencing factors are categorized into three:

1. **Intrinsic:** Originating from within the farmer collectives (FPOs)
2. **Extrinsic:** Emanating from the larger external ecosystem (market and policy)
3. **Innovators' Influence:** The sphere where innovators can/ play an instrumental role



Technology Adoption by Farmer Collectives: A Life-Cycle Approach

Factors Influencing Technology Adoption

Intrinsic

The study indicates that while intrinsic factors hold a predominant role during the initial stages of technology adoption, especially at Stage I, their influence plateaus across the intermediate stages of the life cycle. Their significance is then reinforced towards the final stage of institutionalization, where farmer clusters must actively focus on scaling the validated technologies within the lagging segments of their respective organizations.

Extrinsic

The influence of extrinsic factors is prevalent across the central stages of the farmer clusters' technology adoption journey. They feature prominently as policies governing subsidies, exemptions, and incentives, often serving as major catalysts for technology initiation. Moreover, these factors also encompass systemic requirements such as certification and licence procurement, infrastructural requirements, capacity building and market volatility.

Innovators' Sphere

The study indicates that the Innovators' Sphere of Influence strengthens over the life-span, peaking at the implementation and adoption stages. This trend signifies a healthy correlation between their strategic efforts in intelligently designing both technologies and adoption models. Their critical contributions include building contextuality, embedding finance, establishing robust ongoing technical assistance mechanisms, and offering market linkages for value-realization.

Stage-Wise Observations

Perceived relevance and awareness: The intrinsic factors play a crucial role at this early stage, predominantly comprising trust, perceived relevance and contextuality of the technology proposed. Exhibitions and showcases are reported as crucial avenues for technology discovery and supplier identification from innovators' sphere.

Evaluation & Decision Making: This stage is influenced by a combination of intrinsic, extrinsic, and innovators' innovation sphere factors, centering on the strategic alignment of the technology with the farmer cluster's long-term vision, its financial viability, the provision of assistance and incentives, and securing collective consensus for technology uptake.

Implementation Preparation & Trial: This stage is predominantly influenced by the innovators' sphere, focusing on the provision of capacity building programs & demonstrations, securing partnerships for linkages & finance, and the availability of ongoing technical assistance & accessible support systems.

Barriers & Adaptation: Lack of access to timely & affordable finance, disproportionate land size & machinery, and high investment costs & long gestation periods prove to be the major drawbacks at this stage. Additionally, weak integrated market linkages & value-realization are enumerated as significant barriers that can be mitigated by innovators' interventions. Concurrently, infrastructural gaps and thin availability of skilled workforce to implement technology at scale fall under the ambit of extrinsic factors, underscoring the critical role of policy and government in resolution.

Early Use and Adoption: This critical stage of primary integration and validation is defined by factors that demonstrate success and ensure continuity. The integral elements are establishing proof of improved efficiency & tangible benefits, ensuring comprehensive integration & compatibility of technology, and providing sustained financial support & technical assistance. The prominence of these factors indicates a continued, active role for innovators in resolving any operational challenges and developing advanced models for swifter, more effective adoption.

Institutionalization & Reinforcement: To institutionalize technology adoption and ensure sustained, systemic impact, the final phase requires the validation of key outcomes, which need to be a major focus for innovator efforts: Increased value-realization for the produce, enhanced resource efficiency & reduced cost, and improved quality, production & productivity.

Addressing the slow pace of technology adoption is crucial, especially among certain farmer segments such as older farmers. With most FPOs reporting an adoption rate of only 20% to 40%, a focused effort to reinforce and scale up technology usage is required.

Technology Adoption by Farmer Collectives: Stages and Factors Influencing

1 STAGE

Perceived Relevance & Awareness

Trust in the promoting entity & demonstrated data	Intrinsic – High
Perceived relevance, context & complexity	Intrinsic – High
Exposure to demonstrations & innovation showcases	Innovators' Influence – High
Perceived ecological pressures & impact	Intrinsic – Medium
Social & peer influence	Intrinsic – Medium
Resistance to change & aversion to risk	Intrinsic – Low
Past experiences & generational differences	Intrinsic – Low

2 STAGE

Evaluation & Decision Making

Evidence-backed strategy & long-term vision alignment	Intrinsic – High
Cost-benefit analysis (ROI) & availability of financial assistance	Innovators' Influence – High
Financial incentives, exemptions & subsidies	Extrinsic – High
Collective decision-making & strategic alliance	Intrinsic – Medium
Operational & managerial modalities	Extrinsic – Low

3 STAGE

Implementation Preparation & Trial

Capacity building programs & demonstrations	Innovators' Influence – High
Ongoing technical assistance & accessible support systems	Innovators' Influence – High
Partnerships for linkages & finance	Innovators' Influence – High
Certifications & licenses	Extrinsic – High
Digital integration & data capturing	Extrinsic – Low
Informal learning networks	Intrinsic – Low

4 STAGE

Barriers & Adaptation

Lack of access to timely & affordable finance pool	Innovators' Influence – High
Disproportionate land size & machinery	Innovators' Influence – High
High investment costs & gestation periods	Innovators' Influence – Medium
Weak integrated market linkages & value- realization	Innovators' Influence – Medium
Thin availability of skilled workforce & infrastructural gaps	Extrinsic – High
Adoption lag in specific segment/ older farmers	Intrinsic – Low
Information asymmetry & misinformation	Extrinsic – Low
Market volatility & variable returns on investment	Extrinsic – Low

Intrinsic Factors: High, Meadium, Low

Extrinsic Factors: High, Meadium, Low

Innovators' Influence: High, Meadium, Low

5 STAGE

Early Use and Adoption

Proof of improved efficiency & tangible benefits	
Comprehensive integration & compatibility of technology	
Financial support & technical assistance	
Recurring costs & after-sales services & spare parts availability	
Ease of use, inclusive & intuitive design	
Influence of early adopters	

6 STAGE

Institutionalization & Reinforcement

Increased value-realization & equitable income distribution	
Enhanced resource efficiency & reduced cost	
Improved quality, production & productivity	
Increased appetite for future technology adoption	
Built climate resilience, inclusion & sustainability	
Increased network effect for mass adoption	

Intrinsic Factors: High, Meadium, Low

Extrinsic Factors: High, Meadium, Low

Innovators' Influence: High, Meadium, Low

Key Observations

Intrinsic Factors

The long-term success of technology adoption by farmer collectives is built on a human-centric foundation of trust and practicality. Internal success is anchored by strong governance, financial transparency, and building resilience against market shocks through income diversification, processing, and leveraging existing community structures.

Governance & Trust: Technology adoption must be driven by strong governance, democratic decision-making, financial transparency (e.g., digital billing), and building deep community trust.

Resilience Strategy: Build resilience against shocks through income diversification across the value chain, investing in processing/ value addition, and integrating circular economy models.

Appropriate Technology: The adoption strategy must be highly contextual, ensuring all technology is need-based, affordable, and appropriate for their member cohort, explicitly considering farm size.

Community Mobilization: Leverage existing community structures (like Self-Help Groups) for mobilization and utilize informal learning networks (WhatsApp, YouTube) and local exhibitions for technology discovery.

Innovators' Sphere of Influence

Crucially, innovators must drive 'process innovations'—like affordable rental schemes and sustained technical support—to ensure the technology is contextual for small farms, delivers measurable value (increased income, better efficiency), and avoids being a complicated, "tech-pushed" mandate.

Financial Models: Strategically embed finance into adoption models, such as developing innovative, affordable rental models for expensive equipment to ensure inclusive reach.

Sustained Support: Establishing robust, ongoing technical assistance, capacity building, and accessible field-level support is vital for long-term adoption and integrating all farmer cohorts. This should also assist trust building between innovators and farmer clusters.

Value-Centricity: Technology must actively focus on value realization, delivering key measurable outcomes such as increased equitable income, enhanced resource efficiency, and improved quality/productivity.

Contextual Design: Ensure technology is farmer-centric, intuitive, operationally easy, and appropriately scaled for small-farm focus, avoiding "tech-pushed" mandates.

Extrinsic Factors

This internal strength must be supported externally, like government subsidies are vital for democratizing access to high-cost technology, but policy must also resolve critical infrastructural and systemic gaps.

Financial Inclusion: Subsidies, grants, and exemptions are vital for democratizing access to high-cost technology for smallholders; awareness programs are equally critical to bridge information gaps on eligibility and access.

Systemic Foundation: Resolving external obstacles like infrastructural gaps (electricity, connectivity), increasing the availability of a skilled workforce, and streamlining certifications/licenses are essential for adoption and scaling.

Market Risk: Support mechanisms, such as assured long-standing procurement agreements (e.g., NAFED), are necessary to mitigate high market dependency and price volatility, for consistent technology adoption.

Key Recommendations

India's agritech ecosystem is experiencing unprecedented innovation—yet technology adoption among smallholder farmers remains slow, uneven, and often misunderstood. The gap is not in the availability of solutions, but in the ability of farmers and institutions to absorb, trust, contextualize, and sustain them. Technology in agriculture succeeds only when it aligns with the economic, social, and institutional realities of those it intends to serve.

Farmer Producer Organisations (FPOs) as one of the most promising platforms for scaling meaningful agricultural innovation. But their adoption journey is influenced by far more than the intrinsic quality of technology. It is shaped by governance capacity, financial constraints, behavioural dynamics, market incentives, and the readiness of the broader ecosystem. Adoption is not an event—it is a lifecycle. And it cannot be driven by a single stakeholder.

The study has come up with three key recommendations to drive adoption of technology among the farmer collectives:

1. Establish a systems-based understanding of technology adoption

Adoption outcomes emerge from the interaction of three spheres of influence:

- **Intrinsic factors** within the collective—trust, governance, capability, financial transparency.
- **Extrinsic factors** in the wider ecosystem—policy, subsidies, infrastructure, certification, market volatility.
- **Innovator-driven factors**—product contextuality, affordability, after-sales handholding, and market linkage design.

Only when these spheres align can technology move from pilot to institutionalization.

2. Surface evidence-based patterns across diverse geographies and models

Through 64 farmer collectives across seven states, this study identifies what consistently enables adoption—and what hinders it. The findings reinforce that technologies succeed when they are contextual, financially viable, and embedded in ongoing support, and they fail when they are introduced as top-down "tech-push" solutions misaligned with local conditions.

3. Create a shared blueprint for innovators, policymakers, financiers, and institutions

The six-stage adoption lifecycle developed in this study provides a practical framework for designing and scaling farmer-centric technology. It clarifies where innovators must intervene, where policy must enable, and what institutional capabilities farmer collectives must build to ensure sustained adoption.

Technology will transform Indian agriculture only when it is **trusted, contextual, and economically meaningful** for farmers. Adoption ultimately rests on human behaviour, institutional strength, and value realization—not on the sophistication of the tool itself.

This report sets the stage for an evidence-driven assessment of technology adoption across farmer collectives and outlines the critical shifts required for India's agri-innovation ecosystem to scale impact sustainably.

Case Studies

Farmer Collectives and Technology Adoption

Case Study 1

SUGI PRODUCER COMPANY LIMITED, MAHARASHTRA

VISION AND OBJECTIVES

Sugi Producer Company Limited, Nashik, works to enhance member farmer income by securing better market access, facilitating affordable, high-quality agri-input procurement, and enabling collective bargaining. The FPO seeks to promote modern farming and act as a trusted rural institution interfacing with all necessary financial, technical, and commercial stakeholders.

Technology Adoption and Operational Efficiency

Sugi FPCL's operational transformation is driven by the strategic integration of advanced post-harvest and cultivation technologies, core being a multi-functional cold storage facility, uniquely configured for both dehydration and fruit ripening, which serves to mitigate post-harvest loss and enable secondary value-added processing. It is sustainably powered by biomass-generated energy.

Mechanization efforts include tractor-mounted onion transplanters, yielding a significant labor-efficiency metric, reducing the planting requirement for a one-acre plot from an estimated 100 worker-days to 8 worker-days—an efficiency increase exceeding 90%. Furthermore, innovative field-level practices like Bio Seed Coating for minute seeds (onion and chilli), successfully eliminate the conventional 45-day transplantation phase. This accelerates nursery cycles and facilitates earlier harvests, while simultaneously enhancing seed viability and survival rates.

Complementing these are sensor-based sorting and grading systems, which ensure product quality consistency, lower rejection rates, and consequently, improve net price realization, while a trial for drone-based spraying addresses the objectives of reducing chemical exposure and standardizing input application.

Challenges, Mitigation, and Capital Strategy

The FPO operates under the challenge of high market dependency and price volatility, with 70% of its turnover exposed to climate-linked fluctuations in onion prices. This risk is mitigated by leveraging a long-standing procurement agreement with National Agricultural Cooperative Marketing Federation of India Ltd (NAFED) assuring volume offtake.

Internally, the success of mechanization introduces the challenge of technology versus labor dynamics, as labor-saving technologies cause displacement in a rural economy reliant on seasonal work, necessitating a broader approach to equitable transition.

Sugi FPCL adheres to a robust capital framework that avoids institutional debt, relying on strategic utilization of non-dilutive capital, specifically government subsidies for infrastructure (e.g., cold storage) and targeted Corporate Social Responsibility (CSR) funding (e.g., Tata Research) for machinery acquisition, ensuring capacity is built without financial stress.

KEY INSIGHTS FOR SUSTAINED TECHNOLOGY ADOPTION

Sugi FPCL's journey yields three critical insights for community-led innovation:

Tech Integration: Success must be farmer-led and contextual, driven by internal motivation and trust established through practical demonstrations, rejecting "tech-pushed" mandates.

Discovery & Adoption: Informal learning networks (YouTube, WhatsApp groups) and active participation in local exhibitions are crucial for technology discovery and modular solution identification.

Market Linkages: Strong and assured market linkages are as critical as production efficiency. The final impact on farmer income is only realized through a reliable and diversified market strategy.

Case Study 2

DELTAFIIA, MAHARASHTRA

VISION AND OBJECTIVES

DELTAFIIA, Nashik, is driven by a mission to ensure fair market access, integrate innovative agritech, and establish global market linkages for farmers. They work in multiple crop value chains (e.g., chilli, maize, rice, grapes, and vegetables) integrating both backward and forward linkages.

Technology Adoption and Operational Efficiency

DELTAFIIA maximizes its operational efficiency through the strategic integration of digital and precision agricultural technologies. Precision farming tools include organized drone services for enhanced application efficiency and health-conscious pesticide use, alongside soil & weather analytics—such as on-site soil/water testing, moisture sensors, and weather stations—which enable data-driven decision-making.

Furthermore, traceability technology is deployed to ensure full transparency and quality, allowing buyers to track produce from the farm to their plate and significantly bolstering consumer trust in the supply chain.

Complementing these systems, the FPO leverages digital infrastructure for farmer engagement and financial transparency. Field teams utilize internal portals to gather and verify data, which informs the provision of targeted advisories shared efficiently through WhatsApp groups and village meetings. This digital flow of information strengthens capacity and decision-making among farmers, while the use of digital billing systems streamlines financial transparency across all transactions.

Challenges Mitigation and Capital Strategy

The primary internal challenges relate to adoption barriers in older farmers and the need for continuous effort to build economic literacy and support behavioral change to foster sustained tech adoption. Frequent field training, peer education, and persistent ground engagement by agronomists are deployed to build trust and integrate older cohorts into digital tool usage.

Market risk is mitigated by maintaining diversified Direct-to-Customer (D2C) supply chains and global export linkages, which maximize farmer revenue. The FPO leverages strategic financial partnerships and innovative rental models for equipment (drip winders, herbicide pumps, drones) that reduces the capital entry barrier for smallholders and democratizes access to expensive machinery.

KEY INSIGHTS FOR SUSTAINED TECHNOLOGY ADOPTION

DELTAFIIA's journey yields four critical insights for data-led and inclusive innovation:

Tech Platforms: The integration of diverse digital and precision technologies is paramount for enhancing yield efficiency, traceability and ensuring quality, which commands premium pricing.

Digital Finance: Digital billing tools and partners like Samunnati empower financial transparency and improve access to institutional credit.

Inclusive Reach: Rental models and the structured village group coordination are critical for democratizing technology and service access for small and marginal farmers.

Market Linkages: Integrated domestic-to-export supply chain management maximizes farmer revenue potential and provides demand diversification.

Case Study 3

JATARA MAHILA KISAN PRODUCER COMPANY LTD. (JMKPCL), MADHYA PRADESH

VISION AND OBJECTIVES

Jatara Mahila Kisan Producer Company Ltd. (JMKPCL), Tikamgarh, works with a mission to empower its small and marginal farmers helping them shift from outdated farming to sustainable, value-driven agriculture, transitioning from subsistence to science. This FPO functions in a land that is dry, the plots are small, the resources fewer. The FPO is steered by a women-majority board, utilising Self-Help Group (SHG) participation for farmer mobilization.

Technology Adoption and Operational Efficiency

JMKPCL's operational model integrates biotechnology with essential services for revenue diversification and efficiency. It generates 20-30% of its turnover from certified seed production (sourced from bio-research centers) and further leverages a leased SHG unit for vermicompost production, which enhances soil fertility and minimizes chemical input reliance.

Operational efficiency is improved by deploying drone spraying services (via a Custom Hiring Centre) to replace manual input applications, and by utilizing government-supported soil testing for fertilizer optimization.

The FPO also acts as a significant input wholesaler (30–50% of annual turnover) through corporate dealership agreements. For value addition and market access, it operates processing units for oils and millets (sourcing 50% raw material internally) and expands its reach through digital platforms (ONDC, Market Mirchi, E-Mandi) to build strong B2B linkages with partners like Samunnati, ITC, and Patanjali, while actively pursuing organic certification for its farmers to establish value-driven market access.

Challenges Mitigation and Capital Strategy

Internally, the challenge of shifting members from outdated to science-based practices is mitigated by the continuous focus on farmer capacity building. The FPO mitigates the external challenge of seasonal and price shocks through a robust strategy of income diversification across its core value-chain activities: seed production, input supply, processing, and commodity trading.

JMKPCL's capital strategy minimizes financial stress by relying on non-dilutive capital and partnerships, securing funding through a Central Sector Scheme equity grant and a 75% government subsidy for drone purchase, while also utilizing asset leasing (renting a compost unit from an SHG) to build operational capacity without incurring institutional debt.

KEY INSIGHTS FOR SUSTAINED TECHNOLOGY ADOPTION

JMKPCL's model highlights critical lessons for community-led development:
Technology Adoption: Technology must be need-based and affordable for smallholders.
Resilience: Technologies towards income diversification across the value chain are essential to cushion the FPO and its members against seasonal and price shocks.
Community Trust and Scalability: FPO built on the existing foundation of an SHG, could play a key role in building trust and mobilizing resources for technology adoption, and community alignment.

Case Study 4

YKVM, UTTAR PRADESH

VISION AND OBJECTIVES

YKVM, Bundelkhand, works with the mission of promoting sustainable rural livelihoods by fostering FPOs and enabling access to bio-inputs, agri-tech, and government schemes. Key value chains include Rabi crops (Wheat, Gram, mustard) and Kharif crops (Pulses like Ahrar, Moong), onions, and vegetables

Technology Adoption and Operational Efficiency

YKVM was instrumental in facilitating the adoption of micro irrigation techniques (drip, sprinkler, and solar pumps) by securing a 65% government subsidy for its FPOs. Other interventions, supported by Custom Hiring Centres (CHCs), include mountain spray and drones. YKVM also partners with companies like Skyra Crop Science to adopt novel technologies like sound-based animal deterrents. It also promotes innovative farming techniques like Multi Layer Farming.

Challenges Mitigation and Capital Strategy

The primary challenge is the limited success of drone adoption due to the small size of the farms. YKVM mitigates the high capital cost of essential technology, such as irrigation systems, by leveraging a substantial government subsidy, effectively overcoming the entry barrier for smallholders.

KEY INSIGHTS FOR SUSTAINED TECHNOLOGY ADOPTION

The YKVM model highlights:
Financial Incentives: The critical role of subsidies in democratizing access to capital-intensive technology like micro-irrigation.
Contextuality: It also underscores that technology adoption must be contextual, with farm size being a key limiting factor for solutions like drones.
Democratic decision-making: The FPO's commitment to democratic decision-making in tech adoption is a critical driver of farmer trust and sustained implementation.

Case Study 5

KUSUMGANGA, UTTAR PRADESH

VISION AND OBJECTIVES
Kusumganga, Purvanchal, functions with a core mission focused on women-led dairy models, crop residue management (Paraali), and circular economy solutions. The FPO aims to transform the environmental problem of stubble burning into a sustainable value chain.

Technology Adoption and Operational Efficiency
Under the Government's 'Aggregator Scheme,' it employs a system for mechanized collection of 'Paraali' using subsidized machines (cutter, baler, tractor). This residue is supplied to Compressed BioGas (CBG) plants (Reliance, Indian Oil) for conversion into compressed biogas and bio-fertilizer, which is then circulated back to the FPOs for farm use.

It is setting up a 'Women Operated Community Dairy', which includes a centrally located Dairy Processing Unit with technology such as milking machines, chillers, freezers, and fat content evaluators, designed to collect 12,000 litres of milk daily. Cow dung from the dairy is also supplied to the CBG plants, completing the circular loop.

Challenges Mitigation and Capital Strategy
The FPO directly tackles the severe external challenge of stubble burning (Paraali) by commercializing the crop residue, converting an environmental hazard into a revenue stream. Financial risk for machinery acquisition is mitigated by utilizing high government subsidies.

The capital for the women-led dairy is secured through a strategic financial partnership with Samunnati, which includes support for cattle loans and entire value chain management. This women-operated structure ensures equitable income distribution, with earnings credited directly to the women's accounts.

KEY INSIGHTS FOR SUSTAINED TECHNOLOGY ADOPTION

Kusumganga's model is an example of an FPO-led Circular Economy pioneer.
Value-chain integration: Successful integration of multiple value chains (crop residue and dairy) creates mutual benefits, while addressing environmental challenges.
Community-operated models: The Women-operated community (e.g. dairy operations) could demonstrate a replicable model for inclusive scaling, using technology and partnerships to ensure both financial viability and social empowerment

Case Study 6

Pushkar Rural Agricultural Youth & Employment Producer Company Ltd. (PRAYE PCL, Rajasthan), Krishakmitra Agricultural Marketing & Export Producer Company Ltd. (KAME PCL, Rajasthan), and Araikkal Agriculture Farmers Producer Company Ltd. (AAFPCL, Tamil Nadu)

VISION AND OBJECTIVES
The core vision across these FPOs is to move beyond the distress sale of raw produce and empower smallholder members through value addition and direct market access.

PRAYE PCL (Rose, Phalsa) and AAFPCL (Millets) place a strong emphasis on women empowerment, with both FPOs having high women membership/ management. KAME PCL (Amla, Jaamun) focuses on leveraging its processing unit to prevent produce from perishing and to increase farmer income by bypassing middlemen. All three aim to establish branded, quality-assured products in the market.

Technology Adoption and Operational Efficiency
All the FPOs have established or procured advanced processing units (pulpers, dehydrators, distillators, pulverizers, grinders) for converting raw materials into high-value goods (gulkand, flours, health mixes). PRAYE PCL and AAFPCL strategically utilize solar-powered machinery to ensure sustainable and reliable operations.

KAME PCL has successfully deployed drone spraying on its fields, while AAFPCL facilitates member adoption of micro-irrigation and partners with AgriTech firms to reduce input costs.

AAFPCL's products carry QR codes for traceability, and KAME PCL focuses on processing to establish consistent brand quality. They also proactively run paid training sessions for women entrepreneurs on machine and business skills.

Challenges Mitigation and Capital Strategy
All the FPOs utilize a diversified capital strategy combining non-dilutive funding with subsidized loans. This includes major grants from institutions like SELCO Foundation, alongside significant government subsidies and working capital from banks (SBI, HDFC).

KEY INSIGHTS FOR SUSTAINED TECHNOLOGY ADOPTION

The models collectively confirm three critical insights for rural transformation:
Value-Chain Focus: Investing in technologies for processing and value addition, which directly mitigates market risk and prevents distress sales.
Subsidized Capital: Government subsidies and grants are crucial for overcoming the capital entry barrier for smallholders to procure high-cost processing and field technology.
Social & Tech Contextuality: Successful scaling is achieved through models that are either socially contextual or technologically appropriate for the local community, ensuring high adoption rates.

Farmer Collectives Interviewed

Name	State
Yuvak Kaushal Vikas Mandal (YKVM)	Uttar Pradesh
Kusumganga	Uttar Pradesh
Araikkal Agriculture Farmers Producer Company Ltd.	Tamil Nadu
Access Development Services	Rajasthan
Krashakmitra CBBO	Rajasthan
Krashakmitra Agricultural Marketing And Export Producer Company Ltd.	Rajasthan
Pushkar Rural Agricultural Youth & Employment Producer Company Ltd.	Rajasthan
Bilara Agro Producer Company limited	Rajasthan
Hengula Farmers Producer Company Ltd.	Orissa
Chhedlagan Farmers Producer Company Ltd.	Orissa
Greenflag FPC	Orissa
Agriculture Development Trust	Maharashtra
Mr. Karbhari Mangate- Wakeshwar FPCL, Aurangabad	Maharashtra
Sugi FPCL	Maharashtra
Farm Plus Farmer Producer Company Ltd.	Maharashtra
Samrudhi Sericulture Agro Producer Company Ltd.	Maharashtra
Deltafiia Farmers Producer Company Ltd.	Maharashtra
Harrai Farmer Fed Producer Company Ltd.	Madhya Pradesh
Jatara Mahila Kisan Producer Company Ltd./ Kumari Producer Company Ltd.	Madhya Pradesh
Kesli Sagar Farmer Producer Company Ltd.	Madhya Pradesh
Someshwar Nath Kisan Utpadak Sanghathan Sahkari Samiti Ltd.	Bihar
Dumraon Farmer Producer Company Limited	Bihar
Jan Nayak Farmer Producer Company Ltd.	Bihar

ThinkAg Ground Reports

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We extend our gratitude to Samunnati for their instrumental role and partnership in the successful execution of this study. Specifically, we acknowledge their invaluable contributions in providing the time, critical on-the-ground insights, and the extensive network of farmer collectives that ensured our research had a robust empirical foundation.

The facilitation of access to the 64 participating FPOs and CBBOs, alongside the dedicated assistance and cooperation of Samunnati's officials during the long-format interviews, was a decisive factor in capturing the rich, real-world experiences documented here.

We acknowledge Samunnati for their support and insights!

Farmer Collectives

We would like to sincerely acknowledge the contribution of all the farmer collectives who participated in the survey and interviews. Their insights form the core of this study, and we are grateful for their time and cooperation.

We trust that their invaluable voices and real-world experiences have been adequately incorporated throughout the documented findings and case studies.

ThinkAg Ecosystem Insights

Unlocking Innovations in AgriFinance

Executive Summary

The study, **"Unlocking Innovations in AgriFinance",** examines the role and strategies of AgriFinTechs in addressing the highly specialized and complex financial needs of the agricultural sector.

The core challenge stems from the sector's diverse customer profiles (from landowners to informal tenants and defaulters), its dependence on supply chain stages (pre/post-harvest), and extreme seasonal and climate exigencies.

AgriFinTechs respond to these challenges by focusing their innovations across three core strategic pillars:

They are driving **value-creation** for specialized agricultural needs through integrated product innovation, enhanced customer-centricity, strong market linkages, advanced technology integration, and sector-wide inclusion and capacity building.

Given the inherent risks in agricultural sector financing, they are strategically deploying innovations to build system resilience and facilitate advanced **risk management.** This involves implementing fresh, curated underwriting tools, leveraging alternative data, ensuring end-use visibility, and developing robust risk-sharing models to effectively govern specific threats such as operational, concentration, credit, and commodity risks.

Scaling-up businesses and maximizing impact are central goals, pursued by them through strategic partnerships and collaborations, leveraging adjacencies, diversifying business portfolios and geographies, capitalizing on economies of scale in customer acquisition, and priority sector market capture.

The study emphasises that to continue innovating and maximize their impact, AgriFinTechs require critical support from the ecosystem, starting with regulatory support. They also need robust digital infrastructure, to ensure verified data access and control for improved underwriting and efficiency. Furthermore, the ecosystem must support the integration of new financial markets like carbon credit financing, which offers a new revenue stream for farmers and a growth avenue for AgriFinTechs. Additionally, what will help is access to intelligence or cross-segment/ sectoral data to inform strategy on broad economic shifts for business agility.

Introduction

Agriculture is a sector with highly specialized and complex financial needs, which are often contingent on a range of factors. These include diverse customer categories such as landowners with clear titles, tenant farmers, new-to-credit farmers, defaulters, and micro-entrepreneurs. Needs are also determined by the supply chain stage, covering aspects like pre/post-harvest activities and market linkages.

Furthermore, financial solutions must account for sub-sectoral, climate and seasonal exigencies specific to activities like dairy, poultry, and aquaculture, as well as the demands of major crop seasons such as kharif or rabi and climate-risk coverage. AgriFinTech startups are innovating to address these specific needs of the sector by integrating advancements across product, process, and delivery.

Methodology

The study compiles perspectives from Indian AgriFinTech firms, demonstrating how their innovations are built upon three core strategies—value creation, risk management, and scaling—to effectively serve smallholder farmers with diverse financial needs and customer profiles across the country.

The study first outlines select farmer profiles to depict this customer heterogeneity and specificity of financial needs (especially credit). Further it presents insights from long-format interviews with fourteen AgriFinTechs, and concludes with a vision board to expand the horizon and foster further maturity in the agricultural finance space.

AgriFinTechs interviewed

- WhatsLoan
- Stellapps
- Saswat
- Sarvagram
- Samunnati
- Navdhan
- Human Ventures
- Hitha
- Dvara E-Registry
- Credin
- Avanti
- Aryadhan
- Agrosperity
- Agrizy

Customer Profiles and AgriFinTechs

Here are a few indicative customer/farmer profiles, illustrating the diversity of financial needs that necessitate a move away from standardized products. The AgriFinTechs mapped are solving these specific requirements through curated innovations.

Customer Profiles

1 Based on Land Titles:

The Microfinance-Dependent Smallholder
"I farm about 1–2 acres, and my family depends on microfinance loans. Every couple of years I can borrow INR 30,000–1 lakh as a part of SHG, mostly because I've repaid well in the past—not as per my actual farming needs. The money is too little, also not aligned with my crop cycle."

The Informal Tenant
"I cultivate land through formal or informal agreements without formal land title, hence excluded from most formal loans. I need agricultural credit, but without land documents. I can't satisfy KYC requirements and often rely on costly informal lenders."

The Mid-Scale Cultivator
"I farm 2–3 acres, grow multiple crops, and keep a few cattle. Herd-size of 3-4 helps to maintain my cash-flows, but I need funds for farming twice a year with each season. What I really need is credit that reflects my land situation, crop cycle, and scale of work—and is aligned to my seasonal cash flows and risks."

2 Based on Credit History:

The KCC Farmer
"I rely on the formal agri-finance system. KCC takes weeks to months to get sanctioned and can cost nearly 10% of the loan amount in repeated bank visits. My financial records aren't in standard formats, land documents aren't formalized, and name mismatches between Aadhaar and land records—an issue faced by many of my fellow farmers too—slow down verification."

The Defaulter
"I farm chilli, which is labour-intensive. With just 30 cents of my land growing chili, I earned about INR 80,000 in three months, spending only INR 30,000 on inputs. Recently, my credit record took a hit because of a loan I took to help my sister. She has not repaid on time, and even though I have started making my EMI payments of INR 4,500–5,000 now, other banks won't lend to me."

Customer Profiles

3 Based on Crops/ Climate:

The Coconut Farmer
"I farm 10 acres of coconuts, and my income comes in seasonal bursts, with harvests every 45 days. Banks require fixed monthly EMIs, which don't align with my cash flow, so I rely on moneylenders, input suppliers, or advances from aggregators."

The Sugarcane Farmer
"I am a sugarcane farmer managing irrigated land as a tenant. My crop earns about INR 3.50 per kilogram. Average yields are 35 tons per acre, well below the potential 100 tons. With income being low and arriving only once a year, investing in technologies like drip irrigation becomes difficult."

The Farmer facing Climate Risk
"I am a small farmer, growing cotton which is highly vulnerable to erratic rainfall and climate risks. I have limited capital to adopt modern or climate-resilient practices, and formal loans require land titles or financial records that I don't have."

AgriFinTechs Serving these segments: 1,2,3

Pre-Harvest
Agrosperity (KiVi)
Hitha
Upaj

Farmer Onboarding & Credit Score
Bankbenchers
Sugee
WhatsLoan
Satsure

Full-stack
Ayekart
Samunnati

Customer Profiles

4 Based on Specific Needs:

The Farmer with Warehouse Needs
"I farm 4 acres of soybeans. After harvest, I need immediate cash to repay loans, cover family expenses, and prepare for the next crop. Without reliable storage, I'm forced to sell my crop immediately to local mandi traders at low prices, losing 15–20% of potential value. I lack access to larger buyers who offer better prices, limiting both my income and financial flexibility."

The Farmer with Market Linkage Needs
"I farm a few acres, but at harvest, I often end up selling to local traders at low prices because I don't have access to larger buyers or transparent markets. What I need most is timely, flexible credit and a dependable market channel so I can plan my cash flow, get fair prices, and invest confidently in my farm."

AgriFinTechs Serving these segments

Post-Harvest
Aryadhan
AgriBazaar
DigiGrain
Human Ventures

Farm Asset Creation
S4S Technologies
Ecozen

Customer Profiles

5 Based on AgAllied Value-Chains:

The Poultry Farmer
"I run a poultry farm with 10,000 birds, earning around INR 1 lakh every 42 days across five batches a year. Most of my costs are upfront—shed construction, electricity, feed, and labor. Monthly repayment loans don't suit my business because my income comes in cycles, not every month."

The Dairy Farmer
"I run a small dairy unit with 5 cattle, earning about INR 20,000 a month, and I'm eager to scale. But in my town, formal credit is hard to access—microfinance is my only option, and schemes like KCC are difficult to qualify for."

Based on Customer Category:

The Woman Dairy Farmer
"I manage 4 cattle, and run my house by pouring milk twice a day. I often need INR 40,000– INR 60,000 at a time to buy a cow, repair the shed, or handle medical feed expenses, but without a strong credit history or land documents in my name, banks rarely approve my loans."

AgriFinTechs serving this segment

Ancillary/AgAllied
DGV
Stellapps (MooPay)
Dvara-E-Dairy
Credin
Saswat
Aquaconnect
Aqua Exchange

Customer Profile

6 Based on Customer Category:

The Rural Entrepreneur
"I am a rural entrepreneur, and agriculture and dairy are core parts of my family's income. I need reliable and timely capital to manage cash-flow swings, fund working capital, buy cattle, invest in my farm, support my children's education, and meet important social obligations."

AgriFinTechs serving this segment

Livelihood/ Rural & Entrepreneurship
Avanti
Sarvagram
Navadhan
Jai Kisan

AgriFintech Innovations

AgriFinTechs are driving **value-creation** for specialized agricultural needs through integrated product innovation, enhanced customer-centricity, strong market linkages, advanced technology integration, and sector-wide inclusion and capacity building.

Given the inherent risks in agricultural sector financing, AgriFinTechs are strategically deploying innovations to build system resilience and facilitate advanced **risk management**. This involves implementing fresh, curated underwriting tools, leveraging alternative data, ensuring end-use visibility, and developing robust risk-sharing models to effectively govern specific threats such as operational, concentration, credit, and commodity risks.

Scaling-up businesses and maximizing impact are central goals, pursued by AgriFinTechs through strategic partnerships and collaborations, leveraging adjacencies, diversifying business portfolios and geographies, capitalizing on economies of scale in customer acquisition, and priority sector market capture.

Value-Creation

AgriFinTechs create value by driving integrated product innovation—developing specialized, value-chain and cash-flow-aligned products (e.g., crop-cycle aligned loans for coconut growers, embedded insurance).

They establish strong market linkages to assure uptake, help farmers avoid distress sales via trusted storage, and offer credit against warehouse receipts. Value is further driven by enhanced customer-centricity, which includes a holistic financial well-being approach,

a nuanced understanding of local contexts, and a commitment to faster Turn-Around-Times (TAT) through high-touch and digital delivery models.

Finally, they champion financial inclusion by utilizing alternative underwriting data for landless or 'thin-file' farmers, prioritizing women's financial participation, and promoting capacity building with bundled support for production, technology, and market knowledge.

Product Innovation

Moving from standardised to specialized products, based on value-chains,, repayment clauses and risk management avenues

Customized products for specific value-chains

a. Crop-cycle aligned terms considering farm input needs and seasonality, e.g. loan for a coconut grower as per 45 day crop cycle
b. Cash-flow synced clauses designed as per sale receipts, e.g. 15 day cycle for a dairy farmer based on milk collection receipts

Risk management for perceived high-risk value-chains

a. Provision of insurance against uncertainties, e.g. embedded cattle insurance in dairy and parametric insurance in crops
b. Technology for asset monitoring and traceability, e.g. tracking cattle with muzzle based technology and crop through satellite

Market Linkages

Leveraging farmer collectives and offering guaranteed offtake with better price realization

Triangulating the strengths of grower, lender and procurer

a. Facilitation for produce aggregation and assured uptake, derisking entire production and repayment cycles
b. Avoiding distress sales for the farmers by offering trusted storage facility, and liberty to choose ‘when and whom to sell’
c. Leveraging the aggregated and stored produce for credit, e.g. loan against warehouse receipt
d. Ensuring quality inputs for produce with guaranteed offtake by the corporates, e.g input-loans
e. Triggering prompt payments to farmers from the intermediaries through credit extensions, e.g. bill discounting

Customer Centricity

Proximity to the ground, contextual understanding, and a holistic approach to financial well-being allowing agency to the borrower

Holistic financial well-being approach to facilitation

a. Wealth management approach, to combine borrowing with long term economic stability, e.g. encourage digital savings
b. Insurance integration not only to guard against losses, but also to ensure economic resilience, e.g. opportunity to restart and catch the cycle for livelihood continuity
c. Technology exposure and access, with linked subsidies if applicable, for enhanced efficiency and returns, e.g. drip-irrigation systems for sugarcane farmers

Eyes and ears on the ground

a. Nuanced understanding of the customer-segment, e.g. data on social, cultural or life events affecting economic status
b. Mapping multiplicity and interconnectedness of financial needs including personal, family, vocational and social, e.g. household instead of individual assessment

Geographical and local context

a. Selection of a geographical location, based on hard data and not prevalent legacy projections, e.g. cyclone-prone coastal banks of Odisha but with responsible customer credit behaviour
b. Borrower's ability to access banking services with convenience and dignity, e.g. door-step assisted financial services and advisory
c. Integrating the existing local stakeholders instead of a blind disintermediation thesis, e.g. partnership with local BC, MFIs

Agency to the borrower and faster turn-around-time (TAT)

a. 'High human touch' through ground partners, and digital mode for 'last mile delivery', are combined to actualize 'people first' approach and 'door-step delivery' with efficiency
b. Financial efficiency and inclusion meet speed with disbursement time (TAT) being reduced from weeks to minutes, e.g. advanced bureau checks and digital underwriting
c. Completely digital and data backed (AI/ML) credit worthiness check for an objective and un-biased loan application analysis

Inclusion

Making the unbanked bankable, accessible and capable to graduate to the mainstream banking system

First-time institutional borrower in the fold of formal credit

a. Consideration of alternative underwriting data for the landless/ tenant farmer, or the one with poor credit history, e.g. supply-chain finance transaction history for future loan eligibility
b. 'Household first' approach, for assessment of 'family as a unit' instead of individual capability, e.g. household-based underwriting
c. Last-mile reach and financial inclusion through digital medium even in the absence of a physical branch, e.g. e-KYC

Women's financial inclusion

a. Asset co/ownership by making women co-borrowers, e.g. for cattle loans
b. Softer aspects included in alternative underwriting algorithms to check for women's role, e.g. mobility of women
c. Involving women directly in financial activity, e.g. loan disbursement in women's account

Mainstreaming newer pathways of underwriting

a. Farmers without land as a collateral, or/and with weak credit history to get a loan, e.g. loan against warehouse receipt
b. Measures to guard against default risk or get overleveraged, e.g. digital gold savings ensuring liquidity

Optimizing Priority Sector Lending (PSL)

a. Smallholder farmers brought under PSL mandate (including KCC) via digital medium, e.g. e-KYC, e-land records
b. Banks' requirement of PSL fulfilled through aggregation at an FPO level, creating a win-win for both the lender and the borrower

Capacity Building and Technology Integration

To ensure structural change and long-term sustainability

a. Capacity building on production-side knowledge to improve the customer's productive life and borrowing capacity.
b. Assisting FPOs to secure working capital, and participate in profitable ventures like government MSP procurement.
c. Bundled support to provide financial, technical, and marketing support through a single window to raise yield.
d. Education on production and input quality for better price-realization through assured procurement

Risk-Management

Given the inherent risks in agricultural sector financing, AgriFinTechs have strategically focused their innovations on building system resilience and advanced risk management. They achieve this by enhancing underwriting models and data, moving beyond traditional documentation to employ curated tools that leverage alternative data, such as household-based assessments, milk-pouring data for dairy, satellite analysis for micro-farm performance, and supply-chain history for 'thin-file' farmers.

To ensure end-use visibility and prevent fund diversion, they implement Purpose Controlled Credit solutions, which include preferring credit cards over cash, using embedded finance (deduction at source), integrating embedded insurance, and offering stage-specific finance like loans against warehouse receipts. Finally, they develop robust risk-sharing models to govern against default and climate events, utilizing co-lending with other institutions, securing First Loss Default Guarantees (FLDG) from ground partners, and integrating diverse insurance products like life, health, cattle, and crop.

Underwriting Models and Data

Moving beyond traditional documentation and data screening

a. Household-based, preferring multiple sources of income, multiple earners, and an entrepreneurial family, to ensure cash-flows.
b. Individual loans, requiring twin applicants- core and co-borrower, one preferred to be a woman.
c. PSL compliant asset portfolio, for banks to include MSMEs, agri/ agri-allied, Small & Marginal Farmers, and women
d. For dairy, basis farmers' milk pouring data as surrogate for underwriting, e.g. quality, rate, attendance, and vintage
e. For micro-level farm assessment, satellite data analysis e.g. crop performance, soil, water bodies, weather
f. For household/ business loans, intra-family and social congeniality analysis of a family, e.g. women's role and freedom
g. For thin file, supply-chain transaction history and income validating documents, e.g. warehouse receipt, bill-discounting
h. For fully digital systems, data enhancement to contain interoperability issues, e.g. name mismatch between Aadhaar and land records

Purpose Controlled Credit

For end-use visibility, risk-assessment and portfolio diversification

a. Credit card preferred over cash loans, to secure end-use visibility and avoid diversion of finances for other purposes
b. Embedded finance, enabling deduction at source of income for milk pourers for a closed-loop finance
c. Embedded insurance and limited portfolio exposure to agriculture, to check climate and loan waiver events
d. Supply-chain stage-specific interventions, e.g. post-harvest storage and warehouse receipt loans
e. Input-based finance, tagged along market linkages and input quality specifications of the procurement, e.g. FPO loans

Risk-sharing Models

To share portfolio risk against default and climate/ business events

a. Co-lending with other NBFCs and banks, to increase lending capacity and share risk
b. First Loss Default Guarantee (FLDG), by the ground/ BC partners to their NBFC or bank partners, e.g. 5% to 15%
c. Credit guarantee, with development organizations to share insurance fee and/or de-risk portfolio against climate events
d. Insurance integration through partners, e.g. life, health, cattle, parametric, and crop

Concentration Risk Management

Addressing overleveraging a geography, customer-segment or a sector

a. Avoiding concentration risks, with dense customer clustering in specific regional/ sectoral markets, e.g. sectoral diversification
b. Product-market diversification risk outside core segment, addressed through close monitoring and timely pivots
c. Pure Business-to-Business (B2B) lending avoided for concentration risks, e.g. partner network/ FPO for B2B2C
d. Caution against over-leveraged customers, with documented 2-3 loans and possible additional informal liabilities

Credit and Commodity Risk Management

Proactive measures against predictable and addressable uncertainties

a. For misuse of funds, strict monitoring of loan end-use, e.g. direct payments to vendors for enterprises, tagging by paravets for cattle
b. For ownership identification systems, linking a cattle asset to a specific owner with certainty, e.g. Aadhaar for humans
c. For collateral-based loans, enhancing storage efficiency and guarding managed commodity, e.g. efficient warehousing of grains
d. For Non-Performing Assets (NPAs), close and continuous monitoring, and early risk signalling
e. For volatile agricultural income, restricting loan sizes to less than optimal customer eligibility for underwriting, e.g. 40%
f. For New-to-Credit (NTC) customers, relying on household-based underwriting
e. Early warning systems, for lenders to proactively address changes in farmer behaviour, e.g. if a farmer stops pouring milk

Operational Risk Management

Intelligent processes and technologies for business agility and systems integration

a. Business-unit profitability tracking, with inbuilt business agility to close unprofitable units, e.g. a warehouse, a village
b. Asset light, fixed obligation and lean team models, with digital aid and ground partners, e.g. revenue-sharing models
c. Technology for data collection, supplemented with specialized field force for detailed probing, e.g. satellite imagery for fields
d. Application Programming Interface (API) integrations, for verified land records, e-KYC
e. Low-cost physical presence for loan origination, with partners offering 'eyes and ears on the ground'
f. High human-touch redefined, by taking 'branch to the customer's door-step' through an assisted/ digital medium
g. Collection risk mitigated, by deductions at source, e.g. Equated Cycle Payments (ECPs) by the dairy from milk payables

Scaling-up

Scaling-up businesses and maximizing their impact are core strategic goals for AgriFinTechs, which they pursue through a multifaceted approach. This involves forming strategic partnerships and collaborations while actively leveraging adjacencies—using existing capabilities or markets to enter related ones—to drive growth.

Furthermore, they focus on diversifying their business portfolios and geographies to spread risk and capture new opportunities. Crucially, they aim to achieve expansion by capitalizing on economies of scale in customer acquisition and systematically targeting and capturing the priority sector market.

Strategic Partnerships

To scale core finance business as a lean, efficient and specialized model

a. For geographical expansion, new locations demanding ground support for customer acquisition
b. For operational execution, primarily through a business correspondent model
c. For consortium financing, especially for large projects, establishing a single-window facility for the borrowers
d. For agri-loan market place/ platform, connecting AgriTechs with a variety of willing lenders and borrowers
e. For ground infrastructure, keeping core-finance model lean and agile, e.g. leased warehouses, milk chilling plants
f. For technology integration, offering digital-underwriting as a service and precision data, e.g. satellite data
g. Acquisitions, to leverage technology, customer base, geographical/ sectoral strength

Leveraging Adjacencies

To enhance the supply-chain radius, market share claim, and risk cover

a. Backward supply-chain linkages, for new products, customer service, or risk minimization, e.g. post- harvest to upstream
b. NBFC licence integration, to leverage proprietary data and ground experience to finance from one's own books
c. Additional business vertical, strengthening cashflows and customer understanding, e.g. farm equipment rental services
d. Value-chain expansion, e.g. covering entire dairy ecosystem, e.g. connecting collection & chilling centres, distributors and retailers
e. Village as a business-unit for viability analysis, e.g. break-even unit being a village with multiple offerings-e.g. SIPs, gold loans
f. Forward linkages, to offer market connects with better price-realization and assured offtake, as well as loan repayment

Diversification Endeavours

To leverage functional strengths and optimize business returns

a. For portfolio expansion and risk mitigation, to include agri and non-agri streams, e.g. micro entrepreneurs and farmers
b. For break-even at a business-unit level, e.g. consolidating services at a village level through community value-chains
c. For agri and agri-allied integration, to optimally leverage existing crop farmers with dairy/ poultry/ aquaculture overlap
d. For recent rural migrants in urban locations, especially gig workers similar to third generation rural scouts

Collectives for Scale

Building ground-up to cover more ground

a. FPOs as a medium for farmer community mobilization, bulk customer acquisition, mass disbursement and collection
b. Farmer networks for B2B-to-C distribution layer for insurance (weather, rainfall, etc.) to protect against climate risk
c. Community centres in the villages, e.g. milk collection centres for low-cost dairy farmer acquisition
d. FPOs for assured bulk orders from corporates, to be financed by banks under consolidated PSL requirements
e. Village Level Aggregators (VAS) to strengthen market linkages, particularly for high-risk NPA farmers

Leveraging PSL Market

Making impact on the un/under-served through mandated pathways

a. Generation and trade of PSL assets, to tap into a large yet underutilized lending market, especially for thin-file farmers
b. Build on digital lending framework and new PSL targets for banks to secure capital supply e.g. small & marginal farmers
c. Immediate opportunity to optimise 120 million Kisan Credit Card (KCC) loans, of which 50 million is still a clear gap
d. Low-cost, de-risked PSL lending that can be offered by AgriFinTechs to banks to meet their PSL targets in a viable way

AgriFintechs' Vision

AgriFinTechs are keen to assume a more strategic role and continue strengthening the innovation landscape to have a long-term impact on Indian agriculture. Achieving this enduring role, however, will require:

Positioning and Regulatory Support

AgriFinTechs strategically position the NBFC route as the preferred mechanism to drive innovation, design flexible product terms, and integrate modern tech capabilities like account aggregators (currently challenged by regulatory status). This approach aims to improve financial metrics, specifically by significantly increasing Return on Assets (ROAS), and assume a larger, more integrated role in the lending market.

This strategy is driven by the core belief that the agricultural sector requires less standardization and more curation of products and processes. Consequently, they assert that the conventional focus on 'process, compliance, and technology' must be fully complemented by 'product innovation, operational excellence, and customer centricity' to effectively address the specialized needs of farmers pursuing agriculture for commercial, rather than just subsistence reasons, thus underscoring the critical need for regulatory support and stability.

Technology Integration and Data Access

Creating a Digital Financial Identity (DFI) for the farmer on a blockchain, which grants them ownership, control, and single-number sharing of their data, will fundamentally empower the entire system by significantly enhancing Turn-Around-Time (TAT), improving cost-efficiency, and promoting ease of doing business.

Furthermore, AgriFinTechs emphasize that proprietary, on-the-ground intelligence—covering details like cash-flow status, non-agricultural income, and socio-cultural events—is vital for complementing credit bureau data and tracking critical market and business dynamics. This is why digital technologies, such as satellite data, alongside strategic ground partners, are essential for acquiring climate and other necessary data, which is then cumulatively fed into underwriting models, product design, and comprehensive risk management systems.

New Markets and Expansion Opportunities

The ecosystem must actively support the integration of new financial products, specifically a clear framework for carbon credit financing, which offers farmers an additional revenue stream (e.g., INR 2,000– INR 4,000 per acre) and unlocks a significant new avenue for AgriFinTech growth.

Furthermore, realizing the potential requires generating and leveraging cross-segment/ sectoral intelligence from evenly distributed portfolios (MSMEs, Agri, Non-Agri) to secure deep adjacencies and insights. These insights are crucial for understanding how broad economic shifts—such as local industrialization (e.g., ethanol plants leading to crop diversification)—impact diverse customer personas, thereby enabling better-informed underwriting and product strategy.

Conclusion

AgriFinTechs have established themselves as a fountainhead of innovations, recognizing that the future of the sector lies in moving from standardization to deep product and process curation. By strategically addressing the specialized and complex financial needs of farmers, they are driving long-term resilience and growth.

With agriculture becoming increasingly specialized, the future is indeed theirs, and the support of the ecosystem—in areas such as regulatory stability, digital infrastructure, and market integration—will help accelerate their continuous innovation and scale.

ThinkAg Ecosystem Insights

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