

# How should we scale agricultural practices?

## Inputs to the development of an assessment framework to compare scaling mechanisms

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## Executive Summary

**Problem Statement:** There are multiple ways in which development programs may elect to interact with and influence communities towards a specific outcome. To date, there has been no structured approach to evaluating which way will provide the best outcomes (noting that this will not just encompass the number of end-users influenced or resource benefits, but how cost effective, sustainable, or inclusive such a way is).

**Our Objective:** The purpose of this report is to explore the literature body and use this to inform and create a structured approach to assess different ways to interact and influence agricultural communities towards particular outcomes.

**Our Approach:** To do this we undertook a multistage literature review to synthesize key aspects of existing studies and frameworks that could be integrated into a future scaling assessment tool.

**Key Findings:** The majority of the literature was centered on technology assessment rather than the actual scaling mechanisms themselves, despite the fact that "scaling" was included as a keyword throughout the search process. While there is literature on the implementation and evaluation of scaling options, there no formal structure or framework that enables comparison of alternative scaling strategies in an ex-ante or ex-post manner was found. Most literature evaluates an option in isolation (i.e., not in comparison) and no literature was found that compares different organisations who could implement an activity.

**Conclusions:** Given the findings of this literature review, a void exists in the formal comparative assessment of various scaling options, a void in which this literature review will be used to build a tool to compare and monitor the implementation of alternative scaling mechanisms, based on various criteria synthesized from existing literature and otherwise. This addresses a key gap in the establishment and implementation of interventions that aim to influence agricultural communities.

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# 1. Overview

At the heart of this investigation is understanding how to catalyze change in agricultural communities. To do this, we frame our investigation of a ‘scaling mechanism’ within the below definition:

“ An **activity** undertaken by an **entity** to encourage a **change** by **end users** ”

Where:

- Activity** means an investment of resource(s)
- Entity** means a stakeholder or collaboration of stakeholders
- Change** means difference from the current status quo
- End users** means agricultural producers (though may be applied more broadly in future uses of this tool)

The purpose of this document is to establish from existing literature and create outside of this literature a way to compare different scaling mechanisms. We need to do this because there are many ways in which we can interact with communities that will likely have multiple components to their associated outcomes. That is, there are often many activities and entities that could be implemented to influence a community (Figure 1).

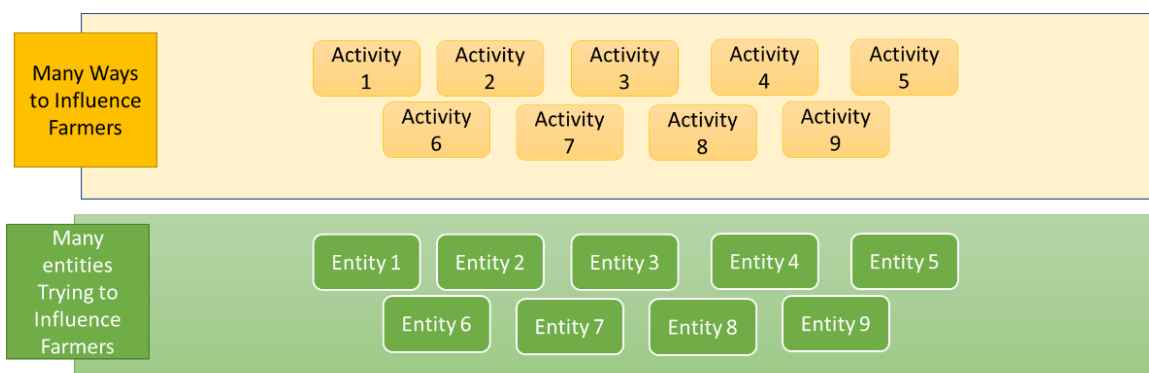


Figure 1: There are many possible entities and activities that could be used to interact with communities, yet no easy way to compare which option(s) have the highest potential for success.

## Research Question

The question this work aims to address is:

*How can we evaluate which combinations of activities and entities will give the best outcome?*

This can be phrased as a hypothesis:

$H_1$  = That {x} is the highest potential scaling mechanism to achieve the objectives of an intervention program

$H_0$  = That {x} is not the highest potential scaling mechanism to achieve the objectives of an intervention program

*Where {x} is a potential scaling mechanism*

## Framework development

To address this question, we propose to create a framework to compare different combinations of activities and entities, and how that would change the status of different community typologies in terms of multiple outcomes (Figure 2). The envisaged tool would compare the likely outcomes for various farmer subpopulations if a particular practice was promoted via different activities and entities.

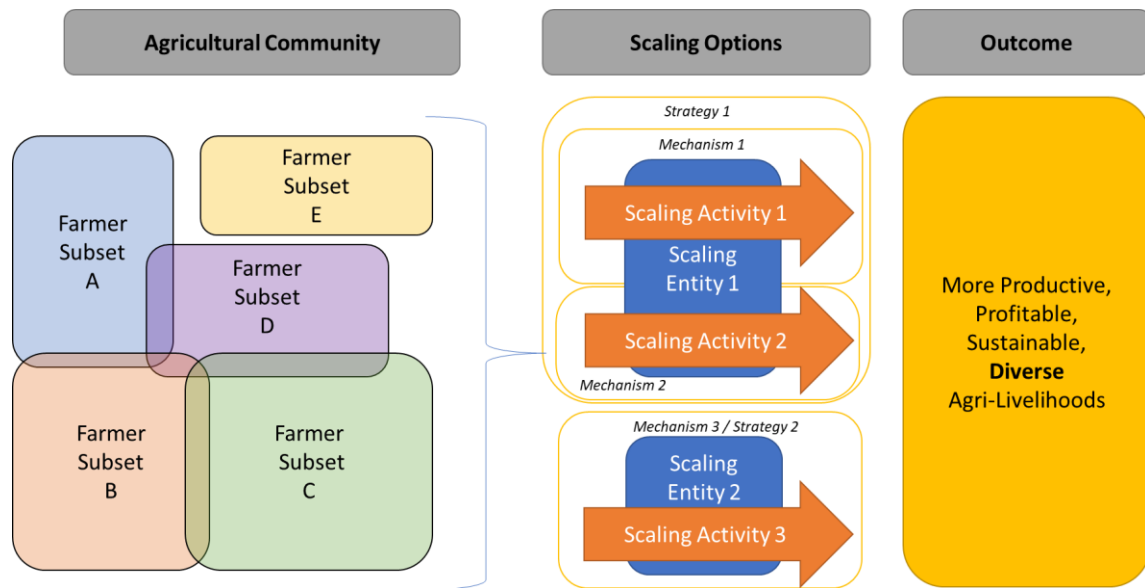
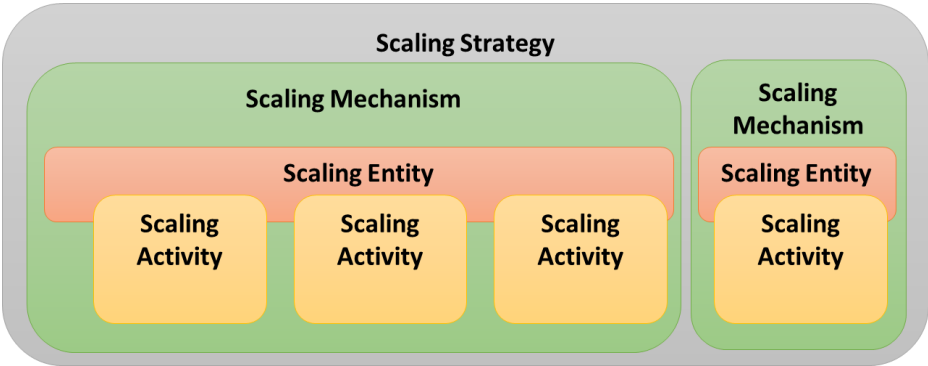


Figure 2: The proposed tool will help evaluate how different scaling options are likely to interact with various subpopulations to create various outcomes.

For clarity, the following nomenclature is applied though this document (Figure 3).



Where:

- Activity** means an investment of resource(s)
- Entity** means a stakeholder or collaboration of stakeholders
- Mechanism** means a combination of one or more activities by an entity
- Strategy** means a combination of one or more mechanisms

Figure 3: Standardized nomenclature for document and proposed tool

## 2. Literature Review

A literature review was undertaken in multiple stages. An initial wide literature review was undertaken to capture a diverse scope of literature, based primarily on abstract analysis (section 2.1). This was then prioritized down and further explored as part of a second, more in depth analysis of full articles (section 2.2) and supplemented with an additional assessment of aligned frameworks that assessed similar themes (section 2.3).

### 2.1 Initial Scan of literature

This initial literature scan was conducted via Google Scholar using a key word search based on keyword and location combinations (Table 1). For each result, abstracts were reviewed. The paper was then classified as either relevant and added to an excel database, or irrelevant based on the below criteria:

- Paper was primarily based on grey literature; or
- Paper has insufficient detail to assess contribution to the scaling evaluation literature; or
- Paper covered topics unrelated to agriculture (e.g., early childhood interventions); or
- Paper did not contain specific reference to a scaling mechanism explored.

Table 1: search inputs used for initial scan of literature

Search Input {keyword} + {location}	
<b>Keyword</b>	"Scaling mechanism", "Project scaling", "Interventions", "agriculture technology adoption", "Project evaluations", "Project Interventions" "Livelihood Scaling mechanism"
<b>Location</b>	"Latin America", "South America", "Central America", "Sub Saharan Africa", "Africa", "Nepal", "India", "Pakistan", "Bangladesh"

A total of 176 titles of the articles were scanned out of which 108 abstracts were reviewed and added to the literature database. Within this, 49 studies were Global in nature either or focused on either Africa, Latin America, or Other Asian countries while 59 studies were focused in South Asia.

## 2.2 Literature Review and Classification

In this section of the literature review, the whole article was reviewed. A template that covered pertinent information from each article was developed. This included: Author, Year, Geographic Focus, Data Used, Scaling Interventions, Technology Investigated, Metric of Measurement, Relationship/ logic between intervention and result, and Implication for framework development. Based on the learnings of the literature scan, additional keywords were also applied to increase the specificity of the literature review (Table 2). An additional 29 articles were added that focused on agriculture extension specific articles.

*Table 2: Additional keywords used for the second phase of the literature review*

Search Input {keyword} + {location}	Additional Keywords (frameworks)	Additional Keywords (Extension)
<b>Keyword</b>	“Homestead Gardens” “ICT” “Innovation Platforms” “End-user Field Schools” “Subsidy” “Capacity Development” “Cash Transfer” “Agricultural Diversification”, “End-user interventions”	“Agriculture extension services” “Lead End-user Approach” “ICT” “End-user to End-user Extension” “Demand based Extension Services”
<b>Location</b>	“Latin America”, “South America”, “Central America”, “Sub Saharan Africa”, “Africa”, “Nepal”, “India”, “Pakistan”, “Bangladesh”	“Nepal”, “India”, “Pakistan”, “Bangladesh”

Across the six categories, more emphasis was placed on understanding the learning and implications of primary assessments, while technological specific and technology metric papers were less emphasized and assessed.

A total of 120 articles were reviewed was classified into one of six categories as below. These form the structure of the below reporting.

1. Assessment of scaling mechanism (using non-technological metrics);
2. Assessment of extension system;
3. Theoretical assessment of scaling (elements);
4. Review papers of scaling literature;
5. Assessment of scaling mechanism (using technological metrics); or
6. Specific investigation of technological performance.



### 2.2.1 Assessments of scaling mechanism performance (using metrics of the mechanism)

#### Summary

- A total of 20 articles were found that directly evaluated scaling mechanism performance with metrics that were not technology specific.
- 14 of these were single country studies, while 5 were regional evaluations (where 3 were Africa specific, 2 were specific to Latin America).
  - 11 studies were identified that were conducted only in South Asia.
- Activity only – no entity comparisons

#### Data Types

- 16 Studies: Quantitative Survey data to evaluate impact of the activities and were cross-sectional studies (Abman & Carney, 2020; Santos et al., 2014), with one study that used panel data (Apanga et al., 2020)
- 5 studies applied various qualitative approach such as FGD's (Singh et al., 2016; Tomlinson & Rhiney, 2018), Case Studies (Azad FRCPCH et al., 2010), and a combination of KII's, FGDs and semi structured interviews (Tomlinson & Rhiney, 2018) to triangulate the findings.
- Only one study applied an ethnographic study and FGD (Wilson et al., 2014) to examine livelihood initiatives.

#### Focus of Investigations

- Studies focused on a variety of scaling mechanisms including subsidies (Abman & Carney, 2020), input distribution (Ogunniyi et al., 2017), credit, training (Tripathi, 2017), conditional cash transfers (Raghunathan et al., 2017), insurance (Subedi & Kattel, 2021), end-user field days/schools (Emerick & Dar, 2020) etc.

#### Potential Questions for integration in the scaling framework:

- Is adequate knowledge able to be transferred via the activity?
- How inclusive is end-user selection?
- Does the entity have a mechanism to provide continued interaction with end-users?
- Is the targeted activity sufficiently supplemented to enable change among end-users?
- Does the activity promote low financial investment and short-term positive cash flow?
- Does the activity provide opportunities for women to engage and join leadership positions?

#### Other considerations for the scaling framework:

- The metrics of measurement included changed livestock ownership, income sources, information sources, loan savings, and land ownership, visit from local resource person, meeting attendance, participation in off farm activities etc.
- Involvement in social networks influences individual's adaptive behavior (Yasmin & Grundmann, 2019).
- Engagement with local community/religious leaders to influence community (Azad FRCPCH et al., 2010)

## List of studies included in this category

Title	Year	Authors	Journal
Effect of scaling up women's groups on birth outcomes in three rural districts in Bangladesh: a cluster-randomised controlled trial	2010	Azad et al.	Lancet
Evaluation and promotion of resource conservation technologies in low land rice-wheat ecosystem	2010	Tripathi	Agronomy Journal of Nepal
Contextual influences on the sustainability of prospective livelihood diversification initiatives in farm villages in the Karnataka semiarid dryland region of India	2014	Wilson et al.	Development Studies Research
Upscaling of agroforestry homestead gardens for economic and livelihood security in mid-tropical plain zone of India	2015	Singh et al.	Agroforest Systems
Can government-allocated land contribute to food security? Intra-household analysis of West Bengal's microplot allocation program	2015	Santos et al.	World Development
The impact of the homestead food garden programme on food security in South Africa	2015	Tesfamariam et al.	Food Security
Scaling Up a Water, Sanitation, and Hygiene Program in Rural Bangladesh: The Role of Program Implementation	2017	Benjamin-Chung et al.	American Journal of Public Health
Scaling Up Agricultural Innovation for Inclusive Livelihood and Productivity Outcomes in Sub-Saharan Africa: The Case of Nigeria	2017	Ogunniyi et al.	African Development Review
Can Conditional Cash Transfers Improve the Uptake of Nutrition Interventions and Household Food Security? Evidence from Odisha's Mamata scheme	2017	Raghunathan et al.	PLoS ONE
Assessing food insecurity in Latin America and the Caribbean using FAO's Food Insecurity Experience Scale	2017	Smith et al.	Food Policy
Assessing the role of farmer field schools in promoting pro-adaptive Behaviour towards climate change among Jamaican farmers	2017	Tomlinson & Rhiney	Journal of Environmental Studies and Sciences
Business models of SMEs as a mechanism for scaling climate smart technologies: The case of Punjab, India	2018	Groot et al.	Journal of Cleaner Production
The evolution of agricultural input subsidy programs: contextualizing policy debates in Malawi's FISP	2018	Nkhoma	World Development Perspectives
Adoption and diffusion of renewable energy – The case of biogas as alternative fuel for cooking in Pakistan	2019	Yasmin and Grundmann	Renewable and Sustainable Energy Reviews
Assessing the Impact and Equity of an Integrated Rural Sanitation Approach: A Longitudinal Evaluation in 11 Sub-Saharan Africa and Asian Countries	2020	Apanga et al.	International Journal of Environmental Research and Public Health
Agricultural productivity and deforestation: Evidence from input subsidies and ethnic favoritism in Malawi	2020	Abman and Carney	Journal of Environmental Economics and Management
Scaling up but losing out? Water commons' dilemmas between transnational movements and grassroots struggles in Latin America	2020	Dupuits et al.	Ecological Economics
Farmer Field Days and Demonstrator Selection for Increasing Technology Adoption	2020	Emerick and Dar	Review of Economics and Statistics
Farmers' perception and determinants of dairy cattle insurance in Nepal	2021	Subedi and Kattel	Cogent Food and Agriculture
Leading issues in implementation of farmer field schools: a global survey	2021	Van den Berg et al.	Journal of Agricultural Education and Extension

## 2.2.2 Evaluating Agriculture Extension Systems

### Summary

- A total of 29 articles were found that explored how current extension services are assessed.
- 22 of these were single country studies, while 4 were global studies and 2 were regional evaluations (focused on Latin America)
- 21 studies were identified that focused on South Asia.

### Data Types

- 12 studies used secondary sources such as review of literature, project documents and policies;
- 9 studies applied primarily quantitative methods to assess the impact of various extension systems and were cross sectional studies;
- 8 studies used qualitative methods such as FGD, KIIs, semi structured interviews

### Focus of Investigations

- Studies focused on a variety of extension and advisory services including traditional government services (Singh & Burman, 2019; Suvedi et al., 2017), Research-Education-Extension (R-E-E) Linkage (Jaishi et al., 2020), End-users Field School Approach (Dhital, 2017), End-user-to-End-user Extension (Fisher et al., 2018), Training and Visit Model (Anderson & Feder, 2004)

### Potential Questions for integration in the scaling framework:

- Does the activity allow for a two-way flow of information between end-users and entity?
- Is knowledge disseminated using interactive methods?
- Does the entity engage with both men and women end-users?
- Are entities providing information that is practically relevant to end-users?
- Does the entity have adequate human resources for information dissemination?
- Are there established communication channels to seek information/clarification?
- Selection criteria for lead end-users?
- Use of ICT tools to access information?
- Are the entities able to provide feedback based on field experiences?
- Are there any collaborations between government agencies or stakeholders and entities to provide information to end users?
- Is the service delivery mechanism used by entities accessible by targeted end-users?

### Other considerations for the scaling framework:

- The framework should ensure regular visits, maintain communication via phone and apply appropriate audio/video materials to educate end-users (Kumaran et al., 2012).
- End-users' choice of entity influenced by presence of buyback guarantee (Kumaran et al., 2012)
- Identification of current social networks to understand the level of interactions among key actors and end-users (Mittal et al., 2018b)

## List of studies included in this category

Title	Year	Authors	Journal
Farmers' Access to Agricultural Information in Nigeria	2003	Ekoja	Bulletin of the American Society for Information Science and Technology
Agricultural Extension: Good Intentions and Hard Realities	2004	Anderson	The World Bank Research Observer
Agricultural Extension Services in Bangladesh: A Review Study	2008	Uddin	Bulletin of Institute of Vocational and Technical Education
Accessing, sharing and communicating agricultural information for development: Emerging trends and issues	2009	Ballantyne	Information Development
Challenges for Improving Service Delivery of Union Parishad (UP)	2010	Aminuzzaman	Local Government Division, Bangladesh
Review of Agricultural Extension in India Are Farmers' Information Needs Being Met?	2010	Glendenning et al.	IFPRI Discussion Paper
Extension Approach for an Effective Fisheries and Aquaculture Extension Service in India	2012	Kumaran et al.	Journal of Agricultural Education and Extension
Gender-Sensitive Approaches to Extension Programme Design	2013	Jafry and Sulaiman	Journal of Agricultural Education and Extension
Extension in India by Public Sector Institutions: An Overview	2013	Singh et al.	MPRA Paper
Government Run vs. University Managed Agricultural Extension: A Review of Nepal, India and the United States	2014	Ghimire	Asian Journal of Agricultural Extension, Economics & Sociology
Extension Service and Farm Productivity in Nepalese Agriculture	2016	Adhikari and Nepal	Himalayan Research Papers
Framework to Assess Performance and Impact of Pluralistic Agricultural Extension Systems the Best-fit Framework Revisited	2016	Faure et al.	IFPRI Discussion Paper
Agricultural Extension in Nepal: Experiences and Issues	2017	Dhital et al.	Journal of Advances in Agriculture
Women Participation in Agricultural Extension Services in Bangladesh: Current Status, Prospects and Challenges	2017	Rashid et al.	Bangladesh Journal of Extension Education
Farmers' participation in extension programs and technology adoption in rural Nepal: a logistic regression analysis	2017	Suvedi et al.	Journal of Agricultural Education and Extension
Awareness and adoption of conservation agriculture in Malawi: what difference can farmer-to-farmer extension make?	2018	Fisher et al.	International Journal of Agricultural Sustainability
Agricultural information and knowledge network in rural India: a case of Bihar	2018	Mittal et al.	Journal of Agricultural Education and Extension
Small businesses, potentially large impacts: The role of fertilizer traders as agricultural extension agents in Bangladesh	2018	Mottaleb et al.	Journal of Agribusiness in Developing and Emerging Economies
Reforms in agricultural extension service system in Bangladesh	2019	Afrad et al.	Agricultural Extension Reforms in South Asia
Can women's self-help groups improve access to information, decision-making, and agricultural practices? The Indian case	2019	Raghunathan et al.	Agricultural Economics
Agricultural extension reforms and institutional innovations for inclusive outreach in India	2019	Singh and Burman	Agricultural Extension Reforms in South Asia
The use and abuse of the 'model farmer' approach in agricultural extension in Ethiopia	2020	Hailemichael and Haug	Journal of Agricultural Education and Extension
Strengthening Research-Education-Extension (R-E-E) Linkage in New Context of Federal Structured Nepal	2020	Jaishi et al.	Responsible Education, Learning and Teaching in Emerging Economies
Identifying factors affecting the acceptance of government-to-government system in developing nations – empirical evidence from Nepal	2020	Rai et al.	ResearchGate
Demand-led extension: a gender analysis of attendance and key crops	2020	Williams and Taron	The Journal of Agricultural Education and Extension
Women's access to agriculture extension amidst COVID-19: Insights from Gujarat, India and Dang, Nepal	2021	Alvi et al.	Agricultural Systems
Agricultural Information Need of Smallholder Farmers in Chitwan District, Nepal	2021	Mishra and Bhatta	Journal of Applied Sciences and Biotechnology
Taking a snapshot of Extension and Advisory Systems performance and outcomes: insights on a semi-quantitative evaluation approach	2022	Blockeel et al.	The Journal of Agricultural Education and Extension
Rice Subsector Development and Farmer Efficiency in Nepal: Implications for Further Transformation and Food Security	2022	Choudhary et al.	Frontiers in Sustainable Food Systems

### 2.2.3 Theoretical Scaling Studies

#### Summary

- A total of 18 articles were found that examined existing tools and frameworks developed to assess various scaling activities
- 3 of these were single country studies, while 5 were regional evaluations (focused on Africa and Latin America) and 9 were global studies,
- 4 studies were identified that were conducted in South Asia.
- Note that 5 of the 31 are more deeply reviewed in section 2.3

#### Data Types

- 12 studies used secondary (literature review) data (Zamboni et al., 2019), within which 2 studies also supplemented with expert consultations and one study supplemented with KII and FGD (Pandey et al., 2020)
- 2 studies applied quantitative methods such as household surveys (Iiyama et al., 2008) and one study applied ex-ante prediction (Llewellyn & Brown, 2020a)
- 2 studies used qualitative methods such as case studies (Notenbaert et al., 2017b).

#### Focus of Investigations

- Studies focused on developing frameworks to assess activities in public health (Indig et al., 2017; Zamboni et al., 2019), innovation platforms (Brown et al., 2022), Sustainable Land Management (Thomas et al., 2018b), and Climate Smart Village Approach (Aggarwal et al., 2018).

#### Potential Questions for integration in the scaling framework:

- Does the framework incorporate questions regarding human and financial resources required?
- Does it incorporate the local context setting to identify limitations to change?
- Are the social and information networks mapped and identified?
- Does it identify resource prerequisites necessary for change?

#### Other considerations for the scaling framework:

- Ensure framework do not only assess outcomes related to activities.
- Framework should take local, political, environmental context when assessing the activities used by the entity to promote activities

## List of studies included in this category

Title	Year	Authors	Journal
Livelihood Diversification Strategies, Incomes And Soil Management Strategies: A Case Study from Kerio Valley, Kenya	2008	Iiyama et al	Journal of International Development
Scaling Up of Breastfeeding Promotion Programs in Low- and Middle-Income Countries: the "Breastfeeding Gear" Model	2012	Perez-Escamilla et al	PubMed
A framework for scaling up health interventions: lessons from large-scale improvement initiatives in Africa	2015	Barker et al	Implementation Science
Targeting, out-scaling and prioritizing climate-smart interventions in agricultural systems: Lessons from applying a generic framework to the livestock sector in sub-Saharan Africa	2015	Notenbaert et al	Agricultural Systems
Scaling-up natural resource management: insights from research in Latin America	2015	Simon & Currie-Alder	Development in Practice
"Scaling-out" evidence-based interventions to new populations or new health care delivery systems	2017	Aarons et al	Implementation Science
Pathways for scaling up public health interventions	2017	Indig et al	BMC Public Health
The climate-smart village approach: Framework of an integrative strategy for scaling up adaptation options in agriculture	2018	Aggarwal et al	Ecology and Society
Scaling up inclusive approaches for marginalized and vulnerable people	2018	Carter et al	K4D Emerging Issues Report. Brighton, UK: Institute of Development Studies.
A framework for Scaling Sustainable Land Management options	2018	Thomas et al	Land Degradation and Development
Predicting Adoption of Innovations by Farmers: What is Different in Smallholder Agriculture?	2019	Llewellyn et al.	Applied Economic Perspectives and Policy
Assessing scalability of an intervention: why, how and who?	2019	Zamboni et al	Health Policy and Planning
A scoping review of feed interventions and livelihoods of small-scale livestock keepers	2020	Baltenweck et al	Nature Plants
Scaling agricultural mechanization services in smallholder farming systems: Case studies from sub-Saharan Africa, South Asia, and Latin America	2020	Loon et al	Agricultural Systems
Why Technologies Often Fail to Scale: Policy and Market Failures behind Limited Scaling of Alternate Wetting and Drying in Rice in Bangladesh	2020	Pandey et al	MDPI - Water
Application of innovation platforms to catalyze adoption of conservation agriculture practices in South Asia	2021	Brown et al	International Journal of Agricultural Sustainability
Unraveling heterogeneity of consumers' food choice: Implications for nutrition interventions in eastern India	2021	Custodio et al	Global Food Security
Food security in high mountain regions: agricultural production and the impact of food subsidies in Ladakh, Northern India	2011	Dame and Nüsser	Food Security

## 2.2.4 Review Studies

### Summary

- A total of 22 articles were found that discuss common approaches to scaling using concepts and provides recommendations drawing from their own reviews
- 5 of these were single country studies, while 12 were regional evaluations (focused in Africa, Latin America and Asia) and 4 were global evaluations
- 4 studies were identified that were conducted in South Asia.

### Data Types

- 22 studies used secondary data to conduct systematic review (Bakker et al., 2021; Molina-Maturano et al., 2020b; Ruel & Alderman, 2013) and case studies (Delgado-Serrano et al., 2017; Quisumbing et al., 2015)

### Focus of Investigations

- Studies focused on activities such as: Crop Insurance (Kaur et al., 2021), Forecast-based Early Action cash transfer (Tanner et al., 2019), Innovation Platforms (Bailie et al., 2020b), Conditional cash transfers (Ruel & Alderman, 2013), and Farmer Field Schools (Bakker et al., 2021; van den Berg et al., 2021)

### Potential Questions for integration in the scaling framework:

- Did the end-users participate in curriculum development?
- Was the number of training days adequate for the promoted activity?
- Was there a prescreening to ensure targeted end-users have skills and resources to adopt activity?
- Were the cash transfers made in time to provide end-users to devise strategies?

### Other considerations for the scaling framework:

- Need to pilot the framework prior to implementation
- Establish linkages of promoted technology with larger policy objectives
- Ensure two-way communication to share M&E learnings to adapt to curriculum
- Selection of entities critical to ensure expertise in promoted technology

## List of studies included in this category

Title	Year	Authors	Journal
Nutrition-sensitive interventions and programmes: How can they help to accelerate progress in improving maternal and child nutrition?	2013	Ruel et al.	The Lancet
Gender, assets, and market-oriented agriculture: learning from high-value crop and livestock projects in Africa and Asia	2015	Quisumbing et al.	Agriculture and Human Values
Systemic perspectives on scaling agricultural innovations. A review	2016	Wigboldus et al.	Agronomy for Sustainable Development
Strengthening scaling up through learning from implementation: Comparing experiences from Afghanistan, Bangladesh and Uganda	2017	Bennett et al.	Health Research Policy and Systems
Community-based management of environmental challenges in Latin America and the Caribbean	2017	Delgado-Serrano et al.	Ecology and Society
Nutrition-sensitive agriculture interventions in mountain areas-Lessons learned from a 5-country project to upscale best practices	2018	Bernet et al.	Mountain Research and Development
Agricultural innovation and inclusive value-chain development: a review	2018	Devaux et al.	Journal of Agribusiness in Developing and Emerging Economies
Scaling and institutionalization within agricultural innovation systems: the case of cocoa farmer field schools in Cameroon	2018	Muilerman et al.	International Journal of Agricultural Sustainability
Strategies For Scaling agricultural Technologies in Africa	2018	Tunde et al.	Forum for Agricultural Research in Africa
Scaling up agricultural interventions: Case studies of climate-smart agriculture	2018	Westermann et al.	Agricultural Systems
Scaling up sustainability in commodity agriculture: Transferability of governance mechanisms across the coffee and cattle sectors in Brazil	2019	Hajjar et al.	Journal of Cleaner Production
Effective scaling of climate smart agriculture innovations in African smallholder agriculture: A review of approaches, policy and institutional strategy needs	2019	Makate	Environmental Science and Policy
Constraint-based innovations in agriculture and sustainable development: A scoping review	2019	Molina-Maturano et al.	Journal of Cleaner Production
Land restoration in Latin America and the Caribbean: An overview of recent, ongoing and planned restoration initiatives and their potential for climate change mitigation	2019	Romijn et al.	Forests
Scaling up innovations in smallholder agriculture: Lessons from the Canadian international food security research fund	2019	Shilomboleni et al.	Agricultural Systems
Scaling up early action Lessons, challenges and future potential in Bangladesh	2019	Tanner et al.	ODI
Using developmental evaluation to enhance continuous reflection, learning and adaptation of an innovation platform in Australian Indigenous primary healthcare	2020	Bailie et al.	Health Research Policy and Systems
Scaling agricultural mechanization services in smallholder farming systems: Case studies from sub-Saharan Africa, South Asia, and Latin America	2020	Van Loon et al.	Agricultural Systems
Science of Scaling: Understanding and guiding the scaling of innovation for societal outcomes	2020	Schut et al.	Agricultural Systems
To what extent is the diversity of Farmer Field Schools reflected in their assessment? A literature review	2021	Bakker et al.	Journal of Agricultural Education and Extension
Spatial diversification as a mechanism to adapt to environmental changes in small-scale fisheries	2021	Gonzalez-Mon et al.	Environmental Science and Policy
Crop insurance policies in India: An empirical analysis of pradhan mantri fasal bima yojana	2021	Kaur et al.	Risks



### 2.2.5 Mechanism-Technology Measures

#### Summary

- A total of 19 articles were found that assessed scaling activities but largely linked the outcomes to the promoted technology
- 10 of these were single country studies, while 6 were regional evaluations (focused on Africa and Latin America), and 3 were global studies
- 5 studies were identified that were conducted in South Asia.

#### Data Types

- 10 studies used quantitative methods using household surveys (Sah et al., 2018) within which 2 studies supplemented with qualitative methods such as FGDs and in-depth interviews (Birdi & Shah, 2015; Joshi et al., 2019)
- 2 studies applied qualitative methods such as interviews (Totin et al., 2020)
- 7 studies used grey literature to develop case studies (Macqueen et al., 2020; Siwach & Paul, 2021; Taye, 2013).

#### Focus of Investigations

- Studies mainly focused on agricultural extension programs (Taye, 2013), SHGs (Dwivedi et al., 2015), CSA practices (Mazhar et al., 2021), home gardens (Talukder et al., 2010) and training and subsidy programs (Joshi et al., 2019)

#### Potential Questions for integration in the scaling framework:

- Does the activity provide opportunities for women to take any leadership positions?
- Did the entities establish partnership with relevant government entities?
- Did the activity lead to increased control of income for end users esp. women?

#### Other considerations for the scaling framework:

- Capacity building is a key to scale out technologies for ensuring end-users have required knowledge to change
- Establish linkages with existing government entities to influence policy changes

## List of studies included in this category

Title	Year	Authors	Journal
Emerging ICTs and Their Potential in Revitalizing Small-Scale Agriculture in Africa	2008	Munyua et al	Agricultural Information Worldwide
Access, adoption, and diffusion: understanding the long-term impacts of improved vegetable and fish technologies in Bangladesh	2011	Kuman and Quisumbing	Journal of Development Effectiveness
Up-scaling potential impacts on water flows from agricultural water interventions: opportunities and trade-offs in the Osman Sagar catchment, Musi sub-basin, India	2012	Garg et al	Hydrological Processes
Evaluating the impact of agricultural extension programmes in sub-Saharan Africa: Challenges and prospects	2013	Taye et al	African Evaluation Journal
Socio-Economic Impacts of JEEViKA: A Large-Scale Self-Help Group Project in Bihar, India	2014	Upamanyu Datta	World Development
Implementing Perennial Kitchen Garden Model to Improve Diet Diversity in Melghat, India	2015	Birdi and Shah	Global Journal of Health Science
Empowering Rural Households through Financial Literacy Case Study of spectacular initiatives by PRADAN	2015	Dwivedi et al	Asian Journal of Multidisciplinary Studies
Market Meets Community: Institutional Logics as Strategic Resources for Development Work	2016	Venkataraman et al	SAGE Journals
Can agroforestry systems thrive in the drylands? Characteristics of successful agroforestry systems in the arid and semi-arid regions of Latin America	2017	Krishnamurthy et. al	Agroforest Syst
Diversity amongst farm households and achievements from multi-stakeholder innovation platform approach: lessons from Balaka Malawi	2017	Makate et al	Agriculture & Food Security
An analysis of wastewater irrigation practices and its impacts on the livelihood generation and food chain contamination in Faisalabad District, Pakistan	2018	Akhtar et al	ISABB Journal of Health and Environmental Sciences
The climate-smart village approach: Framework of an integrative strategy for scaling up adaptation options in agriculture	2018	Pramod Aggarwal	Ecology And Society
Empowerment of Rural Women through Fishery Based Self Help Groups in Chhattisgarh	2018	Sah et al.	Journal of Community Mobilization and Sustainable Development
Does involvement of local community ensure sustained energy access? A critical review of a solar PV technology intervention in rural India	2019	Joshi et al	World Development
Innovations towards prosperity emerging in locally controlled forest business models and prospects for scaling up	2020	Duncan Macqueen	World Development
Fostering Sustainable Agriculture: Do Institutional Factors Impact the Adoption of Multiple Climate-Smart Agricultural Practices among New Entry Organic Farmers in Pakistan?	2020	Mazhar et al	Journal of Cleaner Production
Scaling practices within agricultural innovation platforms: Between pushing and pulling	2020	Totin et al	Agricultural Systems
Scaling agricultural mechanization services in smallholder farming systems: Case studies from sub-Saharan Africa, South Asia, and Latin America	2020	Van Loon	Agricultural Systems
Economies of Scale of Large-Scale International Development Interventions: Evidence from Self- Help Groups in India	2021	Siwach et al	World Development

## 2.2.6 Technology Specific

### Summary

- A total of 13 articles were found that were directly linked to the performance of promoted technology instead of evaluating the scaling activity
- 1 of these was a single country study, while 4 were regional evaluations (mostly focused on Africa and Latin America) and 8 were global evaluations
- 2 studies were identified that were conducted in South Asia.

### Data Types

- 6 studies used quantitative data (household surveys) (Mellon Bedi et al., 2021; Talukder et al., 2010), one study supplemented household surveys with qualitative data using Focus Group Discussions and observations (Rybak et al., 2018).
- 6 studies used grey literature (project reports) (Berti et al., 2004; Mwangi & Kariuki, 2015).
- 1 study used case study method (Westermann et al., 2018)

### Focus of Investigations

Studies mostly focused on scaling activities such as such as long-term trainings (Murshed-E-Jahan & Pemsil, 2011), demonstrations (Mellon Bedi et al., 2021), credit support (Allison & Ellis, 2001) and subsidies (Mottaleb & Krupnik, 2018) were examined in these studies for various technologies (e.g., homestead gardening, climate smart agriculture, microfinance etc.) but the outcomes were attributed directly to the promoted technology

### Potential Questions for integration in the scaling framework:

- Do the metrics of measurement assess only the outcomes of the technology?
- Does the entity consider assessing the mechanism used for promoting the activity?

### Other considerations for the scaling framework:

- Ensure the promoted activity fit within the targeted end-users' constraints, opportunities and investment strategies

## List of studies included in this category

Title	Year	Authors	Journal
The livelihoods approach and management of small-scale fisheries	2001	Allison et al	Marine Policy
A review of the effectiveness of agriculture interventions in improving nutrition outcomes	2004	Berti et al	Public Health Nutrition
Homestead food production model contributes to improved household food security and nutrition status of young children and women in poor populations	2010	Talukder et al	Field Actions Science Reports The journal of field actions
The impact of integrated aquaculture-agriculture on small-scale farm sustainability and farmers' livelihoods: Experience from Bangladesh	2011	Murshed-E-Jahan and PemsI	Agricultural Systems
Research, development and scaling-up the adoption of fodder shrub innovations in East Africa	2011	Wambugu et al	International Journal of Agricultural Sustainability
Home gardens: a promising approach to enhance household food security and wellbeing	2013	Galhena et al	Agriculture & Food Security
Innovation in scaling up access to water and sanitation services in Kenya	2015	Mwangi et al	Water and Sanitation Program: REPORT
Perception and adoption of a new agricultural technology: Evidence from a developing country	2018	Khondoker A. Mottaleb	Technology in Society
Status and scope of kitchen gardening of green leafy vegetables in rural Tanzania: implications for nutrition interventions	2018	Rybak et al	Food Security
Scaling up agricultural interventions: Case studies of climate-smart agriculture	2018	Westermann et al	Agricultural Systems
Scaling up zero-deforestation initiatives through public-private partnerships: A look inside post-conflict Colombia	2020	Paul Furumo	Global Environmental Change
Scaling-up agricultural technologies: who should be targeted?	2021	Bedi et al	European Review of Agricultural Economics

## 2.3 Framework Assessment

- An initial review of the scaling mechanisms literature revealed that scaling frameworks were comparatively rare. Nine scaling frameworks from secondary literature and previous project documents were thoroughly reviewed.
- Although secondary literature and case studies highlight a significant impact on the end users, the assessment process and framework reveal concerns regarding the interventions' sustainability and transformative power (van Loon et al., 2020).
- A framework aids in the improvement of the impact pathway analysis required to anticipate impactful and need-based interventions for end-users directly involved in the project as well as those who are not (Faure et al., 2016).
- It is therefore necessary to develop a framework that will be used to evaluate potential scaling mechanisms in each location at the beginning of the project. This framework will then be improved upon and changed as the project progresses.

### 2.3.1 “A framework for Scaling Sustainable Land Management options” (Thomas et al., 2018a)

#### Full Citation:

Thomas, Richard & Reed, Mark & Clifton, Kathryn & Appadurai, Nambi & Mills, Anthony & Zucca, Claudio & Kodsí, Elie & Sircely, Jason & Haddad, Fida & von Hagen, Craig & Mapedza, Everisto & Woldearegay, Kifle & Kumar, Shalander & Bellon, Mauricio & Le, Quang Bao & Mabikke, Samuel & Alexander, Sasha & Leu, Stefan & Schlingloff, Stefan & Roberto, Quiroz. (2018). A framework for Scaling Sustainable Land Management options. *Land Degradation & Development*. 29. 10.1002/ldr.3080.

#### Framework Background:

- Originates in the UNCCD's First Scientific Conference and other significant multi-institutional projects that provide decision-making tools and guidelines.
- This framework incorporates the learnings from International Fund for Agricultural Development (IFAD) scaling up framework, Management Systems International (MSI) framework and a framework by World Resources Institute (WRI) that focuses on a pragmatic approach to forest and landscape restoration.

#### Assessment:

- Primary focus on review of scaling processes/ qualities of innovation
  - Does not focus on attributes of scaling mechanisms
- Lists several restrictions and adoption barriers of innovations that benefit environment, as well as certain success characteristics,
  - Lists out key barriers as lack of awareness and technical options for specific need, inadequate human and financial resources, lack of political will to address problems of marginal areas.
  - Lists out key drivers for successful scaling as attested interventions, integration into other existing programs; iterative planning and funding availability, stakeholder engagement, enabling policy environment and incentives for adopters
- Explains the range of factors that influence the adoption of innovations,
  - External, contextual factors include demographic (e.g., age and gender), sociocultural (e.g., prevailing norms), economic (e.g., incentives or disincentives), political and institutional (e.g., infrastructure to enable the adoption of SLM) factors; and
  - Internal, individual factors, such as attitudes, values, and beliefs about the environment, personal capabilities (e.g., knowledge and skills, disabilities), resources (e.g., time and money).

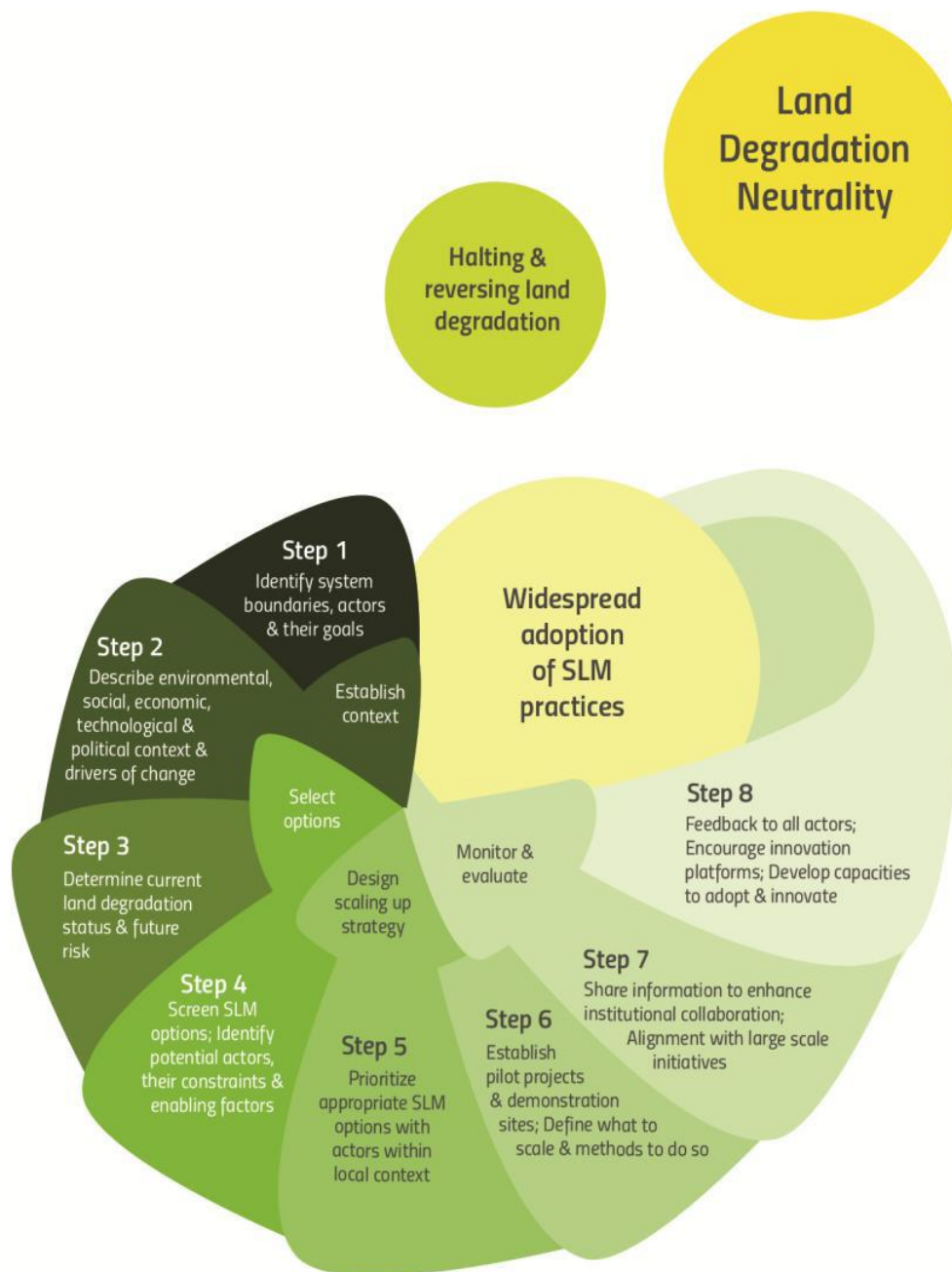
#### Relevant components/questions for framework integration:

- Does the entity have suitable capacity (manpower, logistics, infrastructure, technical skills etc.) to implement scaling activities?
- Does the entity have suitable funding to implement scaling activities?
- Does the entity's political, social, financial goals align with interests of marginal end users.
- Are feedback mechanisms for continual improvement present?
- Are processes inclusive of diverse experiences and opinions?

- Does the entity have the ability to identify potential adopters and integrate assumptions on how they could be targeted?
- Does the entity have developed scaling strategy with an effective monitoring and evaluation system in place?

## Framework

Framework is applied with key stakeholders.



### 2.3.2 “The Best-fit Framework” (Faure et al., 2016)

#### **Full Citation:**

Faure, G., Davis, K., Ragasa, C., Franzel, S., & Babu, S. (2016). Framework to Assess Performance and Impact of Pluralistic Agricultural Extension Systems: The Best-fit Framework Revisited. IFPRI Discussion Paper 01567. <https://doi.org/10.13140/RG.2.2.10224.05129>

#### **Framework Background:**

- It examines techniques for evaluating complex pluralistic Extension and Advisory Services (EAS) systems and discusses the IFPRI "best-fit" approach.
- It explores causal links between the traits of EAS, their organizational effectiveness, their result (a change in attitude at the level of farm households), and their impact on development.
- Stresses that the two unique methods implemented in developing nations for knowledge transmission are the Training and Visit System approach and the End-user Field School approach.

#### **Assessment:**

- Focuses more on assessing the organizational performance and its overall impact rather than a particular mechanism,
  - impact and performance assessment are mostly technology focused.
- Assesses the capacity of potential service providers
- Lists methods to understand the contextual factors
- Provides a set of recommendations for policy makers and practitioners to improve the system,
  - workshops at subnational, national and international workshops with key actors and policy makers,
  - continuous system of monitoring EAS in place.

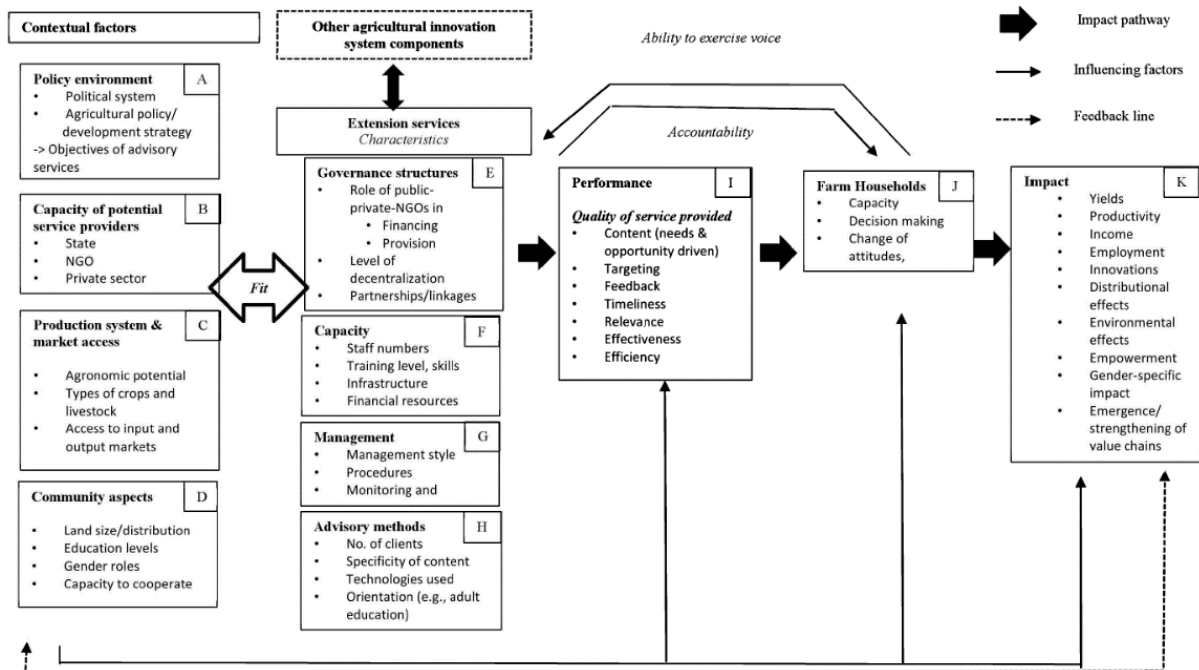
#### **Relevant components/questions for framework integration:**

- Are national agricultural policies in place that currently supports the interventions?
- Is the activity demand driven/ meets the needs of the end-users?
- Are information networks available in the community and their external context and the relationships understood?
- Is there a source of funding for capacity building?
- Does the entity have the infrastructure and the resources, such as financial and human, that it can mobilize?
- Does the entity provide an enabling environment for professional growth of the service providers?
- Is there any mechanism for sharing knowledge with end-users and strengthening their skills?
- Does the entity have continuous system of monitoring?



## Framework

Boxes A, B, C, and D depict the contextual factors influencing EAS characteristics. Box A/C- these are more technology focused than mechanism. D- suitability across subpopulation and E- applicability. Boxes F, G, and H- Focuses on the attributes of service provider. I, J, and K- Links EAS characteristics to performance and impact.



Source: Birner et al. (2006).

Notes: NGO = nongovernmental organization.

### 2.3.3 “Network map analysis” (Mittal et al., 2018a)

#### **Full Citation:**

Mittal, S., Padmaja, S. S., & Ajay, A. (2018). Agricultural information and knowledge network in rural India: a case of Bihar. *Journal of Agricultural Education and Extension*, 24(5), 393–418. <https://doi.org/10.1080/1389224X.2018.1491871>

#### **Framework Background:**

- This framework is used as a tool in a case study approach to show the connections between the major players and stakeholders in the end-user information network.
- Attempts to map Social Knowledge Networks (SKN) and use centrality analysis to identify the key actors.

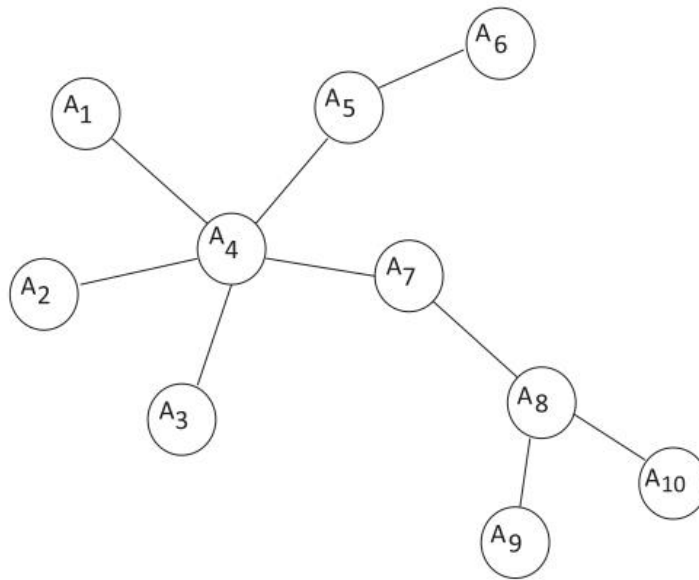
#### **Assessment:**

- Maps the social and knowledge networks of key informants
- Sensitizes on the critical role of small and marginal end-users in the scaling process
- Evaluates the limitations in the operation of these information/knowledge networks
- Uncovers the untapped possibilities for informing people about technology adoption and ultimately having an impact.
- Advocates that actors like Krishi Salahakars, service providers, and, if possible, progressive end-users be strategically employed to make the entire information and knowledge network efficient, and that they be designated as nodes for knowledge creation and development.

#### **Relevant components/questions for framework integration:**

- Has the entity identified key actors for information sharing for each particular activity?
- Has the entity identified gaps in the existing information delivery system?
- Has the entity recognized existing stakeholders and introduced any new ones that it hasn't done so yet?
- Has centrality analysis been used for each activity depending on actors who are more central to the social network or located nearby?
- Are there important channels in place through which the information networks get feedback from the end-user?
- Do men and women prefer different channels for information and feedback?
- Is there a mechanism for integrating feedback from end-users?
- Is information transfer followed by appropriate support (For example, financial, institutional etc.) to implement the activity?
- Is there a single model for the dissemination of information, or are there local and regional models based on regional characteristics?

## Framework



**Figure 1.** Hypothetical network. Source: Developed by author's based on Landherr, Friedl, and Heide-  
mann (2010).

Note: The circle represents actors (A) and the lines represent edges (E).

### 2.3.4 A framework for targeting, scaling out and prioritizing interventions in agricultural systems

(Notenbaert et al., 2017a)

#### **Full Citation:**

Notenbaert, A., Pfeifer, C., Silvestri, S., & Herrero, M. (2017a). Targeting, out-scaling and prioritising climate-smart interventions in agricultural systems: Lessons from applying a generic framework to the livestock sector in sub-Saharan Africa. *Agricultural Systems*, 151, 153–162. <https://doi.org/10.1016/j.agsy.2016.05.017>

#### **Framework Background:**

- This framework is based on the Targeting framework described by (Herrero et al., 2014).
- The framework has a broad range of applications and intends to inspire others to apply the ideas when planning for climate-smart agriculture, which usually includes multi-stakeholder, multi-scale, and multi-objective decision-making.
- The framework has been used in two case studies about livestock development in sub-Saharan Africa to show the applicability of the framework to very different situations.
- This is useful for the policy makers to consult maps with option-specific recommendation when deciding which solutions to promote where.

#### **Assessment:**

- Technology focused and not the best fit for assessing the scaling mechanism.
- Measures success in terms of increased productivity and increased but improved natural resource use.
- Supports the geographical targeting of options for potential solutions.
- Targeting and prioritizing are not linear tasks, even if these four processes define the initial workflow and follow some logical order, with information from one step feeding into the next.
- Supports participatory approaches for entity to intervene and to choose such method: the reasons for involvement and expected outcomes, the nature and scope of the issue, who is affected, interested or can contribute to solutions, amount of time available and availability of resources, must be taken into account.
- Highlights that discrepancies between stakeholders' opinions is thereby likely to shift due to change of knowledge or interest
- Highlights that the context or surrounding environment both influences and is influenced by the systems.

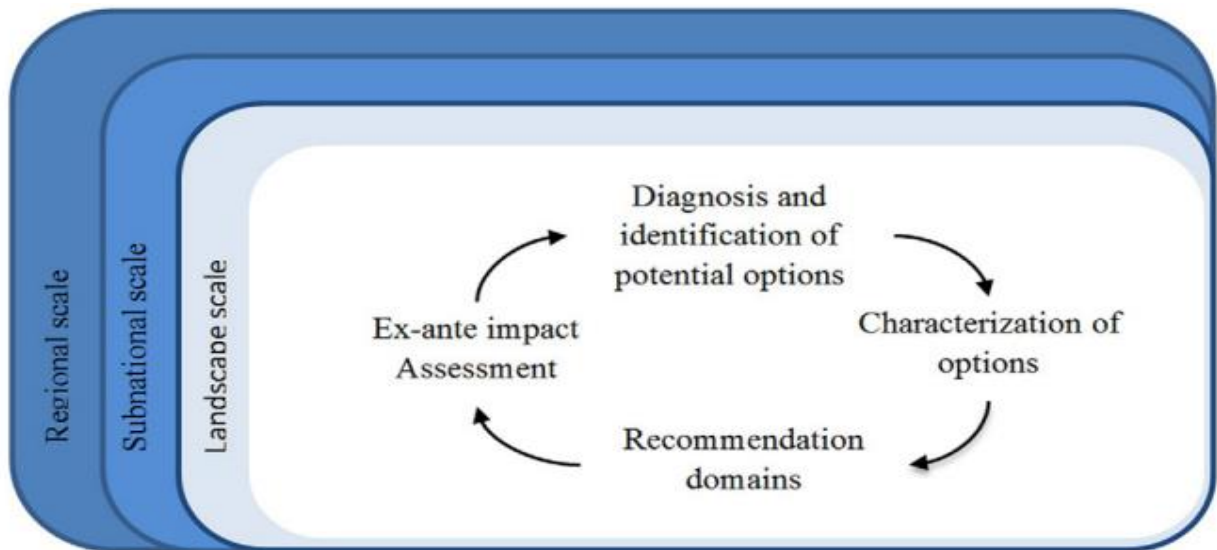
#### **Relevant components/questions for framework integration:**

- What are the available resources (human, natural, financial, social and physical) and how are they organized for implementation of an activity?
- What/who is most vulnerable and why? How can their vulnerability be decreased?
- Does the entity have a list of main stakeholders who can influence the decision or wider context in which the potential activity will be implemented?
- Is there metrics of measurement to assess the different groups of people who are likely to be affected by the output of the activity?
- Does the entity have sound understanding about the local context policies, norms, institutions, the economic environment, and how they are evolving when planning activity?

- Are the objectives and indicators identified through participatory approaches by the entity?

### Framework

- The first step helps to identify the concerns and problems that have been experienced.
- The second step discusses the importance of identifying all options that have an impact on use and adoption.
- The third step entails converting the previously noted technological traits into variables for which spatial data are available.
- The fourth step entails choosing pertinent indicators through a participatory approach so that they reflect their objectives for the planned interventions and the chosen investment region.



### 2.3.5 Developmental Evaluation within Innovation Platforms (Baillie et al., 2020a)

#### **Full Citation:**

Baillie, J., Laycock, A. F., Peiris, D., Bainbridge, R. G., Matthews, V., Cunningham, F. C., Conte, K. P., Abimbola, S., Passey, M. E., & Baillie, R. S. (2020). Using developmental evaluation to enhance continuous reflection, learning and adaptation of an innovation platform in Australian Indigenous primary healthcare. *Health Research Policy and Systems*, 18(1), 1–11. <https://doi.org/10.1186/s12961-020-00562-4>

#### **Framework Background:**

- Developmental evaluation (DE) was first described by Patton in the mid-1990s and is increasingly being used to assess innovative and emerging programs and projects, as it allows for real-time feedback so that evaluation findings can be used to guide development and adaptations.
- The focus on learning and adaptation in DE is in line with the adoption of innovation platforms, which specifically emphasize continual reflection, learning, and adaptation as a design principle.
- This approach works effectively in circumstances like innovation platforms that have a developmental goal, an innovation role, and complexity.

#### **Assessment:**

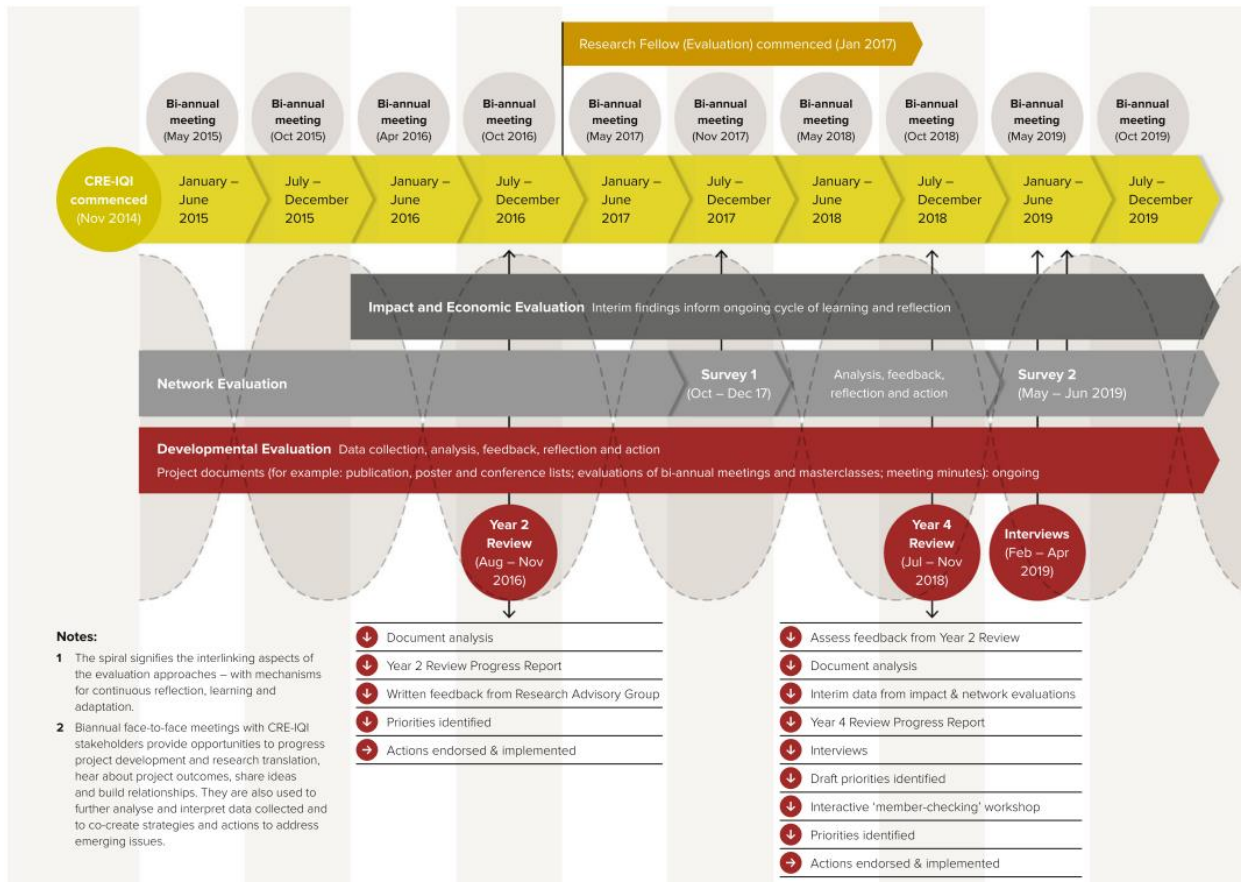
- Places more emphasis on reflection, learning, and change unlike traditional types of evaluation to help interventions and entity to adapt to the changing, complex environments in which they are located.
- Engages multiple stakeholders and their perspectives, whilst paying attention to relationships and interactions.
- Uses opportunistic and planned iterative cycles of reflection and analysis to understand how well the innovation platform functions, and how it could be improved quickly to operate more efficiently.
- Measures successes mostly based on increased participation in meetings, trainings or increased budgeting in capacity building activities and seed grants for research.

#### **Relevant components/questions for framework integration:**

- Is there a provision for capacity strengthening, networking, and learning opportunities for the workforce of the entity?
- Is periodic face to face meetings conducted for sharing progress, new ideas, emerging issues and building relationships?
- Are the collaborative change decisions made through consultations recorded in evaluation logs for future references and transparency?
- Does the entity have mechanisms for generating and sharing knowledge with service providers, policymakers, and researchers?
- Is there an opportunity to provide feedbacks which is essential to strengthen the formation and effective functioning of the IPs?

## Framework

- Timeline of developmental evaluation activities, demonstrating linkages between evaluative approaches. CRE-IQI Centre for Research Excellence in Integrated Quality Improvement.
- Demonstrates the interconnected elements of the evaluation procedures, with a focus on the importance of gathering data for the DE.



### 2.3.6 ADOPT (Llewellyn & Brown, 2020b)

#### **Full Citation:**

Llewellyn, R. S., & Brown, B. (2020). Predicting Adoption of Innovations by End-users: What is Different in Smallholder Agriculture? *Applied Economic Perspectives and Policy*, 42(1), 100–112. <https://doi.org/10.1002/aepp.13012>

#### **Framework Background:**

- This framework was created utilizing an existing tool (Kuehne et al., 2017) for forecasting the adoption of agricultural advances in developed countries.
- The theoretical underpinnings of ADOPT are the idea of "relative advantage" (Everett M Rogers, 2003) and the procedure of learning about an innovation.
- This discovers a number of distinguishing aspects of smallholder agriculture in developing countries that influence agricultural adoption.
- Designed to work for a defined diverse group (or subpopulation) of potential adopters for a particular shift in agricultural technology or practice.

#### **Assessment:**

- Highlights learning and relative advantage as impactful characteristics for adoption
- Predicts the time it takes for a process to reach peak adoption and how quickly end-users learn about the innovation
- Considers strength of social or professional networks, effectiveness of extension campaigns, and the relative advantage of the innovation in their farm and personal contexts
- Segments the populations and produces distinct projections about adoption across the subpopulations if there are evident and growing disparities between large and small end-users.
- Emphasizes end-users' subsistence as a complicating factor in predicting adoption of new methods.
- Predicts the potential for sociocultural factors to influence exposure to innovations and their perceived relative advantage
- Gives greater relative weightage to short-term returns and upfront costs
- Excludes considering how widely scalable practices are used on farms.

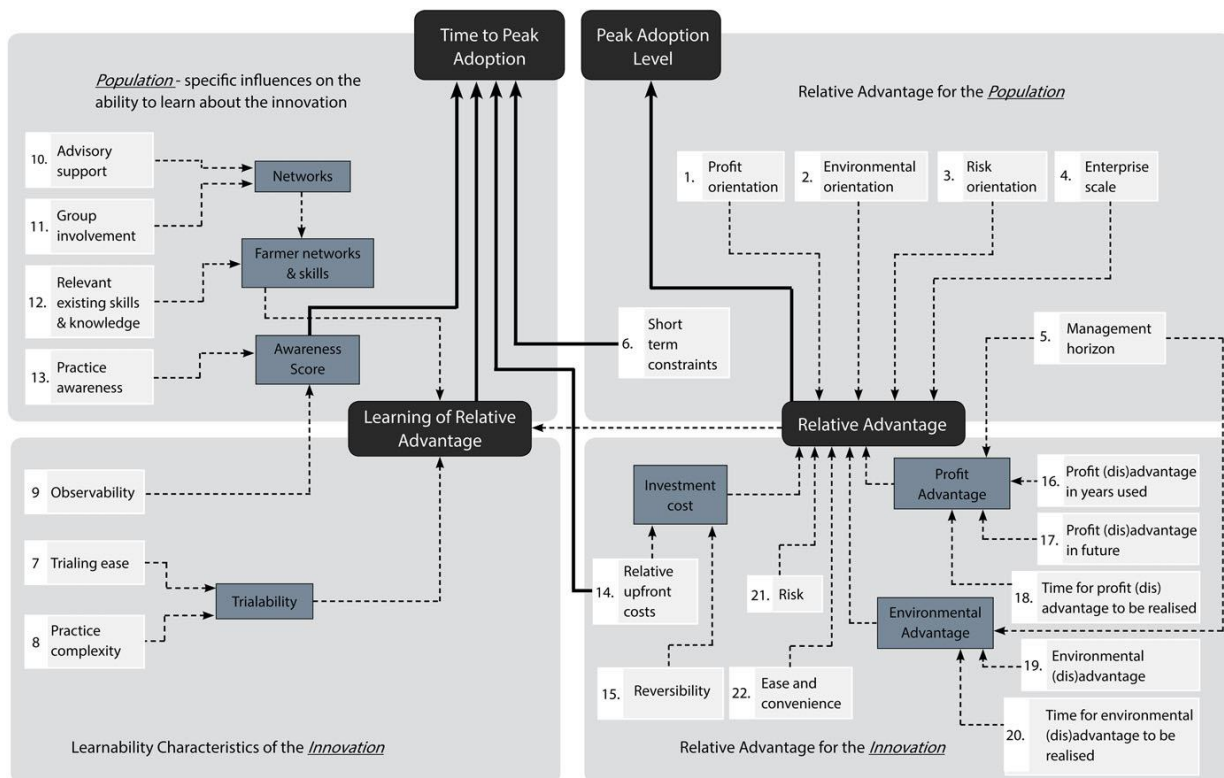
#### **Relevant components/questions for framework integration:**

- Does the activity consider the end-users' upfront costs and their impact on effective future costs?
- Do the end-users have existing innovation awareness and relevant existing skills and knowledge?
- Does the entity have existing Advisory Support for the end-users?
- Does the entity have a mechanism for the end-users from various social or economic groups or cultural groups to communicate?
- Are labor shortages, low labor prices, and labor expenses underestimated in smallholder environments for scaling interventions?
- Has the likelihood for failure of promoted activity considered by the entity?



- Is the considered promoted activity socially or culturally appropriate for specific end-users? (Gender norms, spiritual beliefs, caste, or ethnicity are some examples)
- Does the entity identify a growing disparity between the characteristics of large and small end-users?
- Do end-users have orientations towards objectives other than profit?
- Is the priority of end-users considered by the entity in terms of efficiency and monetary rewards between a promoted technology and an existing choice or between two promoted technologies?
- Is the heterogeneity of the end-user population acknowledged by the entity?
- Do end-users see the immediate need to supply food and resources for the farm family or as a benefit in the distant future?
- Do end users see implementation process as a whole package or consider only certain components of the process?

## Framework



### 2.3.7 *Scaling of Climate-Smart Agriculture* (Makate, 2019)

#### **Full Citation:**

Makate, C. (2019). Effective scaling of climate smart agriculture innovations in African smallholder agriculture: A review of approaches, policy and institutional strategy needs. *Environmental Science and Policy*, 96(January), 37–51. <https://doi.org/10.1016/j.envsci.2019.01.014>

#### **Framework Background:**

- The framework was initially adapted from Ostrom, Gardner, Walker, and Walker (1994).
- The three main pillars that make up the IAD framework: “initial conditions,” “action arena,” and “outcomes”.
- The framework reveals that we need "initial conditions" that include assets as one component (tangible and intangible assets) that end-user owns, mobilizes, and exchanges with other actors in preceding conditions called the “action environment” to aim for success or "outcomes" for the actor and/or society as a whole.

#### **Assessment:**

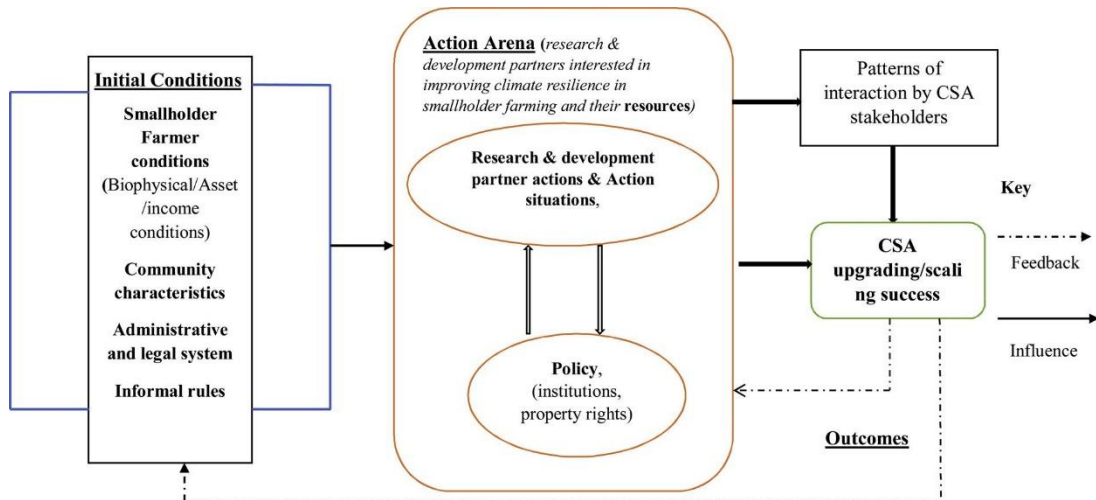
- Emphasizes that if the consequences on end-users' livelihoods are positive and substantial, the lack of incentives shouldn't hinder them from gaining access to the right technologies.
- Emphasizes that asset conditions are most important as they can directly influence technology adoption among end-users.
- Distinguishes depending on the object of scaling, scaling up will refer to transition, institutionalization, transformation, integration, incorporation, evolution, and or development while scaling out will refer to repetition, copying, more of the same, expansion, extension, adoption, dissemination, transfer of technology, mainstreaming, roll-out, or multiplication.
- Underlines that market-driven and value chain development approaches, market development done to cater to productivity-improving technologies make scaling success of innovations extremely likely.
- Highlights that scaling success of innovations is very likely when innovations do not require high start-up capital and/or significant labour input in the beginning phase to promote sustainability.
- Highlights that Institutional support and cooperation, advocacy and political will are crucial for scaling

#### **Relevant components/questions for framework integration:**

- Does the entity consider negative impacts of climate change on the activity promoted?
- Does the activity promoted provides improved social, economic and environmental benefits?
- Have the initial conditions, biophysical, characteristics of the larger community, including political and legal framework as well as the unwritten laws and local customs been identified by the entity?
- Is the entire procedure iterative and includes feedback mechanisms?
- Do the activity introduced have clear and tangible benefits for end-users where technologies address immediate end-user problems and concerns?

## Framework

- The "initial conditions" include the biophysical conditions, the asset conditions, and the characteristics of the larger community of the smallholder end-user.
- "Action arena" - The setting for the action is defined by all the initial circumstances. The "action arena," which is the area where all stakeholders engage, is impacted by the starting circumstances.
- "Outcomes": The final result (success) for the end-user and/or the larger society is included in the outcome(s).



2.3.8 *Constraint based innovations in agriculture and sustainable Development (Molina-Maturano et al., 2020a)*

**Full Citation:**

Molina-Maturano, J., Speelman, S., & De Steur, H. (2020b). Constraint-based innovations in agriculture and sustainable development: A scoping review. *Journal of Cleaner Production*, 246(xxxx), 119001. <https://doi.org/10.1016/j.jclepro.2019.119001>

**Framework Background:**

- Adapted from the Technology Acceptance Model: less explored aspects of the model, the design, direction, and scale of the innovation (Agarwal et al., 2017).
- This considers productivity improvements by identifying marginal areas and local smallholders, as well as the potential for innovation.

**Assessment:**

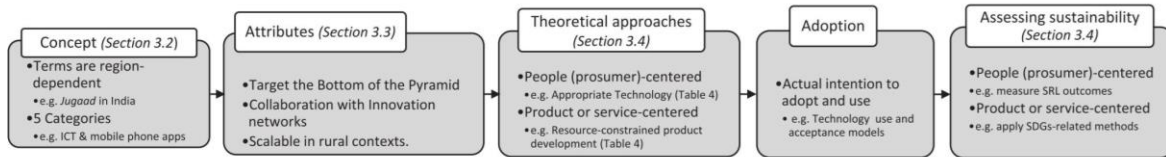
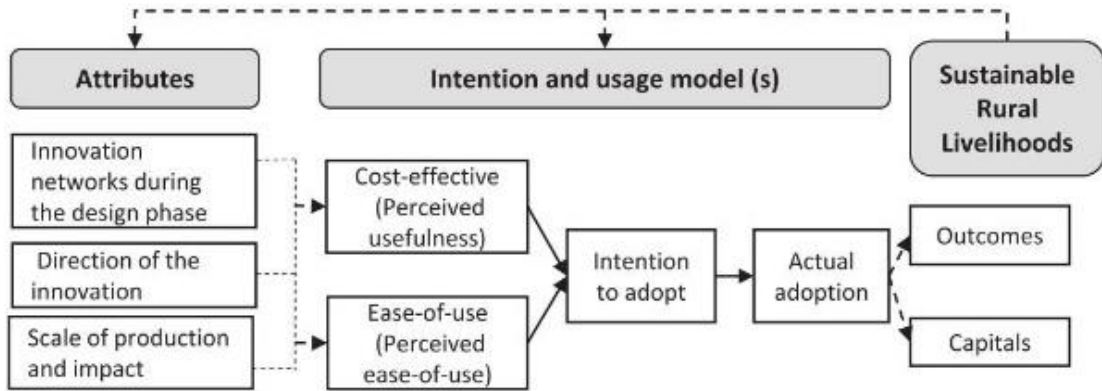
- Focuses on collaborative initiatives for inclusive development
- Focuses on mapping cultural and social factors within a particular context
- Focuses on interactions between technological requirements, farming systems, ecological resources, and institutional and poverty characteristics for scaling.
- Emphasizes the significance of innovation networks for scaling success and in the early stages.

**Relevant components/questions for framework integration:**

- Does the entity have a comprehensive understanding of the interactions between technological requirements, farming systems, ecological resources, and institutional and poverty characteristics?
- Is the activity inclusive of end-users with lower level of capitals?
- Is the activity designed with the help of collaborative initiatives with end-users and diverse entities?
- Are the activities promoted equitable to all community members?

**Framework**

- Different capital assets and outcomes were shown to be related. These connections are crucial for identifying beneficial unintended indirect or "multiplier" effects on sustainable development.
- For practitioners and innovators who conduct research and create constraint-based innovations in the agricultural domain, the framework seeks to serve as a jumping-off point.



(Molina-Maturano, Speelman, & De Steur, 2020a)end-userend-userend-user

2.3.9 *Scaling and institutionalization within agricultural innovation systems* (Muilerman et al., 2018)

**Full Citation:**

Muilerman, S., Wigboldus, S., & Leeuwis, C. (2018a). Scaling and institutionalization within agricultural innovation systems: the case of cocoa end-user field schools in Cameroon. *International Journal of Agricultural Sustainability*, 16(2), 167–186. <https://doi.org/10.1080/14735903.2018.1440469>

**Framework Background:**

- This framework is based on Patient-Reported Outcomes Measurement Information System (PROMIS) approach derived from Wigboldus et al., (2016) which builds on the multilevel perspective (MLP) on socio-technical innovation and the theory of modal aspects (of experienced reality: physical, social, economic, cultural and moral, aesthetic, ethical aspects).
- It is used in this paper to identify a wide variety of potential causes and dynamics that may have contributed to the failure to institutionalize Farmer Field School (FFS) in the agricultural innovation system.
  - Government's reluctance to adopt reforms.
  - Focused on multiple activities parallelly.
  - Lack of technical support through external agents.
  - Lack of internal funding

**Assessment:**

- Offers pertinent information for scaling similar multi-stakeholder processes and participatory methodologies, like innovation platforms and innovation labs.
- Measures success in terms of productivity and yields but also emphasizes the need to assess the existing context and then gradually and systematically scale up.
- Necessitates need for all the relevant stakeholders to be engaged in the activity.
- Suggests keeping clear goal to link up and capitalize entity's reality.

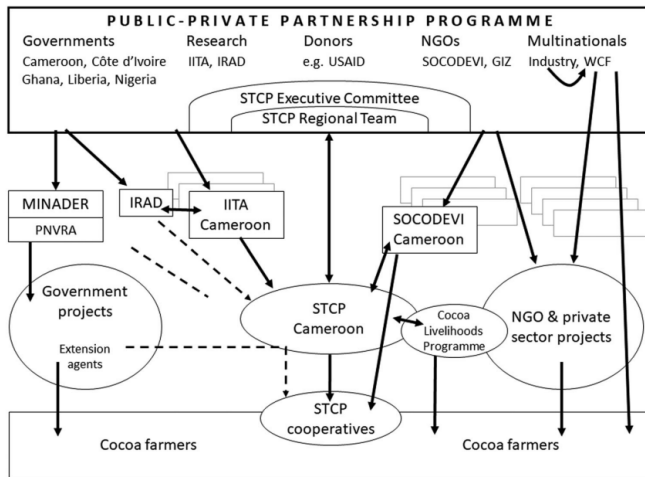
**Relevant components/questions for framework integration:**

- Does the entity and relevant stakeholders have same vision and expectation from the potential activity?
- Does the planned activity meet the local context and does not conflict with the end user needs?
- Is there opportunity for multiple exposures to ensure sustainable adoption by the end users?
- Does the entity provide opportunities for capacity building of the team for implementing an activity?
- Does the entity have optimal connection with public and private partners, directly involved in the activity?
- Does the activity target and treat the end users equally irrespective of lead end-users/ large producers?

- Does the entity have developed scaling strategy to successfully anticipate ongoing processes and mitigation plan?
- Is monitoring and evaluation system in place providing an opportunity for timely evaluation, learning and adjustments?
- Is the promoted activity already piloted and adapted to meet the criteria for scaling in the targeted community?

### Framework

- The first component is especially helpful for understanding the dynamics of innovation and scaling, and the second one aids in revealing the complexity of innovation and scaling.



FFS leadership by country and by programme type during STCP scaling phase (2006–2011), based on STCP annual reports.

**Table 3.** Analytical categories derived from the PROMIS approach (abbreviated and adapted from Wigboldus et al., 2016).

Analytical categories	Description
<b>Social dynamics</b>	Stakeholder decision-making dynamics Stakeholder diversity and social impact
<b>System dynamics</b>	Complexity of scaling Dominance/deviance dynamics System/practice inertia System/practice instability
<b>Scale dynamics</b>	Path dependence and past imprinting Anticipated futures Cross-scale, cross-domain dynamics
<b>Management dynamics</b>	The process of engaging stakeholders The scope of analysis and evaluation, and preparation/anticipation The connection between strategy and situational reality The capacity to facilitate convergence

### 2.3.10 The Scaling Scan A practical tool to determine the strengths and weaknesses of your scaling ambition (Jacobs et al., 2018)

#### Full Citation:

CIMMYT, & PPPLab,. (2018). The Scaling Scan A practical tool to determine the strengths and weaknesses of your scaling ambition.

#### Framework Background:

- This framework is developed based on literature review of other scaling and designing tools.
- Designed for anyone involved in pro-poor and sustainable development programs looking to scale impact.
- Aims to:
  - Understand the various dimensions of scaling and the substantial role that non-technical variables play in scaling
  - Develop more realistic scaling ambitions
  - Consider and discuss (in teams) if a scaling approach is appropriate and track progress.

- Determine if project proposals, action plan, and evaluations are “scale-proof”
- Identify bottlenecks for scaling and find openings to tackle these
- Approach (future) interventions with a scaling mind-set

### Assessment:

- The Scaling Scan can be applied:
  - Within a range of sectors, despite being based on experience from the agriculture and the water sector

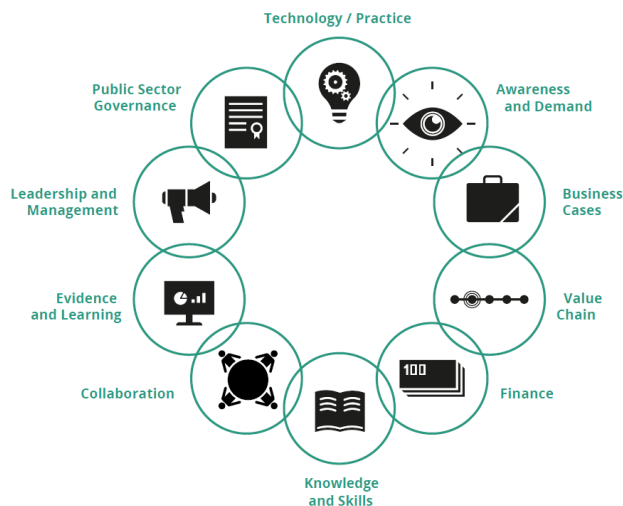


Figure 4 The framework of 10 scaling ingredients is based on a literature review

- By individuals as well as (project) teams
- By individual organizations and partnerships
  - Ensures that the scaling ambition is well defined and firmed-up by a system and responsibility check before assessing using the scaling ingredients.
  - Has been used by ILRI for Ghana Livestock Vaccine Innovation Fund Project assess and monitor the scalability of transforming the vaccine delivery system under Women Rear project.
  - Some of the limitations are: not designed for developing a scaling strategy, scale a project or program as it focuses on selectable scalable innovations and provide solutions as it

only identifies weaknesses and strengths. The approach is driven primarily by expert opinion.

- Factors in other considerations on climate change and impact on natural resources.

### Relevant components/questions for framework integration:

- Is there enough evidence from the pilot phase to go to scaling interventions?
- Is the entity considering geographic expansion or a larger/different end users within the same geographic area? Maximum: How big is the prospective target group? Minimum: What is the current rate of acceptance of the potential intervention (up to the pilot stage)?
- Are the end users ready for adoption and scaling? Is this a realistic target?
- What is a realistic timeline for achieving your scaling ambition?
- Is the entity that piloted the solution experienced and skilled enough to lead the scaling process?
- Does the entity and end users have capacity to use, adapt and promote scaling intervention?
- Is there sufficient and sustainable funding secured so that the scaling ambition can be achieved?



- How long can the entity lead the scaling? Does the leadership for scaling need to be done in phases and handed over at some time?
- Are there effective financing options available for end users and other value chain actors?
- Does the Government support to reach the scaling ambition?
- Does the target group have access to information about the innovation and are there effective communication channels?
- Do all value chain actors have a genuine interest to continue and improve the supply and use of the technology/practice?
- Are relevant financial mechanisms available, accessible, and affordable for all value chain actors?
- Are appropriate training materials and methods available to allow the target group and other value chain actors to adopt and promote the innovation?
- Are there effective networks or (sector) platforms for joint strategic direction-setting, advocacy, and creating buy-in?
- Are data and monitoring (including bottom-up/field data) effectively being used to steer the scaling process and change course where needed?
- Are relevant government financing mechanisms (such as subsidies or tariffs) smart and can they be applied to benefit scaling the innovation?

## Framework

- Comprises of three steps
  - Step 1: Construct your scaling ambition
  - Step 2: Check the scaling ingredients
  - Step 3: Identify points of attention for scaling strategy
- Scoring levels include:
  - 1: No, this is very uncertain OR not enough information to answer
  - 2: Serious doubts
  - 3: Some doubts/unsure
  - 4: Quite confident
  - 5: Yes definitely, this is not an issue for my scaling case OR not applicable

## The Scaling Scan

### 1. Technology / Practice

1. Is your innovation relevant to your target group?

Score (1-5): 

2. Does the innovation have a comparative advantage over existing alternatives?

Score (1-5): **0** 

3. Is the innovation easy to adopt?

Score (1-5): 

4. Is the innovation compatible with local circumstances and preferences?

Score (1-5): 

Average Score:

**0.0**

Observations:

### 2. Awareness and demand

1. Do important stakeholders recognize that a new technology/practice is necessary and desirable?

Score (1-5): 

2. Does the target group have access to information about the innovation and are there effective communication channels?

Score (1-5): 

3. Do you have evidence that demand for the innovation is real and growing as anticipated?

Score (1-5): 

4. Can you distinguish segments of the target group for effective marketing of the innovation?

Score (1-5): 

Average Score:

**0.0**

Observations:

### 3. Business cases

1. Are there viable business cases for the technology/practice for all actors along the value chain?

Score (1-5): 

2. Is enough information available to continue developing and sharpening business cases for the technology/practice?

Score (1-5): 

3. Do all value chain actors have a genuine interest to continue and improve the supply and use of the technology/practice?

Score (1-5): 

4. Is the business climate conducive to the business cases of all actors?

Score (1-5): 

Average Score:

**0.0**

Observations:

3

### 4. Value chain

1. Can the value chain provide/enable the technology/practice with the right quality, in the right quantity, and in a timely manner?

Score (1-5): 

2. Are relations between the various actors in the chain adequately developed?

Score (1-5): 

3. Is the overall performance of the value chain conducive to scaling?

Score (1-5): 

4. Are the target group and other value chain actors adequately organized?

Score (1-5): 

Average Score:

**0.0**

Observations:

### 5. Finance

1. Can the target group finance the investment in, and operation of, the innovation?

Score (1-5): 

2. Are relevant financial mechanisms available, accessible, and affordable for all value chain actors?

Score (1-5): 

3. Are financial risks acceptable for value chain actors and financial institutions/investors?

Score (1-5): 

4. Is there sufficient and sustainable funding secured so that the scaling ambition can be achieved?

Score (1-5): 

Average Score:

**0.0**

Observations:

**6. Knowledge and skills**

1. Does the target group have the necessary knowledge and skills to use the innovation in the intended way?

Score (1-5):

2. Are training materials and methods available to allow the target group and other value chain actors to adopt and promote the innovation?

Score (1-5):

3. Are the right actors engaged to provide and improve the training programs necessary for sustainable adoption of the innovation?

Score (1-5):

4. Is there an institutional environment in which actors (such as knowledge institutes) develop and improve the technology/practice within the national and local system?

Score (1-5):

**Average Score:** 0.0

**Observations:**

**7. Collaboration**

1. Are all actors relevant to scaling the innovation engaged?

Score (1-5):

2. Are roles and responsibilities of key actors clear, accepted, and complementary?

Score (1-5):

3. Are there effective networks or (sector) platforms for joint strategic direction-setting, advocacy, and creating buy-in?

Score (1-5):

4. Do you have effective links with parallel initiatives or policy processes that could serve to scale the innovation?

Score (1-5):

**Average Score:** 0.0

**Observations:**

**8. Evidence and learning**

1. Is there useful and credible data available on the impact and other parameters, which could help in understanding the scaling process?

Score (1-5):

2. Is effective use being made of modern data and IT tools to support, analyze, share, and promote the innovation and to drive the change process?

Score (1-5):

3. Are data and monitoring (including bottom-up/field data) effectively being used to steer the scaling process and change course where needed?

Score (1-5):

4. Are you enabling institutional learning so the scaling process becomes more sustainable?

Score (1-5):

**Average Score:** 0.0

**Observations:**

**9. Leadership & management**

1. Is day-to-day leadership of the scaling process adequately established, recognized, and connected to the relevant actors?

Score (1-5):

2. Are different actors and stakeholders sufficiently affecting the larger process and decision-making?

Score (1-5):

3. Are there adequate, influential and compelling spokespersons, messengers, conveners and power brokers for the innovation?

Score (1-5):

4. Does the leadership support internal and external change management processes to achieve organizational/ institutional changes required?

Score (1-5):

**Average Score:** 0.0

**Observations:**

**10. Public sector governance**

1. Is the role of the government in reaching your scaling ambition clearly defined?

Score (1-5):

2. Are local and national strategies, policies and regulations conducive to scaling the technology/ practice?

Score (1-5):

3. Are government agencies actively supporting scaling the innovation?

Score (1-5):

4. Are relevant government financing mechanisms (such as subsidies or tariffs) smart and can they be applied to benefit scaling the innovation?

Score (1-5):

**Average Score:** 0.0

**Observations:**

### 3. Summary

This literature review finds that although there is a wide variety of studies that relate to “scaling”, most remain exploring the domain of technological assessment of relevance or performance. Few studies assess directly the performance of a scaling mechanism, and none compare the comparative performance of scaling mechanisms outside of technological performance.

Moving beyond the limitations of the existing literature, this review identifies key aspects that could be integrated into a future scaling assessment framework. This framework will be an important tool to go into future scaling ‘toolboxes’ that help interventions assessment how they should scale particular technologies and practices. That tool should provide an avenue through which to assess both the ‘how to scale’ and ‘who to do the scaling’, of which currently there is no existing tool.

The next steps in progressing this line of think include:

- Informal inputs sought from various project leaders on the key questions they ask when going about scaling (as of October 2022, this form has been sent and responses are currently incoming).
- Synthesis of these findings, the inputs above and experiences from CIMMYT team into a scaling assessment beta tool (As of October 2022, a pre-beta tool has been developed).
- Piloting of the pre-beta tool (This will be done in three locations during November 2022 (Biratnagar, Coochbehar and Rangpur)
- Presentation of pilot results and learnings for completion of the Beta tool (Conducted at the Rupantar ARPM in November 2022).
- Finalization of the Beta Tool for wider dissemination and testing (Proposed for early 2023).
- Implementation of the final tool as part of the road-mapping process for the 2023 Rupantar project workplan.

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