DISCOVERING THE PATHWAYS FOR INNOVATION AT SCALE

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Contents

I. Background

Vibrant Agriculture Innovation Systems (AIS) and successful pathways of innovation at scale that emerge from them are a necessity for improved nutrition, abundance and diversity of foods, (OECD 2013). At present, there is no consensus on a detailed blueprint of AIS (World Bank 2012) or innovation pathways. However, it is clear that interaction and coordination among actors from domains of research, development, business, governance, along the entire agriculture value chain is one of the key features of AIS (AgriFutures 2016), with an emphasis on scaling up innovations (FAO 2018).

In the Indian agricultural landscape, 92% of innovations for increasing productivity have been dominated by technology-led innovations (high yielding seeds, chemical fertilizers, etc.) supported by government policies, since the Green Revolution (Singh, n.d.). However, currently, technological innovations face the challenge to deliver packages that improve productivity while accounting for the environment and developmental needs (ibid). At the same time, there are meagre investments and technical support by the public and private sector for alternative agricultural practices. E.g., in 2021, the budget allocated to National Mission for Sustainable Agriculture (NMSA) - the flagship program on sustainable agriculture, is just 0.8% of the INR 1,42,000 crore budget of the Ministry of Agriculture & Farmers' Welfare. Furthermore, the green revolution-based regime has historically focused on irrigated regions, limiting investment and innovation in rainfed regions (60% of India's cultivated land).

Changing farmers' behaviour is fundamental to scaling any agriculture innovation. Findings from the report - Sustainable Agriculture in India 2021 (Gupta et al. 2021) - show that there is a dearth of transitional support to farmers as they shift from conventional practices to low-input sustainable practices (e.g. supporting the initial income loss, capacity development, etc.). At the same time, there are limited incentives from the market (e.g. significant price premiums), and limited availability of implements to reduce the labour cost of alternative agricultural practices (e.g. intercropping or natural farming). This has led to the prevalence of practices (such as indiscriminate use of pesticides) that do not necessarily improve productivity, and have severe repercussions on profitability, environmental and human health (Shetty et al. 2014; Bhardwaj and Sharma 2013; Sharma and Singhvi 2017). Only five of the sixteen Sustainable Agriculture Practices studied by Gupta et al. have scaled up beyond 5% of the net sown area and 4% of the farmers in India (Gupta et al. 2021). Moreover, the challenge of increasing natural disasters and climate events such as acute droughts and floods are negatively impacting the prospects of agriculture growth in India.

The opportunities for innovation in the Indian agriculture system lie in the middle of these challenges. With a hike in the number of actors in the agriculture space from the public, private, non-profit and research institutions, there are increasing opportunities to broker innovation networks (Saravanan Raj and Bhattacharjee 2017; Moschitz et al. 2015; World Bank 2012). A cohesively created AIS in India will improve the ability of innovation stakeholders to work together towards a shared vision of smallholders being better managers of their farming enterprises (Saravanan Raj and Bhattacharjee 2017). There is also scope for convergence of agriculture and related activities through policy design, refocusing investments and building new inter-ministerial and public-private collaborations (IFPRI n.d.).

With a thriving innovation environment, increasing consciousness among consumers, international and local pressure for suitable policies and developing technologies, the Indian agriculture landscape is ripe for sustainable and scalable innovations. There is a clear case for understanding and governing innovation pathways for SAI Innovations at scale in India.

II. Select case studies

Table 1: Selected cases

Case Study 1: DeHaat			
Case Summary	**Impact of SAI Outcomes** (productivity, social, environmental, economic)	**Stakeholders**	**Type of Innovations** (technology, business, social, institutional, policy)
Aim: Employs artificial intelligence (AI) enabled technologies to revolutionize supply chain, markets and production efficiency in the Indian agriculture sector. Scale: 200 institutional partners, 20 regional hubs, 350,000 farmers engaged with DeHaat model across India. They are engaging 35K new farmers per month and 200+ new entrepreneurs per month, at the moment. Unique Aspect: Among the first platforms to provide crop agnostic full-stack services to farmers through digital means. By partnering with industrial buyers, last-mile service providers and entrepreneurs it has created a hyper-local network of Dehaat centres to provide the services.	Economic/Productivity: Improves the farm productivity and income of farmers by providing real-time information and customised advisory services. Additional support is given for logistics. At the same time, smallholder farmers get access to more than 800	Originator: Dehaat (private entity) Collaborators: FMO Ventures Program (Dutch Development Bank), Omnivore, Agfunder, Sequoia, RTP Global, Prosus, micro entrepreneurs, and institutional buyers.	Technology: Development of an application that provides tailored notifications/advisory in local language in the form of voice calls Business: The model removes the involvement of a middle man, eliminating the exploitation of farmers. Further, the model works as a one-stop solution for farmers by providing farmers access to 3000 agricultural inputs (seeds, fertilizers and equipment).

Timeline: 2012 - Present Geographical Focus: Bihar, Uttar Pradesh, Odisha, and West Bengal (at the moment). Finance: Financially viable in the long run. Currently profitable in terms of unit economics, but not at company level because of expansion in units/activities and continued investments. Availability of Data: Annual reports of the company. The CEO of the company is willing to facilitate discussions and share relevant information that would help us capture innovation in the processes. We will have access to various nodes of the network - farmer organisations, micro-entrepreneurs, industrial buyers to triangulate findings. Stakeholder contact: ● Shashank Kumar, CEO, shashank@agrevolution.in	companies to sell their produce.	End Users: Farmers (all categories) across India with a keen focus on women.	Additionally, it also caters to the requirements of micro-entrepreneurs and institutional buyers, creating a positive feedback cycle.
Hypothesis for success: 1) Accessibility - Hyperlocal presence of Dehaat centre/entrepreneurs around the target farmers 2) Network effect: Created a digital marketplace that enabled a wide variety of offerings relevant for a wide range of farmers, buyers and service providers, attracting whom resulted in even more offerings. 3) Relationship and trust with farmers: Dehaat entrepreneurs developed a deeper relationship with farmers via multiple touch-points through-out the year. This high-quality relationship then enabled desired shifts in farmer behaviour			

Case Study 2: Trustea – The Indian Sustainability Tea Program			
Case Summary	**Impact of SAI Outcomes** (productivity, social, environmental, economic)	**Stakeholders**	**Type of Innovations** (technology, business, social, institutional, policy)
Aim: Development and driving adoption of a sustainability code and verification system tailored for the Indian tea sector. Scale: As of December 2020, Trustea has covered 65,267 smallholder tea growers and 606,781 tea workers of which 56% (i.e. over 3,37,559) are women, verified 696 million kgs of tea (approximately 56% of India's tea production) and 677 entities. Unique Aspect: A bar-raising sustainability certificate that is completely developed, owned and managed by Indian tea industry stakeholders, working through a collaborative approach. The certification cost is relatively lower than its peers to keep the focus on smallholders and small estates. Timeline: 2013-Present Geographical Focus: Tea growing regions all across India (mainly Assam, Darjeeling, Bengal, Tamilnadu, Karnataka, Kerala, Himachal Pradesh). Finance: Trustea is primarily funded by IDH, Hindustan Unilever Limited, Tata Consumer Products Limited and was later strengthened by WaghBakri Group in 2017. The Trustea revenue model is currently under transition; it will	Economic/Productivity: Improves productivity and income of tea planters through continuous training and workshops on the certification code and relevant legal policies. Social: Addresses some of the key challenges in the tea industry including working conditions and health and safety of tea workers. Trustea provides special support to women through training, skill-gap assessment, advocacy and partnership by setting up self-help groups with the financial support from the Tea Board of India, resulting in a better working environment for them (maternity benefits, quality of crèche facility for working women, etc.).	Originator: Founded and launched by Hindustan Unilever Limited (HUL), Tata Global Beverages (TGB) Limited and Tea Board of India. Collaborators: The Sustainable Trade Initiative (IDH), Ethical Tea Partnership, and other local stakeholders being a part of the project in advisory capacities. End Users: Smallholder tea growers, bought leaf factories, estates and packers.	Organizational/Governance: The model draws its innovative strength from being a multi-stakeholder initiative, involving collaborators like global companies/institutions, state-level and national level gov't agencies, research associations, end-users, etc.

now start only to rely on the fee paid by tea brands for use of Trustea logo. This new model is expected to remain financially sustainable given the large volumes of tea it certifies and its existing market hold. Availability of Data: Official impact assessment reports of Trustea, published articles and informants from different stakeholders (tea brands, tea producer associations, IDH, CSOs, Trustea secretariat) Stakeholder contact: - Vikram Singh, Regional Manager, Ethical Tea Partnership (Vikram.Singh@ethicalteapartnership.org) and member of Trustea governance council - support@trustea.org (+91 33 4073 2658) - Jagjeet Kandal, IDH, India	Environmental: The Trustea code focuses on integrating Good Agricultural Practises and other relevant practices for efficient soil management, water management, fertilizer application, pest management, responsible usage of pesticides and judicious use of plant protection formulations.		
Hypothesis for success: 1) Effective engagement with gov't that led to the gov't to co-own/endorse the initiative, 2) Pull from the market: the founding collaborators - Tata and Unilever India who together controlled 50% market share – committed to a clear roadmap towards exclusive procurement of Trustea certified tea, 3) Awareness program/campaigns by CSOs around the worrisome situation of tea sector producers and workers created the urgency in the sector for collective action, such as Trustea initiative, and 4) expanding the scope of the initiative beyond just the certification and verification to include capacity development initiatives for farmers and other value chain stakeholders towards gaining eligibility for certification			

Case Study 3: Safe Harvest			
Case Summary	**Impact on SAI Outcomes** (productivity, social, environmental, economic)	**Stakeholders**	**Type of Innovations** (technology, business, social, institutional, policy)
Aim: Safe Harvest provides consumers with premium pesticide-free farm produce at affordable prices while restoring the richness of soil by utilizing non-pesticide management via its network of small and marginal farmers across India. Scale: 1,00,000 farmers, 22 FPOs. Unique Aspect: It's a producer-driven or bottom-up innovation. Safe Harvest was created by coming together of FPOs who wanted to create a market for NPM produce. They distinguish NPM from certified organic with their unique Zero label certification while ensuring an affordable price point. NPM products stand unique in a sustainable food market dominated by organics with comparable health benefits at a much accessible price. Timeline: 2009 - Present Geographical Focus: Spread across 10 states. Finance: It is a triple bottom line company. Around 2012-2013, Safe Harvest was close to shutting down due to difficulties transitioning into a for-profit organization/mindset and information gaps regarding markets. In 2020, they generated a revenue of ₹36 crores, successfully meeting all the operating costs.	Environmental: The use of non-pesticide management (NPM) practices considerably reduces hazardous impacts on soil, ecology and health and mitigates rampant pesticide use. No synthetic pesticides, herbicides, GM seeds and artificial ripening agents and additives are used during cultivation, storage and transportation. Long-time farmers have been recorded to "graduate" to more sustainable practices like completely chemical-free/organic farming. Safe Harvest also promotes local varieties of food. Economic/Productivity: Safe Harvest reported a drastic reduction in input costs from	Originators: Safe Harvest (private entity) Collaborators: FPOs and retail chains like Big Bazaar, Grofers, Amazon, etc. End-Users: Smallholders and marginal farmers with a focus on female farmers.	Business: Safe harvest has an inventory led model that builds engagement at every level of the chain of custody. This ensures quality assurance and standards on pesticide-free practices across the supply chain. Their Zero label certification establishes a unique identity and trust for NPM produce and reduces the price premium comparative to certified organics. Furthermore, connecting with NPM network and FPOs instead of individual farmers Safe harvest has been able to achieve the scale more effectively. The market created by Safe Harvest bridges the gap

Achieving net profitability depends on scale, which seems to accelerate at the moment Availability of Data: The director, Mr. Rao, is willing to facilitate information sharing from various stakeholders, including their partner FPOs and farmers. Stakeholder Contact: Rangu Rao, Director - rangu@safeharvest.co.in info@safeharvest.co.in (080-41115464)	₹2,500 to ₹100/hectare. Their fair weighing practices, remunerative prices and village level procurements increased farmers income by 30%. Social: Safe harvest is partnering with Women on Wings and had over 2,500 female farmers connected in 2007. Through Safe Harvest and NPM Network, farmers can get credit through Nabkisan and Friends of Women's World Banking at reasonable rates. The model is inclusive and also tries to address the needs of stakeholders throughout the value chain.		between health and quality conscious consumers excluded by higher prices of certified organic foods, and NPM farmers wanting to enter the conventional market.
Hypothesis for success: 1) Choosing the right problem to solve: Safe Harvest deliberately chose non-pesticide management (NPM), instead of zero-chemical use. The assured continued productivity on yields from NPM practices at low input costs and higher incomes ensure farmer buy-in. They see NPM a the first step – a high feasibility + high impact one - towards a trajectory to zero chemical farming, directly moving to which would be a high-risk transition for farmers (thus lower adoption). 2) Safe Harvest engages with FPOs over individual farmers which increases their reach. 3) Affordability and availability of their products across platforms tap into middle-income consumer demand for healthy and quality food, allowing NPM farmers to enter more conventional markets.			

Case Study 4: Community managed Natural Farming in Andhra Pradesh (APCNF)			
Case Summary	**Impact on SAI Outcomes** (productivity, social, environmental, economic)	**Stakeholders**	**Type of Innovations** (technology, business, social, institutional, policy)
Aim: Started by Rythu Sadhikara Samstha (RySS) in Andhra Pradesh, Community managed Natural Farming seeks to create a system-wide agro-ecological transformation. The idea is to reduce the financial distress of farmers while improving soil health, increasing farm biodiversity and producing highly nutritious food. Scale: The programme has directly engaged with 500,000+ farmers in Andhra Pradesh, with an aim to reach 6 million by 2024. The programme covers 200,000+ hectares of land out of 8 million hectares of the total agricultural land. Unique Aspect: By teaching the principles of agroecology in the form of Community-led Natural Farming (CNF) to the farmer community, APCNF has found success as a knowledge-based initiative. Overall APCNF seems to be driving distributed innovation throughout the state at a large scale by making farmers the innovators. By complementing ecological science with traditional knowledge, it has enabled on-ground experiments by the community that use a mix of agroecological concepts and local context-based solutions.	Social: The programme empowers farmers to tailor their own solutions in their local contexts. The programme has improved farmer dignity by keeping them at the centre of all solutions and by making the community members knowledge bearers. By sharing agency with Community Resource Persons (champion farmers), Natural Farming Fellows (young agriculture graduates who experiment and share technical knowledge), Farmer Cooperatives and Self Help Group, the programme has also created large social and human capital in Andhra Pradesh.	Originators: State Government Collaborators: community members, Self Help Groups, farmer cooperatives, community youth, agricultural department of Andhra Pradesh Gov't, on-ground CSOs and NGOs. End Users: All categories of farmers	Social and organization innovation: Community-managed Natural Farming in Andhra Pradesh emerged out of farmers' need for alternate methods to reduce input costs and increase the health of the farm. The programme comprises farmer champions (Community Resource Persons, CRPs) to take charge and spread knowledge of natural farming among peers. These champions are also the source of innovation in natural farming as they use acquired knowledge and experience to develop localised context-based solutions. Pre-Monsoon Dry Sowing is one such innovation that has shown widespread

Timeline: 2016 - present Geographical Focus: Andhra Pradesh Finance: Mix of public and private funds. It is funded by two central schemes - the Rashtriya Krishi Vikas Yojana (RKVY) and the Paramparagat Krishi Vikas Yojana (PKVY). It also receives technical and financial support in the form of grants and loans from international banks, philanthropies and other refunding agencies. Source of data: Journal papers, articles, blogs, contact persons at RySS, researchers, donors, etc. Stakeholder contacts: ● Swati Renduchintala, Project Executive, swati.r1@gmail.com ● Divya Veluguri, Researcher, divyaveluguri@gmail.com ● Anwar Shaik, Azim Premji Foundation, Shaik.Anwar@azimpremjifoundation.org	Economic: Farmers engaged in Natural Farming spend negligible amounts of money on inputs as most inputs come from the farm itself (fertiliser from cow urine and cow dung, mulch from trees, etc). Reduction in cost of input has reportedly increased the net income of natural farming practitioners and higher savings. Environmental: CNF uses traditional farming with other agro-ecological techniques such as farmyard manure, vermicompost, NADEP compost, dung from buffaloes, and use of bioinoculants. Farms that practise natural farming report better soil health (high fertility, increased moisture retention, germination of more seeds, increased organic content), crop health (healthy crops even in water scarcity, resilience against pests), and biodiversity (above and below the surface).		success. Other on-ground innovators include Natural Farming Fellows. These are young agriculture graduates who showcase natural farming experiments and provide technical assistance to farmers. On the management side, Self Help Group and Farmer Cooperatives are responsible for aspects such as market linkages, financial assistance, programme management. The innovation in how ownership is shared with community members has made the programme resilient even through the COVID 19 pandemic.

Hypothesis for success: 1) Affordable, accessible and timely solution: The programme was launched in Andhra Pradesh when farmers' economic distress was at a height. Natural farming techniques make use of only farm-based inputs which reduces cost of external inputs for farmers. 2) Flexibility of solution and co-creativity: Farmers accept the solution as they have the flexibility to tailor diverse natural farming techniques, according to their local context, with appropriate transitional support and hand-holding from the state government. By making farmers the centre of the solution, the adoption of localised and innovative natural farming techniques stays in the hands of the community.			

Case Study 5: Krishi Vigyan Kendra Baramati			
Case Summary	**Impact on SAI Outcomes** (productivity, social, environmental, economic)	**Stakeholders**	**Type of Innovations** (technology, business, social, institutional, policy)
Aim: KVKs are a key mechanism for extension services in India. KVK Baramati, located in Pune, focuses on technology assessment and refinement, knowledge dissemination and provides critical input support for the farmers by effectively tapping into existing gov't schemes and infrastructure for maximized impact. Furthermore, it aims to increase incomes, productivity and efficiency within agriculture and allied sectors, while promoting sustainable practices. Scale: 112,775 farmers benefitted Unique Aspect: KVK Baramati has won awards for its innovativeness and effectiveness in implementing the extension program. They host kisan melas (farmer fairs) and other gatherings which attract high footfall, building a community of farmers not just in Baramati but also around India. Their collaborations with partners like the Dutch Ministry for their Centre of Excellence and Agricultural Development trust etc. add to their unique impact. While the government's overall KVK program has seen mixed success, studying KVK Baramati in this comparative context should reveal success	Economic: Increase in farmer income by improving market access, quality of information available and experiential training via melas and demonstration sites. Training programs for school dropouts and unemployed rural youth in agricultural activities. They've set up 7 FPOs in Pune which facilitate linkage with export agencies and provide farmers with more consistent returns Environment: Through their Center for Excellence of vegetables they promote more sustainable practices like organic farming, drip irrigation etc. and making the relevant technology available to their farmers. They've reported increased water quality and	Originators: Central Government and a local partner Collaborators: State agricultural universities, central agricultural universities, Dutch Agricultural Ministry, Indian Agricultural Ministry, Agricultural Development Trust, COE for vegetables, non-governmental organizations, ICAR research institutes, state governments, and the private sector End-users: All farmers, including urban and suburban farmers	Institutional: KVK Baramati has effectively converged with other public extension services such as the Soil Health Card scheme, ATMA, All India Radio among others. They have also built effective collaborations that allow them to build impact across various aspects of rural agriculture. Technology: Their educational and communication technology is innovative in that it deeply goes into demonstrative and experiential learning models, which are also participatory, strengthening the scope of gaps bridged. KVK Baramati is also a front runner in technological implementation.

factors of innovative and effective implementation of the government's extension program. Timeline: 1992-Present Geographical Focus: Direct focus Pune district; spill-over impact much beyond the district Finance: Government-funded via Indian Council on Agricultural Research (ICAR). Also receives contributions through other entities like NABARD Availability of Data: Sufficient published literature available on the overall KVK program (for comparative context). blogs, informants at the KVK Baramati Center. Leadership KVK Baramati has agreed to share resources and to connect us with key stakeholders Emails: jhadhav_9616@yahoo.co.in kvkbmt@yahoo.com	successfully implemented the Soil Health card scheme. Social: The KVK Baramati has actively promoted the convergence of different actors in the agriculture and allied fields through its mela and community groups. They enable farmers clubs and support the inception of women Self-help groups and FPOs such that farmers can build key support communities and organize themselves. Through interventions on enabling technological access, they support increased learning and opportunities for farmers, especially smallholder farmers who may have otherwise been unable to access such resources.		Social: Their participatory approach effectively engages with its end users.
Hypothesis for success: 1) Resource building, and effectively tapping into existing innovations, infrastructure and government schemes 2) Entrepreneurship of target farmers has resulted in a positive feedback loop of growth. 3) capacity building and technological implementation in a way that fit local contexts 4) Effective collaboration with complementary organizations			

III. Case Study Analysis

1. Analytical Framework

The analytical goal is to capture key take-aways from each of the above cases that have created transformative and sustainable change, at scale. The research will aim to understand the innovation process and strategy, characteristics of innovation, role of enabling environment, and how timely moves by specific stakeholders made the case successful. The overall analytical approach consists of analysis of the Theory of Change (ToC). Beyond the explanation below to the Theory of Change, a suggested list of questions to be employed in every case study has been included.

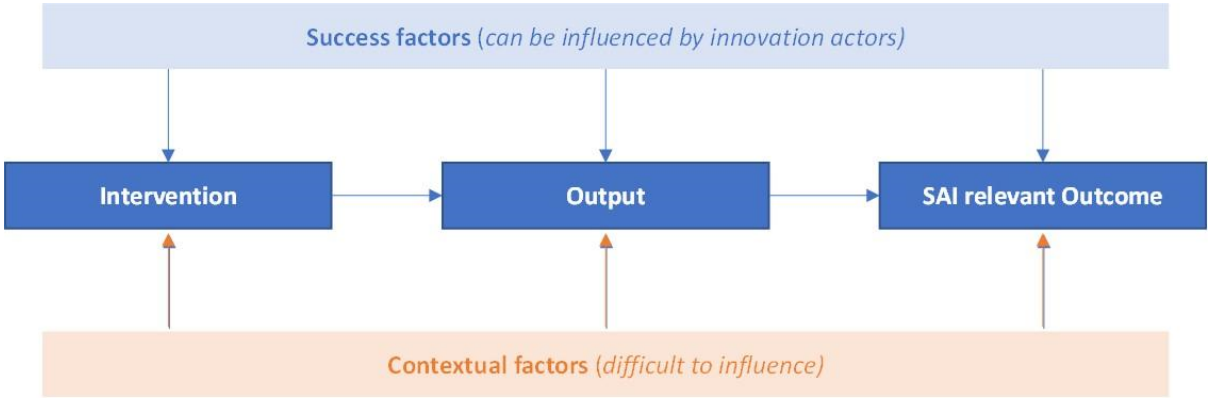

Figure 1: A leaner version of the results-chain (dark blue blocks) and its interactions with other factors

The following are the key features of the suggested methodology:

- Sources of investigation for the ToC: available literature on the selected cases and detailed interviews with key informants (from multiple stakeholders to enable triangulation, if possible).
- Investigations will capture:
    - Outputs and outcomes that the selected interventions resulted in and the measurable KPIs for them
    - Success/risk factors that enabled/disabled the above-identified outputs/outcomes
    - Contextual factors that influenced the changes along the ToC chains

  Where possible, we will seek and assess the evidence of proper implementation of key activities, changes affected at different levels of ToC, and contribution of contextual/external factors in driving change along with ToC chains. We will identify wherever evidence gaps remain.

The following questions will guide the research and analysis:

When

1. Construct a timeline of key events.

Where and who (target)

1. What was the geographic scope? How did this change over time?
2. How did the geographic location/scope affect the way the innovation package developed?
3. Did demand exist in advance, or was it developed? (How?)
4. Who were the intended users of the innovations? Was there any disaggregation of users (e.g. by farming system/type, wealth, ethnicity, gender, age).
5. Were end users involved in the innovation process? What kind of steps were undertaken to tailor the innovation to them? How and when in the innovation process (if at all)?

Who (involved)

1. List key players, characteristics and their roles through time.
2. Who initiated the innovation process, and what was their motivation?
3. What partners were brought in, why and how?
4. What were the complementing capacities? Were there any capacity gaps in the overall partnership?
5. If different phases of the innovation were led by different groups, how did handover take place?

How

1. How were intended users involved in the process? If so, through what mechanisms?
2. How were trade-offs addressed? (a) between innovation objectives (e.g. social vs environmental) and (b) between interests of different actors.
3. What funding mechanisms were used?

What: Outcomes and explanations

1. What role did changes in policy, tech, regulation, social institutions, financing play? Did that supported success?
2. Which of these changes were influenced by the stakeholders of the innovation actively?
3. What evidence is there on outcomes at scale ? Effects on different SAI objectives? (Environmental, social, human, productivity, profitability)
4. What were the costs and benefits? *to the partnership stakeholders* (if any data exists)
5. Who were the winners and losers from innovation? What happened to different groups? Any compensation or mitigation measures – who provided and how? Any spinoffs or unexpected benefits?

Lessons:

1. Key success factors**?** How were they enabled/addressed? What challenges remain untackled?
2. What factors helped or hindered involvement and uptake by different users/groups?
3. How were problems addressed? What lessons can be learned for others?
4. Are there characteristics of innovation pathways that are likely to be more useful for specific types of innovations or users?
5. What needs to be done to upscale the innovation (further)?

2. Hypotheses: Potential success factors that may be in action

The following is a list of potential success factors that will be used to develop the initial hypotheses and thus direct the investigation:

1. **Relevance of the Challenge or Problem addressed**
    a. The need and urgency of the problem
    b. Is the issue relatable or needed
    c. Is it timely
    d. Was there a pre-existing demand by end-users
2. **Nature of Solution**
    a. Does the solution effectively address the problem
    b. How did they generate buy in in the short term and the long term
    c. Did it center the end users and were they involved in the design process
3. **Collaboration**
    a. Were there key collaborations or partnerships that supported its success
    b. what did these look like and how was it innovative
    c. Did they include stakeholders and/or end users from the start
4. **Sustainability**
    a. Is this financially sustainable and how
    b. What factors ensure the adaptability of the intervention, its outcomes and its success
5. **Enabling environment**
    a. Were their institutional, systemic etc. factors that speak to its ability to produce, deliver, implement or scale the innovation
    b. Were there supportive changes
    c. How were these identified and achieved as part of the innovation and scaling process

6. **Scaling strategy**
    a. Choice of impact / scaling pathways and approaches
    b. Was it public, private, NGO, or some form of mixed pathway like PPP and how did this facilitate or constrain successful sustainable scaling ? How was the scale reached?
        i. Through a social enterprise that grew?
        ii. A large scale donor or publicly funded project or program?
        iii. grafting the innovation onto public or private systems?
        iv. some form of multi-stakeholder collaboration or network?
        v. some mix of these things? Did it evolve or change over time or as scale was achieved.

7. **Organizational / Program Structures**

    a. Did specific internal decisions or human centered design approaches enable innovation and its success?

    b. Within the parameters of the overall pathway and approach. Issues to consider might include:

        i. Evidence generation and proof of concept
        ii. Marketing and/or advocacy

iii. Coalition building
iv. Aligning with the incentives and motivations of various actors,
v. Mobilizing human, organizational, financial and other resources at scale they knew how to reach

8. Leaders and Drivers

a. Were there any champions: community ownership, government ownership, or specific organizations and individuals

b. Who were they and what were their characteristics in terms of leadership, organizational skills and capabilities, organizational mission and motivation

9. Agency

a. Did the end-users have agency throughout the process

Annexure I: Case studies not included in the final list

Sno.	Case Study	Component of SAI	Stakeholders	Key innovation (Tech, Business, Social)	Web Sources
1	The International Maize and Wheat Improvement Center (CIMMYT) & Syngenta Foundation for Sustainable Agriculture Scale: 753 farmers Timeline: 2012-13	Economic - Improved the income of smallholder farmers. Environmental - Hybrid variety is climate resilient and uses less water for irrigation compared to the traditional seeds.	Originator: Public-Private Partnership | Funded by Syngenta Foundation and research & development carried by CIMMYT Collaborator: CIMMYT Target Group: Smallholders farmer in Central India (Madhya Pradesh, Rajasthan, Gujarat and tribal areas under these states)	Technical: Development of a hybrid variety of corn seeds through innovation & testing. This includes, marker discovery (genome-wide association studies); trait adiscovery (understanding root structure and function-lysimetrics); marker applications (genomic selection); drought phenotyping facilities (rhizotronics, rain-out shelters; managed drought stress screening locations); germplasm development.	https://www.cimmyt.org/news/international-experts-discuss-progress-and-challenges-of-maize-research-and-development-in-asia/ https://www.cimmyt.org/projects/affordable-accessible-asian-aaa-drought-tolerant-maize-project/ https://www.scienceopen.com/document_file/610b05d5-f75c-42c6-a7fb-d056baa5019a/PubMedCentral/610b05d5-f75c-42c6-a7fb-d056baa5019a.pdf
2	Systems of Rice Intesification (SRI) Scale: N/A Timeline: Technique developed in 1980s	Environmental - Focusses on less usage of water, seeds and chemical inputs. Economic - Aided in achieving food sufficiency and securing livelihood of rice farmers. Social - The success of SRI is	Originator: public sector Target Group: Rice Farmers, special focus on marginal and small farmers.	Technical: SRI is a low-cost technology-intensive solution and a mix of scientifically proven methods, indigenous knowledge and better management of soil, water, plant and nutrients.	https://journals.sagepub.com/doi/10.1177/0976399619900615 https://www.manage.gov.in/publications/extnnext/June2017.pdf (Page 18)

		a result of the collaboration of governments, private sectors, civil societies and farmers with knowledge being transferred from one institution to another institution.			https://www.sri-india.net/html/aboutsri.html https://www.tatatrusts.org/our-work/livelihood/agriculture-practices/system-rice-intensification-initiative
3	Krishi Vigyan Kendra (KVKs) Scale: 643 districts of India Timeline: 1974 (establishment of first KVK in Puducherry)	Social and economic (location specific farmer fields for increasing production, productivity and net farm income on a sustained basis)	Originator: government Collaborator: Indian Council of Agricultural Research, Central and State Governments Target Group: Farmers all across India	Policy: Established to bridge the gap of farmers and their usage of science and technology in agricultural practices	https://agritech.tnau.ac.in/kvk/kvk_intro.html https://www.researchgate.net/publication/292970757_Governance_a_missing_piece_in_KVK_Reforms http://www.kvkcrijaf.org.in/evolution_of_the_kvk%20.html https://kvk.icar.gov.in/ https://www.niti.gov.in/niti/writereaddata/files/document_publication/NITIBlog27_YogeshSuri.pdf
4	Participatory Guarantee Systems (Organic Certifications) Scale: 753,319 registered in PGS Timeline: 2006 - Development of PGS India, 2011- PGSOC was	Economic- Provides farmers an affordable and collaborative mechanism for getting their organic produce certified/verified thus making it reliable for the consumers.	Originator: FAO, United Nations Collaborator: FAO, National Centre of Organic Farming and NGOs Target Group: Organic farmers all across India	Established to provide the farmers with an affordable mechanism for getting their organic produce verified and reduce their dependence on third-party certification systems.	https://leisaindia.org/participatory-guarantee-systems-making-organic-certification-more-accessible-for-small-scale-farmers/ http://www.fao.org/3/I8288EN/i8288en.pdf https://www.pgsindia-ncof.gov.in/pdf_file/PGS-India%20Operational%20Manual.pdf https://hal.archives-ouvertes.fr/hal-01350829/document (chapter 7)

	established by a coalition of NGOs.				
5	Upscaling Micro-irrigation Technology in Maharashtra, NETAFIM Scale: 2009 (community projects): 350 famers; 20 sugar mills; Awareness generation: 47-50K farmers per year in Maharashtra Timeline: 1986	Environmental - save water up to 35 to 40 %, saves labour, electricity and fertilizer cost. Economic - increase in the production, helps to produce better quality of fruits, vegetables and other crops, reduces pests and disease incidence, saves labour cost.	Originator: private company Collaborator: Central and State Government Target Group: Farmers in Maharashtra	Technical: Micro-irrigation reduces cost of cultivation, weed problems, soil erosion and increases water use efficiency as well as power use efficiency, besides performing as an useful device in reducing the over-exploitation of groundwater. PMKSY aims at providing end-to-end solutions in the irrigation supply chain, viz. water sources, and distribution network and farm level applications. Pattern of assistance payable to the beneficiary under the Micro-irrigation scheme is 55 % for small and marginal farmers and 45% for other farmers.	https://wrd.maharashtra.gov.in/site/upload/pdf/Water%20conservation%20and%20saving%20in%20agriculture%20low%20res.pdf?MenuID=1379 https://wrd.maharashtra.gov.in/site/upload/pdf/Water%20conservation%20and%20saving%20in%20agriculture%20low%20res.pdf?MenuID=1379 (pg 190)
6	Tomato Procurement, HUL Scale: 2012-13(PPP): 579 farmers 2012-15: 3000 farmers	Economic - offers farmers with the knowledge and expertise in sustainable agriculture practices for tomato cultivation to increase their yields with a buy-back guarantee. Environmental - this	Originator: Private sector Collaborator: State Governments & Private organizations (Varun Agro, Syngenta, Bayer) Target Group: Small	Business operations: HUL is one of the world's largest buyers of processed tomatoes, using an estimated 3% of global production volume. Given the scale of their footprint, sustainable agricultural sourcing is a strategic priority for their business and brands and therefore this program	https://www.kissan.in/our-story.html https://www.slideshare.net/Oxfamgb/india-tomatoes-vca-power-point

	2015-19: 8000 farmers; became self-sustaining Timeline: 2012 (A PPP between HUL and the Government of Maharashtra)	program is a part of HUL's sustainable living plan, aimed at sourcing all its agricultural raw materials by 2020.	farmers with a special focus on women.		
7	FARM - North East phase II (CARITAS India) Scale: 2013-2016: 7 districts (1 per state): 189 villages, 18372 Families, 10,4,284 people 2016-19: 15 districts, 200 villages Timeline: Sep 2016 - Oct 2019	Environmental - adopted traditional farming practices which are more sustainable and more efficient to meet the food and nutrition security needs. Economic - Increase in income of farmers (productivity & quality of produce increased)	Originator: multi stakeholder cooperation (CSOs, international organisations) Collaborator: NGOs (15) Target Group: Marginal & indigenous farmers	Community: collective action by farmers for promotion of socio-economic and self-governance development; Shift towards traditional farming techniques and usage of traditional seeds for establishing food sovereignty.	https://www.caritasindia.org/facilitating-agriculture-regeneration-farm-in-north-east-india-farm-north-east// https://www.caritasindia.org/farm-northeast-recognising-the-invisible-farmers/ https://www.caritasindia.org/farm-northeast-ii-will-focus-on-reviving-traditional-socio-economic-governance-and-health-systems/

8	IFAD-NUS Minor Millets Promotion, Biodiversity International (+ MS Swaminathan research foundation in India) Scale: Multiple sub-projects in various locations: Phase 1: 35 villages; 22-33% yield gain; 2.8 times higher net return; 630+ trainings (21,000 millet accessions) Timeline: 2000 - 2011	Economic - significant achievements made on yield enhancement together with better cost-benefit ratio and increased income generation through value addition of grain and linking these products to the market. Environmental -	Originator: Multi Stakeholder cooperation (International Fund for Agricultural Development, Bioversity International) Collaborator: M.S.Swaminathan Research Foundation; public universities Target Group: Small and marginal farmers (special focus on women)	This project facilitated the institutionalization of on-farm conservation with the establishment of village seed banks and promoting quality seed production and seed sharing among farmers. The project has been successful in generating considerable awareness among farmers and other consumers on the nutritional importance of these grains, while it had addressed policy makers on the importance of these grains in regional and national food and nutritional security.	http://www.nuscommunity.org/research/projects/ifad-nus-iii-iv/
9	Sustainable Sourcing Program for Spices, Sustainable Agriculture Network – Nestlé Scale: N/A Timeline: 2018	Economic - Responsible Sourcing intends to support improvements in livelihoods of farming communities by tackling challenges like farm productivity, malnutrition and child labour. Environmental - improvements in human and environmental health:	Originator: Private sector Collaborator: SAN (international network of NGOs focused on helping companies, producers and donors to move forward with their sustainability agenda), Olam, Synthite, AVT McCormick and Paras Spices	Business operations: The Spices Responsible Sourcing Program is designed to focus on delivering impact for People, Planet, and the Business by co-construction with Nestle partners on the ground to deliver positive impacts on people, planet and Business.	https://www.sustainableagriculture.eco/san-nestle-partnership-v2 https://static1.squarespace.com/static/59d44f074c0dbfb29da45615/t/5ee2942980579345b6df0e79/1591907370669/Two-pager_Spices-Sustainable-sourcing-program.pdf

		ensure good yields without the usage of pesticides	Target Group: Spice farmers, families and communities		
10	Integrated Farming Systems (Odisha) Scale: 2000 + farmers Timeline: 2016 - present	enhancing production, income and household level food security & reducing climate risks will be the focus.	Originator: network of CSOs, researchers (WASSAN and RRAN) Collaborator: state government Target Group: small and marginal farmers	Institutional: In order to come up with the best IFS practices, the innovators have built a network of advisories and implementing partners from diverse geographies and multiple disciplines of agriculture and related activities. The broad advisory range ensures that due attention is paid to all four areas, livestock, aquaculture, agriculture and agroindustry under IFS.	http://integratedfarming.in/
11	Digital Green Scale: 15,200 villages across India - over 1.8 million farmers, aims to reach 7 million more farmers within the next five years.	Enviromental - Focus on teaching farmers sustainable methods of farming. Economic - Noted to increase farm productivity and farmers' income. Social - focus on farmers teaching farmers in their native language, community building.	Originator: private sector Collaborator: Ministry of Rural Development, National Rural Livelihoods Mission (NRLM) and its state-level counterparts, NGOs (Mann Deshi Foundation Farm)	Business: This innovative model works on connecting all the relevant stakeholders, digitally through the following actions: (a) participatory identification of priority content, (b) local production of low-cost videos designed to promote uptake of priority practices, (c) group discussion using the videos as a basis for mediated instruction, (d) follow-ups to drive adoption of the	https://www.digitalgreen.org/innovation/ https://www.idinsight.org/project/supporting-digital-green-bringing-tech-enabled-solutions-to-agricultural-extension/ https://www.digitalgreen.org/india/ https://www.digitalgreen.org/wp-content/uploads/2017/08/Digital-Green-Factsheet-06.22.20.pdf

	Timeline: 2008 - present		Target Group: smallholder farmers (90% women)	promoted practices, and (e) data collection to engage farmers in an iterative cycle of learning. To generate revenue, Digital Green takes a commission on the transactions that happen on their marketplace app.	
12	Edible Routes Scale: 5000 - people attended workshops, over 500 kitchen gardens have been set up. Timeline: 2014 - present	Environmental - focus on making consumers aware of organic pesticide free food and its production. Social - Bringing change in terms of dependency on pesticide food and developing self-reliance.	Originator: private sector Target Group: Consumers in urban areas	Business: The model focuses on designing home kitchen gardens, farm management, restoration of degraded land, water harvesting, and workshops, helping people grow organic food in miniature farms and by providing them with natural and organic gardening inputs/produce. It is novel because of the holistic services that the business is providing to popularize the self-grown organic food concept in India.	https://www.tatasechallenge.org/resource/edible-routes-offers-integrated-set-services-urban-gardeners/ https://www.theconstantrevolution.com/connecting-people-with-food-through-edible-routes/

13	Agra Entrepreneur project, Syngenta Foundation India Scale: A total of 2666 entrepreneurs connected with approximately 220,000 farmers. Timeline: 2014 – Present	Economic/Productivity: No effective data available. Social: The program is a hard-hitting initiative in terms of educating the rural youth and making them self-sufficient	Originator: Syngenta Foundation India Collaborators: Public sector, private players, international agencies and NGOs End Users: Small and marginal farmers	Social: The project specifically targets rural youth for making them agricultural entrepreneurs through a rigorous training procedure which effectively leads to the empowerment of a whole agricultural community. Even after the completion of their training, the program aids them with capacity building, development of SOPs, and partnerships with agribusinesses. Further, the project ensures that its working model is free from corruption and unscrupulous practice, by putting into place a stringent set of policies for their agricultural entrepreneurs.	https://www.syngentafoundation.org/agriservices/whatwedo/ae https://www.syngentafoundation.org/agriservices/whatwedo/digitalsolutions/agri-entrepreneurplatform

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