

White Paper

Improving Innovation for Smallholder Farmers

A Call for a Collaborative Ecosystem

syngenta foundation
for sustainable
agriculture

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A Call for a Collaborative Ecosystem

Charles Chigemezu Nwokoro^{1,2*}, Jonathan Richards¹, Mark Blackwell³, Sunil Hemdev¹,
and Robert Berlin¹

¹ Syngenta Foundation for Sustainable Agriculture, Rosentalstrasse 67, 4058 Basel, Switzerland

² Sustainable Agroecosystems Group, Department of Environmental Systems Science, ETH Zurich, Switzerland.

³ Arkaro Limited, CP228, 1215 Genève 15 Aéroport, Geneva, Switzerland

*Correspondence: syngenta.foundation@syngenta.com

Correct citation:

Nwokoro, C., Richards J., Blackwell M., Hemdev S. and Berlin, R. 2023. “Improving Innovation for Smallholder Farmers”. Syngenta Foundation for Sustainable Agriculture. <https://tinyurl.com/Improving-Innovation-for-SHF>

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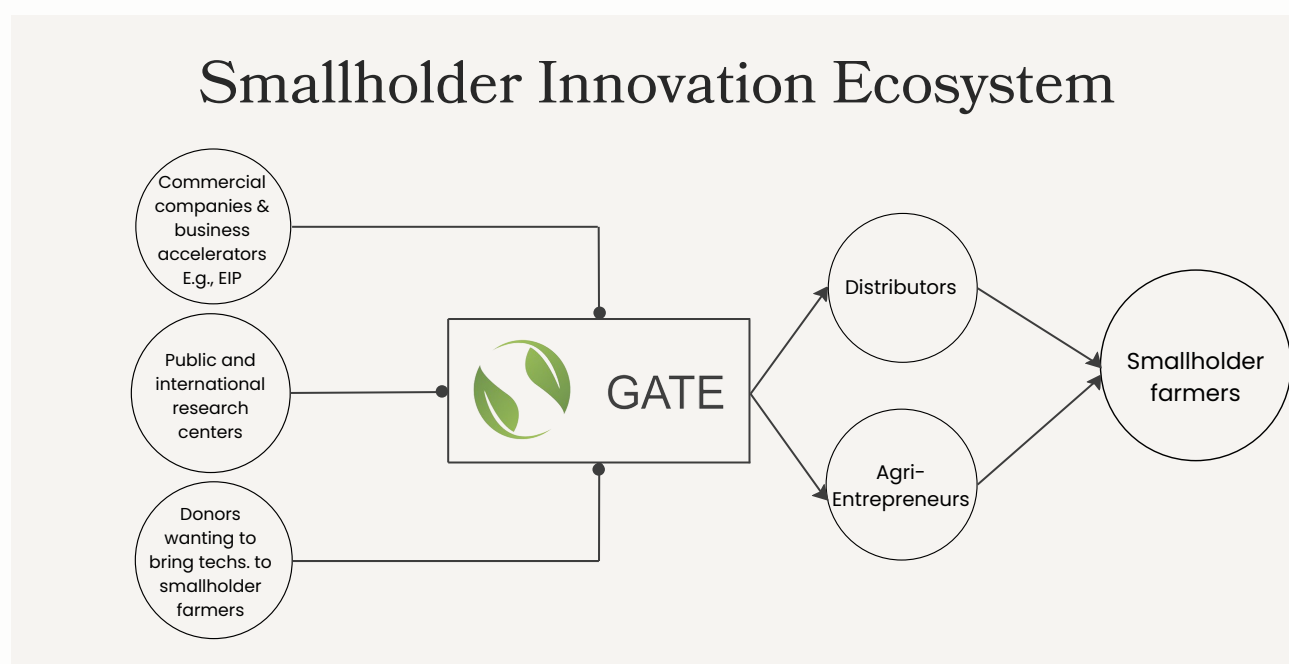
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Executive Summary

The Syngenta Foundation for Sustainable Agriculture (SFSA) exists to strengthen smallholder farming and food systems by catalyzing the market development and delivery of innovations while building capacity across public and private sectors. SFSA has a successful history of incubating products and services that target smallholder needs and of scaling them beyond the locations in which it has a direct presence, by spinning off as independent enterprises. This step is currently being explored for GATE (Global Agricultural Technology Evaluation), an internally developed platform supporting the evaluation of the effectiveness and market-appropriateness of climate-smart innovations in local smallholder settings. As part of the assessment of the potential benefits GATE could bring beyond the SFSA domain in which it has been deployed to date, a voice of stakeholder study was initiated in May 2023 to collate the pain points relating to the establishment of innovations in the smallholder context, as seen from the various perspectives of different ecosystem actors (see diagram below).

This white paper presents the results of this voice of stakeholder study and the insights arising. GATE is open to collaboration* with other smallholder innovation ecosystem actors.



*Contact: syngenta.foundation@syngenta.com

Highlights

1. Whilst significant efforts and resources have been invested by many different stakeholders in smallholder innovation and delivery, **current impact outcomes fail to meet all stakeholders' expectations. Smallholders still frequently lack both knowledge of, and access to, critical needs-based innovative solutions**, especially profitable climate-change adaptation, and climate-change mitigation solutions.
2. There is a **lack of adequate financial enablers** for delivering innovation targeted to smallholders, including **funding, market incentives** for innovation uptake, and contemporary business financing models such as **blended financing**.
3. **Improvement is needed in matching innovation to local smallholder needs**. Examples include appropriate **product/solution bundling**, smallholder **market aggregation models**, and **capacity building**. **Involving smallholder farmers more actively** during the assessment process can facilitate this improvement.
4. There is a **lack of visible regional and global communities of practice**. For example, there are very few public platforms relating to smallholder innovation and delivery that are focused on information sharing or on simply connecting actors within the same value chain.
5. **Upstream (innovators) actors are more dissatisfied than downstream (last-mile) actors**. This suggests a disconnection between these two broad groupings of stakeholders in the smallholder innovation and delivery ecosystem.
6. **A more holistic cross-sectoral approach**, rather than additional disconnected individual or sub-sectoral initiatives, **will make a significant difference in the effectiveness** of bringing innovative climate-smart agricultural solutions to smallholder farmers.

SFSA will use these insights to inform its activities as a catalytic integrator spanning the whole smallholder innovation ecosystem and to consider the potential for the GATE platform to support effective scaling of smallholder innovation delivery.

Introduction

By 2050 half of the world's population is projected to live in South Asia and Sub-Saharan Africa (UN-DESA, 2019). It is vital to match the projected population growth in these regions with increases in food production and equally vital that these increases are achieved in ways that also benefit the natural environment and rural communities.

Estimates show that smallholder farming currently produces about 80% of the food consumed in these regions (FAO, 2012; IFAD, 2011), yet it faces significant challenges such as low soil fertility, pests and diseases, limited inputs, lack of political attention, unfavourable policies, limited or lack of access to markets, and climate issues (Zerssa et al., 2021). There is already a clear and urgent need for innovation to address these challenges and to help drive sustainable intensification of smallholder farming systems; this need will become even more critical as food demands increase with the projected population growth (Ajibade et al., 2023).

Concerning climate, agriculture is both a significant contributor to anthropogenic global warming (Lynch et al., 2021) and vulnerable to climate changes (Yohannes H, 2015) – and global south smallholder farmers are the most impacted group (Morton, 2007). Smallholder-appropriate, context-specific, climate-smart, sustainable agricultural intensification innovations provide benefits for climate change adaptation and mitigation, whilst at the same time supporting wider ecological and social stability for this vulnerable, growing population, especially when matched with infrastructural development (Akpan & Zikos, 2023). Sustainable intensification based on climate-smart technologies can therefore help to address both socio-economic and environmental challenges (Donovan, 2020) and thereby can play a critical role in achieving SDG1 and SDG2 (CNS-FAO, 2019). Such innovation involves, for example, the judicious use and management of natural production resources including genetic biodiversity, efficient use of fertilizers, conservative farm mechanization, good agronomic management practices, improved locally adapted crop varieties, composting, soil conservation, zero-burning, smart irrigation technologies (FAO, 2023), and digital advisory tools. Many such technologies fall within the boundary of regenerative agriculture, i.e., not just minimizing future ecosystem damage, but contributing to recovery from past degradation and delivering net environmental and social benefit.

The potential market value for climate-smart investment opportunities in developing countries is estimated to be USD23 trillion by 2030 (Stein et al., 2018). Within this, climate-smart innovation in agriculture offers a very significant commercial opportunity. However, adoption levels of climate-smart agriculture technologies are currently very low amongst smallholder farmers. Both this low adoption rate in itself and the high complexity of the challenges to overcome make these opportunities relatively unattractive as an innovation target for investment, especially as it is relatively simpler and less risky to focus attention instead on the commercial agriculture sectors in the same locations. A few leading international R&D institutional organizations and innovation centres (e.g., CGIAR) have developed several smallholder-based climate-smart technologies; however, even in these cases, rollouts have achieved only limited success (CGIAR, 2021). This combination of unattractive return-on-investment and low adoption success leaves the needs of smallholders very poorly addressed, despite representing such a significant proportion of the total food production in these markets.

To help identify potential ways forward to addressing these challenges, the study reported here sought to surface, describe, and collate the pain points perceived by stakeholders across the smallholder innovation value ecosystem. Successfully overcoming these challenges would significantly contribute to food security and the resilience of rural livelihoods.



Methodology

Data collection was conducted in two phases:

1. Initial qualitative **discovery interviews** with stakeholders actively engaged in smallholder farmer innovation.
2. A quantitative online survey (**‘preference interview’**) from a broader set of respondents, exploring perspectives from across the smallholder innovation ecosystem.

Discovery interviews

Following a stakeholder mapping exercise[1], individuals from 11 different organizations[2] actively involved with climate-smart innovation for smallholder farmers were contacted for discovery interviews.

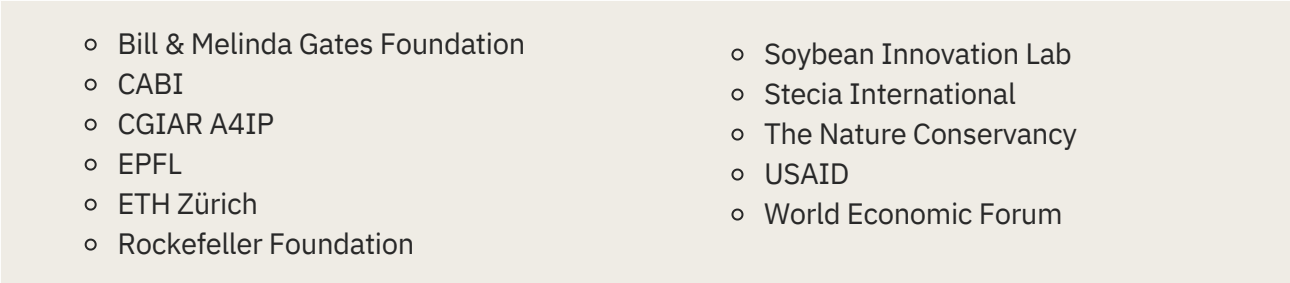
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- | | |
|-----------------------------------|--------------------------|
| ◦ Bill & Melinda Gates Foundation | ◦ Soybean Innovation Lab |
| ◦ CABI | ◦ Stecia International |
| ◦ CGIAR A4IP | ◦ The Nature Conservancy |
| ◦ EPFL | ◦ USAID |
| ◦ ETH Zürich | ◦ World Economic Forum |
| ◦ Rockefeller Foundation | |

Figure 1. Affiliations of the discovery interview participants

Through these conversations, which frequently involved more than one person from each interviewee organization, a set of sixteen desired outcome statements relating to improving innovation for smallholder farmers was created. These desired outcome statements were then taken into the “preference interview” phase to quantify their importance from the perspective of a broader range of stakeholders from across the smallholder innovation ecosystem.

[1] Both the Stakeholder mapping exercise and the interview process were facilitated by Arkaro Consultancy.

[2] Responses for both the discover interviews and subsequent preference interviews should be understood as being individual views, and not necessarily the views of the organizations they are affiliated to.

Preference interviews

The ‘preference interviews’ phase was conducted through an online survey. Invitations to complete the survey were sent to a wide range of stakeholders throughout the smallholder value ecosystem; over 200 responses were received. For analysis purposes, respondents were categorized by their position in the smallholder innovation value ecosystem (table 1). A list of affiliations is included in Appendix 1.

Upstream actors (62)	Downstream actors (140)	
Commercial companies & business accelerators (10)	Distributors	Commercial (21)
Public & international research centers (32)		Global South first mile (58) - Africa (43) - Asia (15)
Donors wanting to bring technologies to smallholder farmers (20)	Agri-entrepreneurs/ Enablers	Enablers (28) - Africa (8) - Asia (13) - Global (7)
		Global south farmers (33) - Africa (6) - Asia (27)

Table 1. Grouping of respondents by position in the smallholder value chain ecosystem.

Respondents were presented with the list of desired outcome statements from the discovery interview process and were asked to score each statement[3] on a scale of 1-10 to indicate their view of (i) its importance in improving innovation for smallholders and (ii) their level of satisfaction with the current situation.

In addition to these quantitative questions, respondents were requested to indicate any desired outcomes they felt had been missed in the statement list, add any additional comments or insights, and indicate whether they wished to have a follow-up call to explore their perspectives further. Several also provided comments by email in response to the survey invitation.

[3] Respondents were requested to calibrate their score in line with the following indicative scale:

Importance: 5 = moderately important; 10 = critical to delivering the mission of improving innovation to smallholder farmers
Satisfaction: 5 = barely acceptable; 10 = very satisfied

Analysis

The quantitative responses relating to each outcome statement were analyzed following the Market Satisfaction Gap (MSG) methodology, as developed by the AIM Institute (Adams, 2019): importance and satisfaction scores are plotted on an MSG chart (see Figure 2, our adaptation of the AIM Institute representation) and combined into an MSG score[4]. A positioning towards the top left of the MSG chart or a higher MSG score indicates that the respondent felt most strongly that improvement efforts should be focused on that outcome statement, i.e., it is an important outcome, for which they have a low level of satisfaction (high dissatisfaction) with the current situation. As a rule of thumb, an MSG score of 30% or higher indicates that the desired outcome has sufficient perceived market value to justify investing in improvement efforts.

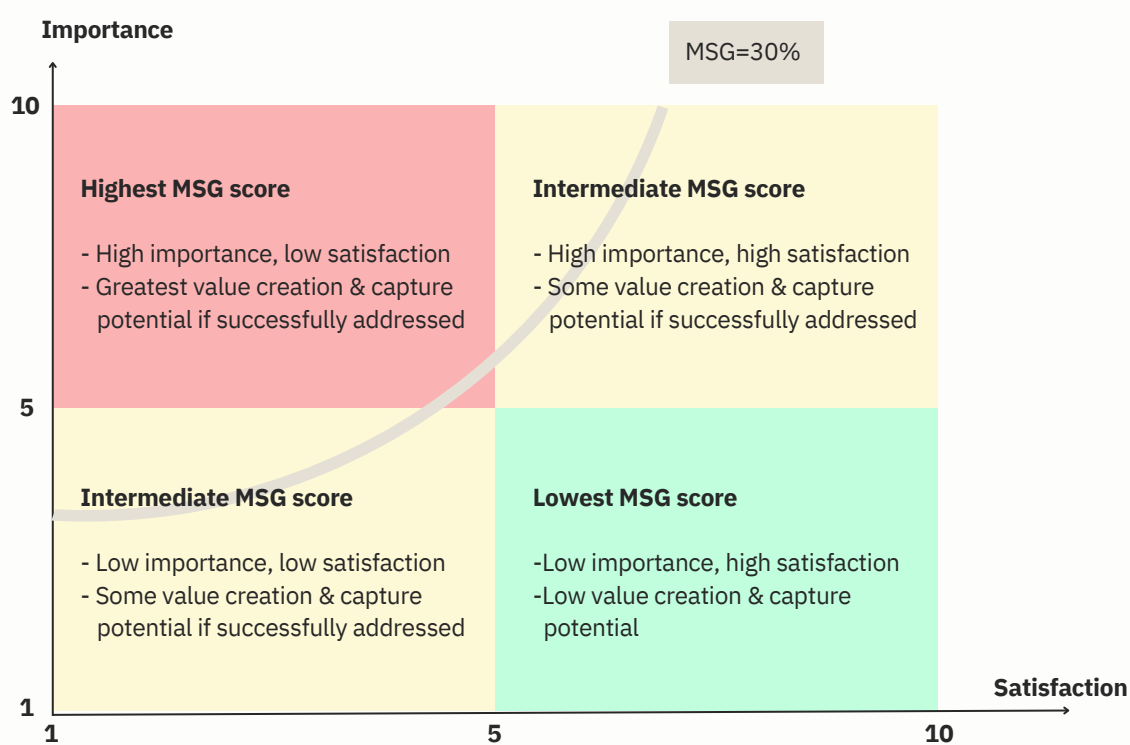


Figure 2. MSG chart indicating the zones corresponding to >30% MSG score.

[4] MSG score = (Importance x (10 – Satisfaction)) %

For example, an outcome statement scored as 8 for importance and 6 for satisfaction would have an MSG of 32%

Results & Discussion

Phase 1: Discovery interviews and Desired Outcome statement development

The discovery interview conversations covered a wide range of topics related to smallholder innovation delivery, with individuals' different positions within the innovation ecosystem as well as their experiences and areas of expertise being reflected in the insights shared. Perceived gaps and issues were surfaced and described relating to the nature of innovations and the way in which these innovations were being developed and brought into the smallholder context, as well as the political and financial ecosystems in which the innovators, smallholders and intermediary actors find themselves.

Following the completion of the discovery interview process, the collated insights were distilled into a set of sixteen distinct “Desired Outcome” statements, structured in a form suitable to support evaluation following the MSG methodology. These 16 Desired Outcome statements were further grouped into five themes (Context, Finance, Innovation Process, Innovation Offer and Go-To-Market). These statements are given in the table below.

Theme	Desired Outcome
1. Context	<ul style="list-style-type: none"> - Understanding of value chain needs - Smallholder market potential awareness - Enhance collaboration with government for favorable policy
2. Finance	<ul style="list-style-type: none"> - Providing adequate funding for pre-commercial and commercial stages for innovation - Blended finance for smallholder farmer innovation
3. Innovation Process	<ul style="list-style-type: none"> - Improving the commercial mindset of R&D organizations - Public-private partnership for smallholder farmer innovation - Co-creating to align incentives - Improving the rigor of innovation processes
4. Innovation Offer	<ul style="list-style-type: none"> - Improve extension services in innovation adoption - Delivering bundled solutions against single product launch - Improving product design and training for ease of use - Farmer aggregation for economies of scale
5. Go-To-Market	<ul style="list-style-type: none"> - Developing last mile connection with distribution channels - Involving local agri-entrepreneurs in the commercialization of smallholder innovations - Effective communication of benefits of value chain innovations

Table 2. Desired Outcome statements emerging from discovery interviews.



Theme 1. Context

Understanding of value chain needs. It was a general view of participating stakeholders that understanding of smallholders' needs is fundamental for delivering market-backed solutions to them. Equally important is understanding the requirements of other actors in the value chain, such as upstream and downstream distribution channels, regulatory agencies, and private and public business accelerators. Taking into account these diverse needs increases the likelihood of adopting innovative approaches. Directly involving actors across the value chain was considered the most effective and impactful mechanism to do this.

Smallholder market potential awareness. Collectively, smallholders are the world's largest food producer group. Thinking about innovation applied to a large group rather than many individuals is vital to improving innovation. Interviewees suggested that insufficient awareness of smallholder farmers' regional and global food market shares contributes to their unattractiveness for innovation. Improvement proposals included: (i) connecting local aggregators of agricultural products to global small and large marketing organizations, and (ii) increasing adaptations and transfer to smallholder systems of farming innovations applied in the developed world e.g., simplifying complex irrigation systems for smallholder contexts.

Enhance collaboration with government for favorable policy. Technology and innovation acceptance and uptake in smallholder markets is significantly influenced by the local policy context, including the regulatory framework and incentivisation landscape. In general, interviewees felt that greater multi-stakeholder engagement and dialogue (involving multiple tiers of government, including regulatory agencies, as well as private sector actors) is needed to create a more favorable environment for innovation adoption.



Theme 2. Finance

Providing adequate funding for pre-commercial and commercial stages for innovation.

Inadequate funding for pre-commercial and commercial campaigns was highlighted by interviewees as a major contributor to poor adoption rate. Smallholders are frequently highly capital-constrained and risk-averse; outcome-based external funding is extremely important until adoption reaches the point that a business model becomes self-sustaining and provides return on investment to the innovators and their financial backers. Yet, agricultural innovation funding often stops once academic goals are reached (i.e., proof of concept and scientific publications); scale-out events (e.g., on-farm demonstrations, field days and training) remain underfunded. Likewise, there are few visible exhibition events by start-ups for the agriculture world in developing countries because of lack of sponsorships (a rare example that shows the value of such events being the AgriTech Tunisia: there would be great potential benefit for this to be replicated in West African markets).

Blended finance for smallholder farmer innovation. One major takeaway from the interviews was the need for blended financing to secure the delivery of high-impact cost-intensive long-term projects. Blended financing, which refers to the strategic use of different types of funding from across public and private sectors, enables investors to select different risk levels while allowing multiple stakeholders to participate in a project. Furthermore, by involving participants financially as well as through technical contribution, this funding model increases their level of engagement and commitment, increasing the probability of projects being successful beyond the proof-of-concept phase.



Theme 3. Innovation Process

Improving the commercial mindset of R&D organizations. Strong calls were made by several stakeholders for closer collaboration between people with commercially-aware mindsets (e.g., a market needs team) and R&D team, and to be maintained all the way from innovation front-end to commercial launch. One respondent told us, “When a product’s commercialization potential is considered [early in the innovation process], it is very unlikely that it fails commercialization post-development.”

Public-private partnership for smallholder farmer innovation. The limited public sector resources available for smallholder innovation, and the impact this has on their access to needed solutions, was widely acknowledged in the interviews. The public-private partnership (PPP) model, whilst no-one claimed it as a guarantee of innovation success, was advocated by some respondents as helping to simultaneously address both budgetary and knowledge constraints in the value chain.

Co-creating to align incentives. Partnership and collaboration with stakeholders helps to align incentives early in the innovation process, pre-empting some potential adoption barriers. Interview participants suggested that smallholder farmers are active partners in innovation, and that learning how to engage them in this process actively is a critical outcome. For example, use of locally adapted nutrient-use-efficient crop genotypes having high-yield potential as part of a protocol designed to minimize excessive fertilizer use helps address the farmers' desire not to compromise yields.

Improving the rigor of innovation processes (e.g., Stage-Gate process). This study highlighted that innovation adoption depends on confidence in the reliability of information, insights and recommendations gained during the development process, both on technical performance and appropriateness to the target market context. Transparent and rigorous innovation process management is a critical enabler to providing this confidence, with significant room for improvement reported.



Theme 4. Innovation Offer

Improve extension services in innovation adoption. Interview participants emphasised the crucial roles of extension services, particularly as a primary source of information dissemination to farmers. Drawing attention to a rapid decline in the ratio of extension agents to farmers in developing countries, they advocated for interventions to quickly arrest and reverse this trend. Suggestions included: (i) to improve partnerships with and funding for intermediary actors addressing gaps in extension services, and (ii) to improve connection with last mile actors in target markets to improve innovation scaling and adoption rates by users.

Delivering bundled solutions against single product launch. Smallholder solution innovators who participated in the interviews strongly believe that bundling helps ensure cost-effectiveness of solutions compared to standalone products, which is especially important for small and marginal farmers. For example, simple to use grain drying equipment could be bundled with moisture and humidity sensors to help reduce postharvest losses related to storage at inappropriate moisture levels.

Improving product design and training for ease of use. For a product to enjoy public acceptance leading to mass adoption in the emerging organized smallholder market, ease of use should be among the benefits it offers, especially given the wide ranges of literacy levels among smallholder farmers. The more complex a product is, the more pushback it receives from end-users; however, this can be addressed through customer or user training & advisory services. Ease of use considerations also extend to ancillary products or services – the availability of which can often be difficult either due to limited supply chain coverage or bureaucratic hurdles.

Farmer aggregation for economies of scale. Downstream aggregation was cited by multiple respondents as potentially helping to address the fragmented nature of the smallholder market. By this, market network economies of scale can be achieved, enabling efficient smallholder innovative solution delivery. Some practical approaches could include (i) to aggregate and partner with farmers who have capacities for large-scale production; (ii) to reduce transaction and client acquisition costs by implementing cost-effective aggregation models (e.g., cooperatives) in target markets; and (iii) by partnering with government procurement institutions at local levels (e.g., connected to schools and child feeding programs, for food and nutrition security).



Theme 5. Go-To-Market

Developing last mile connection with distribution channels. Very strong expert opinions were shared on developing last-mile connections. Emphasis was laid on (i) partnering organizations with local distribution networks in target markets; (ii) selecting solutions for commercialization in collaboration with local distribution channels; and (iii) connecting with strong nodes that have proven track records in customer engagement to influence adoption. As an example, input dealers with customers, nucleus farms with their out-growers, or off-takers with their suppliers. This desired outcome was particularly emphasized in the conversation about soybean value chain.

Involving local agri-entrepreneurs in the commercialization of smallholder innovations.

Local agri-entrepreneurs were viewed as playing a critical role in the dissemination, adoption, and implementation of agricultural solutions. Acting as catalytic intermediaries for social and economic development, they create employment and contribute to poverty reduction, their engagement in agriculture businesses contributes significantly to overall food security in rural areas.

Effective communication of benefits of value chain innovations. Several respondents emphasized the need for communicating and sharing field trial and validation data, so that all actors across the smallholder innovation ecosystem share the insights arising on response levels to interventions. Specific examples included: (i) sharing impact study results; (ii) showcasing contextualised innovations via on-farm demonstrations to communicate benefits directly to target growers; (iii) partnering with extension service organizations to inform their local networks; and (iv) sharing investor-focused information, e.g., business case variables such as cost of goods sold (COGS) and return of investment (ROI).

Phase 2: Evaluation of Desired Outcome statements

The Market Satisfaction Gap scores (MSGs) for each of the desired outcome statements are presented in the following table. The scores have been aggregated by value ecosystem actor category (upstream/downstream) and the outcome statements are ordered in the table from highest to lowest upstream actor MSG score.

Desired Outcome	Market Satisfaction Gap Score (MSG%)	
	Upstream actors	Downstream actors
Blended finance	49	40
Last-mile delivery	49	32
Local agri-entrepreneurs	48	34
Commercial mindset of R&D organizations	48	31
Public and private partnership	47	36
Extension services	47	30
Stakeholder co-creation & aligned incentives	46	33
Funding for (pre)commercialization	46	35
Integrated bundled solutions	45	35
Easy of product use +/- training	44	32
Government collaboration	43	37
Communication of innovation benefits	42	33
Market potential awareness	42	34
Farmer aggregation	41	35
Understanding of value chain needs	40	31
Innovation process rigour	39	32

Table 3. Average market satisfaction gap scores for the 16 desired outcomes statements.

Observations

- Every desired outcome was scored at 30% or higher by both ecosystem actor groupings. This indicates that all issues are viewed as having sufficient perceived market value to justify investing in improvement efforts.
- The aggregated MSG scores for the 16 desired outcomes lay within a range of 10 percentage points for each ecosystem actor grouping (upstream: 39-49; downstream: 30-40).
- The MSG scores from the Upstream actors were consistently higher than the MSG scores from the downstream actors, with a difference of between 6 and 17 percentage points on each outcome statement.
- The ranking of the desired outcomes was different between the two ecosystem actor groupings; however, Blended Finance was the highest-scoring desired outcome in both cases.

To analyze the underlying drivers of these MSG scores, the MSG chart was plotted, aggregated by ecosystem actor type (Figure 3).

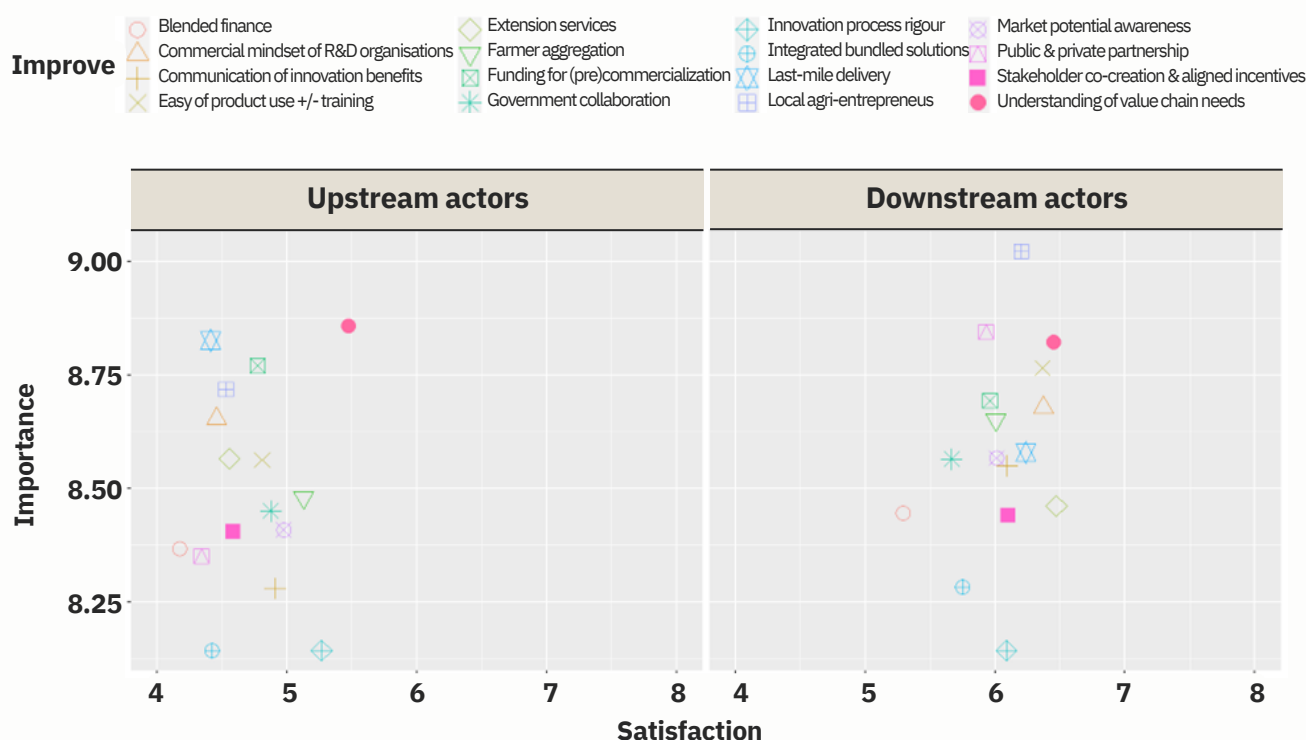


Figure 3. MSG charts for the 16 desired outcome statements disaggregated by ecosystem actors.

From this representation of the data, the observed difference between aggregated MSG scores by ecosystem actor grouping is driven almost entirely by a 1 to 1.5-point difference in the *satisfaction* score for each desired outcome, with the aggregated scores for upstream actors being more dissatisfied with the current situation than those for downstream actors.

One possible explanation for this difference in *satisfaction* scores could be that downstream actors are simply unaware of innovations that never make it to the point of implementation, whereas upstream actors see those innovations that fail at a much earlier stage. This potential awareness gap suggests a lack of interconnectivity and interaction between the actors in the two groupings.

Within this, some different perspectives can also be seen between the relative *importance* of different desired outcome statements between the two groupings, which drives the observed differences in ranking between the two groups. For example, the *importance* ascribed to **innovation process rigor** is almost identical between the two groupings, whereas **public-private partnerships** are seen as 0.5 points more important (on aggregate) by the downstream actor grouping than the upstream actor grouping.

Conclusions

This study confirmed that climate-smart innovations are not reaching smallholder farmers and that this is limiting progress towards much-needed socio-economic and ecological improvements for smallholders and the environment.

Several potential factors hindering innovations from being adopted at scale have been identified; these factors are described in this paper in terms of transformational “desired outcomes”. These cover five themes: contextual factors, the availability and form of enabling finance, the innovation offer and process, and go-to-market aspects. They are generally unified by the view that a greater degree of coordination and holistic thinking across the whole smallholder innovation ecosystem will be highly beneficial. Such an approach places particular focus on the inter-connectedness of the challenges as well as the need to deliver innovations that benefit all actors in the ecosystem, i.e., create a win-win-win solution with the practical needs of smallholder at the centre.

This holistic, inter-connected approach would be fostered by developing interactive platforms for knowledge and technology exchanges between the various actors in the smallholder innovation ecosystem. Such multi-perspective inter-connectedness is exactly what the SFSA GATE platform and the underlying innovation process were designed to address (see Appendix 2). Within SFSA’s domain of direct activity, GATE has successfully validated several innovations that have achieved good levels of adoption. Particularly important features include: an early focus on quantifying farmers’ needs and the assessment of potential impacts on other aspects of the local smallholder ecosystem; a rigorous validation of assumptions on context relevance and local testing of potential benefits during the development phase; and explicit consideration of scale-enablers including on-farm demonstration & training and involvement of last-mile actors such as Agri-entrepreneurs, Farmers Hubs, and network managers.

This White paper identifies perceived areas of improvement in smallholder innovation value chain and calls for collaboration with GATE to support effective scaling of smallholder innovation delivery.

Appendices

Appendix 1

Preference interview respondent affiliations

Upstream actors	Organization
Innovation labs	Singapore Agri-food Innovation Lab, Soybean Innovation Lab, Stecia International, World Economic Forum, and other small and independent consulting companies
Potential funders	ACIAR, The Bill & Melinda Gates Foundation, The Crawford Fund, Deutsche Gesellschaft für Internationale Zusammenarbeit, Global Environment Fund, Philanthropy Asia Alliance – Temasek, The Rockefeller Foundation, Swiss Agency for Development & Cooperation, Shell Foundation, USAID
Research & Development organizations	CGIAR (AfricaRice, Alliance Bioversity International – CIAT, CIMMYT, IITA), CABI, National Root Crops Research Institute, Nigeria, Universities of Alberta, KwaZulu-Natal, Wageningen, ETH Zurich
Technology owners/ start-ups	AfricaRica, Agriot, Arable Agri Science Pvt Ltd, Arogyam Mediasoft Solution Pvt Ltd, Enterprise Maralfalfa Bio, Farmforce, FIB-SOL Life Technologies, Intech Harness PVT Ltd, Pulsar Technologies, Renuka Bio Farms LLP

Downstream actors	Organization
Commercial	<ul style="list-style-type: none"> ◦ Multinational companies – Bayer; Cargill; John Deere; Nestlé; OCP Africa; Olam Agri; and Syngenta. ◦ SMEs – GBK Enterprise; Keringet Foods; Nabil; Nyabon; and Singi.
Commercial First Mile	Syngenta Foundation for Sustainable Agriculture Farmers’ Hubs – Bangladesh, India, Mali, Nigeria, and Senegal
Enabler	<ul style="list-style-type: none"> ◦ The Enablers segment had influence globally or within the regions of Africa and Asia. ◦ Global enablers included individual views from those working in the Swiss Tropical & Public Health Institute, the World Food Programme as well and the Syngenta Foundation for Sustainable Agriculture. ◦ An African perspective was secured from individuals from the Clinton Development Initiative, Observatoire du Développement de Selingué, and the Sasakawa Africa Association. ◦ From Asia individual insights were gained from the Agri Entrepreneur Growth Foundation, SFI, YASI, and the Sight and Life Foundation.
Farmers	As well as the individual views from farmers in Asia and Africa, farmer organizations including the Coalition of Farmers – Ghana (COFAG) and the Union Paysanne de Pont Gendarme provided survey input

Appendix 2

SFSA GATE process and comparison with innovation Desired Outcomes

SFSA GATE stage	Corresponding desired outcome	SFSA GATE program capacity and capability to provide solutions
0 – I: Definition	<ul style="list-style-type: none"> Understanding value chain needs Innovation process rigor Market potential awareness Commercial mindset of R&D organizations 	<ul style="list-style-type: none"> Farmer needs assessment survey Sourcing need-based solutions based on survey results Screening of sourced need-based solutions Selection of potentially promising solutions for context validation (and adaptations if necessary)
II: Designing	<ul style="list-style-type: none"> Innovation process rigor Stakeholder co-creation & aligned incentives Public and private partnership Government collaboration Funding (pre-) commercial innovation stage(s) Blended finance 	<ul style="list-style-type: none"> Provide background information about local conditions Define validation scope in partnership with solution providers Define validation parameters in partnership with solution providers
III: Development	<ul style="list-style-type: none"> Innovation process rigor Commercial mindset of R&D organizations 	<ul style="list-style-type: none"> Implement defined scope and parameters at local innovation validation centers. Either in the local centers of excellence with the local network of farmers or in both Data collection and project management by country field staff and project managers
IV: Precommercial	<ul style="list-style-type: none"> Last mile development Local agri-entrepreneurs Farmer aggregation 	<ul style="list-style-type: none"> Large scale solution dissemination via on-farm demonstration and training Product/ solution promotion through SFSA Farmer Hubs channels operated by local agri-entrepreneurs
V: Commercial	<ul style="list-style-type: none"> Extension services Integrated bundled solutions Communication of innovation benefits 	<ul style="list-style-type: none"> Large scale solution dissemination via on-farm demonstration and training Product/ solution promotion through SFSA Farmer Hubs channels operated by local agri-entrepreneurs

- Blue** Core GATE offers where SFSA has the capability and capacity to provide solutions through its GATE program.
- Green** Adjacent GATE offers where SFSA works with ecosystem partners to provide collaborative solutions jointly.
- Beige** Not engaged by GATE - where SFSA recognizes it does not have appropriate capabilities to provide solutions to address desired outcomes and looks for other organizations in the innovation ecosystem to address these challenges.

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**Syngenta Foundation
for Sustainable Agriculture**

Rosentalstrasse 67
4058 Basel
Switzerland

T +41 61 323 5634
syngenta.foundation@syngenta.com
www.syngentafoundation.org

