EVENT REPORT, May 2026

Growing Forward

Decisions that Could Define the Future of Agri-Food Systems

TABLE OF CONTENTS

Growing Forward

Decisions that Could Define the Future of Agri-Food Systems

Context

Global agri-food supply chains are growing in scale and complexity, with far-reaching implications for people, natural ecosystems, and businesses. In India alone, agriculture employs nearly 50% of the workforce and contributes ~17% of GDP, meaning decisions at every node of these agri-value chains directly shape outcomes for environments, markets, and all involved players, from farmers to global MNCs.

Smallholder farmers absorb escalating climate and market risks while supply chains face tighter quality, scale, and sustainability expectations. India is home to 150 million farmers, of whom 86% own less than 2 hectares of land, bearing high stakes with few buffers as weather disrupts cycles and corporate mandates (net-zero, circular economy) create pressure and opportunity.

Designed to move ideas into action, TechnoServe's closed-door convening - Growing Forward: Decisions That Could Define the Future of Agri-Food Systems, aims to focus on collaboration opportunities across three key areas:

- **Sustainable and responsible sourcing:** Examining why shared value is becoming a strategic imperative, and how it can mitigate long-term supply chain risks while strengthening farmer resilience.
- **Dairy:** A high-level discussion exploring what it will take for India's dairy sector to be export-ready, covering key topics like quality improvements, processing, cost-competitiveness, climate, and energy considerations.
- **Entrepreneurship & Innovation in Agri-Food Systems:** Exploring MSMEs and startups as drivers of growth in agritech, circular economy solutions, and sustainable business models.

Additionally, the convening included two critical cross-cutting discussions on:

- **Technology & AI as a game-changer in agri-food systems.** Specifically, its potential to democratize access to localized information and the opportunities it can create for smallholder farmers.
- The **importance of consortia and cross-sector partnerships** between governments, the private sector, philantropy and technology to co-create a shared architecture for maximum impact within agri-food systems.

Opening Remarks

Krishnan Hariharan, Senior Practice Lead for Agriculture and Programme Development at TechnoServe, drew attention to the deliberate language of the convening's title in his opening remarks.

"Growing Forward" was chosen to signal that the future of agriculture needs to be thought about not only through the lens of the farmer but also through the lens of the other stakeholders in the room.

The word "decisions" rather than "discussions" was chosen because the people in the room were being addressed as decision-makers.

And the word "could" was chosen to allow the possibility of these decisions to evolve as the world changes.

He reminded the room that this was not a TechnoServe event but a collective convening. The future, he said, will have to be navigated together.

Three contextual realities ran through every session that followed. First, climate volatility has become a structural feature of agricultural planning rather than a tail risk: India lost approximately 69 million hectares of cropped area to extreme weather between 2015 and 2021, a number that was cited later in the day to underline that supply chain disruption is no longer hypothetical for corporates sourcing from India.

Second, corporate sourcing strategy has decisively shifted: sustainable sourcing has moved from CSR posture to board-level imperative, driven jointly by climate, regulatory pressure (including the EU Deforestation Regulation and tightening ESG reporting), and consumer expectations.

Third, capital and innovation flows are reshaping who pays for what: philanthropy is moving toward catalytic models, venture and blended-finance vehicles are slowly entering the space, and a new generation of entrepreneurs is building tools that were not technically feasible five years ago.

Sessions Overview

The day was organised around three discussion pillars and two cross-cutting sessions, sequenced to move from the practical (sourcing, sectoral scale) to the structural (innovation, partnership architecture). Each session was framed around a specific decision-question rather than an open topic, and was deliberately constructed to combine corporate, government, philanthropic, civil-society and entrepreneurial perspectives in the same conversation.

Panel 1: Is Shared Value a Non-Negotiable for Sustainable Sourcing?

Sustainable sourcing has evolved from a corporate social responsibility aspiration to board-level imperative as climate risks, regulatory pressures, and supply volatility intensify across global agri-food chains. Corporate commitments to net-zero and nature-positive targets create pressure and opportunity, yet the gap between ambition and systemic impact remains significant.

With smallholder farmers bearing disproportionate climate and market risks, from erratic rainfall and water stress to fragmented market access, sustainable sourcing offers a strategic pathway to align corporate risk mitigation with farmer opportunity, ecosystem restoration, and long-term supply chain resilience. This session unpacked what drives sustainable sourcing as a strategic priority for the private sector: not just as a response to regulatory or reputational pressure, but as a preventive approach to managing long-term risks around climate, quality, and traceability. It explored the systemic shifts in markets, philanthropy, and partnerships needed to move from commitment to scale, and set the stage for the sessions that followed on dairy value chains and agri-entrepreneurship, where quality, market-based approaches, and innovation each shape the future of India's agri-food systems.

Fireside Chat: Tech & AI as a Gamechanger in Agri-Food Systems

As climate volatility, market fluctuations, and sustainability requirements reshape global agri-food systems, the resilience of smallholder farmers has become a critical determinant of supply chain stability and long-term food security. Yet for most smallholder farmers, the ability to respond to these pressures depends on something deceptively simple: access to timely, relevant information. Formal agricultural extension reaches fewer than 10% of India's farmers, and where it exists, is rarely frequent or localised enough to influence in-season decisions. That gap, between what farmers need to know and what actually reaches them, compounds across every cropping cycle.

Digital innovation is changing what is structurally possible here. AI-powered, voice-enabled, multilingual platforms can now deliver hyperlocal guidance on crop health, climate adaptation, input use, and market access at a scale and frequency no conventional system could replicate. When that guidance reaches farmers at the moment it matters, it stops functioning as a service and starts functioning as economic infrastructure.

The evidence is building: platforms operating at scale are already demonstrating measurable shifts in farmer behaviour, with women farmers in particular showing stronger engagement and decision-making confidence when tools are designed around their actual constraints. The Government of India, in its Union Budget 2026-27 announcements, launched the Bharat-VISTAAR, a multilingual AI-powered tool designed to provide farmers with reliable, real-time, and location-specific personalized agricultural advisories while ensuring seamless access to a comprehensive range of allied agricultural and support services. These shifts point to a larger transition underway: digital agriculture is no longer about individual solutions, but about building the infrastructure that underpins decision-making at scale.

This fireside chat was designed to explore what it takes to move digital solutions in agri-food systems from pilots to scalable infrastructure: how AI can deliver timely, localised information as a public good; what it means to build platforms that strengthen farmer agency; what it takes to design for women farmers not as a secondary consideration but as a measure of whether a solution has truly scaled; and what the cross-sector alignment across technology providers, corporates, funders, and governments needs to look like to get there.

Panel 2: From India to the World: Scaling Dairy Exports

India is the world's largest milk producer: 251 million tonnes in FY25, growing at 5.7% annually, nearly three times the global average. It powers livelihoods for 80 million smallholder farmers and contributes around 4% to GDP. And yet India's share of global dairy exports is just 0.25%, and exports, even after an 81% surge in FY25 (mostly driven through butter and ghee), stand at ~$493 million against a global dairy trade worth close to $100 billion.

Global dairy trade is estimated to be in the $90–110 billion range per year, so India's current $493 million export basket in 2024-25 still represents a small share of this trade.

The core question for this session was: how do we move forward on a roadmap to scaling dairy exports from India, as this has the potential to diversify and increase the incomes for millions of smallholder farmers. Markets in the Middle East and Southeast Asia are structurally milk deficit and growing.

- Middle East: Imported almost 2.3 million MT of dairy (~$7.2B) in 2024, with UAE and Saudi as the two largest importers. Largely dependent on imports for powdered milk, cheese, and processed dairy.
- Indonesia: Over 80% of dairy demand is imported - around 1.2 million MT of skimmed milk powder.
- The Philippines imports 99% of its dairy requirements as domestic production doesn't meet demands.
- Sri Lanka & Vietnam: Import dependency exceeding 80% for processed dairy.

India has a cost and proximity advantage. Hitting even a 5% export share could unlock an estimated $5-10 billion in annual foreign exchange earnings. The Government of India's White Revolution 2.0 initiative has set a target to boost cooperative milk procurement by 50% over five years, while other schemes like Production-Linked Incentives (PLI) for food processing and Rashtriya Gokul Mission to conserve indigenous bovine breeds and enhance milk productivity sustainably are channeling significant investments into the sector.

Panel 3: Innovation in Agri-Food Systems: Entrepreneurship Models, Tech & Policy

Agri-entrepreneurs are trying to make agriculture more innovation-driven, climate-resilient, scalable, and aspirational. However, their ability to deliver systemic impact remains constrained. Many solutions operate in isolation within fragmented value chains; only a small subset of enterprises successfully transition from pilot to scale; and access to patient and risk-aligned capital continues to be limited. Additionally, weak linkages between entrepreneurs, corporates, and institutional buyers restrict market access and price realization.

The discussion focused on the future: how innovation, capital, policy, and collaboration can be better aligned to build agri-enterprises that are not only commercially viable and scalable, but also future-ready. By bringing together perspectives from early-stage ventures, on-ground implementation, large-scale platforms, research, foundation and impact investor capital, the session aims to surface practical pathways for accelerating value chain transformation and making agriculture a sector of opportunity, resilience, and sustainable growth.

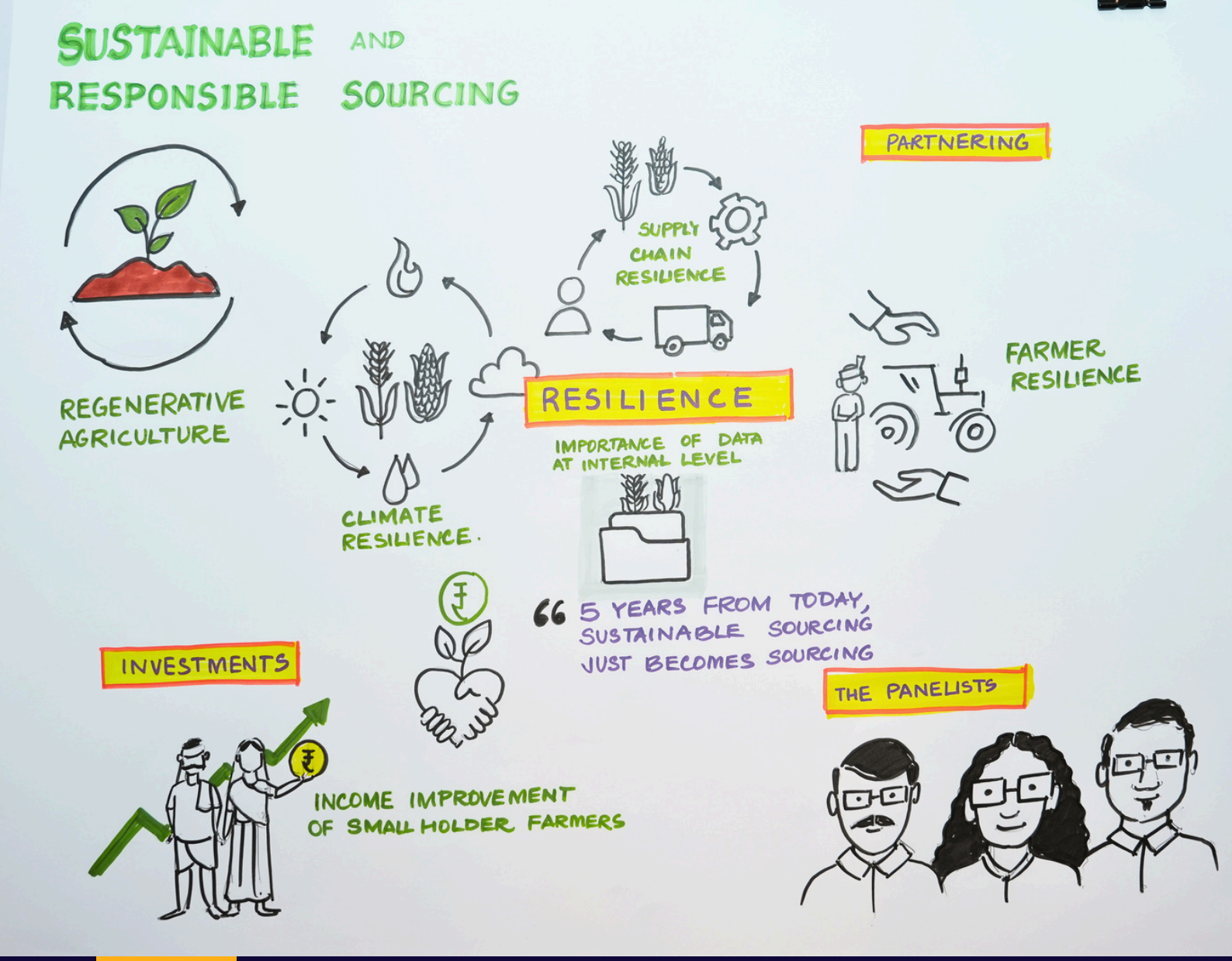
Closing Panel: What Makes a Consortia Work?

Across India's agri-food systems, corporates, philanthropic organizations, governments, and implementation partners are each investing in solutions, yet efforts remain largely siloed, limiting the depth and scale of impact. India's agricultural sector receives significant financing flows annually, yet smallholder farmers continue to face persistent gaps in climate resilience, market access, and income stability. The most pressing challenges are systemic in nature and cannot be addressed by any single actor working alone. Climate change is disrupting production cycles and farmer incomes. On the other hand, for corporates, these disruptions are increasingly translating into structural supply chain risks.

The discussions of the day, spanning sustainable sourcing, India's dairy export readiness, entrepreneurship, and the transformative potential of technology and AI, converged on a single question: given the scale of what is at stake, what will it take to move from aligned ambition to coordinated action? Whether the goal is helping millions of smallholder farmers absorb climate risk, building the infrastructure needed to compete in global dairy markets, or deploying technology to reach the last mile, the momentum is there, and the strategic imperative is to channel it through partnerships designed for the long term.

Consortium-based models offer a pathway to co-create that shared architecture: pulling together government, private capital, philanthropy, and implementation expertise around unified goals and shared accountability, and creating the conditions for innovation that no single actor alone can afford to de-risk.

This closing session asked what makes consortia work, and whether cross-sector collaboration can be the mechanism that unlocks scale and lasting impact for smallholder farmers in India.



Panel 1

Is Shared Value a Non-Negotiable for Sustainable Sourcing?

- *Moderator: Krishnan Hariharan, Senior Practice Lead - Agri, TechnoServe*
- *Jasmer Dhingra, Director - India Programs, IDH - The Sustainable Trade Initiative*
- *Vaibhav Garg, Associate Director, Positive Agriculture - Africa, Middle East and South Asia, PepsiCo*
- *Amrendra Mishra, Managing Director, ADM*

Session Recording:

Panel 1: Is Shared Value A Non-Negotiable for Sustainable Sourcing

Panelists (Left-to-Right):

- *Moderator: Krishnan Hariharan, Senior Practice Lead - Agri, TechnoServe*
- *Jasmer Dhingra, Director - India Programs, IDH - The Sustainable Trade Initiative*
- *Vaibhav Garg, Associate Director, Positive Agriculture - Africa, Middle East and South Asia, PepsiCo*
- *Amrendra Mishra, Managing Director, ADM*

Krishnan Hariharan opened the panel by framing the central question: sustainable sourcing has evolved beyond corporate social responsibility to become a board-level imperative, driven not only by climate risk, regulation, and supply volatility, but by a collective understanding that aligning farmer interest with business interest is the most effective way to move the agriculture sector forward. The panel, he said, would unpack what is actually driving sustainable sourcing as a strategic priority for the private sector, and where philanthropy, market shifts, and partnerships fit into that picture.

Amrendra Mishra took the first question and began with a frank statement of necessity. Given the way agricultural challenges are evolving: climate pressure on farmers, customer demand for food produced with less environmental impact, and farmers needing to produce more with less water and fewer chemicals. Companies, he said, *"don't have any other choice"* but to develop a focus on sustainable sourcing. He framed the work as sitting at the intersection of three interests: (i) companies looking to reduce energy intensity and pass that on to consumers; (ii) farmers looking for solutions that lower their cost of production; and (iii) consumers wanting to feel they are doing the right thing for the environment. That overlap, he argued, is what makes shared value commercially durable rather than philanthropically dependent.

At ADM, this approach translates into measurable results. Through a five-year partnership with Proterra, ADM adapted international sustainability standards to Indian smallholder realities, starting small, demonstrating results at the farm level (especially soil health), and scaling to nearly 100,000 farmers. Such standards, Amrendra argued, create market visibility and income potential for smallholders. He highlighted ADM's collaborative platform with Bayer CropScience, Coromandel International, and an NGO partner, an open, pre-competitive model for shared infrastructure that others, including PepsiCo, could join.

Vaibhav Garg shared that PepsiCo's investment in sustainable and responsible agriculture starts from a fundamental fact: *"We are an agricultural company at heart."* Most of PepsiCo's brands depend on farmers, soils, water, and climate stability, which makes positive agriculture a transformational strategy rather than a CSR programme. He laid out three reasons why the investment thesis has shifted:

First, the framing has moved from cost to resilience: climate volatility is causing damage to soils, water systems, and value chains, and resilience is what protects long-term supply. Second, delay only aggravates the cost: the longer adaptive investment is postponed, the more expensive it becomes. Third, regulators, investors, and customers are increasingly looking at sustainable performance, and getting ahead of that curve matters reputationally and commercially.

Vaibhav also spoke about what makes growth models actually stick in emerging markets. He cited PepsiCo's biochar work, converting value-chain waste into a farmer-revenue stream, and vermicomposting, which both rejuvenates soils and adds income. *"In emerging markets,"* he said, *"demand anchors are very important versus short-lived grants."* When corporates like PepsiCo send strong, stable demand signals to suppliers and build their capability to be market-ready, the investments transcend pilot mode and become long-lived impact. Grants alone, he argued, are not what build durable supply ecosystems.

When asked about impact measurement, Vaibhav elaborated on PepsiCo's three-dimensional resilience framework:

- **Economic resilience:** tracking income improvement over time.
- **Adaptive resilience:** observing adoption of soil and water management practices.
- **Risk resilience:** gauging preparedness for climate extremes.

This data-centric approach uses soil carbon studies, water-use baselines, satellite tracking (via Cropin), and digitised farm records, making the business case as robust internally as it is externally.

Jasmer Dhingra expanded the lens to provide an overview of the entire supply chain, not just large buyers. Sustainable sourcing in India must engage the full private ecosystem, from aggregators to smallholders. She introduced a distinction that ran through the rest of the day's conversations: stability versus resilience. Stability, she explained, is what a business needs to secure tomorrow: quality, supply security, and fair value-share with farmers. Resilience, however, is a longer-term horizon: climate, water stress, and soil depletion. No single company can solve these alone. Resilience requires partnering with government, civil society, and other companies, and critically, treating the farmer as a partner rather than a single-commodity supplier or beneficiary. Farmers, like everyone else in the room, manage multiple income streams. Resilience efforts have to start from that fuller picture.

Jasmer also tackled the persistent misconception about farmer motivation. Farmers are willing to invest in resilience; the obstacle is liquidity and stable market relationships. Without predictable value-sharing and working-capital mechanisms, even motivated farmers cannot act on sustainability intentions. Building trust-based, long-horizon relationships is what truly enables sustainable investment at the grassroots level.

The panel converged on a shared outlook: sustainability is no longer peripheral. It is the operating lens for agricultural business continuity.

Key Takeaways

- **Sustainable sourcing is a resilience strategy:** Corporates are managing climate, water, and soil risk as core business problems: with PepsiCo and ADM treating regenerative agriculture as enterprise-level priorities, not as separate sustainability projects.

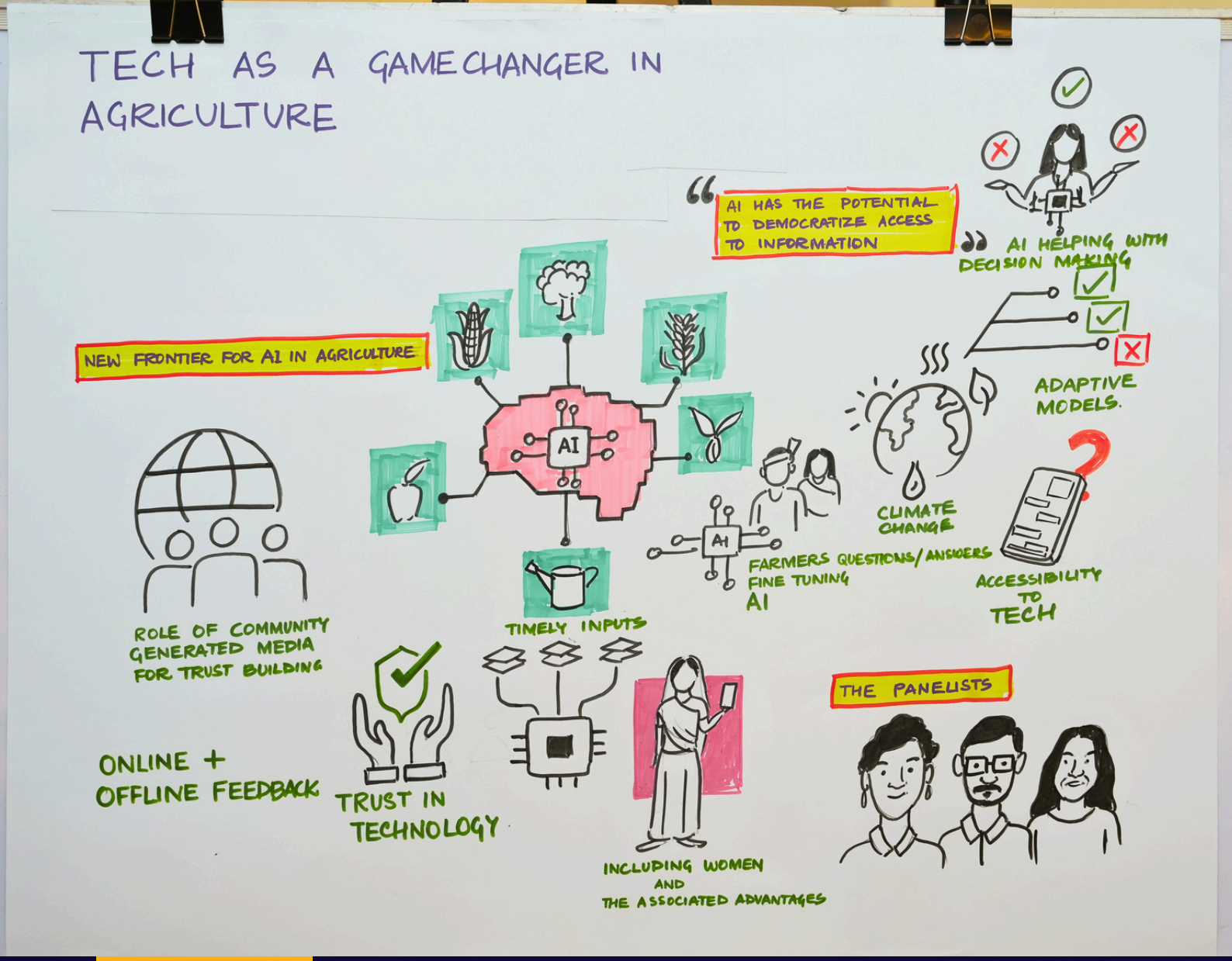
- **Farmer economics are the unit of scale:** Farmers are the first line of risk management for every downstream actor. Sustainable practice change only sticks when it creates tangible value for farmers through stable demand signals, market access, and embedded revenue models.

- **Stability and resilience require different architectures:** Supply security and fair value-share are problems a single company can solve. Climate, water, and landscape resilience are structurally beyond any one actor; they require cross-sectoral partnerships where partner roles (inputs, market linkage, capital, advocacy) are combined on a shared platform.

- **Measuring resilience requires a three-dimensional lens:** Economic, adaptive, and risk resilience — backed by longitudinal soil and water data, satellite tracking, digitised farms, and farmer perception surveys. Internal business cases must be as data-rich as farmer business cases.

- **The CFO has to be in the room:** Landscape investments only unlock when "value at risk" can be quantified for finance and risk teams, not only for procurement and sustainability. This is the next governance reform inside large corporates.

- **The next frontier is de-risking regions, not just farms:** If landscape-level investment is framed as avoided value at risk, it becomes legible to the financial sector, making regions and their farmers more creditworthy. This is where philanthropy, DFIs, and corporates need to converge, anchored by the recognition that soil is the real balance sheet every supply chain depends on.



Fireside Chat

Technology and AI as a Gamechanger in Agri-food Systems

- *Moderator: Elaine Noronha, Program Development, TechnoServe*
- *Nidhi Bhasin, CEO, Digital Green Trust*
- *Arjun Venkatraman, Senior Officer, AI, Gates Foundation*

Session Recording:

Fireside Chat: Technology & AI as a Gamechanger in Agri-Food Systems

Panelists (Left-to-Right):

- *Moderator: Elaine Noronha, Program Development, TechnoServe*
- *Nidhi Bhasin, CEO, Digital Green Trust*
- *Arjun Venkatraman, Senior Officer, AI, Gates Foundation*

Elaine Noronha opened the fireside by noting that one of the most significant impacts of technology has been to democratise access to localized information, and that having the right information at the right time is power, especially in farming. Knowing weather conditions, predicting heatwaves or unseasonal rainfall, anticipating pest attacks, deciding whether to take a loan, and knowing when to go to market; these decisions sit close to the farmer's climate vulnerability, and they were the practical entry points for the conversation.

Nidhi Bhasin challenged the dominant narrative around digital access in rural India. India today has roughly 950 million internet users, of whom 57% are in rural India. *"Access is no longer the biggest barrier,"* she said. The real barrier now sits one step deeper; it is about who is building technology, whether the farmer trusts what is being built, and whether trust translates into action.

She referenced Digital Green's journey as an example. Digital Green has been working with farmers for around 17 to 18 years across India, Ethiopia, Kenya, and Nigeria, reaching approximately 8 million farmers. Before the Generative-AI era, the organisation experimented with video-based learning and chatbots, and learned what the trust gap actually felt like. That learning fed into FarmerChat, an AI-powered Android application that smallholder farmers can download to access localised, contextual advisory. FarmerChat now has approximately 1.4 million users, around 60% of whom are in India, and 45% of whom are women. The metric Nidhi returned to most often was adoption: under the older video-based model, advisory uptake was around 30%; on FarmerChat, it is over 60%. Trust, she said, is what makes that difference.

On gender, Nidhi shared a use-case from Bihar. Initial adoption saw only 27% women's participation. Reaching 45% required solving for structural barriers: low smartphone ownership (~35%), shared-device usage, and ecosystem-level trust building. Onboarding women costs 2–3x more than men, but once onboarded, women engage more.

What stayed with her, she said, was something women farmers across multiple countries and states reported back in almost identical words: *"I don't feel judged when I'm using a digital tool."* With male migration to urban areas, women are increasingly involved in on-farm decision-making roles, but they are often dismissed by elders or lead farmers when they ask questions. A digital tool gives them privacy to ask hundreds of questions without social cost. The metric Digital Green now tracks alongside adoption is agency and confidence, whether a woman farmer is becoming more willing to make her own decisions.

On the question of contextual relevance, Nidhi explained that FarmerChat is built on a large language model (OpenAI) with reinforcement learning from human feedback layered. Digital Green has built its own evaluation platform, taking thousands of real farmer queries across crops and having both internal and external agronomists annotate and validate responses. A first release of this is now live in Bihar, with other states next. She emphasised the importance of both in-app and outside-app feedback, including periodic phone calls to ask farmers whether they actually took action on the advice and what the result was.

Arjun Venkatraman placed this evolution in context. The Gates Foundation's thinking on smallholder farmer outreach, he said, has long been intertwined with Digital Green's journey. He framed the question of advisory adoption against a much longer arc; from Krishi Darshan broadcasts thirty years ago, where there was a long refractory period during which farmers watched, conversation happened in the village, and something got implemented with attrition at every step.

What has fundamentally changed, he argued, is the speed at which the advisory needs to evolve. Monsoon patterns are now shifting within two-week refractory windows; he cited an Odisha cycle from one of the last monsoon seasons where the Ministry of Agriculture & Farmers Welfare and the Ministry of Environment, Forest & Climate Change, together developed a model adaptive enough to issue advisory inside that compressed window, opening up the possibility of farmers actually acting.

The true value of AI in this context, he said, is not in the broad term "AI" but in predictive intelligence and predictive models becoming finer-grained, combined with the long-term trust relationships organisations like Digital Green have built, which ensure that advice flowing down those channels actually gets acted on.

He also highlighted Digital Public Infrastructure (DPI) as a structural shift. Customer acquisition cost is a major constraint in scaling ag-tech. Aadhaar-linked registries enable targeted outreach without per-user onboarding costs, significantly improving scale economics, while still requiring careful design around land ownership versus cultivation realities.

On gender inclusion, Arjun noted that bias often begins in content design. Advisory systems built around staple crops structurally exclude women, who are more active in horticulture, home gardens, and aquaculture. Designing for these domains is essential. He also pointed to women's contextual knowledge as a potential advantage in "human-in-the-loop" AI systems.

Regarding context, he highlighted the complexity of language with a simple example: distinguishing between *"moong"* and *"moonga"* in Hindi, where most chatbots fail. Addressing dialects, speech variation, and real-world usage conditions remains costly, requiring shared infrastructure such as public datasets and experimentation across model architectures.

Asked to summarise what is different about this moment, Arjun aligned with Yann LeCun's view that AI is a significant technological advancement but not necessarily revolutionary. Each major technological wave: the internet, mobile, and now AI, gets the same pitch about "democratising information," but real democratisation requires governance, regulation, agreement on standards, and crucially, a collapse in cost. Mobile, he noted, has become cheap enough in India to be considered genuinely democratic; AI is not there yet. The path forward is bringing the cost of bulk operations — voice-to-text being one — as close to zero as possible.

Nidhi closed with a practical observation: older farmers are often willing adopters when supported by younger family members. Digital Green has intentionally designed for this dynamic, recognising that solving for one user group often unlocks access for others, especially in shared-device contexts.

Key Takeaways

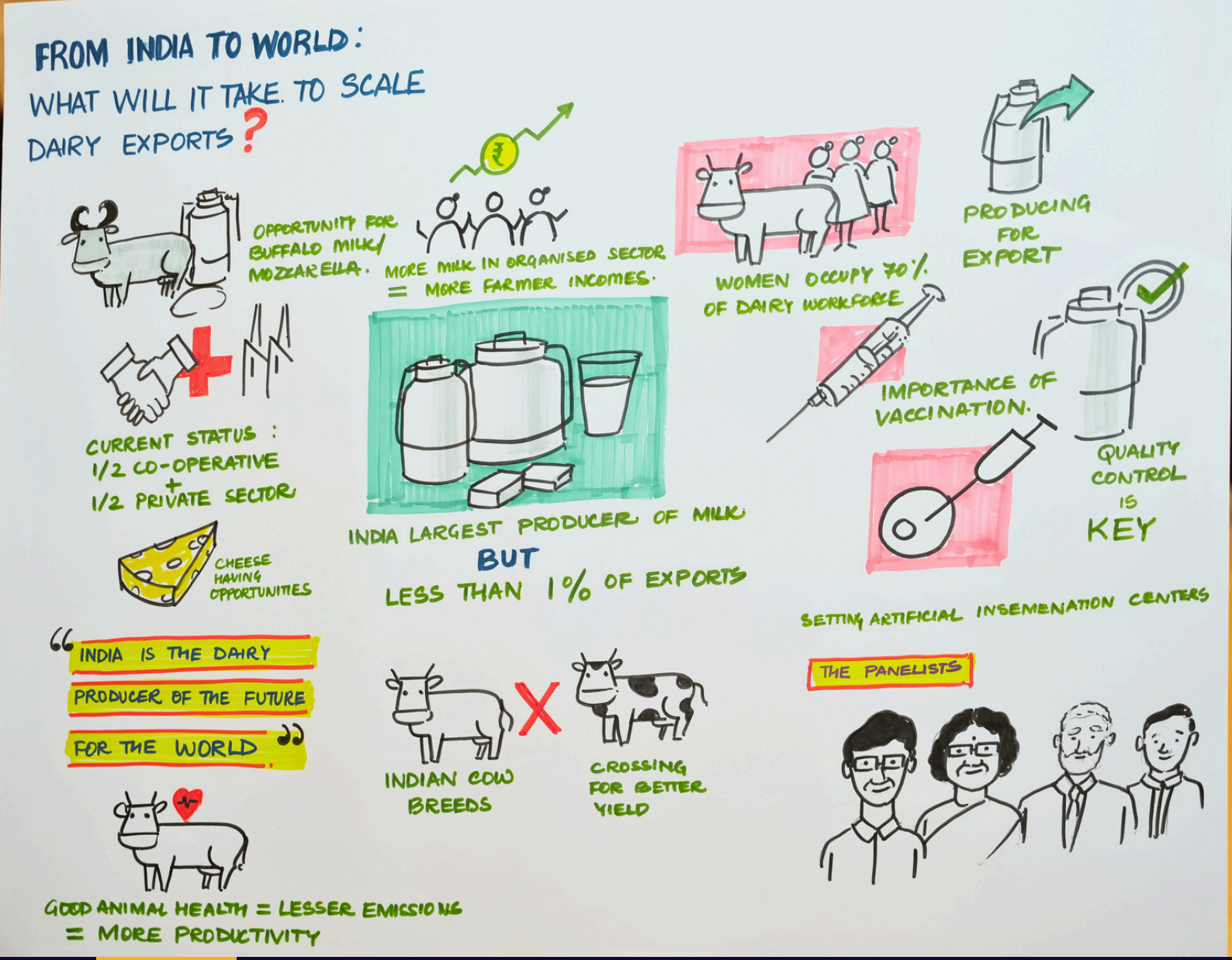
- **Access is no longer the binding constraint:** trust and action are the real frontier. With 950 million internet users in India, the constraint has shifted from connectivity to adoption. Advisory uptake doubles when tools are contextualised, localised, and built around continuous farmer feedback, moving from generic information delivery to advice farmers actually act on.

- **Inclusion is a design decision:** Most AI farm advisory is designed around staple crops, which are typically male-managed. Women farmers, who tend to manage horticulture, home gardens, and aquaculture, are quietly excluded just by that content choice. Women cost more to onboard but engage 2–3x more post-adoption, and increasingly serve as farm decision-makers, with digital tools offering privacy and agency that in-person channels don't.

- **Context is the new frontier, and it has two blind spots AI must solve for:** The first is linguistic: subtle dialectical variation breaks chatbots, and bringing down the cost of localisation requires public-good datasets like IISc's RESPIN and smart architectural choices between fine-tuned and general models. The second is indigenous knowledge: AI can only learn from what has been digitised, which means locally adapted, indigenous farming knowledge, passed down orally and never written down, risks being silently excluded from the advice it gives. Both gaps require deliberate, ecosystem-level effort to close.

- **AI's edge is speed, not just accuracy:** When monsoon windows shift inside two weeks, the value of AI lies in time-to-actionability. Predictive models matter most when paired with a trusted, localised channel through which advice can flow fast, and when indigenous, non-digitised knowledge is actively brought into the loop.

- **The opportunity is tremendous, but execution is everything:** AI can meaningfully reduce climate vulnerability for smallholder farmers, but only when backed by strong systems, affordable models, governance, and long-term implementation commitment.



Panel 2

From India to the World: What Will It Take to Scale Dairy Exports?

- *Moderator: Dwijo Goswami, Associate Partner, McKinsey & Company*
- *Smt. Varsha Joshi, IAS, Additional Secretary, Ministry of Fisheries, Animal Husbandry, Dairying, Government of India*
- *James Marc de Sousa Shields, Country Director, India Multi-Country Office, IFAD*
- *Dr. Abhinav Gaurav, Lead Advisor, Sustainable Dairy Environmental Defense Fund*

Session Recording:

Panel 2: From India to the World: What Will It Take to Scale Dairy Exports?

Panelists (Left-to-Right):

- *Moderator: Dwijo Goswami, Associate Partner, McKinsey & Company*
- *James Marc de Sousa Shields, Country Director, India Multi-Country Office, IFAD*
- *Smt. Varsha Joshi, IAS, Additional Secretary, Ministry of Fisheries, Animal Husbandry, Dairying, Government of India*
- *Dr. Abhinav Gaurav, Lead Advisor, Sustainable Dairy Environmental Defense Fund*

Dwijo Goswami opened with a clear disparity: India produces ~25% of the world's milk (~250 million tonnes) but contributes less than 1% to global dairy exports. Current exports sit at roughly half a billion dollars against a global trade of $70–100 billion. Of what India does export, around 75% is skimmed milk powder (SMP) and ghee, leaving the value-added space: cheese, ice cream, and yoghurt largely untapped.

Varsha Joshi, IAS, explained that this gap is largely historical. Domestic demand has absorbed production, with ~35% of milk still consumed locally and the rest distributed across cooperatives, private players, and a vast informal sector. While the informal channel is critical, it also presents quality challenges, particularly around adulteration and testing. The government's strategy has been to push as much milk as possible into the organised sector, while also creating space for private-sector investment through schemes like the Animal Husbandry Infrastructure Development Fund (AHIDF), which offers a 3% interest subvention. Roughly 250 million litres per day of new capacity has come up, she said, that probably would not have come otherwise.

Asked specifically about the progress on animal health, Varshaji walked the room through national-level programs in detail. The Pashu Arogya Mission (formerly the National Animal Disease Control program) aims for FMD freedom with vaccination by 2030 across the entire country. The central government finances the entire vaccine supply, the vaccines are now manufactured domestically, and the state machinery delivers the vaccinations. Two rounds of vaccination per year, with each full state covered within 45 days, have brought national outbreaks into the lower double digits, and FMD-free certification by 2028 may be achievable for some states. On breeding, the Rashtriya Gokul Mission now provides semen for every indigenous breed – India has more than 50 milch breeds, alongside Jersey and HF for crossbreeding, plus high-yielding Gir, Sahiwal, and Tharparkar. Artificial insemination penetration is at 40% through government schemes, supplemented by private-sector activity.

The harder problem, Varshaji explained, is feed and fodder quality and aflatoxin reduction, neither of which can be solved by central decree. They require farmer-level practice change at scale, which is slower and more distributed. The government is developing a Central Feed Act to replace fragmented state regulations and enable cross-state feed sales with self-certification, and has built a certified-seed ecosystem for fodder. But, aflatoxin and somatic cell count cannot be addressed at one go, and the right strategy is to support exporters who can build a guaranteed supply chain of sufficiently good-quality milk, then expand bit-by-bit.

James Marc de Sousa Shields reframed the sector across four dimensions: large in global scale, small in production structure, significant in environmental footprint, and enormous in export potential, with 80–99% of dairy markets in parts of Southeast Asia and the Middle East currently met by imports. He argued that India does not need US-style consolidation. With the cost efficiencies that AI and digital technology are now enabling, India can achieve scale economics without herd consolidation. And the smallholder farmer, he reminded the room, is now best understood as a 'multi-asset business', farm households manage different income streams across different asset classes, and they manage them well.

To illustrate the opportunity, he walked through three farmer-producer organisations he had recently met in the Northeast of India, all working in the turmeric value chain,; all at different scales, with different export models. The first, an all-women FPO with high-quality medium volumes, moved into biopharmaceuticals, selling dehydrated turmeric in pill form. The second, with large volumes and a state-supported processing facility, chose to export pulp globally. The third, small and organic, only exports whole turmeric to the United States.

Same crop, three FPOs, three completely different models, all working. His point for dairy was the same: India doesn't need a single export strategy; it needs an ecosystem of differentiated models that match producer scale to end market. He closed with a line from his work at IFAD: bridges depreciate, people appreciate. The development bet, he argued, should be on capacity, not concrete.

Dr. Abhinav Gaurav shifted focus to climate risk. While dairy's emissions are often discussed, the impact of climate on dairy is equally critical. Lancet Projections suggest up to a 30% decline in milk production in India by 2080 without intervention, making adaptation urgent for smallholder systems.

Through EDF's Resilient Dairy Alliance, companies are aligning on resilience standards and sharing adaptation costs. The core principle: climate transition must be commercially viable to scale.

On the perceived trade-off between exports and emissions, Dr. Abhinav offered a key insight: animal health is the convergence point. Tackling diseases like mastitis and FMD reduces emissions more effectively than productivity gains, while also improving milk quality and farmer economics. He also noted that most emissions in India occur at the farm level, making farmer-focused interventions: feed, health, and quality, central to both climate and export strategies.

Two strategic opportunities emerged. First, global regulations (e.g., on deforestation-linked supply chains) will increasingly shape export readiness. Second, India's buffalo dairy — ~60% of the global buffalo population and ~50% of domestic milk remains underleveraged as a differentiated global category.

Closing the discussion, Varshaji emphasised that real export growth lies in value-added products, while current exports (SMP, ghee) remain largely balancing trades. The key constraint remains quality compliance, particularly residue management and aflatoxin control.

She also outlined a broader policy push: including AHIDF expansion, 2,500 Livestock Producer Organisations, aggregator models, and new credit mechanisms, with institutional credit to the sector scaling sharply, indicating strong systemic momentum.

Key Takeaways

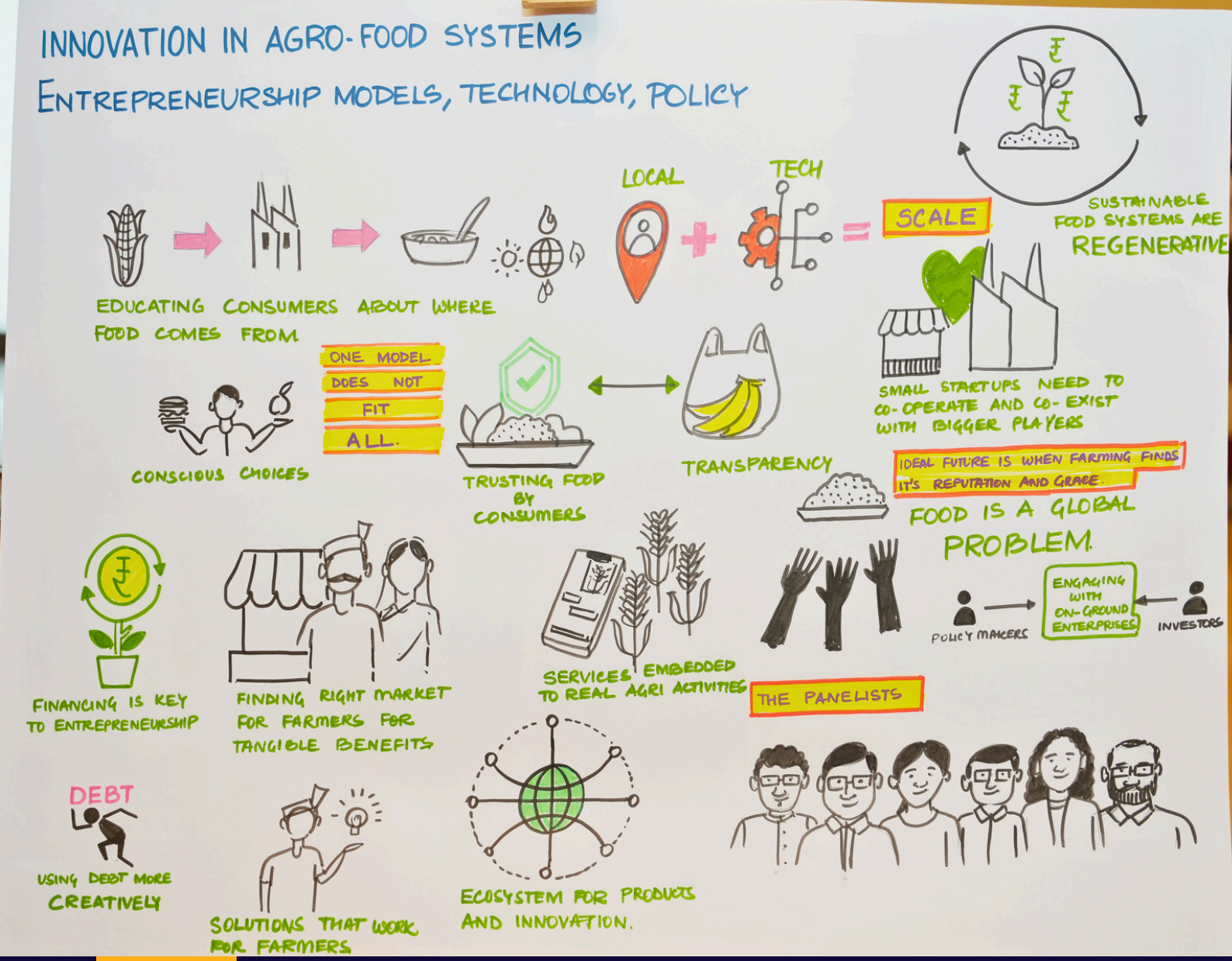
- **India's dairy export gap is structural, not economic:** Producing roughly 25% of the world's milk but under 1% of global dairy trade, India is already the most competitive source on landing cost into the Middle East and Southeast Asia. The constraint is that India has never built for export, and closing that gap means moving beyond SMP and ghee into value-added products like cheese, mozzarella, and specialty dairy, where the real white-space sits.

- **Animal health is where export ambition and climate goals meet:** Tackling mastitis and FMD doesn't just improve milk quality and open export markets; it also delivers greater emissions reductions than chasing productivity gains alone, while cutting farmer costs. The two agendas reinforce each other rather than compete. Progress is already visible: national FMD outbreaks are in the lower double digits, and some states are on track for FMD-free certification by 2028.

- **Feed, fodder, and aflatoxin are the next-hardest problems:** These cannot be solved by central decree, they require farmer-level practice change at scale. A Central Feed Act is in development, but the deeper challenge is behavioural. Without solving feed quality and hygienic handling, premium export markets remain out of reach, regardless of volume.

- **India doesn't need consolidation; it needs differentiated export models:** Smallholder structure is not the obstacle; it is the system. With the right digital and AI tools, scale efficiencies are achievable. The opportunity is an ecosystem of export models matched to producer scale.

- **Sustainability and productivity are not trade-offs but mutually reinforcing goals:** Investments in animal health, nutrition, and genetics can simultaneously improve farmer incomes, reduce emissions intensity, and enhance milk quality, with smallholder farmers remaining central to this transformation.



Panel 3

Innovation in Agri-food Systems: Entrepreneurship Models, Tech & Policy

- *Moderator: Ajay Menon, Senior Practice Lead & Program Director - Greenr, TechnoServe*
- *Archana Stalin, Founder, myHarvest Farms*
- *Shyam Sunder Singh, Co-Founder, DeHaat*
- *Suranjana Ghosh, Head of Foundation, Marico Innovation Foundation*
- *Subhadeep Sanyal, India Lead, Wavemaker Impact*
- *Apoorve Khandelwal, Fellow, Council on Energy, Environment and Water (CEEW)*

Session Recording:

Panel 3: Innovation in Agri-food Systems: Entrepreneurship Models, Tech & Policy

Panelists (Left-to-Right):

- *Moderator: Ajay Menon, Senior Practice Lead & Program Director - Greenr, TechnoServe*
- *Archana Stalin, Founder, myHarvest Farms*
- *Shyam Sunder Singh, Co-Founder, DeHaat*
- *Suranjana Ghosh, Head of Foundation, Marico Innovation Foundation*
- *Subhadeep Sanyal, India Lead, Wavemaker Impact*
- *Apoorve Khandelwal, Fellow, Council on Energy, Environment and Water (CEEW)*

Ajay Menon opened the panel with a deliberate framing. When people talk about innovation in agri-food systems, he said, the conversation defaults to technology: AI, drones, precision farming. But that is only one slice. In reality, the biggest shifts often come from non-tech innovations that change how value is created, distributed, and captured. He asked each panelist to name the one non-tech innovation that, in their experience, has made the biggest difference.

Apoorve Khandelwal opened with **consumer-side innovation**, drawing on a report he had co-authored five years earlier on scaling agri-innovation in India. His central argument: demand creation: changing what consumers ask for, changes what farmers can produce profitably. The example he cited was 'Safe Harvest', which didn't just launch a new product but created a new category (pesticide-free food) and built latent demand for it. That required bundled innovations: FPO capacity-building for separate storage and processing, traceability systems, and supply chain reorganisation. Supply-side innovation alone, he argued, cannot drive this kind of production-system transformation.

Subhadeep Sanyal named **capital structure as the innovation** that has moved the needle most over the last decade. Agriculture is working-capital-intensive, and the shift toward diverse forms of capital: debt instruments alongside equity, blended finance, and digital banking has materially changed what agri-businesses can attempt. The enabling mega-trends were cheap mobile phones, ubiquitous banking, and the flow of similar information and access across the system. The bigger story, he said, is not equity alone but the diversity of capital now reaching the sector and how it supports different business models at different stages.

Suranjana Ghosh built on this with a related innovation: **adoption-as-a-service**. She recounted that Marico Innovation Foundation's work with agri-startups kept hitting the same constraint: good technology stalls when farmers cannot afford upfront adoption costs or risk. FPOs are increasingly playing the role of an adoption layer: aggregating demonstrations, demand, and shared usage so farmers can experiment on a pay-per-use or shared basis. This reduces farmer risk, supports the technology provider's path to commercial traction, and creates partnership infrastructure where innovation can land at scale.

Shyam Sunder Singh argued from inside the agri-tech ecosystem that the shocks the sector faces: weather, soil erosion, price volatility, trade disruption, are systemic enough to require **structural, long-duration, government-led programmes**. He cited examples of governments bringing together technology companies, corporates, and implementation partners on multi-year programmes, and argued that for several crop value chains critical to India, orchestration is unavoidable. Certain kinds of change, he said, cannot be driven by markets alone.

Archana Stalin brought a perspective from outside the corporate and policy frame, a former IT professional who moved into farming and built myHarvestFarms on a direct-to-consumer organic model. Her non-tech innovation was **consumer education**. India has lost much of its food literacy, she said: *"children grow up not knowing that okra comes from a plant"*. She was shocked on entering farming to learn that India once had over 100,000 rice varieties and has lost roughly 90,000 of them. Building the consumer layer, specifically, educating people about where food comes from and why fresh, local, and seasonal matters, is what makes nutrition, biodiversity, and farmer livelihoods defensible together. She had directly observed the effect: people stopped wasting food once they had visited the farm.

When asked about what has been hardest about scaling myHarvest Farms, Archana shared that farmer trust was easier than expected. Once the model proved farmers could earn across eight or nine months rather than two paddy seasons, trust followed. Consumer trust was harder. There is no consumer-grade test for organic produce; the signal that worked best was taste, but taste is difficult to market. The ongoing challenge is building consumer belief without quantifiable proof, including correcting misinformation, like reassuring consumers that a black spot on a cauliflower is natural, even when Google suggests otherwise. Content gaps in the digital ecosystem, she noted, become farmer-livelihood problems.

Subhadeep offered a detailed framework on what separates agri-startups that break out of pilot mode from those that don't. The first four or five years are about building foundations: model, team, early customers. Multiple co-founders help, given the sector's complexity. What investors look for at an early stage is the team and intent, because there is often little else to underwrite. Post-revenue, the strongest signal of product-market fit is replicability: the same farmer returning across multiple seasons and products. That tells an investor the business isn't a one-off. The discipline that ultimately determines whether a business scales is working-capital management, which is unforgiving in agri-food. His capital wish-list: creative use of debt and more proactive blended finance. The first one or two years remain the hardest to fund; the right response for founders is to pace growth and match capital type to company stage.

Suranjana added a sequencing argument: scale happens when validation capital, scale capital, and market-linkage capital work in sequence. The most common mismatch is in field R&D, underfunded or rushed, with products tested under ideal conditions rather than real variability of seasons, geographies, and farmer behaviour.

Shyam traced DeHaat's evolution from point solution to full-stack platform through deliberate steps: market linkage first, then information, inputs, and services, expanding crop by crop. Scaling each step required serious internal capacity-building. Trust at scale, he said, is built one crop at a time, with depth on both the input and market sides.

On policy, Apoorve argued that agriculture's infrastructure is built for homogeneous, large-batch production; smaller and more diverse producers cannot access millers, processors, or certification ecosystems designed for industrial scale. Patient finance, with horizons long enough for agroecology transitions and soil regeneration, remains the largest structural gap. On the policy direction: agroecology lags despite evidence and political traction; digital agriculture moves fast through Bharat Vistaar and AgriStack, creating risks of exclusion and loss of indigenous knowledge from AI advisory systems.

Closing reflections converged on unwinding distorted subsidies, building predictable income loops for farmers, scaling technology adoption, and making climate resilience the norm. Apoorve added that farming needs to reclaim its dignity; it is currently seen as the worst profession to be in. Archana agreed, noting that families who emigrated to the US and UK 30 years ago had funded those journeys with agricultural earnings. Today, farming is spoken of with sympathy. That cultural shift, she said, is itself a structural problem.

Key Takeaways

- **The most impactful innovations in agri-food systems are often non-tech:** consumer-side category creation, capital structure diversification, FPO-led adoption services, and consumer education have driven more transformation than product or technology innovations alone.

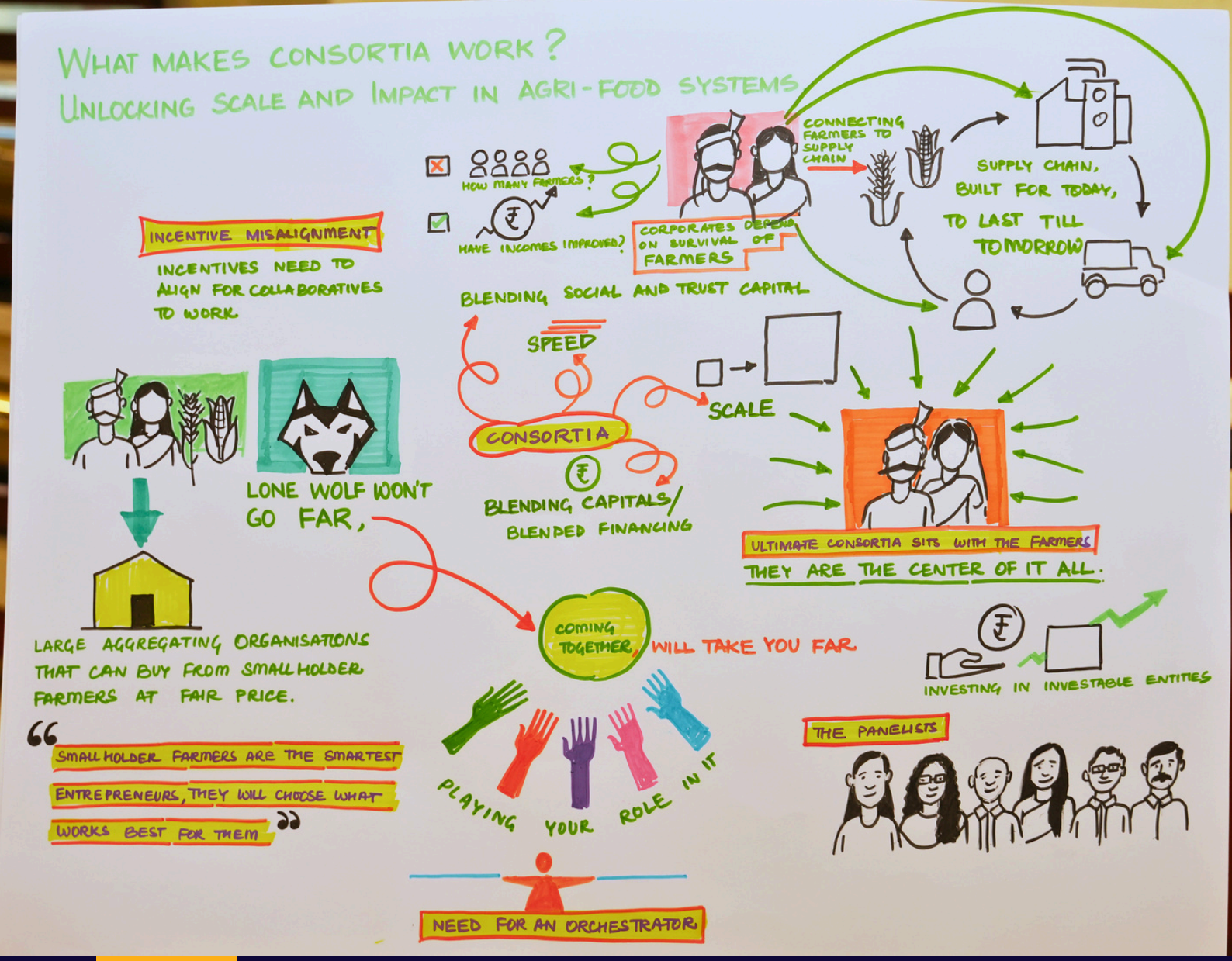
- **Farmer trust is built through tangible outcomes:** stable demand, fair value-share, and demonstrable income improvement matter more than organic framing or awareness campaigns. Scaling farmer-centric models also requires consumer literacy.

- **Capital type must match the company stage.** Grants and family-office capital fit unproven science; regulated equity fits repeatable post-revenue models; debt is essential for working-capital cycles. The first one or two years remain the hardest because banks don't lend meaningfully, founders must pace growth accordingly.

- **Patient capital is universally requested and structurally undersupplied.** Soil regeneration, agroecology, R&D, and consortium-building all need horizons longer than typical equity (8–10 years) and annual CSR cycles allow. Blended finance with philanthropic first-loss tranches is an emerging answer.

- **Replicability is the strongest early signal of product-market fit.** A customer returning across multiple seasons or multiple products tells an investor the business is not a one-off; it is the signal that unlocks the next stage of capital.

- **Policy is both lagging and leading; both create risk.** Policy lags on agroecology and natural farming despite strong evidence; policy is racing ahead on digital agriculture without phasing for the digital divide and the exclusion of indigenous knowledge. Distorted incentive structures (subsidies that decouple economics from outcomes) are actively impeding innovation. The cultural reputation of farming may be the deepest structural problem. Farming is currently treated as a profession of last resort, evoking sympathy rather than aspiration. Restoring its dignity in the national imagination is a precondition for attracting youth, capital and policy attention back to the sector.



Panel 4

What Makes Consortia Work? Unlocking Scale & Impact in Agri-Food Systems

- *Moderator: Leena Datwani, Senior Finance Sector Specialist, CGAP*
- *Latika Nayar, India Sustainability Lead, PepsiCo*
- *Dhritiman Biswas, Senior Director - Government & External Relations, Cargill*
- *Kritika Singh, Country Management Unit, IFC*
- *Anant Bhagwati, Partner, Bridgespan*
- *Prabhakar L, EVP, Social Investments, ITC Limited*

Session Recording:

Panel 4: What Makes Consortia Work? Unlocking Scale & Impact in Agri-Food Systems

Panelists (Left-to-Right):

- *Moderator: Leena Datwani, Senior Finance Sector Specialist, CGAP*
- *Latika Nayar, India Sustainability Lead, PepsiCo*
- *Dhritiman Biswas, Senior Director - Government & External Relations, Cargill*
- *Kritika Singh, Country Management Unit, IFC*
- *Anant Bhagwati, Partner, Bridgespan*
- *Prabhakar L, EVP, Social Investments, ITC Limited*

Leena Datwani opened the panel with a stark reality: between 2015 and 2021, India lost approximately 69 million hectares of cropped area to extreme weather, with the disruption increasingly translating into structural supply-chain risk for corporates. The challenges, she said, are systemic and cannot be addressed by any single actor working alone. The session was designed to ask whether consortia, as a model, can deliver the systemic shifts that the day's pillar conversations had identified.

Latika Nayar began with what the consortium task looks like from inside a large corporate like PepsiCo. The fact that two PepsiCo representatives showed up to a single convening, she said, was itself a signal of how the company thinks about this: solving the agri agenda requires bringing together policy people, finance people, partners from CSR, and from procurement. 2030 goals do not belong to any single organisation; they belong to all of them, and unless the room works together to simplify the message for farmers, change does not happen.

She clearly framed that consortia must deliver to farmers. The same farmer in a rotation might hear PepsiCo's pitch on potatoes, someone else's on corn, and a third on wheat, each with different metrics and protocols. Until consortia produce a common definition that the farmer can identify with, subscribe to and adopt, the work of multiple companies in the same geography produces fragmentation rather than scale. The expectation from a consortium, she argued, is simplification at the farmer level, not at the corporate level. Critically, she added that supply-chain resilience is a business risk, not a sustainability concern, and should be funded from business budgets, not philanthropic ones. Sustainability has to become part of the cost of goods, not a CSR line item.

Dhritiman Biswas argued that consortia are no longer optional. If single-actor money could fix agriculture's structural problems, India's reserves and economic scale would have done so already. His design principle was sharp: farmer centricity must be built in from the start, not added later. Corporates bring supply chain, cold storage, and market access; government brings policy and scheme architecture; civil society brings aggregation and last-mile work. When any actor stops doing what they do best, the consortium breaks. He cited aflatoxin in dairy as a live example of parallel effort failing, because it is not coordinated around the farmer.

He cited an example of the Cargill-PepsiCo regenerative agriculture programme in the United States, where Cargill grows crops to PepsiCo's specification using regenerative practices and sells the produce to PepsiCo. Both companies make a profit, and the farmers earn a stable income. The consortium works because the economic engine is intact. The Indian discomfort with profit in social-impact contexts, he suggested, is part of why agri consortia here have not achieved the same outcomes. He closed with three disciplines: (i) move from reach metrics to outcome metrics (has farmer income actually increased?); (ii) build in patience, since meaningful consortia take years, not quarters, to produce results; and (iii) plan capital and partnership commitments across the full lifecycle.

Kritika Singh spoke from IFC's experience of the gap between access to formal financing and the actual readiness of the smallholder ecosystem to absorb it. The learning, increasingly, is that sustainable ecosystems require a behavioural shift in farming communities, enabling government policy and more advanced financial instruments, particularly blended finance and risk-sharing facilities, to crowd in capital simultaneously. She cited the 'Open Network for Agriculture', built with Google Cloud and the Government of Uttar Pradesh, as a deliberate consortium governance model. The central lesson, as it scales to other states: define roles clearly across the full project lifecycle, not just at launch.

She also pointed to a fundamental inefficiency; production is often misaligned with market demand, leading to lost value for farmers. In Uttar Pradesh, most potato production is table-top varieties that cannot be processed into chips or other value-added products, leaving farmers with no pricing power. Initiatives like the Better Life Farming Alliance, which IFC built with Bayer, address this by integrating inputs, credit, advisory, and market linkages, demonstrating that coordinated ecosystems can significantly improve income and resource efficiency.

Anant Bhagwati shared a critical data point: less than 5% of global philanthropic capital actually flows to collaboratives, while around 40% of stakeholders talk about them. Many collaboratives lack a sharp North Star and lose accountability as a result. What works are bold bets: sharp, time-bound goals with clear outcomes and aligned funding. Very few such bets have reached agriculture. India's CSR system has put close to Rs 15,000 crore through the system over the last decade, most of it going to health, with very little reaching agri-food.

His structural diagnosis was clear. Health collaboratives align incentives easily because governments, the private sector, and civil society all want the same outcome. Agriculture has fundamental incentive misalignment: smallholder fragmentation on one side, highly consolidated buyers on the other, and no large unifying entity. A Latin American pesticide-free soy collaborative worked because an export premium flowed back to farmers, creating an economic engine that aligned everyone. Where that engine is absent, consortia fail regardless of design quality. His closing principles: be honest about whether a monetary incentive exists before building a consortium; bet on aggregating investable entities like producer-owned companies that can eventually attract private equity and VC capital; and remember that collaborations are means, not ends. A poor answer is not rescued by a great collaboration.

Prabhakar Lingareddy added that successful consortia are rare, particularly in agriculture. He highlighted two overlooked factors: First, informal consortia, including KVKs, agricultural universities, and government extension, already exist and are often forgotten in these conversations.

Second, while consortia are usually discussed in terms of scale, speed (given climate urgency), and social and trust capital matter just as much. Financial capital is more available than social capital in the agri-sector, and consortium design needs to account for that.

He also pointed to an internal constraint: while leadership may support collaboration, middle management often remains competitive. Until collaborative behaviours are reflected in internal KPIs, organisations will default to siloed action. He also pointed to the lack of discovery infrastructure: many organisations are doing relevant work in the same catchments without knowing about each other. Better matchmaking infrastructure would increase the rate of collaboration. And in his experience, neutral orchestrators, whether multilateral, philanthropic, or specialised intermediaries, significantly outperform corporate-led consortia, because when one corporate tries to lead, others hedge.

Leena closed by acknowledging that consortia are a pathway, not an answer in themselves. What is good for business can also be good for farmers, but only when incentives are aligned, there is a common language and shared metrics, and the problem being solved is sharply defined.

Key Takeaways

- **Agri-consortia are structurally necessary** but routinely fail; less than 5% of global philanthropic capital reaches collaboratives. **This is due to incentive misalignment:** unlike health sectors, where all actors want the same outcome, agriculture combines fragmented smallholder realities with consolidated buyers and no natural unifying entity. Effective consortia require **an economic engine** where all actors, including farmers, generate value. The Cargill-PepsiCo regenerative agriculture model succeeds because it is structured as a commercial transaction, not a philanthropic one. Sustainability investment must follow the same logic: supply-chain resilience is a business risk, and must be funded from business pockets.

- **Farmer centricity must be a design principle.** A single farmer in a rotation often receives multiple inconsistent messages from different corporates. Consortia must produce unified farmer-facing definitions and protocols, with **each actor playing to its strength**: corporates on supply chain and demand, government on policy, civil society on last-mile delivery. Parallel effort without coordination around the farmer produces no outcome, regardless of investment.

- The ambition must shift from counting farmers reached to **measuring real change in farmer incomes and market access.** This requires outcome metrics, multi-year time horizons, and resolved questions around double-counting in ESG frameworks, which currently create ambiguity that actively discourages joint work on shared farmers. Achieving this depends not just on financial capital but on social and trust capital, technical expertise, and implementation capacity.

- **Neutral orchestrators outperform corporate-led consortia**. When one corporate tries to lead, others hedge. A neutral convening entity: multilateral, philanthropic intermediary or specialised orchestrator, significantly raises the probability of alignment and follow-through.

- **Discovery and matchmaking are missing infrastructure.** Organisations frequently work in the same catchments without knowing it. Informal consortia, built on transparent problem statements and structured matchmaking, may be more practical than formalised governance bodies for many agri use cases.

INDIA
B1-201 Centre Point | Opp. Bawla Masjid
243-A NM Joshi Marg | Lower Parel (E)
Mumbai 400013
T +91 22 61283200

HEADQUARTERS
1777 N Kent St | Suite 1100
Arlington, VA 22209
T +1 202 785 4515 | F +1 202 785 4544
technoserve.org

TechnoServe
Business Solutions to Poverty™