

CONTENTS

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|--|--|-----|
| Foreword | | |
| Purdue University—Mitch Daniels, <i>President</i> | | v |
| African Development Bank—Akinwumi A. Adesina, <i>President</i> | | vi |
| Executive Summary | | vii |
| Introduction | | 1 |
| Chapter 1 | Designing Projects and Innovations with Scale in Mind | 3 |
| Chapter 2 | Assessing Scalability | 6 |
| Chapter 3 | Using Commercial Markets to Drive Pro-Poor Scaling | 9 |
| Chapter 4 | Financing the Transition to Scale | 12 |
| Chapter 5 | Creating an Enabling Environment for Scale—Partnerships, Policy, Behavioral Change, and Institutions | 17 |
| Chapter 6 | Tailoring Metrics, Monitoring, and Evaluation to Support Sustainable Outcomes at Scale | 22 |
| Chapter 7 | The Critical Role of Intermediary and Donor Organizations | 25 |
| Chapter 8 | Conclusions | 28 |
| Chapter 9 | An Invitation to Continue the Conversation | 29 |
| Notes | | 31 |

The content of the *Scale Up Sourcebook* was informed by a Scale Up Conference organized by Purdue University and held in West Lafayette, Indiana, USA, on September 25–27, 2018. The conference was made possible by Purdue’s partner organization, the African Development Bank, and company sponsors, which included BASF, Bayer, Corteva Agriscience, and Land O’Lakes. Lead conference organizers at Purdue University were Suzanne Nielsen (Professor of Food Science; Faculty Fellow in the Office of Corporate & Global Partnerships) and Carolyn Woo (Emeritus President and CEO of Catholic Relief Services; Distinguished President’s Fellow for Global Development at Purdue University). The keynote speaker at the conference was Akinwumi Adesina (President of the African Development Bank, 2017 World Food Prize laureate, and Purdue alumnus). Over 200 persons from 20 countries, representing over 90 organizations, attended this conference that focused on how to best scale agricultural technologies and innovations to impact millions in the developing world. The objectives of the conference were to enhance understanding of scaling up, establish a network among agricultural experts working in developing countries, and aid in the spread of technologies that will feed our growing global population. Two major conference participants and experts in the area of scale up, Larry Cooley and Julie Howard (see bios at end of book), accepted the challenge to write this *Scale Up Sourcebook*, which is intended to capture the spirit and content of the Scale Up Conference, continue the conversation on scale up, and serve as a user guide on the topic.

—Suzanne Nielsen, Co-organizer of Scale Up Conference
and Project Manager for *Scale Up Sourcebook*

Cover images courtesy of the following: Purdue Improved Crop Storage (PICS) bag opening ceremony in Burkina Faso (Tom Campbell, Purdue University); farmer in field of Striga-resistant sorghum, near Habro, Ethiopia (Taye Tessema, while at Ethiopian Institute of Agricultural Research); Salif Sow, using small-scale extruder to make instant cereal-based food, at Institut de Technologie Alimentaire in Dakar, Senegal (Amudhan Ponrajan, while at Purdue University); Rezaul Karim Pannu, using small-scale farm equipment, in Bangladesh, through iDE Cereal Systems Initiative for South Asia—Mechanization and Irrigation (CSISA-MI) Initiative (Ranak Martin, iDE); and market in Eldoret, Kenya (Gary Burniske, Purdue University).

ACRONYMS

| | | | |
|----------|---|--------|--|
| AATIF | Africa Agriculture Trade and Investment Fund | IDIA | International Development Innovation Alliance |
| AECF | Africa Enterprise Challenge Fund | IDRC | International Development Research Centre |
| AGRA | Alliance for a Green Revolution in Africa | IFAD | International Fund for Agricultural Development |
| AMSAP | Advanced Maize Seed Adoption Program | IFC | International Finance Corporation |
| ASAT | Agricultural Scalability Assessment Tool | IFPRI | International Food Policy Research Institute |
| CFRI | Coffee Farmer Resilience Initiative | IITA | International Institute of Tropical Agriculture |
| CGIAR | Consortium of International Agricultural Research Centers | ILRI | International Livestock Research Institute |
| CIMMYT | International Maize and Wheat Improvement Center | LSP | Local Service Provider |
| CIP | International Potato Center | M&E | Monitoring and Evaluation |
| COMESA | Common Market for Eastern and Southern Africa | MSI | Management Systems International |
| CoP | Community of Practice | NGO | Nongovernmental Organization |
| CSISA-MI | Cereal Systems Initiative for South Asia—Mechanization and Irrigation | NIRSAL | Nigeria Incentive-Based Risk Sharing System for Agricultural Lending |
| DFI | Development Finance Institution | OAF | One Acre Fund |
| EAC | East African Community | PASS | Program for Africa’s Seed Systems |
| ECOWAS | Economic Community of West African States | PCE | Projet Croissance Economique |
| FAFIN | Fund for Agricultural Finance in Nigeria | PIATA | Partnership for Inclusive Agricultural Transformation in Africa |
| GIIF | Global Index Insurance Facility | PICS | Purdue Improved Crop Storage |
| GIZ | German Agency for International Cooperation | PMC | Population Media Center |
| ICRISAT | International Crops Research Institute for the Semi-Arid Tropics | SADC | Southern African Development Community |
| ICT | Information and Communication Technologies | SFSA | Syngenta Foundation for Sustainable Agriculture |
| IDB-MIF | Multilateral Investment Fund of the Inter-American Development Bank | SME | Small and Medium Enterprises |
| iDE | International Development Enterprises | SNV | Stichting Nederlandse Vrijwilligers (Netherlands Development Organization) |
| iDE-B | International Development Enterprises—Bangladesh | USAID | United States Agency for International Development |
| | | WRS | Warehouse Receipt Systems |

FOREWORD



FOREWORD BY PRESIDENT MITCHELL E. DANIELS, JR.

Few events could kick-off Purdue's 150th Anniversary celebration quite like the Scale Up Conference, which we were proud to host in partnership with the African Development Bank in September 2018.

Celebrating our position as a leading land-grant university, the theme of our yearlong celebration is "150 Years of Giant Leaps," recalling Boilermaker astronaut Neil Armstrong's famous words upon the first moon landing 50 years ago. The theme also honors the footprints that Purdue alumni have left across the U.S. and around the world, like those of Dr. Akinwumi Adesina, keynote speaker at the Scale Up Conference. Dr. Adesina is president of the African Development Bank and in 2017 became the most recent of three World Food Prize winners whom Purdue proudly claims as alumni.

The Scale Up Conference tackled one of the most important topics in agriculture: leveraging globally the technology and innovations designed to improve food security, nutrition, and livelihoods in the developing world. More than 200 people from 20 countries and some 90 organizations attended the conference, establishing a broad network among agricultural experts committed to feeding our growing global population.

In his keynote, Dr. Adesina challenged attendees to find new ways to create impact through what he described as the "Scaling Up Triangle"—strong and sustained political will, the power of science and technology, and suitable policy incentives. A video recording of Dr. Adesina's remarks and other featured presentations and panel discussions, photos, and additional conference materials are available through Purdue e-Pubs (docs.lib.purdue.edu/scaleup).

In partnership with and through generous support from the African Development Bank, Purdue University has published this *Sourcebook* on scaling agricultural innovation. Authored by Larry Cooley and Julie Howard, experts in international development, the *Sourcebook* summarizes key insights, tools, examples, and references on designing for scale, assessing scalability, financing the scaling process, and the effective use of partnerships to support scaling. It is intended for a broad audience in academia, research institutions, governments, businesses, policy groups, and nongovernmental organizations concerned with leveraging agricultural innovation to meet the needs of the developing nations.

Purdue is proud of the role its faculty and alumni have always played in conquering world hunger, and we hope this guidebook serves you well in your efforts to do the same.



FOREWORD BY PRESIDENT AKINWUMI A. ADESINA

SCALE UP: A NECESSITY FOR TRANSFORMING AFRICAN AGRICULTURE

The African Development Bank was honored to co-organize the Scaling Up Agricultural Technologies for Transformation conference with Purdue University (my alma mater) on the occasion of Purdue's 150th Anniversary celebrations.

The "Giant Leaps" theme for the anniversary is consistent with my own conviction that now is the time for transforming agriculture into an engine of growth for Africa's economies and a pathway to prosperity for millions of its people.

All the conditions for African agriculture's "Giant Leap" are in place: Africa holds 65% of all the uncultivated arable land left in the world, and the technologies to transform this resource into a breadbasket of healthy, nutritious food and finished agricultural products exist. What remains is a systematic process to deploy these technologies and the required complementary services to millions of farmers, while stimulating value addition and unlocking regional and global markets.

This *Sourcebook*, distilling the incredible expertise, groundbreaking innovations, and examples of successful scale on display at the conference, will surely serve as a valuable guide for those driven by the imperative to revolutionize African agriculture.

As our own commitment to driving technologies at scale, the African Development Bank has launched a \$1 billion initiative called "Technologies for African Agricultural Transformation" (TAAT)—in collaboration with our partners at the World Bank, the Bill and Melinda Gates Foundation, the International Fund for Agricultural Development (IFAD), the Alliance for a Green Revolution in Africa (AGRA), and others.

TAAT is founded on the principles of the "Scaling Up Triangle" that I emphasized in my keynote address. These principles include the prerequisites of strong political will to ensure enabling infrastructure policies; harnessing innovations in science and technology that are tailored to local conditions; and the alignment of incentives that unleash commercial profitability across the agriculture value chain . . . down to the smallholder farmer.

I believe that this *Scale Up Sourcebook* will accelerate initiatives that in turn scale up agricultural innovations such as TAAT and many more. Harnessing these lessons and tools for concrete impact at scale requires continued and sustained investments across the board.

We must therefore all honor this commitment. We owe it to ourselves and generations to come to use every opportunity at our disposal to make that Giant Leap of agricultural transformation in Africa a reality.

EXECUTIVE SUMMARY

A decade ago, the audience for a discussion on “scaling” international development initiatives could fit comfortably in a telephone booth. But times have changed. Today, virtually every serious conversation about development includes attention to strategies for achieving and sustaining results at scale; and there is an emerging body of literature, tools, case examples, and communities of practice from which to learn.

This change reflects growing concern over the seemingly endless array of projects that fail to reach large numbers of the poor or to sustain outcomes over time, and the mismatch between the magnitude of many of the world’s most serious problems and the numerous but relatively small donor resources arrayed against those problems.

Despite this growing recognition, major challenges remain, including the need for fundamental changes in established policies, procedures, and priorities of donor agencies, national governments, researchers, and program implementers. Most specifically, these changes imply a reexamination of the current preoccupation with technological innovation and “pilot projects,” and a fundamental rethinking of ways to ensure that donor investments are more likely to catalyze lasting, systemic change. This reorientation requires (1) designing interventions with scale in mind and with clear scaling strategies; (2) assessing and addressing obstacles to scalability; and (3) actively managing the pathway to scale. The agriculture sector has been slower than some other sectors, most notably health, to incorporate these changes.

In an effort to close this gap, Purdue University organized a major conference in September 2018 on *Innovations in Agriculture: Scaling Up to Reach Millions*, in partnership with the African Development Bank. This *Sourcebook* is informed and inspired by that conference and is intended as an easy-to-use reference targeting a broad and diverse audience drawn from host governments, research institutions, and academic, business, policy, and donor communities concerned with leveraging agricultural innovation to meet the needs of the world’s poor.

The *Sourcebook* is divided into chapters addressing the following issues: designing with scale in mind; assessing scalability; using commercial markets to drive scaling; financing the transition to scale; creating an enabling environment for scale; tailoring metrics, monitoring, and evaluation to support sustainable outcomes at scale; and the critical role of intermediary and donor organizations. It is designed to be a stand-alone source of guidance, tips, and examples, and to provide links to additional resources for readers wishing for more detail.

Also summarized in the *Sourcebook* are many of the growing array of on-the-ground cases, donor practices, and analytic tools that can help to inform future efforts to scale agricultural interventions and outcomes.

The *Sourcebook* ends with a call to action and highlights the following conclusions:

- Delivery at scale is not a gigantic project or a series of projects. We need to plan for millions, not thousands; for uncontrolled, not controlled, settings; for generations, not for five years; and for addressing, not working around, political and market realities.
- This requires narrowing the gap between macro goals and micro interventions by linking the language and logic of projects to the language and logic of development effectiveness.
- Development assistance can help, but it will not solve the problem. Only markets and governments can; and commercial markets should normally be the default setting. Short-term interventions (“projects”) and subsidies can make big and positive differences, especially in reaching underserved smallholders and small and medium enterprises (SMEs), but only if used strategically. They can also introduce major distortions.
- It is essential to view agriculture as a business, not a social sector; to treat farmers as businesses and customers, not as beneficiaries; and to focus

more attention on the full value chain, on finance, on incentives, on the intermediation needed to bring innovation to scale, and on the enabling environment.

- New partnerships and multi-stakeholder initiatives are essential for tackling scaling challenges.
- Initiatives must go beyond being “policy takers” and play a much more proactive role in facilitating policy change that can be a scaling force multiplier.
- There is rarely a straight line or a short journey from research and innovation to validation and

rollout. Adaptive management is an essential ingredient in all successful scaling efforts.

- The actions of research institutions, nongovernmental organizations (NGOs), and other implementing partners are shaped by donor policies, metrics, and procedures. Systemic change, therefore, needs to give special attention to changes in the funding priorities, internal incentives, and operational procedures of those donor institutions.

Introduction

Commercial flows far outstrip official development assistance, and it has been estimated that for every dollar of official donor and philanthropic assistance to developing countries, those same countries now spend 35 of their own tax dollars.¹ But there is increasing awareness that neither the private sector acting alone and in its own interests, nor governments continuing to do business as usual, will be sufficient to solve some of the world's most vexing development challenges.

Confronted with these realities, the development community is increasingly acknowledging that new types of partnerships are needed, and that new technologies and development interventions are likely to be material if and only if they are designed and managed in ways that have lasting effects on the incentives, policies, and practices of governments and businesses.

There is much work to be done in systematizing approaches to scaling and incorporating increased attention to the nontechnological forces that support—or challenge—scaling efforts. Just as was done with topics like monitoring and evaluation (M&E) and gender, this work includes assembling useful tools, approaches, and relevant experience, and mobilizing cadres of professionals—researchers, businesspeople, donors, and host government officials—who are comfortable using and building on those advances.

The global conversation about reaching and sustaining scale has been slow to infuse the discourse about agricultural development and food security. To bring these issues to the forefront, Purdue University, in partnership with the African Development Bank, organized a conference in September 2018 on *Innovations in Agriculture: Scaling Up to Reach Millions*. This *Sourcebook* is informed and inspired by that conference, which, we believe, was an inflection point in efforts to harness innovation for the benefit of those who need it most.

The *Sourcebook* is intended as a consolidated reference and a foundation for future discussions about scaling



Intro Figure 1. Word cloud based on responses by Scale Up Conference attendees to the question, “What one word do you think describes the biggest challenge for successful scale up of agricultural technologies/innovations in developing countries?”

agricultural interventions and innovations. The *Sourcebook* suggests practical guidance for addressing each of the major scaling considerations emphasized at the conference (Intro Figure 1). While directed primarily to the agricultural sector, the document should also be relevant for those working on scaling development outcomes through commercial pathways in other sectors.

The publication benefited greatly from the guidance and project management provided by Suzanne Nielsen of Purdue University and from thoughtful review and substantive recommendations provided by the following individuals: Shaun Ferris (Catholic Relief Services), Mark Huisenga (United States Agency for International Development, USAID), Johannes Linn (Brookings Institution), Maria Elena Mangiafico (International Fund for Agricultural Development, IFAD), Marc Schut (International Institute of Tropical Agriculture, IITA), Simon Winter (Syngenta Foundation for Sustainable Agriculture, SFSA), Lennart Woltering (International Maize and Wheat Improvement Center, CIMMYT), and Carolyn Woo (Purdue University).

Materials from the Purdue conference can be found at <https://docs.lib.purdue.edu/scaleup/>, including video

presentations from the conference, the complete set of PowerPoint presentations, case study abstracts, and poster abstracts. These materials and subsequent contributions will be permanently hosted by the Community of Practice on Scaling Development Outcomes (see Chapter 9 for details).

Should readers have additional questions or be interested in joining the Community of Practice, they are invited to reach out to Larry Cooley, the principal author of this *Sourcebook* and co-curator (with Johannes Linn) of the Community of Practice, at lcooley@msi-inc.com.

CHAPTER 1

Designing Projects and Innovations with Scale in Mind

Big problems demand big solutions, but too often entrepreneurs and development agencies find themselves inventing, prototyping, and making modest investments in promising technologies with no scaling strategy beyond a hope that the best of these technologies will somehow find their way to scale. On occasion, that strategy works, but not often enough, with estimates that less than 5% of pilot projects ever reach national scale.²

A growing body of experience suggests that it is possible to do much better by following a few rules for designing interventions, innovations, and technologies with scale in mind.³

Scaling, as used here, is defined as “expanding, adapting and sustaining successful interventions (policies, processes, programs or projects) in different places and over time to reach a greater number of people.”⁴ More specifically, we are focusing on what some call “population-level” scale where the reach of the intervention (the “numerator,” e.g., reduced stunting of 5,000 children under the age of 5) must be evaluated in the context of the size of the problem or aspiration (the “denominator,” e.g., a national aim of reducing stunting for 1 million children under the age of 5).

Projects focused on limited populations or proof of concept are useful, particularly when they explicitly address unanswered questions of key stakeholders and provide the evidence needed to guide adaptation, simplification, and advocacy. But too frequently, projects focus on perfecting an innovation within a small, controlled setting rather than on beginning with a vision of system-wide change and how the project will help to get us there, as depicted in Figure 1.1. Without that, “pilot project” is just a synonym for “small project” and research is likely to result in “miracles on the shelf.”

Project = A short-term intervention designed to alter long-term processes and outcomes

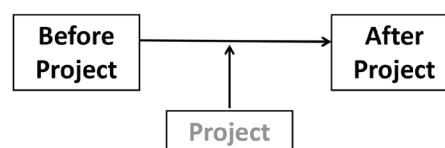


Figure 1.1. Projects as Instruments of Change

In agriculture, there are only two platforms able to reliably deliver goods, services, and technologies at population scale—governments and businesses, or a hybrid of both. Unlike projects and donors, these two platforms are predicated on operating at scale—delivering services at “population level” in the case of governments, and reaching the “addressable market” in the case of businesses—and are intended to sustain delivery of goods and services over time. Scale and sustainability are part of their DNA. Projects are, by contrast, designed to achieve discrete objectives over a fixed period of time, usually for a limited number of direct beneficiaries. Simply put, **if an agricultural project or innovation has no strategy for catalyzing a lasting change in market conditions and/or government services, it has no plan for achieving and sustaining outcomes at scale.**

While it is impractical and wrong-headed to assume that every intervention should be scaled or that everyone should become a scaling expert, a serious focus on scaling has implications throughout the research-to-results continuum. At a minimum, integrating a focus on scale into agricultural research investments, prototypes, and pilot

projects includes thinking through a plausible pathway to scale and designing the initial project or prototype to advance that strategy by:

- Ensuring that the research/pilot/prototype generates evidence for advocacy, simplification, and tailoring of the intervention;
- Identifying, involving, and working with the intended large-scale implementers through multi-stakeholder initiatives;
- Focusing early on unit cost and implications of the proposed change for existing businesses and current service providers; and
- Allowing for frequent adaptation and adjustment based on market and client feedback.

There are several frameworks that can be used for planning a pathway to scale and for assessing scalability. One widely used framework consists of three steps and a total of 10 tasks essential for planning and achieving scale (Figure 1.2).⁵

This framework and others support scaling by detailing the actions required for successful scaling, and by distinguishing a range of scaling strategies and their operational implications. The analysis is elaborated in a separate publication that clarifies the considerations and implications of pursuing scaling objectives in agriculture through commercial pathways.⁶

The following seven procedural guidelines or admonitions derived from these works have been shown to enhance the scaling prospects of interventions and innovations that benefit the rural poor (i.e., “pro-poor” agricultural solutions).⁷

Guideline #1: Technological innovation is only one part of the challenge. Focusing on supply chains, the business case, and the incentives for key players; overcoming skepticism; strengthening key institutions and financing mechanisms; and minimizing transition costs, are essential.

Guideline #2: Focus early on scale and on what’s “beyond the project.” The linear approach of focusing first on effectiveness, then on efficiency, and finally on expansion will not work. By the time attention turns to

Three management challenges: (1) planning with scale in mind, (2) assessing scalability, and (3) managing the scaling process

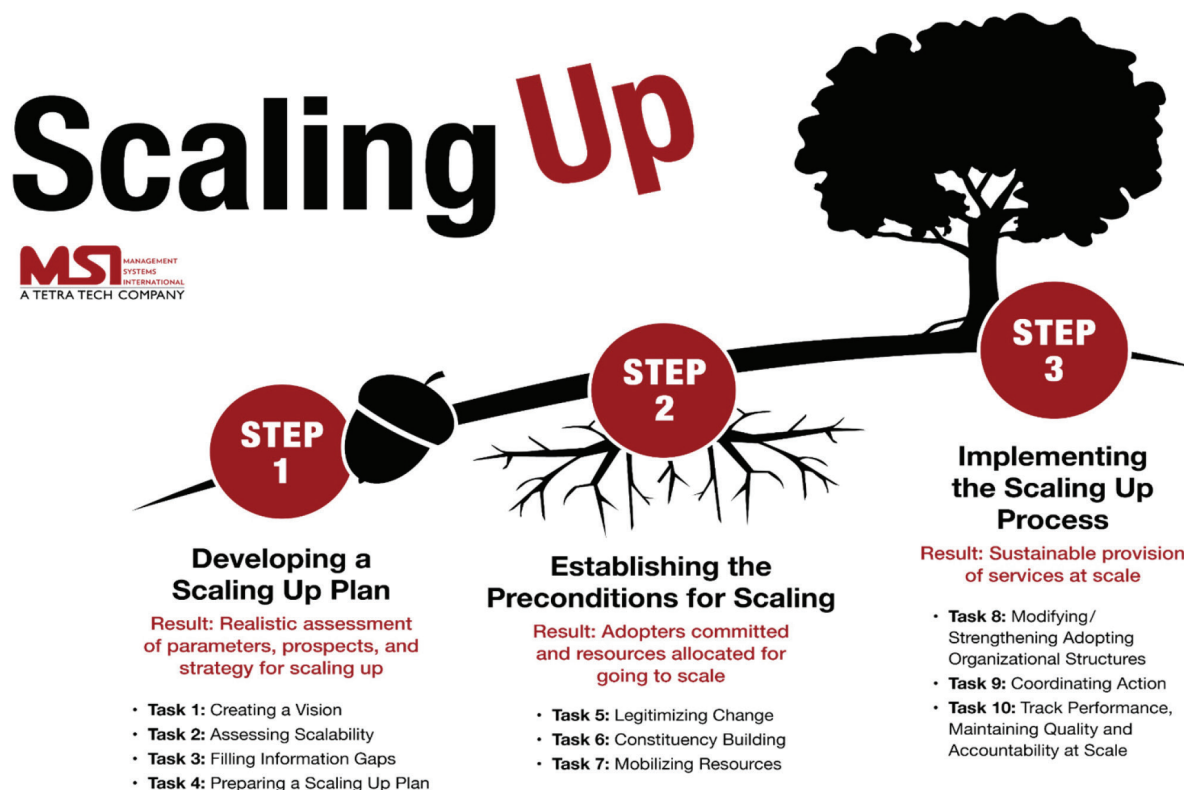


Figure 1.2. A Three-Step, 10-Task Management Framework for Scaling

expansion, the innovation will likely be too complicated or too expensive to scale, or it will be insufficiently attuned to other market realities. Although it is challenging to do so, early-stage innovators need to have one foot on the accelerator at the same time as they have the other foot on the brake—laying the groundwork for scaling while reserving judgment as to whether scaling is warranted.⁸ And project designers and implementers need to plan from the beginning for “What happens beyond the project or pilot if it works?”

Since a principal role of pilot and demonstration projects is to generate the evidence, learning, and communication needed to make these kinds of decisions, a good rule of thumb for pilot or R&D projects is to budget 20% of total costs for these functions rather than the 5% typically earmarked for monitoring and evaluation in conventional development projects (see Chapter 6 for more on this topic).

Guideline #3: Think subtraction, not addition. As you develop and refine an innovation, do not just think about how to make it better; think at every stage about how to make it simpler, cheaper, and more compatible with the procedures and incentives of the provider you hope will deliver it at scale.

Guideline #4: Link scale and sustainability. “Sustainability”—the continuation of services and outcomes over time—should be inextricably linked to the concept of scale. Every time a project discusses scale, someone should ask, “Yes, but is it sustainable?” Every time a project discusses sustainability, someone should ask, “Yes, but at what scale?”

Guideline #5: Expect and plan for iteration. The pathway from innovation to scale, even when successful, takes an average of 15 years⁹ and involves multiple changes in intervention design and scaling strategy along the way. A capacity for course correction is typically more important than a perfect plan. This puts a premium on establishing monitoring and evaluation (M&E) systems designed to inform these changes and negotiating as much flexibility as possible with funders and partners. (See Chapter 6 for more.)

Guideline #6: Prioritize intermediation. Scaling pro-poor agricultural solutions requires a wide range of supporting activities. Included in this “intermediation” are functions such as convening key stakeholders, investment packaging, syndication, and garnering support for policy change. In high-end commercial markets (including high-margin markets in low-income countries, as discussed in Chapter 3), these functions are performed by venture capitalists, investment bankers, and specialized consultants. At the bottom of the pyramid, these functions often fall between the cracks. When designing projects and interventions aimed at scaling for these markets, designers and funders, as part of their due diligence, need to take special care to ensure that capacity and funding exist to perform these functions (see Chapter 7 for more on this topic).

Guideline #7: Someone has to drive. Scaling of pro-poor outcomes almost never occurs spontaneously, and it will rarely succeed without the determined leadership of people who are able to garner substantial resources and support, are deeply committed to the change, and are willing to stick with the effort over time. But change can begin anywhere and is more likely if everyone has an eye on scale from the outset. While it may be unrealistic, for example, to expect innovators and researchers to drive change from their labs or workshops, their focus on workable solutions to real problems and on plausible pathways to scale can be an essential ingredient in turning aspirations into outcomes.

One way of increasing attention to the array of scaling considerations noted in this chapter is by incorporating a scaling plan as a component of—or companion to—project and grant proposals. Rather than focusing on an intervention’s technical theory of change (i.e., how the intervention or innovation is expected to work), these plans highlight how the project is expected to lead to change in the larger system—what some have termed a “second theory of change” or “theory of scaling.”¹⁰ See Management System International’s (MSI) guidelines for one suggested format for scaling plans,¹¹ available at <http://tinyurl.com/yxt6wen9>.

CHAPTER 2

Assessing Scalability

As noted in Chapter 1, assessing the potential for reaching and delivering at scale is hard-wired into the business models and incentives of private companies and government service agencies, both of which are motivated to operate at a scale dictated by the size of the need or market, and to satisfy those needs over the long run. This is quite different from the incentives and business models of organizations that fund or implement activities on a project basis and that, therefore, are focused from the outset on defined targets and deliverables, fixed implementation periods, and clear exit strategies. For most project-based organizations, adopting a scaling mentality thus requires major shifts in organizational systems, procedures, incentives, and mindsets. Often this change begins by institutionalizing some kind of “scaling scan,” “scaling readiness,” or “scalability assessment” at the project or transaction level.

The purpose of “scalability assessment” is to identify as early as possible the upside prospects and likely challenges that will be faced in scaling a specific service, innovation, approach, or product. Doing this systematically allows everyone involved to make informed decisions about whether and how to proceed, and to take specific steps to mitigate potential scaling obstacles.

Analyzing scalability requires careful analysis of four interlocking elements: (1) characteristics of the innovation or intervention; (2) characteristics of the organization(s) that would deliver it at scale and that would support the scaling effort; (3) characteristics of the prevailing policy regime and other enabling or constraining conditions; and (4) contextual factors such as the homogeneity or diversity of potential adopters (Figure 2.1).¹²

Some of the first efforts to address scalability used cost-benefit and cost-effectiveness analysis as principal tools.¹³ More recently, there have been several efforts to formalize the process of scalability assessment and, subsequently, to

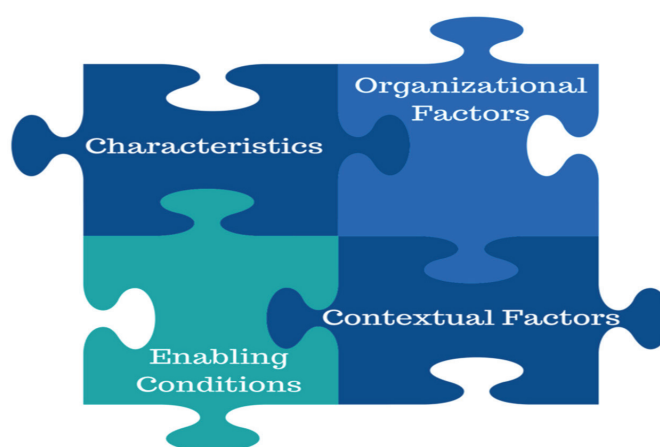


Figure 2.1. Four Dimensions of Scalability Assessment

adapt and apply systematic scalability assessment to pro-poor agricultural interventions and innovations.

Typical of these efforts is a 32-item scalability assessment checklist,¹⁴ available at <http://tinyurl.com/yxlqgmfd>, that has been applied as a decision-support and planning tool in a variety of sectors and countries since 2006. That checklist was recently adapted and elaborated for application to pro-poor agricultural innovation. The adapted instrument, the Agricultural Scalability Assessment Tool (ASAT),¹⁵ available at <https://bit.ly/2UaZ1B5>, includes 37 factors related to (1) the importance of the innovation; (2) its credibility and observability; (3) the ease with which it can be tried, purchased, adopted, and implemented by potential adopters; (4) the benefits and business case for potential adopters; (5) the business case for other supply chain actors and the strength of the underlying market system; and (6) the enabling environment.¹⁶

Given the subjective nature of some of its elements, the ASAT is most useful when applied by diverse stakeholders in a facilitated process. Since each of the 37 factors in the

index can be addressed through policy or programmatic actions, the tool is more appropriately used as a basis for modifying or adjusting scaling strategies than as a “scorecard” for determining the feasibility of an intervention or innovation reaching scale.

A second tool emerging from USAID-sponsored research is a “decision tree” intended to assess the feasibility and suitability of private sector, public sector, and hybrid scaling pathways for each of six key functions involved in scaling agriculture, namely: production, distribution, incentives, demand creation, training/support, and overall leadership of the scaling process.¹⁷

In search of a simple-to-apply method of assessing scalability, the CIMMYT collaborated with the Netherlands Development Organization (SNV) to develop a tool intended to help researchers and project leaders conduct self-assessments of their scaling plans, aspirations, and prospects—what the authors term a “scalability scan.” Like the ASAT, this tool is designed to be used in a moderated workshop setting. Users are guided through three steps: (1) construct your scaling ambition; (2) assess scaling ingredients; and (3) list and respond to critical concerns. Step 2, the scaling assessment, is organized around 10 “scaling ingredients” as shown in Figure 2.2.¹⁸

With similar aspirations, Wageningen University and the IITA have developed a methodology called “Scaling Readiness.” Building on a NASA framework for assessing Technology Readiness,¹⁹ Scaling Readiness was developed under the CGIAR (Consortium of International Agricultural Research Centers) Research Program on Roots, Tubers and Bananas. It uses scientifically based methods and tools to (1) characterize and unpack agricultural innovations, (2) diagnose the readiness of the innovation to scale, (3) develop scaling strategies, (4) support stakeholder selection and action to overcome bottlenecks to scaling, and (5) navigate whether investments have resulted in the desired effect through monitoring, evaluation, and learning. Scaling Readiness has been used by research, development, and donor organizations in 12 countries.²⁰

Other recent contributions on scalability assessment include a book by the International Development Research Centre (IDRC) on the science of scaling, Ann Mei Chang’s book *Lean Impact*, and a publication by Lennart Woltering and colleagues on the “scaling mindset.”²¹

A final noteworthy methodology comes from IFAD, which has been particularly ambitious in its efforts to integrate scaling as a central element in all aspects of its operations. Building on a conceptual framework for scaling up

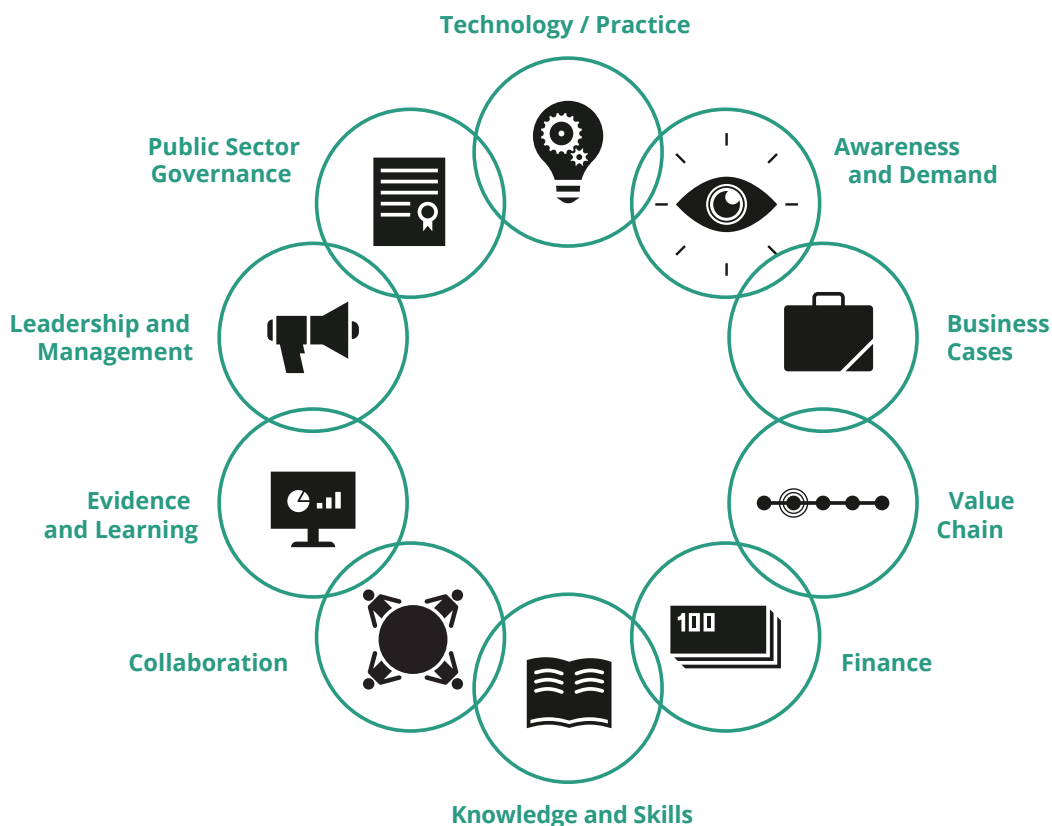


Figure 2.2. The Scaling Scan—10 Scaling Ingredients

developed in partnership with the Brookings Institution (see Chapter 7), IFAD elaborated an *Operational Framework for Scaling Up Results*.²² The framework provides guidance on how to systematically consider scaling up in IFAD's operations, from inception to completion, and in different contexts. It suggests specific guiding questions for the different stages of the project cycle related to "Vision, Strategy, and Implementing the Scaling Up Process" that probe threshold considerations on scaling.

This approach has been further adapted in an operational scaling assessment framework and toolkit developed under the auspices of the International Development Innovation Alliance (IDIA), a grouping of 12 major development finance institutions focused on supporting innovation for development impact at scale.²³

A growing number of cases document the use of these various scalability assessment tools. Notable among these are five detailed case studies on market-based scaling of agricultural innovation,²⁴ five applications of the ASAT,²⁵ four case studies of "scaling readiness,"²⁶ and a variety of cases presented at the 2018 Purdue conference on scaling agricultural innovation.²⁷

Box 2.1. Case Studies of Scaling Through Commercial Pathways

USAID's Bureau for Food Security commissioned in-depth case studies of pro-poor agricultural innovations scaled through commercial pathways, including:

- o Hybrid maize in Southern Zambia;
- o Irrigated Sahel rice in the Senegal River Valley;
- o Low-cost agricultural machinery in Southwest Bangladesh;
- o Purdue Improved Crop Storage (PICS) bags in Kenya; and
- o Kuroiler chickens in Uganda.

The results—available in a series of case reports²⁸ and synthesis documents²⁹—contributed directly to the development of the Agricultural Scalability Assessment Tool (ASAT³⁰) and decision tree methodology presented in this *Sourcebook*.

Among many insights emerging from the cases are the following:

- There is no such thing as a fully "commercial" pathway to scale; government policies, regulations, and subsidies play central roles in scaling all agricultural interventions.
- Successful commercial scaling requires forming partnerships that go well beyond the traditional concept of "implementing partners" to include key value chain actors such as equipment leasing, input provision, and product aggregation enterprises.
- Scaling works best when changes are tangible, familiar, and easy to bundle and unbundle.
- Information technology has rapidly accelerated and fundamentally altered some pathways to scale.
- The most vexing bottlenecks for scaling of innovations are usually nontechnological in nature (e.g., access to markets, enabling policies, seed systems, access to finance).
- Poor farmers' time horizons tend to be extremely short; they cannot afford a mistake and therefore tend to place a higher priority on minimizing risk than on maximizing reward.
- Monopoly and/or monopsony are sometimes useful in the short run to build effective and efficient supply chains, but often present challenges later.
- It is usually more effective for strategies and projects to avoid mandating the choice of local partners and prespecifying the sequencing of actions.

While the development and use of scalability assessment tools for pro-poor agricultural interventions are still relatively new, there is a growing recognition that project planning and applied research design should both include some form of "scalability screen." The tools noted above provide a foundation for that analysis and for deeper discussion among stakeholders on the most appropriate scaling strategy to adopt.

CHAPTER 3

Using Commercial Markets to Drive Scaling

Because functioning markets are critical for creating population-level impact, it is essential that researchers working on technological improvements engage with relevant private entities at an early stage in the research process. These private sector representatives—small agribusinesses, cooperatives, input dealers, wholesalers, retailers, processors, equipment leasing firms, and food service companies—can provide timely feedback to steer the development of the technology, partner on demonstrations, and, once the technology is launched, play a critical role in sustainably scaling technology adoption.

The prevailing gulf between publicly financed research and markets is due partly to the fact that private sector investment in agriculture has been viewed with suspicion until recently in many low-income countries. Governments often assumed monopolistic roles for major inputs and commodities, cast as a protection for ordinary producers and consumers from market fluctuations and unscrupulous private sector actors.

With the global debt crisis of the 1980s, many of these government interventions were no longer tenable. Structural adjustment lending programs were frequently conditioned on government commitments to liberalize major markets, including agricultural markets. Donor agencies began to work with host country governments and private sector investors to develop and strengthen agricultural value chains and markets, but rarely were these programs systematically linked to research and technology development activities. In his keynote address³¹ at the Purdue conference, Akin Adesina recounted his excitement about bringing new high-yielding varieties of sorghum to farmers as a postdoctoral researcher at the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT). “But,” asked the farmers, “will ICRISAT buy the sorghum?” In other words—innovation is great, but where is the

market? Technologies must be profitable, and there must be a buyer for the additional production.

A growing body of experience highlights the following four major insights regarding the role of markets to achieve scaling:

Address gaps in value chains to improve the economics of technology adoption. Several cases examined in a USAID-funded assessment of scaling through commercial markets feature examples of technologies that sat on a shelf for years because key parts of the value chains were missing. These include Senegal Sahel high-yielding irrigated rice varieties that were introduced in the 1990s but did not take off until the 2010s, when they were included as part of donor- and government-supported value chain innovations to improve the production of certified quality rice seed; extend good agricultural practices; strengthen capacities to supply inputs, services, and downstream market linkages; and access finance.³² The critical role of government policies in facilitating Senegal rice adoption, including guaranteeing farmer prices above production costs, is discussed in Chapter 5.

Similarly, PICS (Purdue Improved Crop Storage) technology, featuring triple-layer bags that provide a hermetic seal against pests, was developed in the late 1980s in Cameroon through USAID-funded research.³³ But PICS bags did not begin to scale until 2007, following an economic analysis by the Bill and Melinda Gates Foundation that determined, because of the high cost of imported PICS bags, that developing local manufacturers and suppliers would be critical to bring down PICS bag costs and make their adoption more attractive. Today PICS bags are in use in more than 30 countries in Africa and Asia.

Focus on strengthening local capacity and companies to solve the “missing middle” problem. In low-income countries, there are large gaps in access to agricultural market services. The small group of fully commercial farmers

are reached by the larger international and regional seed companies and machinery providers, for example, while the vast majority of semicommercial and subsistence farmers largely rely on saved seed and operate with animal and people-powered equipment.

Promising models to reach underserved farmers who are transitioning from subsistence to semicommercial farming focus on strengthening local companies and capacity. In the PICS case, filling the “missing middle” to improve smallholder access to better postharvest storage involved developing local manufacturing capacity, a dealership network, and innovative marketing strategies for selling bags in small quantities. Local manufacturers of burlap bags and other woven products, for example Pee Pee Limited of Tanzania, were trained to manufacture a different, higher quality bag than the ones they were producing previously. Activities to incentivize the local manufacture of bags were combined with community-level demonstrations and innovative programs to generate demand and attract local vendors to sell the bags, including established agro-input shops, women, and youth.³⁴

The Program for Africa’s Seed Systems (PASS) of the Alliance for a Green Revolution in Africa (AGRA) worked to strengthen local research and seed value chain capacity at several levels. Critically, the PASS model focused not only on building the capacity of different value chain nodes, but also on purposefully linking the nodes. Efforts included building local university capacity to produce plant breeders; developing the technical and managerial capacity of African seed companies from the “ground up” to produce high-quality seed at scale; facilitating links between breeders and companies; and developing local seed marketing outlets close to farmers.³⁵

Seeds for Impact, a partnership between AGRA, the Africa Enterprise Challenge Fund (AECF), and Syngenta Foundation for Sustainable Agriculture (SFSA), launched in late 2018, will leverage the progress by PASS and similar initiatives to provide small, growing seed companies with a mix of grants, loans, and technical assistance to scale faster.³⁶

Both the PICS and PASS programs demonstrate that building local capacity is often a long, slow, and costly process. These efforts have been underway for well over a decade, a much longer timeframe than many project-based donors have been willing to support. Monitoring and evaluation efforts are usually focused on more immediate “outputs” rather than indicators of market development and sustainable impacts over a longer time horizon (see Chapter 6). Progress in developing local capacity may only manifest its full effects years after the project’s close.

Increase smallholder access to markets and lower the costs of capital-intensive inputs and services by working through local service providers, franchise systems, and membership groups, and by harnessing technology. The comparatively large expense of agricultural machinery, especially for use on small tracts of land for limited periods of the year, combined with difficulties in accessing finance for fixed capital (see Chapter 4), has severely limited the adoption of agricultural mechanization by smallholders. In Bangladesh, the Cereal Systems Initiative for South Asia—Mechanization and Irrigation (CSISA-MI) project addressed this challenge by developing a model in which a local service provider (LSP) provides machinery services to the community. LSPs are key farmers with adequate capital, entrepreneurship, and business skills to buy a machine, which they use on their own land and then provide services for a fee to neighbors during the rest of the season.³⁷

Babban Gona’s³⁸ model in Nigeria and One Acre Fund³⁹ in East Africa both address economies of scale challenges by providing farmer members or franchisees with access to markets, negotiated prices, and technical advice. Hello Tractor,⁴⁰ operating in several African countries, has introduced an innovative “Uber for tractors” concept that uses information and communication technologies (ICT) to connect farm machinery owners with smallholders desiring mechanized services. The objective is to increase the efficiency of machine use and reduce unit costs in order to facilitate much wider adoption of mechanization. Farmers can book services via an app or a local Hello Tractor agent. Requests are validated, aggregated geographically, and scheduled. Tractors are fitted with remote tracking devices so that Hello Tractor and tractor owners are able to track location and usage at all times.

Encourage private sector collaboration on extension. Private companies are embracing new functions to fill in missing pieces of the value chain, build a longer-term relationship with customers, and ensure quality, often leveraging ICT. Over the years, funding for public extension services in low-income countries has declined, and local agro-dealers are beginning to step in to provide various services. These include organizing community-level demonstration plots where farmers can see the impact of technologies close up. In Egypt, BASF created a mobile clinic, operating on market days, where farmers can bring their diseased plants and receive advice. BASF, Bayer, and others also make extension advice available by phone through interactive voice messages or through Internet sites. Product stickers on bags of fertilizer, seed, and chemicals provide phone or Internet contact information through which customers can check lot numbers and avoid fake products.

Locating the Cases in the Scaling Framework

Relating these case examples to the three-step scaling framework described in Chapter 1 (Figure 1.2) raises critical strategy, monitoring, policy, and timeframe questions related to Step 2 of the framework, Establishing the Preconditions for Scaling, and Step 3, Implementing the Scaling Up Process.

Like many promising agricultural interventions and innovations funded through projects, each of these cases struggled to carry out the foundational tasks included in Step 2 of the framework. But unlike most, each of these cases found a way to progress toward significant scale. Now, as each faces the operational tasks associated with Step 3, there are an array of new challenges relating to the development of profitable and competitive market solutions for the provision of inputs, equipment, and/or distribution and sales at scale (see below). Limitations regarding the financing of scale and the enabling environment for scaling are discussed in Chapters 4 and 5.

Senegal Sahel rice and PICS bags are clearly in Step 3 (Implementing the Scaling Up Process). Both initiatives have benefited from strong government and/or donor support for organizational innovations and coordination to connect smallholders to critical technologies and markets, and, in the case of PICS bags, to create local manufacturing capacity. Questions related to government support and the sustainability of Senegal Sahel rice adoption will be discussed in Chapter 5.

The spread of PICS bags appears to be more clearly on the path to sustainability over the long term without external support. Locally manufactured bags are generally lower cost and of competitive quality with imported competitors, and the private sector is continuing to evolve bag design and marketing innovations with diminishing reliance on program support. However, as PICS bags become a dispersed private sector product rather than a project output, monitoring will become more difficult. Adoption rates, costs of manufacture and distribution, and determining the point at which population-scale, sustained scaling is reached in a given country or region will be hard to determine, particularly if no specific external assessment efforts are put into place.

PASS is in the latter stages of Step 2 (Establishing the Preconditions for Scaling) and appears to have achieved the desired result of committed adopters and resources allocated for going to scale. The nature and level of competition in producing quality seed, and the ultimate scale potential of the effort, remain to be determined. PASS has now been folded into a new program, Partnership for Inclusive Agricultural Transformation in Africa (PIATA). Tracking progress in Step 3 toward sustainable scaling will

require monitoring PIATA as well as affiliated programs that build on PASS such as Seeds for Impact—in short, a much different approach to monitoring (see Chapter 6).

Takeaways

Several key points emerge from this analysis with respect to the use of commercial markets to drive pro-poor scaling:

- Government and/or donor action is often required to promote inclusive market development when the private sector is unwilling or unable to absorb the costs of reaching remote and dispersed smallholders.
- Commercial markets are inherently volatile. In seeking scale, donors and governments should be sensitive to the risks faced by those who live on the margin, and seek measures to offset some of that risk without creating moral hazard.
- Engaging with markets is critical for creating population-level impact, but most smallholders have limited access to reliable input or commodity markets. Resources and patience are required to launch or strengthen local entities that can provide, and sustain, services to underserved rural areas.
- Effective support for pro-poor agricultural innovation often includes collaboration with, and assistance for, the nonfarming businesses and organizations, e.g., bag manufacturers and universities, that are vital to filling the gaps and developing viable agricultural value chains.
- Working through local service providers, franchise and membership groups can help to aggregate demand and reduce the costs of providing capital-intensive inputs and market services to remote smallholders.
- There is considerable scope for local agro-input dealers and service providers to offer quality extension and product verification services to smallholders to fill the gap left by diminished support for public extension.
- Although often needed to jump-start change, sustained public or external support also carries risks of dependence, or may inadvertently crowd out other private sector investors. Similarly, temporary monopolies are sometimes necessary to create investment incentives and economies of scale, but planning should include a strategy for encouraging competitive markets over time at all stages of the value chain.

CHAPTER 4

Financing the Transition to Scale

Scaling impact in agriculture requires investment at scale, but where will the money come from? Commercial banks have been famously reluctant to lend to the sector. In Africa, an estimated 1% of commercial bank loans go to agriculture.⁴¹ Globally, the unmet demand for smallholder finance is estimated at \$200 billion.⁴² A World Bank survey of commercial lending in Ghana, Nigeria, Cote d'Ivoire, and Sierra Leone found that most lending for agribusiness was short-term and did not match borrower needs, particularly investment capital requirements for farm machinery, nonfarm assets, and industrial property. Banks mainly financed off-farm value chain activities, including processing and marketing, and avoided lending to smallholder farmers except where they were organized into cooperatives or producer organizations.⁴³

Why Is Commercial Bank Lending to Small and Medium Enterprise (SME) Agribusiness so Low?

Commercial banks perceive agricultural value chain activities as relatively high risk, high cost, and low margin compared to other sectors. Production can be devastated by droughts, floods, pests, and diseases. Input and commodity markets can be affected by price volatility and logistics challenges. Legal issues, including land tenure and contract enforcement, also add risk and costs. Providing financial services through regular brick and mortar banking facilities to widely dispersed farmers and agribusinesses is costly. In addition, banks often cite their lack of in-house technical expertise and inability to assess agriculture-related risks as a key reason for the low level of finance to the sector. When commercial bank financing is available, interest rates are often prohibitively high for smallholders and SME agribusinesses.

To deal with the chronic lack of funding for agriculture from the commercial sector, the agriculture sector has traditionally turned to government for subsidies, and to donor and development finance institutions for investments in agricultural development projects. However, the level of public funding delivered through individual projects in this way has been inadequate to support scaling up, and public-only financing is unsustainable over the long term.

The following sections review some of the emerging public and private sector innovations that are beginning to offset risks and increase financial flows to the agricultural sector from commercial banks and newer financial actors. The financing channels—by themselves or in different combinations as blended financing—offer funding, repayment terms that are tailored to specific situations, and, increasingly, ongoing management and technical advice.

The financial sector innovations described below are generally at the nascent stage. While there are an increasing number of examples on the ground, implementation and learning tend to be siloed, with limited resources for innovation and few platforms for sharing across organizations. An exception and potential model is the Council on Smallholder Agricultural Finance, an alliance of social lending institutions targeting “missing middle” agricultural businesses in low- and middle-income countries. Established in 2012, the alliance provides a platform for members to convene on a precompetitive basis to share learning, identify best practices, and develop industry standards related to market growth, responsible lending principles, and social and environmental impact.⁴⁴

Even the most innovative partnerships and mechanisms, however, will be limited by the policies, regulations, and services provided by the government (see Chapter 5). These include contract enforcement, laws and regulations affecting input and commodity trade, and policies

governing land tenure, as well as levels of corruption that can discourage private sector investment.

In the early stages of developing an innovation and scaling pathway, lead scaling partners should review the landscape of financial partners and programs that have aligned interests and/or are already operating in the target region(s). Prospective financial partners for scaling should be engaged at an early stage—even if their funding is not needed until later—so that these partners can help to shape the program as it develops and ready it for larger financing streams.

The remainder of this chapter reviews a range of risk mitigation and capital mobilization mechanisms intended to increase the financing available to scale up pro-poor agricultural innovation.

Risk Mitigation

Traditional loan collateral requirements, including land or building titles, are often difficult or impossible for smallholders to obtain. *Warehouse receipt systems* (WRS) enable farmers and agribusinesses to use stored commodities in lieu of traditional collateral for finance. Long-established WRS exist in the United States, across Latin America and Western Europe, and in China, Vietnam, and the Philippines. In WRS, the farmer deposits a quantity of agricultural products in a licensed warehouse. The warehouse then issues a receipt that can be retained for later sale of the commodity or used as collateral for finance.

Donor programs to help develop WRS and link their use to credit guarantee funds have expanded farmer access to financing in some countries,^{45, 46} but overall their use in low-income countries remains limited.⁴⁷ While a number of countries have developed legislation that enables warehouse receipts to be used as legal collateral, it has proved more difficult for low-income countries to meet broader system-level requirements, including a reliable network of licensed warehouses that are regularly inspected, competently managed to maintain the quality of stored commodities, and insured.⁴⁸

Traditional insurance. Agricultural insurance is used by producers and their financial partners to mitigate unpreventable risks at the production level and throughout the value chain. Financial partners for scale up investments may require programs to acquire insurance against producer risk as a prerequisite for financing approval, and/or may seek additional insurance themselves. Agricultural insurance is common in industrialized countries, but its

use in low-income countries remains low. A 2012 World Bank study found that only one-third of middle- and low-income countries offer agricultural insurance products.⁴⁹ Even when such products are available, utilization may be low because of the expense or the lack of confidence by banks and farmers in the overall system.⁵⁰

Index-based insurance. In recent years, the development of advanced agricultural risk modeling techniques and the emergence of insurance pools and index-based insurance have sparked new interest in agricultural insurance. In contrast to traditional insurance, which assesses risks and claims on an individual basis, index-based insurance is based on measuring an objective parameter(s) that is highly correlated with actual losses sustained by farmers or herders.⁵¹ For example, the insurance payout scale may be agreed to in advance, based on rainfall levels recorded at a given weather station. In aggregate index insurance, the payouts are based on an index developed from aggregated statistics of farm production in a defined geographic area, for example, crop yield estimates.⁵²

Index insurance has increased in popularity, and today tens of millions of farmers in India and a growing number of farmers and herders in Africa are thought to be insured through these programs.⁵³ Their popularity is due in part to the potential to address systemic catastrophic risks, including widespread drought. Available evidence suggests that farming households with index insurance increase their investments in production and in some cases make riskier production choices, both critical to advance scaling of agricultural innovations.⁵⁴ The International Livestock Research Institute (ILRI) pioneered the adaptation of index insurance for livestock herders in drought-prone areas.⁵⁵

However, a 2018 stock-taking study by ISF Advisors found that while index insurance shows great potential, it is not yet at a mature enough point for innovations to scale and graduate from donor assistance. There are issues to be overcome at different nodes: from smallholder farmers who have difficulty understanding, trusting, and affording products; to aggregators and intermediaries who lack experience and resources to deal with a range of complex tasks; to global reinsurers faced with a very small market; and to governments attempting to fit these products into broader national insurance policies and programs. The World Bank, the International Finance Corporation (IFC), and other development partners are focusing on the development of effective, sustainable markets for index-based weather and catastrophic risk insurance through the Global Index Insurance Facility (GIIF).⁵⁶ But there is a need for broader industry-wide collaboration and a platform similar to the Council

on Smallholder Agricultural Finance to facilitate ongoing innovation, testing and prototypes, improvements in the regulatory and enabling environment at national levels, and cross-organization sharing, learning, and investment.⁵⁷

Credit guarantee funds, usually provided by governments or development organizations, make commercial lending more attractive by sharing or absorbing the risks of lending to the target sector, value chain, or enterprise type. Credit guarantees provided by the Alliance for a Green Revolution in Africa (AGRA), the International Fund for Agricultural Development (IFAD), the World Bank, and other partners have motivated local banks to make loans to agro-input dealers, small-scale farmers, and other SMEs in several African countries. AGRA reports that \$17 million in loan guarantees leveraged \$160 million in low-interest loans from commercial banks in five African countries.⁵⁸ The Africa Guarantee Fund for Small- and Medium-Sized Enterprises,⁵⁹ funded by the African Development Bank in partnership with Denmark and Spain, provides partial credit guarantees and funding to help financial institutions develop their capacity to manage SME portfolios.

The Nigeria Incentive-Based Risk Sharing System for Agricultural Lending⁶⁰ (NIRSAL), initiated by the Central Bank of Nigeria in 2011 with seed capital of USD \$500 million, is the largest government-run program of its kind in Africa. In addition to credit guarantees, NIRSAL provides insurance and technical assistance to banks with the objective of increasing commercial lending to agriculture from 2% to 7% of the overall portfolio within 10 years. Between 2012 and 2015, NIRSAL provided credit guarantees for more than 450 agricultural projects valued at \$170 million.⁶¹

Innovative Finance

Blended finance is the combination of funding from a range of capital providers (including, but not limited to, commercial banks) with differing financial and social objectives. Blended finance partners might include development agencies or other philanthropic funds anticipating a negative financial rate of return, and other funders seeking capital preservation, below-market, or market rate returns. Blended finance approaches are typically used to “attract capital for investments addressing market failures and delivering substantial social and/or environmental impact in emerging and frontier markets.”⁶²

Blended finance mechanisms have become increasingly popular and can provide important opportunities for scalable innovations to gain access to finance. According

to a World Economic Forum survey of 74 blended finance vehicles, each dollar of grant funding invested typically attracts \$1–20 in private investment.⁶³ There are many types of blended finance instruments, often packaged in different ways to meet the requirements of a specific opportunity and group of investors.

In *structured finance agreements*, public or philanthropic investors agree to absorb “first losses” to protect private investors in case the financed program fails to perform as expected and investors cannot be repaid. For example, in the Africa Agriculture Trade and Investment Fund (AATIF),⁶⁴ a \$146 million fund that invests in African agriculture, the first two tiers of shareholders, the German Ministry of Development and Deutsche Bank, agree to absorb losses before the third tier—composed of private investors—is hit. This means that losses would have to exceed 50 percent of the fund’s value before private investors were harmed.⁶⁵

Another example of structured finance comes from Root Capital, a social impact investor (see the following section) specializing in providing financial access to underserved smallholders and SMEs in low-income countries.⁶⁶ In response to a devastating outbreak of coffee leaf rust affecting millions of coffee farmers in Latin America beginning in 2012, Root Capital mobilized partners from across the public, private, and nonprofit sectors to co-design the Coffee Farmer Resilience Initiative (CFRI).⁶⁷ CFRI is funded with a blend of below-market-rate capital, including low-cost debt, catalytic credit enhancements, and grant funding. Several tiers of partners were recruited to support the program. The Ford Foundation, the Inter-American Development Bank’s Multilateral Investment Fund (IDB-MIF), and Starbucks Coffee Company made long-term investments (7–10 years) of \$12.5 million in Root Capital to support coffee farm renovation and rehabilitation-related lending. Keurig Green Mountain and USAID provided first-loss capital and other forms of credit guarantees.

USAID also provided an additional \$2 million in grant funding under the Global Development Alliance to mobilize funding and partnerships from several specialty private sector roasters, who channeled funding for technical assistance to their suppliers to reach over 40,000 farmers. Support from other donors covered the costs of program design, financial management training, ICT activities, and impact assessment.

Agribusiness investors and agricultural investment funds. Investments by foreign agribusiness firms in low-income country agricultural sectors provide important sources of finance as well as technical assistance. Governments and donor agencies often partner with multinational firms in

these investments to supplement resources for technical assistance and ensure greater inclusion of smallholders.

Olam's rice investment in Nasarawa State, Nigeria provides one example. Olam established Ondorie Nucleus Rice Farm, a 10,000-hectare irrigated rice farm, and a state-of-the-art mechanized rice milling and parboiling facility with the capacity to process 105,000 MT rice/year. The rice is sourced from the nucleus farm and from smallholder outgrower networks in communities across three states. Farmers are being supported with group formation, training, and agricultural inputs on credit to improve their production. They also benefit from a guaranteed buyer system. Grant and financing partners include the federal government of Nigeria, the Commercial Bank of Nigeria, IFAD, and USAID/Nigeria.⁶⁸ From a starting base of 30 farmers in 2015, the partnership by 2017 had expanded to nearly 5,000 farmers. During this period Olam purchased over 25,000 MT of rice from smallholders for \$9.8 million. The partnership also created 3,800 off-farm value chain-related jobs, primarily for youth and women.⁶⁹

The Advanced Maize Seed Adoption Program (AMSAP) is another example of a public-private agribusiness investment, here including USAID, DuPont Pioneer (now Corteva Agriscience), and the Government of Ethiopia. In AMSAP, USAID offered a dollar for dollar grant matching program that leveraged a \$2 million contribution from DuPont. The program's goal was to improve the yields, incomes, and nutritional outcomes of more than 100,000 smallholder farmers across three regions of Ethiopia. ACDI/VOCA provided technical assistance to develop demonstration plots and field training sessions, and strengthened a network of agro-input dealers and cooperatives to advance the adoption of improved inputs and production techniques. By the end of 2016, two years before the program's end, over 250,000 smallholders had adopted new technology. Participating farmers achieved a threefold increase in maize yields and boosted their annual incomes by as much as \$1,500.^{70, 71}

Agricultural investment funds combine capital resources from different types of investors for on-lending to, or investment in, agricultural enterprises. Through these pooled resources, the funds offer diversified investments and vehicles that help manage investors' risks.⁷² The investment funds utilize a range of instruments to provide capital to agribusinesses, including equity, debt, and guarantees. They also provide specialized technical and management expertise to support clients and improve investment performance.

Many agribusiness investment funds were established as public-private partnerships with government agencies,

sovereign wealth funds, and development finance institutions (DFIs) as major investors. More recently, foundations, bilateral donors, and nongovernmental organizations have also entered partnerships with agricultural investment funds. The development partners are important because they provide direction to focus investments on lower-income, harder to access farmers and SMEs. They also provide a source of patient capital, and sometimes separate grant funds for technical assistance, enabling fund investment managers to have greater flexibility in providing support to underserved clients.

Social impact investments are made "with the intention to generate positive, measurable social and environmental impact alongside a financial return."⁷³ Targeting a range of returns from below market rate to market rate, social impact investments are typically made to address challenges in sectors including agricultural development, renewable energy, microfinance, housing, health care, and education services. Social impact investing and enterprises represent a growing trend among donor agencies, multilateral organizations, and philanthropic funders to invest within the framework of a business model to ensure sustainability of results on the ground.

The Kenya certified potato seed program illustrates how social impact investing can be used to support scaling up of improved agricultural technology that has expected high social benefits over the long term but is not a good candidate for immediate commercial funding. Potato is a key cash and subsistence crop for 2.5 million Kenyan smallholders, but average yields of 7–8 tons per hectare are low compared to the potential 30 tons/ha, mainly due to the lack of quality disease-free seed of improved varieties. A long-term partnership between donors, the CGIAR's International Potato Center (CIP), SFSA, the Kenyan government, and the private sector made it possible to address this need in a systems context.⁷⁴

CIP, with funding from USAID and the German Agency for International Cooperation (GIZ), developed a "3G" approach and technologies that significantly reduced the time and cost to produce certified, disease-free seed potatoes.⁷⁵ The CIP 3G advance made it more attractive for the private sector to expand potato seed production in Kenya.

SFSA subsequently assisted one of the original 3G private sector potato seed multipliers (Kisima Farm), beginning in 2011, to expand its production base from 10 to 100 hectares in 2018, with most potato seed sold locally to smallholder farmers. Kisima Farm's seed potato production now exceeds the total seed production output of the Kenyan public sector. SFSA assistance included technical

consulting for seed production and support for training local potato growers. To complement the improved varieties available through CIP, SFSA also brokered a successful alliance with a Dutch private breeder (HZPC) to allow Kisima to commercially produce seed of modern processing varieties in Kenya in return for a royalty payment. In addition, SFSA co-funded a USD \$1.1 million investment by the Africa Enterprise Challenge Fund (AECF) to construct a 1,000-ton cold store and additional facilities with Kisima Farm, which later self-funded a further doubling of their cold store capacity. A survey of local smallholder farmers credited the new and improved potato seed with increasing yields up to tenfold.⁷⁶ However, despite the successes of Kisima and four other similar potato seed businesses, their combined potato seed production capacity still reaches only an estimated 10% of the local market.⁷⁷

Babban Gona,⁷⁸ which means “great farm” in Nigeria’s Hausa language, works through a network of franchise farmer groups to provide services to large numbers of widely dispersed smallholders. The program has disbursed 16,000 small, 2-year loans (\$600/client on average). With a repayment rate of 99%, Babban Gona has been able to attract commercial investors who do not ordinarily invest in the agricultural sector. Franchise group members are provided with the correct mix of agricultural inputs and application services and, through their groups, can access good warehousing, commodity markets, and negotiated, fair prices.⁷⁹

The organization has developed a blended capital structure to raise funds by leveraging debt from domestic and international social investors to de-risk and “crowd in” low-cost commercial capital. By 2018, Babban Gona had raised approximately \$30 million in debt and equity, with a further pipeline of \$30 million anticipated.⁸⁰

One Acre Fund (OAF) is a nonprofit social enterprise that generates earned revenue to maintain its core programs and solicits donor funding to support program expansion and innovation across different countries. OAF began working with 120 smallholder farm families in western Kenya in 2006, and by 2018 had expanded to serve 809,000 farm families in six countries of Southern and Eastern Africa⁸¹ across Kenya, Rwanda, Burundi, Malawi, Uganda, and Tanzania. Like Babban Gona, One Acre Fund has developed a scalable model built around farmer groups and offers several services. The program offers financing for agricultural inputs, including hybrid seed and fertilizer, to farmer-organized

groups that are jointly liable for loan repayment by harvest time. These inputs are distributed for collection within walking distance of farmers’ homes. OAF also provides interactive, in-person training on topics throughout the season such as fertilizer application, planting in rows, and other agricultural methods. In addition, the program assists farmers in marketing their crops (in contrast to Babban Gona, which buys commodities directly from farmers), including training on safe storage so that farmers are able to wait to sell in order to maximize their profits. OAF programs have farmer loan repayment rates of 99%.^{82, 83}

Babban Gona and One Acre Fund both appear to have moved into Step 3 of the scaling framework (Figure 1.2), but it is too soon to judge the eventual scale of either. Both cases have raised some questions about whether their access to larger amounts of capital at lower interest rates and domination of local input and commodity markets may discourage investments by more local private sector competitors. The models are very promising, but much will depend on the appetite of investors to sustain them over the long term, and their longer-term impact on the shape of rural market services.

Takeaways

Scaling pro-poor agricultural innovation will be possible only if means can be found to scale the availability of the finance needed to fuel such change. And that gap is unlikely to be significantly diminished without reducing the risk, perceived risk, or transaction costs associated with investment in pro-poor agriculture. For now, the \$200 billion of unfunded need remains a yawning chasm.

While we cite in this chapter some promising examples of potentially scalable financing mechanisms and an increasing array of new financial innovations from which to learn, the fact remains that virtually all of the finance approaches—ranging from index insurance to social impact investing partnerships—are relatively modest in size and at an early stage in their application to pro-poor agriculture. Testing, stretching, and adapting mechanisms such as those noted in this chapter, so that they can meet the needs of millions of farm and SME families, should occupy a central place in the action and learning agendas of official donors, governments, philanthropists, and scholars.

CHAPTER 5

Creating an Enabling Environment for Scale—Partnerships, Policy, Behavioral Change, and Institutions

As the scalability assessment tools highlighted in Chapter 2 make clear, many of the factors most central to scaling are not under the direct control of project implementers or donors. They are characteristics of the settings and arrangements within which these interventions occur. But that doesn't mean intervenors should accept these conditions passively. Rather, it is a call to action for ways in which intervenors can marshal the evidence and build the coalitions needed to make fundamental and lasting change.

The enabling environment for scaling includes factors that are internal to the implementer or funder (e.g., institutional incentives for scaling) or external (e.g., in the ecosystem). Enabling conditions may include existing, positive “drivers” of the scaling process, and factors that currently present “barriers” to scaling but that, if altered, may themselves become positive drivers. Among the enabling environment components highlighted during the Purdue conference were partnerships, policy, behavioral change, and institutions.⁸⁴

Partnerships

Partnerships are the beating heart of successful, sustainable scaling efforts. Recognizing the different strengths, objectives, and ways of operating that various partners bring to the table, and finding common ground, is fundamental. Mutual trust, transparency, ongoing dialogue, and a willingness to adapt are important in building partnerships among organizations with very different strengths.

Evidence from recent cases suggests that there is much to be gained by critically rethinking the role of private sector partners and the role of donors in facilitating effective and sustainable partnerships. An illustrative example is the Cereal Systems Initiative for South Asia—Mechanization and Irrigation (CSISA-MI) project in Bangladesh, co-designed by CIMMYT, an international research organization, and iDE, an organization specializing in commercial market development.

The project goal was to expand the use of small mechanized seeders, reapers, and high-volume irrigation pumps by smallholder families to alleviate a severe labor constraint. CIMMYT knew what technologies were needed, and where, to improve smallholder productivity and efficiency; and iDE brought its expertise in business and market development, enabling it to source machinery from agro-industry and develop networks of micro-entrepreneurs to bring the machinery and services close to farmers. Critical to this partnership and successful scaling effort were the commitment to using a market approach and adapting the project in response to market feedback. This included CIMMYT's willingness to pivot on which crops, machines, farmers, and locations to target, despite its organizational commitment to supporting wheat, maize, and cereals.⁸⁵

Intermediary organizations (see Chapter 7) can play a key role in facilitating strategic partnerships for scaling—a role that is usually underrecognized and underfunded. Financial organizations—NGOs and for-profits—are increasingly playing this role in low-income countries.

For example, as discussed in Chapter 4, Root Capital mobilized the public, private, and nonprofit sectors to co-design the Coffee Farmer Resilience Initiative (CFRI), illustrating how blended finance and social impact investment can help bring together partners with different motivations to solve a complex financing and technical assistance problem. In CFRI, the objectives of the involved public sector institutions were to improve incomes and food security while addressing systemic issues, including conflict, migration, and deforestation. Private sector partners needed a reliable supply of high-quality coffee and, for purposes of corporate social responsibility, also wanted to advance economic development and environmental sustainability in the communities where they worked. Philanthropic partners sought to develop new cross-sector models where their funding could be used to unlock additional resources from other private and public sector partners.⁸⁶

CFRI also illustrates the practical difficulties of implementing a partnership, and the key role of intermediaries in pulling together all the pieces. Both USAID and IDB-MIF wanted to partner with global coffee buyers to ensure the sustainability of the program, but the private sector had to co-invest so that public monies would not directly subsidize private supply chains, and public monies had to be used where development needs were greatest. While private companies wanted to support activities in their own supply chains, they were reluctant to pool funds to address an industry-wide problem. As intermediaries, Root Capital and CFRI were able to direct corporate investments to their specific supply chains and use grant funding to address needs in underserved areas.⁸⁷

Partnership selection should be part of a stepwise approach of characterizing innovations, diagnosing their readiness to scale, developing strategies to overcome scaling bottlenecks, and subsequently agreeing on which partners and partnership process can effectively address the bottlenecks.⁸⁸

A key premise for partner selection should be a shared vision of delivery at scale and of the partners best equipped to overcome specific scaling bottlenecks. This is in stark contrast to the common practice of defaulting to the most familiar partners regardless of the scaling context. It is likely, for example, that partners for doing field demonstrations (e.g., a national NGO) will be very different from partners that can provide access to finance at scale (e.g., commercial banks).⁸⁹ Likewise, it is likely that the best partners for long-term delivery may be unaccustomed to working on short-term donor-funded projects.

Policy Environment

In his remarks to the Purdue Scale Up Conference, Akin Adesina cast policy as one side of a “scaling up triangle”—science and technology, political will, and policy and incentives.⁹⁰ The government plays an essential role in regulating access to core factors of production, including land, and in providing services such as seed certification and trade regulation. Policies and programs, including smart subsidies, can play a major role in driving scaling and creating an enabling environment for scaling agricultural innovations; but any subsidies, if not well targeted, can also create significant distortions. Ensuring that proposed interventions are aligned with government priorities, and early outreach to build relationships with public sector agriculture officials, increase the prospects for helpful synergies and openings for discussions about how to address policy constraints.

Also speaking at the Purdue conference, David Spielman⁹¹ of the International Food Policy Research Institute (IFPRI) suggested that those interested in addressing policy shortfalls and scaling innovation need to become policy “makers” rather than policy “takers” by seeking to influence the influencers. He noted the need to go beyond evidence and data analysis, which by themselves do not actually change policy. Spielman called for an increased focus on evidence-based advocacy and communication to accelerate policy changes that matter for scaling innovations.

As the scaling framework presented in Chapter 1 suggests, third parties can play a role in facilitating and supporting policy change. Key functions involve developing and socializing solid evidence, identifying and supporting champions of change, building the capacity of key agencies, and providing bridge funding for the transition from one policy regime to another. Projects can be used to highlight policy constraints that limit scaling and to build the evidence supporting change; but they can also be used to help build the constituencies, coalitions, and strategies for advancing that change.

One example of proactive work to support policy change comes from Rwanda, where HarvestPlus began to engage high-level government officials prior to the release of biofortified iron-rich bean varieties. This early outreach helped to integrate the production and consumption of biofortified crops into national policies. The National Food and Nutrition Policy highlights biofortified crops as a strategy to improve nutrition in the country, and the Strategic Plan for the Transformation of Agriculture in Rwanda recognizes consumption of legumes, such as iron beans, as critical for improved nutrition. HarvestPlus established

a close relationship with the Rwanda Agriculture Board, which helped to quickly scale up biofortified bean production; and linkages created with the Ministry of Health, through participation in the joint nutrition taskforce, built stronger nutrition messaging, including the promotion of iron bean varieties by community health clinics.⁹²

Government policies and program interventions can significantly affect both demand and supply factors that have a direct bearing on the spread of innovations. Senegal, heavily reliant on imported Asian rice for its main staple food, was severely affected by the 2007/2008 global food price crisis. The price of rice rose by more than 100%.⁹³ Subsequently, the government of Senegal introduced a policy of rice self-sufficiency and a comprehensive package of subsidies to support irrigated rice sector development. These incentives included setting prices paid to farmers well above their production costs, making direct purchases of rice, improving irrigation and road infrastructure, and subsidizing inputs, credit, insurance, and purchases of machinery. Rice importers were also required to purchase amounts of domestic rice in direct proportion to their imports, guaranteeing a market for domestic rice.

The use of public subsidies to promote agricultural development in low-income countries has been debated numerous times over the years, but, as Akin Adesina and other participants at the Purdue conference pointed out, the United States and the European Union both heavily subsidize their agricultural sectors, and without subsidies India would not have achieved the Green Revolution. Subsidies can be misused, but the challenge, Adesina said, is to target these subsidies more effectively and to create better and more transparent ways of delivering them.

The heavy government intervention in the case of Senegal appears to have helped “crowd in” private sector investment by significantly reducing risks. Overall, the package of policies and programs greatly facilitated the adoption of irrigated rice innovations promoted by the USAID-funded *Projet Croissance Economique* (PCE), even as they clearly distorted parts of the value chain, especially for wholesalers and retailers.⁹⁴ A recent cost-benefit analysis found that PCE, government, and other donor programs significantly improved the productivity of the irrigated rice value chain since 2012. Even accounting for government subsidies and donor support, economic benefits outweigh the costs. However, the analysis raises concerns about long-term sustainability. The economic rate of return was found to be only marginally above the discount rate, indicating the importance of an exit strategy for government and donor programs, while also noting that the removal

of subsidies “could result in adverse effects throughout the value chain.”⁹⁵ Rice is an internationally traded good. There are questions about whether Senegal, particularly its smallholders, will be able to successfully compete with lower-cost international competitors (many of whom themselves benefit from government subsidy programs) over the longer term, even with improved technologies and preferred access to the domestic market.

Similarly, the Nigerian government has long sought to expand the cultivation of cassava to boost its domestic agriculture sector, improve smallholder incomes, and reduce the country’s reliance on imported wheat and rice. Cassava spoils easily and must be gathered and quickly processed after harvest. Over the years, the Nigerian government has introduced a range of policies and programs to boost production and demand for cassava products, including tariffs on wheat importation and requiring bakers to incorporate a percentage of high-quality cassava flour into their goods.⁹⁶ These and other incentives to further develop the value chain have facilitated the widespread adoption of high-yielding cassava varieties and the expansion of production from about 12 million metric tons in the late 1980s to over 50 million metric tons in 2011.⁹⁷

Transferring the delivery of subsidies from the public sector to the private sector, and adding technology, is helping to improve efficiency and deter corruption. In Nigeria, nearly \$5 billion in fertilizer subsidies intended to support greater agricultural productivity are estimated to have been diverted through corruption.⁹⁸ Some states have responded by removing the public sector from direct procurement and distribution of fertilizer, and by developing systems that allow farmers to use mobile phones and smart vouchers to buy fertilizer directly from local private agro-dealers.

Government agencies also provide essential regulatory and oversight services for scalable innovations. It is important for scaling partners to understand the process and get an early start on addressing requirements. Kenya has a highly regarded plant health safety inspection system, for example, but it can still take several years to register new seed varieties, even when those varieties are already available in neighboring countries. Some countries, including Zambia, are now allowing private sector companies to undertake inspection services to speed up the process, shifting the state’s role from direct service provision to oversight.⁹⁹

An important scaling consideration is whether new innovations will have access to regional markets. In sub-Saharan Africa, regional economic communities (ECOWAS,

COMESA, EAC, SADC) have developed frameworks for harmonizing seed variety release, registration, certification, and sanitary and phytosanitary review, but implementing the frameworks will require changes at the national level—legislation or regulation—in order to take effect.¹⁰⁰

Data and technology are increasingly being used to improve the efficiency of systems that were formerly dominated by the public sector. For example, as discussed in Chapter 4, index-based insurance has created new interest and markets for agricultural insurance. The use of data and advanced modeling has effectively removed the need for the cumbersome, expensive, and corruption-prone process of assessing risks and claims on an individual basis. Other new tools, including test kits, scratch cards with lot numbers, and telephone help lines, allow consumers to easily verify online whether purchased fertilizer and seed are legitimate and unexpired.

An alliance of public and private organizations, the SeedAssure Alliance, has facilitated the development of a new digital technology platform to unblock multiple challenges in African seed systems. SeedAssure¹⁰¹ will enable real-time data collection and secure data sharing across multiple seed value chain stakeholders for both quality assurance and regulatory purposes. The platform will operationalize harmonized seed regulation protocols and, when fully launched in 2019, is anticipated to expedite quality production, commercialization, and trade of seed for major crops in eastern and southern Africa.¹⁰²

Behavior Change

When asked to identify the scale up driver or enabling condition they felt was most often neglected to the detriment of the scale up effort, a majority of participants at the Purdue conference pointed to behavior change. In reflecting on effective media strategies for behavior change and the challenges faced by many current strategies for encouraging behavior change in pro-poor agriculture, Bill Ryer-son, founder of the Population Media Center (PMC),¹⁰³ reminded conference participants that people rarely change their behavior because of information alone.

Research shows that most behavioral decisions are heavily influenced by emotional considerations and cultural norms. Finding creative ways to engage with the audience and affect what looks like the norm, therefore, can be a useful strategy to produce change. The infotainment radio and TV programs developed by PMC, for example, focus on constructing role model characters with whom

listeners can identify. During its long-running, multi-issue, compelling programs, various characters are developed, presented with options, and make choices. To ensure the sociocultural relevance of content, all programs are created by local writers. Because radio programming is widely accessible in low-income countries, these programs reach scale immediately. In northern Nigeria, PMC programs on family planning reached up to 72% of the whole population; and 67% of reproductive health clients in Nigeria cited the PMC program as the motivation for their visit.¹⁰⁴

Kuza Biashara¹⁰⁵ is premised on the importance of starting a conversation with the “client” wherever he or she is, providing information that is relevant to their needs, in a format that is accessible to them. This Kenya-based digital micro-learning and community platform offers people in the informal sector access to a library of structured, micro-module learning that can be accessed by users on demand. The models deal with practical, sector-specific skills (from smallholder agriculture to masons to bakers), interpersonal skills, and business management training.

Other programs that are more focused on agriculture and tap into similar ideas about context and role models are also emerging. *Shamba Shape-Up*,¹⁰⁶ a television show aired in Kenya, Uganda, and Tanzania since 2012, features co-hosts and a farm-based “makeover reality show” format that engages participants. Funded through contributions from development agencies, foundations, and private companies, the content of the show is provided by national and international research centers. For example, CIMMYT partnered with *Shamba Shape-Up* to produce an episode on conservation agriculture.¹⁰⁷ Staff interact with viewers to find out what topics are of most interest to them. The show’s website has now expanded to include a tool to submit questions offline to be answered by an expert, and an agricultural budgeting tool.

Digital Green,¹⁰⁸ an NGO working in India, Ethiopia, Ghana, and Afghanistan, trains farmers to make and show short videos in which they discuss their problems, share solutions, and highlight success stories. It is a technology-enabled means of behavior change communication built around local communities and role models. Researchers, development practitioners, and rural villagers come together to produce and share locally relevant information through videos in which the villagers are the “stars.”

Market forces are, of course, a very powerful force for behavior change affecting both consumers and producers. Rising incomes and urbanization are driving consumers across the globe to demand more meat, poultry, fish, fruit and vegetables, and more processed products. This is

beginning to change farming systems, creating opportunities for different models of farming such as peri-urban farming and protected cultivation, and increasing opportunities for SMEs offering such things as artisanal processing and food service. Consumer demands are also affecting agricultural systems in other ways. Heightened awareness of sustainability and concerns for the livelihoods of small-holder communities by consumers are driving new partnerships such as the one between Corteva and CIMMYT in Mexico to train farmers and improve sustainable agriculture practices, in collaboration with companies such as Nestle, Kellogg, and Walmart that are increasingly interested in responsibly sourced products.¹⁰⁹

Institutions

A recurring theme of discussions at the Purdue Scale Up Conference is the worry that the internal institutional incentives of most funding agencies and implementing organizations are not aligned to support the fundamental changes thought to be critical to the scaling process (see Chapter 7). For example, flexibility in implementation, including in redesigning the approach at stages to reflect learning and accommodate changing partnerships, is not typically supported by the prevailing project design and contracting process, which

currently allows little flexibility for midcourse changes. Prevailing practice facilitates “partnerships of funding convenience” in which “partnered” organizations continue to operate largely in siloes.¹¹⁰ It does not facilitate the creation of working, strategic, and opportunistic partnerships within individual programs or between related sets of programs that are not contractually connected to one another from the program start. The result is separate programs that address agricultural productivity, improved nutrition, strengthening value chains, and improving policy in siloed fashion. There is no “meta-level” guidance or “system leader” to steer so that the yield of the components is something more than a summing of individual efforts.

There is no single formula or easy path to creating the enabling environment needed for successful scaling. But every intervention that aspires to scale needs to pay intense attention to the partnership, policy, behavioral, and institutional factors on which such scaling will depend. To say that these factors are beyond the direct control of innovators does not in any way reduce their centrality or, as several examples in this chapter bear witness, mean that creative approaches and partnerships cannot be devised to influence these factors and overcome barriers. This has far-reaching implications for the strategy, design, monitoring, and exit conditions of more technically conceived interventions aspiring to reach large populations.

CHAPTER 6

Tailoring Metrics, Monitoring, and Evaluation to Support Sustainable Outcomes at Scale

As noted in Chapter 2, relatively few research or pilot projects generate the critical information needed to go beyond proof of concept and provide a basis for assessing scalability, streamlining delivery, informing advocacy, and guiding scaling.¹¹¹ Increasingly, however, scaling experience demonstrates that the following three overlapping but different types or tiers of information are needed (Figure 6.1).¹¹²

Tier 1 information is generated to test the efficacy of interventions, often under controlled or semicontrolled conditions.

Tier 2 information is used to refine, simplify, and adapt interventions to real-life policy, financial, and operational considerations.

Tier 3 information is generated during the scaling process to monitor fidelity and inform needed adjustments to intervention design and scaling strategy during the scaling process.

It is tempting to view these tiers as a sequence of information needs over time as the focus of scaling moves from *effectiveness* to *efficiency* to *expansion*. However, experience suggests the need to incorporate *efficiency* and *expansion* considerations, and to test results under realistic conditions, at the earliest possible time rather than to defer these issues until proof of concept is well established. To do otherwise is to run serious risk of adding to the graveyard of “proven” but unscalable technologies.



Figure 6.1. Information Needs for Scaling—a Three-Tier Approach

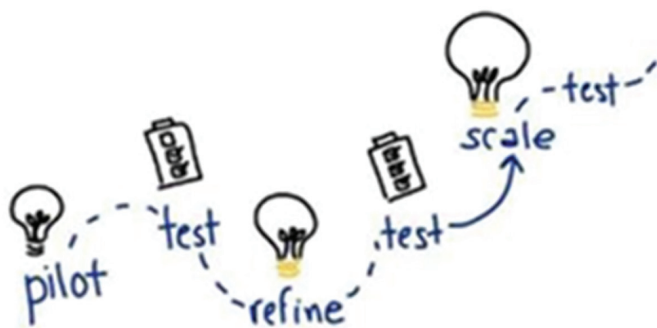


Figure 6.2. The Winding Pathway to Scale

It is also important to note that detailed planning is no substitute for rapid learning, and for the willingness and flexibility to make changes in response to that learning. With a few notable exceptions, interventions that scale successfully take 15 or more years to achieve sustainable national scale; and, during that period, they make numerous adjustments to accommodate realities that were unforeseeable at the outset (Figure 6.2).¹¹³

As agricultural interventions scale, one good practice is to institutionalize “pause and reflect” sessions at least twice a year. Increasingly, however, it is becoming clear that this is not enough. The most effective scaling strategies now use information technology to drive a variety of real-time monitoring tools intended to support frequent changes. One Acre Fund, PCE in Senegal, and Babban Gona in Nigeria are three instructive examples of the use of real-time information to drive implementation and guide scaling. It is also important that information systems—particularly Tier 3 information systems—incorporate and support the information needs of the private sector and the host government at the earliest possible time.¹¹⁴

By definition, scaling places a premium on effects and impact beyond a project’s direct reach and duration. As such, the focus of monitoring and evaluation necessarily includes—and should prioritize—*indirect* rather than direct beneficiaries, and *contribution* (or “plausible association”) rather than strict attribution. These realities have direct implications for metrics, monitoring, and evaluation, including:

- It is counterproductive to focus performance indicators exclusively on the direct effects of donor expenditures.
- For technologies that are bundled with good agricultural practices, “adoption” is not a binary variable; and packages of innovations are often

adopted incrementally, partially, or on only a percentage of a farmer’s land.

- Evidence of efficacy under controlled conditions needs to be complemented by careful analysis of scaling under real-life conditions and constraints.
- More useful are metrics such as “repeated use,” “willingness to pay,” “willingness to recommend to a friend or relative,” “competition among suppliers and aggregators”—metrics familiar to growing businesses.

Two informative cases of the effective use of data to support long-term scaling efforts are the ongoing work of Alliance for a Green Revolution in Africa (AGRA) to promote the development and use of high-yielding varieties in Africa;¹¹⁵ and the work of International Development Enterprises—Bangladesh (iDE-B) and CIMMYT to promote the commercial leasing and use of two-wheel tractors, threshers, and low-lift irrigation pumps.¹¹⁶ These cases also underline the point made by several observers that it is possible to better integrate project metrics and M&E systems with the data on sales and marketing, distribution, transaction costs, and profitability generated by and useful for commercial partners.

One useful compilation of M&E tools for scaling pro-poor agricultural interventions comes from a surprising source—the health sector.¹¹⁷ Particularly useful are the range of tools suggested for Tier 2 and Tier 3 monitoring, evaluation, and learning. Tools such as these make it a possible to track over time the variables and challenges prioritized during scalability assessments in ways that meet the information needs of farmers, agribusinesses, and policy makers.

A methodology called Real-Time Scaling Labs, originally developed and applied by the Brookings Institution in a program called Millions Learning in the education sector, offers considerable potential for improving knowledge about agricultural scaling.¹¹⁸ The approach embeds teams within selected interventions, equipped with clear protocols and a multi-stakeholder participatory process. The teams develop and monitor scaling plans in ways designed to serve, simultaneously, three objectives: (1) organized learning; (2) strategic reflection and review; and (3) documentation (Figure 6.3). Recent developments in information technology, particularly cellphones and remote sensing, hold particular promise for making such real-time or quick-loop learning a practical reality even in low-resource settings.

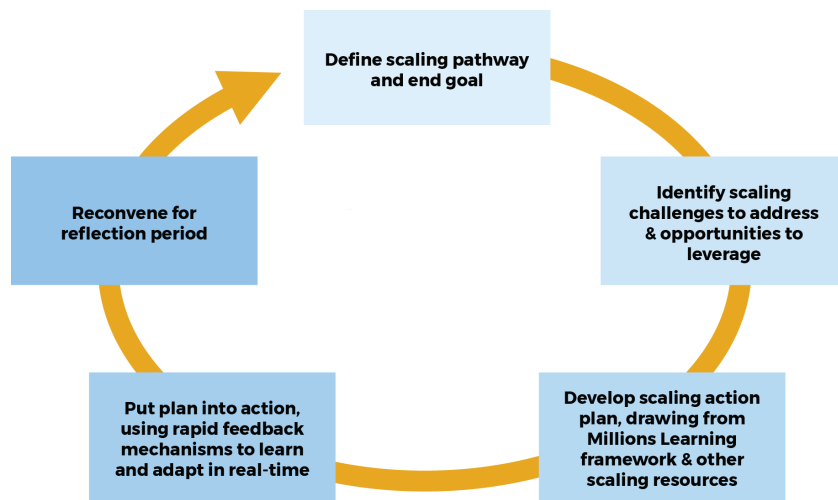


Figure 6.3. Real-Time Scaling Labs

Finally, it is important to note that, even with the best planning and the most diligent management, relatively few innovations will—or should—be scaled. The human and material costs of change, the potential downside risks for adopters, and the inevitability of unpleasant surprises along the way mean that the bar should be set high. That applies to the viability of the business model as well as the efficacy of the innovation. Although the current success

rate of scaling—estimated at less than 5%—is unacceptably low, reported “success” rates in excess of those common in the private sector should likewise be cause for concern. Given the intensity of donor and market pressures for rapid results, compounded by the normal human impulse of implementers to fall in love with their interventions, the role of effective monitoring and evaluation should often be to say “no,” or at least “not yet,” or “not here.”

CHAPTER 7

The Critical Role of Intermediary and Donor Organizations

Few interventions or innovations transition successfully to scale without someone performing a variety of “intermediation” functions, including investment packaging and policy advocacy. In the commercialization of high-margin innovations, these functions are often performed by highly compensated investment bankers, venture capitalists, and strategic consultants.¹¹⁹

By contrast, in the low-margin, high-risk world of pro-poor agriculture, these semi-invisible functions, which fall between the more easily recognized functions of innovation and service delivery, have few reliable funding sources or advocates. Lacking the glamor of innovation, the immediacy of direct service delivery, or the prospect of charging and recovering significant transactional returns, funding for these intermediation functions—with a few notable exceptions—becomes a missing link in the value chain or a missing gear in the scaling “machine” (Figure 7.1).

The term “intermediation” as used here refers to functions such as:

- Strategic Planning
- Impact Evaluation and Operations Research
- Fundraising
- Investment Packaging and Placement
- Advocacy and Marketing
- Convening and Coordinating Stakeholders
- Change Management

As presented in Chapter 1, scaling up can be seen as a three-step process. The first step focuses on planning for scale, the second step focuses on galvanizing necessary support, and the third step focuses on carrying out a disciplined change management process. Intermediation takes

different forms during each of these steps. During Step 1—the *planning* step—key intermediation functions include strategic planning, impact evaluation, and operations research. During Step 2—the *commitment* step—the focus of intermediation shifts to convening and coordinating stakeholders, fundraising, investment packaging, advocacy, and marketing. And during Step 3—the *operational* step—the emphasis is on change management, organizational development, and systems strengthening.

There is a key difference between fully commercial consumer goods and pro-poor agricultural innovation that makes intermediation functions even more important in the latter case. For pro-poor agricultural interventions, decisions by governments and third-party funders often stand between supply and demand. Reconciling the different incentives and operating styles of governments, investors, donors, and farmers means that intermediary organizations have a particularly important role to play in bridging these divides.



Figure 7.1. The Critical Role and Functions of Intermediary Organizations

In these settings, intermediary organizations often find themselves unable to pass the cost of their operations on to either the organization doing the innovating or the organization that potentially delivers the service at scale. There is, for this reason, a compelling case for more donor support for these intermediary functions and for the organizations that carry them out.

Equally profound are the changes needed in the internal procedures and incentives of donor organizations in order to institutionalize a focus on scale and scaling. The challenge in this case is to reimagine projects as ways to catalyze, de-risk, or otherwise advance systemic change by governments and businesses. That requires major changes in strategy, metrics, procedures, and incentives to move the scaling agenda from the periphery into the mainstream of organizational operations.

Fortunately, there are a growing number of successful reform efforts from which to learn. Some donors are setting

up new entities with an explicit mandate that includes scaling (e.g., Grand Challenges Canada); others are establishing specialized units to foster innovation and/or support scaling (e.g., USAID's Global Development Lab); several donor strategies incorporate or prioritize support for intermediary organizations (e.g., the Ford Foundation); and a few donors have begun to institute top-to-bottom efforts to mainstream scaling as a central feature of organizational operations.

Among the most extensive and instructive efforts to mainstream scaling within a donor organization has been undertaken by IFAD (Box 7.1), beginning in 2009 with an institutional review of its approach¹²⁰ and later an analysis of its experience in 2013.¹²¹ Studies carried out by the Brookings Institution informed that effort, and the candid evaluation of progress several years later (2017¹²²) offers useful touchpoints for other donors considering such efforts.

Box 7.1 IFAD's Efforts to Institutionalize a Focus on Scale

An evaluation by IFAD's Independent Office of Evaluation (IOE) and an assessment by a technical team from the Brookings Institution,¹²³ both published in 2010, concluded that while IFAD had supported successful scaling efforts in particular countries and projects, the fund needed to develop a systematic approach to scaling. The Brookings team provided IFAD with specific recommendations on how to mainstream the scaling up agenda into its operational policies and practices, its staffing and financial resource management, its monitoring and evaluation, and its knowledge management.¹²⁴

Between 2012 and 2018 IFAD management committed to the scaling up agenda in its action agendas for three successive Replenishment Consultations (IFAD9, IFAD10, and IFAD11). To help mainstream scaling up into its operations, IFAD prepared in 2015 an "Operational Framework for Scaling Up Results" as a guide for its operational staff. It also developed various knowledge products (including country and thematic scaling up notes), a staff training program, and a website for its scaling up documentation. Since 2015, IFAD has participated actively in the global Scaling Up Community of Practice and has led the Working Group on Scaling Up in Agriculture and Rural Development.

An evaluation of IFAD's efforts on scaling up carried out by IOE in 2017 noted that, despite considerable progress, "scaling up remains a work in progress," emphasizing the need to ensure that frontline staff are fully engaged in implementing the scaling agenda and that the agenda is shared by IFAD's partners in the countries of its operations.¹²⁵

There are also a growing number of foundations and NGOs incorporating scaling as a central feature of their mission, mandate, and operating modalities. Noteworthy examples include Catholic Relief Services, which is basing its new strategy on scaling outcomes related to six key

interventions; the MacArthur Foundation's 100&Change competition, which awards a single \$100 million grant to scale a solution to a major problem; collective philanthropy efforts by Co-Impact and the Audacious Project; and the Eleanor Crook Foundation's full integration of

scaling and sustainability considerations into its grant procedures.¹²⁶

The implications of adopting a scaling perspective are no less profound for research institutions. In that regard, there are many insights to be gleaned from GIZ's support for a task force of full-time scaling experts that help integrate scaling considerations and a "scaling scan" into the

CGIAR system¹²⁷ and from IITA's efforts to incorporate a systematic approach to assessing and enhancing "scaling readiness."

Some of the specific implications of scaling for value chain organizations concerned with production, financing, marketing, and regulation are explored in Chapters 3, 4, and 5.

CHAPTER 8

Conclusions

It is time to deepen the discourse, extend the audience, and enhance the tools available for (1) designing with scale in mind, (2) assessing scalability, and (3) managing the transition to platforms capable of, and incentivized to, deliver at scale. To that end, we conclude with eight insights informed by the Purdue conference, side sessions at the 2018 World Food Prize, and discussions within the Agriculture and Rural Development Working Group of the Global Community of Practice on Scaling Development Outcomes:

- Delivery at scale is not a gigantic project or a series of projects. We need to plan for millions, not thousands; for uncontrolled, not controlled, settings; for generations, not for five years; and for addressing, not working around, political and market realities.
- This requires narrowing the gap between macro goals and micro interventions, by linking the language and logic of projects to the language and logic of development effectiveness.
- Development assistance can help, but it will not solve the problem. Only markets and governments can; and commercial markets should normally be the default setting. Short-term interventions (“projects”) and subsidies can make big and positive differences, especially in reaching underserved smallholders and SMEs, but only if used strategically. They can also introduce major distortions.
- It is essential to view agriculture as a business, not a social sector; to treat farmers as businesses and customers, not as beneficiaries; and to focus more attention on the full value chain, on finance, on incentives, on the intermediation needed to bring innovation to scale, and on the enabling environment.
- New partnerships and multi-stakeholder initiatives are essential for tackling scaling challenges.
- Initiatives must go beyond being “policy takers” and play a much more proactive role in facilitating policy change that can be a scaling force multiplier.
- There is rarely a straight line or a short journey from research and innovation to validation and rollout. Adaptive management is an essential ingredient in all successful scaling efforts.
- The actions of research institutions, NGOs, and other implementing partners are shaped by donor policies, metrics, and procedures. Systemic change, therefore, needs to give special attention to changes in the funding priorities, internal incentives, and operational procedures of those donor institutions.

CHAPTER 9

An Invitation to Continue the Conversation

The September 2018 conference at Purdue University (Figure 9.1), which inspired this *Sourcebook*, built on work taking place under the auspices of a Global Community of Practice on Scaling Development Outcomes (CoP). The CoP was launched in February 2015 to:

- Serve as a champion for “scaling up” as a priority concern within the development community,
- Develop and disseminate an effective framework for scaling,
- Establish a peer network for sharing operational approaches, experience, and lessons,
- Contribute to thought leadership and case examples on scaling, and
- Provide advice and networking on how to access resources and talent.



Figure 9.1. Participants at Scale Up Conference held at Purdue University, September 25–27, 2018. Photo credit: Tim Thompson, Agricultural Communication, Purdue University

The CoP includes representatives from 250 donor, research, and implementing organizations. Its members come from a wide variety of sectors and backgrounds, drawn together by a common commitment to advancing and professionalizing the scaling of development interventions.

The CoP is member-run, member-supported, and free of charge, and includes working groups on:

- Agriculture and Rural Development
- Education
- Health
- Monitoring and Evaluation
- Scaling in Fragile States
- Youth Employment (planned for 2019)
- Social Enterprise (planned for 2019)

The CoP and its Working Group on Agriculture and Rural Development have agreed to host the materials from

the Purdue conference and to serve as a forum for deepening the discussions begun there.

Interested readers are encouraged to reach out directly to the organizations cited in this *Sourcebook* or through the CoP with their ideas for building on and enhancing the efforts, tools, and approaches presented here; to experiment with the tools cited here and with their own; and to document and contribute their thoughts, approaches, and experience to our collective understanding on how to scale pro-poor agricultural solutions most effectively.

Those interested in joining the CoP can contact its curators, Larry Cooley (lcooley@msi-inc.com) or Johannes Linn (jlinn@brookings.edu). Enquiries about the CoP's Working Group on Agriculture and Rural Development should be directed to Maria Elena Mangiafico (m.mangiafico@ifad.org).

NOTES

1. Steve Radelet, Georgetown University, private correspondence with the author, June 4, 2018.
2. Authors' estimate based on firsthand experience and extensive anecdotal evidence.
3. MSI, *Scaling Up—From Vision to Large-Scale Change*, 3rd ed. (MSI, 2016), <https://msiworldwide.com/additional-resources/msi-scaling-framework>; Seerp Wigboldus et al., "Systemic perspectives on scaling agricultural innovations," *Agronomy for Sustainable Development* 36, no. 3 (2016): 46, <http://dx.doi.org/10.1007/s13593-016-0380-z>.
4. Arntraud Hartmann and Johannes Linn, "Scaling Up: A Framework and Lessons for Development Effectiveness from Literature and Practice" (Wolfensohn Center for Development Working Paper 5, Brookings Institution, October 2008).
5. MSI, *Scaling Up*.
6. Richard Kohl and Colm Foy, *Guide to the Agricultural Scalability Assessment Tool for Assessing and Improving the Scaling of Agricultural Technologies* (USAID, 2018), https://pdf.usaid.gov/pdf_docs/PA00T6KX.pdf.
7. "Session 1 Planning with Scale in Mind" (video), Purdue University, September 26, 2018, <https://docs.lib.purdue.edu/scaleup/planning/speakerpanel/1>.
8. The One Acre Fund, the Syngenta Foundation for Sustainable Agriculture's work to improve the quality of potato seed in Kenya, and Babban Gona's use of a franchise model to promote commercial farming in Nigeria are three examples of innovations that paid early attention to commercialization and unit cost. For videos describing the Babban Gona and Syngenta Foundation case studies, see Babban Gona, "Babban Gona Wins Prestigious Skoll Award for Social Entrepreneurship" (video), 2017, <https://docs.lib.purdue.edu/scaleup/opening/videos/1/>; Syngenta Foundation, "Scaling Potato Seed Production in East Africa" (video), 2018, <https://docs.lib.purdue.edu/scaleup/opening/videos/2/>.
9. Authors' estimate.
10. MSI, *Scaling Up*; Seerp Wigboldus and Jan Brouwers, *Using a Theory of Scaling to Guide Decision Making* (Wageningen University & Research, 2016), <http://www.theoryofchange.nl/resource/using-theory-scaling-guide-decision-making>.
11. MSI, *Guidelines Planning for and Assessing Scalability* (MSI, 2018), <https://msiworldwide.com/sites/default/files/2019-03/GUIDELINES.pdf>.
12. Larry Cooley, "Innovating Is the Easy Part" (blog post), Center for Education Innovations, Results for Development Institute, April 20, 2016, <https://educationinnovations.org/blog/innovating-easy-part>.
13. Gregory Gangelhoff and Sally Rey, "Delivering More Bang for Development Bucks: Cost-Benefit Analysis and Feed the Future" (blog post), USAID, December 15, 2014, <https://blog.usaid.gov/2014/12/delivering-more-bang-for-development-bucks-cost-benefit-analysis-and-feed-the-future/>; "Cost-Benefit Analysis" (infographic), Office of Economic Policy, USAID, accessed February 20, 2019, https://www.usaid.gov/sites/default/files/documents/1865/CBA_Map.pdf.
14. MSI, *Scalability Checklist* (MSI, 2016), <https://msiworldwide.com/sites/default/files/2019-02/MSI%20Scalability%20Checklist.pdf>; MSI, *Scaling Up*.
15. Kohl and Foy, "Agricultural Scalability Assessment Toolkit."
16. For the foundation research supporting the ASAT tool and guidelines for using the tool, see Kohl and Foy, *Guide to the Agricultural Scalability Assessment Tool*.
17. *Conference Program: Supplemental Materials—Scalability Assessment Tools and Frameworks* (Purdue University, September 2018), <https://docs.lib.purdue.edu/scaleup/assessing/tools/1/>; Kohl and Foy, *Guide to the Agricultural Scalability Assessment Tool*, 49.
18. F. Jacobs, J. Ubels, and L. Woltering, *The Scaling Scan: A Practical Tool to Determine the Strengths and Weaknesses of Your Scaling Ambition* (PPPLab and CIMMYT, 2018), <https://www.cimmyt.org/wp-content/uploads/2018/06/PPPLab-Scaling-Final-25-09.pdf>.
19. "Technology Readiness Level," NASA, updated October 28, 2012, https://www.nasa.gov/directorates/heo/scan/engineering/technology/txt_accordion1.html.
20. [Marc Schut and Murat Sartas], *Scaling Readiness: Assessing and Accelerating Scaling of Innovations* (CIGAR, January 2019), www.scalingreadiness.org.
21. John Gargani and Robert McLean, *Scaling Impact: Innovation for the Public Good* (forthcoming); Ann Mei Chang, *Lean Impact: How to Innovate for Radically Greater Social Good* (John Wiley & Sons, 2018); Lennart Woltering et al., "Scaling—From 'Reaching Many' to Sustainable System Change: A Critical Shift in Mindset," *Agricultural Systems* (forthcoming).

22. IFAD, *IFAD's Operational Framework for Scaling Up Results* (IFAD, 2015), <https://www.ifad.org/en/document-detail/asset/39563355>.
23. IDIA, *Insights on Scaling Innovation* (IDIA, 2017), <https://static1.squarespace.com/static/5b156e3bf2e6b10bb0788609/t/5b1717eb8a922da5042cd0bc/1528240110897/Insights+on+Scaling+Innovation.pdf>; IDIA, *Good Practice Guides for Funders: Scaling Innovation* (IDIA, 2017), <https://static1.squarespace.com/static/5b156e3bf2e6b10bb0788609/t/5b17185af950b797a96de027/1528240221838/Scaling+Innovation+Good+Practice+Guide.pdf>.
24. Gray and Kohl, *Scaling Up of Drought-Tolerant Maize in Zambia*; Kohl, *Scaling Up of Sahel Rice Varieties in Senegal*; Kohl, *Scaling Up of Agricultural Machinery in Bangladesh*; Foy and Wafula, *Scaling Up of Hermetic Bag Technology (PICS) in Kenya*; Foy, *Scaling Up of Improved Poultry Breeds in Uganda*.
25. The ASAT tool commissioned by USAID and developed by Management Systems International (MSI) was used to assess the scalability of five USAID-supported innovations—Improved Bean Varieties, Rift Valley Fever Vaccine, Directly Sown Rice, Wetting Front Detector, and Heat Stress Tolerant Maize. Each of these applications resulted in a stand-alone report assessing the scalability of the innovation based on 37 scalability considerations related to characteristics of the innovation, the market, and the country context.
26. For the scaling readiness cases, see *Scaling Readiness Newsletter Series #3: The Scaling Readiness Case Studies*, (CIGAR, 2017), <https://tinyurl.com/scalingreadinesscases>.
27. *Conference Program: Scale Up Conference—Innovations in Agriculture: Scaling Up to Reach Millions* (Purdue University, September 2018), https://docs.lib.purdue.edu/scaleup/scaleup_program.pdf.
28. George Gray and Richard Kohl, *Scaling Up of Drought-Tolerant Maize in Zambia: Review of Successful Scaling of Agricultural Technologies* (USAID, 2016), <https://agrilinks.org/sites/default/files/resource/files/BFS%20Scaling%20Review%20-%20Zambia%20Report%20REVISED%202-8-16.pdf>; Richard Kohl, *Scaling Up of Sahel Rice Varieties in Senegal: Review of Successful Scaling of Agricultural Technologies* (USAID, 2016), https://pdf.usaid.gov/pdf_docs/PA00MDRC.pdf; Richard Kohl, *Scaling Up of Agricultural Machinery in Bangladesh: Review of Successful Scaling of Agricultural Technologies* (USAID, 2016), https://pdf.usaid.gov/pdf_docs/PA00MC52.pdf; Colm Foy and Martin Wafula, *Scaling Up of Hermetic Bag Technology (PICS) in Kenya: Review of Successful Scaling of Agricultural Technologies* (USAID, 2016), https://pdf.usaid.gov/pdf_docs/PA00MDZD.pdf; Colm Foy, *Scaling Up of Improved Poultry Breeds in Uganda: Review of Successful Scaling of Agricultural Technologies* (USAID, 2017), https://pdf.usaid.gov/pdf_docs/PA00MK5G.pdf.
29. MSI, *Synthesis Report: Review of Successful Scaling of Agricultural Technologies* (USAID, 2017), https://pdf.usaid.gov/pdf_docs/PA00MMWJ.pdf; MSI, *Briefing Note: Using Commercial Pathways to Scale Up Agricultural Technologies* (USAID, 2017), https://pdf.usaid.gov/pdf_docs/PA00MXVS.pdf; MSI, *Workshop Report: Bureau for Food Security's Scaling Agricultural Innovations Workshop* (USAID, 2016), https://pdf.usaid.gov/pdf_docs/PA00MB2R.pdf.
30. Richard Kohl and Colm Foy, "Agricultural Scalability Assessment Toolkit" (Excel file) (USAID, 2018), https://dec.usaid.gov/dec/content/Detail_Presto.aspx?vID=47&ctID=ODVhZjk4NWQtM2YyMi00YjRmLTkxNjktZTcxMjM2NDBmY2Uy&rID=NTA5Mjlx; Kohl and Foy, *Guide to the Agricultural Scalability Assessment Tool*.
31. Akinwumi Adesina, "Keynote Presentation—Scale Up" (video), Purdue University, September 26, 2018, <https://docs.lib.purdue.edu/scaleup/opening/keynote/1/>.
32. Kohl, *Scaling Up of Sahel Rice Varieties in Senegal*.
33. Purdue Improved Crop Storage, "Purdue Improved Crop Storage (PICS)" (video), 2019, <https://docs.lib.purdue.edu/scaleup/opening/videos/3/>.
34. *PICS Newsletter* 1, no. 1 (2015), <https://picsnetwork.org/wp-content/uploads/2016/04/NewsletterFinalsmall.pdf>; *PICS Newsletter* 2, no. 1 (2016), https://picsnetwork.org/wp-content/uploads/2016/04/newsletter_April_2016.pdf.
35. "Developing Africa's Seed Systems," AGRA (website), updated 2017, <https://agra.org/program-development-and-innovation/developing-africas-seed-systems/>.
36. "Seeds for Impact Program," AECF (website), accessed February 28, 2019, https://www.aecfafrica.org/agriculture/Seeds_for_Impact.
37. Kohl, *Scaling Up of Agricultural Machinery in Bangladesh*.
38. Babban Gona (website), accessed February 20, 2019, <http://www.babbangona.com/>; Babban Gona, "Babban Gona Wins Prestigious Skoll Award for Social Entrepreneurship" (video), 2017, <https://docs.lib.purdue.edu/scaleup/opening/videos/1/>.
39. One Acre Fund (website), accessed February 20, 2019, <https://oneacrefund.org/>.
40. Hello Tractor (website), accessed February 26, 2019, <https://www.hellotractor.com/home>.
41. IFC, *Access to Finance for Smallholder Farmers Learning from the Experiences of Microfinance Institutions in Latin America* (IFC, 2014), iii, <https://www.ifc.org/wps/wcm/connect/071dd78045eadb5cb067b99916182e35/A2F+for+Smallholder+Farmers-Final+English+Publication.pdf?MOD=AJPERES>.
42. Dalberg Global Development Advisors, *Inflection Point: Unlocking Growth in the Era of Farmer Finance* (MasterCard Foundation, Rural and Agricultural Finance Learning Lab, 2016), 2, https://www.rafllearning.org/sites/default/files/inflection_point_april_2016.pdf?token=OS8hc14U.
43. World Bank, *Financing Agribusiness in Sub-Saharan Africa: Opportunities, Challenges, and Investment Models* (World Bank, 2016), vii–viii, https://www.agrifinfacility.org/sites/agrifin/files/Africa_Agrifinance_%202016.pdf.
44. "About CSAF," Council on Smallholder Agricultural Finance (website), accessed February 28, 2019, <https://csaf.org/about/>.
45. USAID, *Improving Food Security with Warehouse Receipts* (USAID, n.d.), https://2012-2017.usaid.gov/sites/default/files/success/files/Improving_Food_Security.pdf.

46. AFD, CTA, and IFAD, *Study on Appropriate Warehousing and Collateral Management Systems in Sub-Saharan Africa* (CTA, 2015), <http://www.ruralfinanceandinvestment.org/node/2038>.
47. Philine Wehling and Bill Garthwaite, *Designing Warehouse Receipt Legislation: Regulatory Options and Recent Trends* (Rome: FAO, 2015), <https://europa.eu/capacity4dev/sorudev/documents/warehouse-receipt-systems-fao-2015>.
48. Lamon Rutten et al., "The Use of Warehouse Receipt Finance in Agriculture in Transition Countries" (FAO Investment Centre working paper, presented at the World Grain Forum 2009), https://www.researchgate.net/profile/Lamon_Rutten/publication/242578672_The_use_of_warehouse_receipt_finance_in_agriculture_in_transition_countries/.
49. World Bank and IFC, *Agricultural Insurance: Disaster Risk Financing and Insurance Concept Note* (World Bank, March 2012), http://siteresources.worldbank.org/EXTDISASTER/Resources/AI_Concept_Final.pdf.
50. World Bank and IFC, *Agricultural Insurance*.
51. World Bank and IFC, *Agricultural Insurance*.
52. World Bank and IFC, *Agricultural Insurance*.
53. Nathaniel Jensen and Christopher Barrett, "Agricultural Index Insurance for Development," *Applied Economic Perspectives and Policy* 39, no. 2 (2017), 199–219, <https://doi.org/10.1093/aep/ppw022>.
54. Jensen and Barrett, "Agricultural Index Insurance for Development."
55. "Index-Based Livestock Insurance," ILRI (website), accessed February 28, 2019, <https://ibli.ilri.org/>.
56. Index Insurance Forum (website), Global Index Insurance Facility, managed by the World Bank Group, accessed February 20, 2019, <https://www.indexinsuranceforum.org/>.
57. ISF Advisors, *Protecting Growing Prosperity: Agricultural Insurance in the Developing World* (ISF Advisors, 2018), 15, <https://www.raflerning.org/post/protecting-growing-prosperity-agricultural-insurance-the-developing-world?platform=hootsuite>.
58. Rauno Zander, Calvin Miller, and Nomathemba Mhlanga, *Credit Guarantee Systems for Agriculture and Rural Enterprise Development* (Rome: FAO, 2013), <http://www.fao.org/docrep/017/i3123e/i3123e00.pdf>.
59. "African Guarantee Fund for Small and Medium-Sized Enterprises," African Development Bank Group (website), accessed February 20, 2019, <https://www.afdb.org/en/topics-and-sectors/initiatives-partnerships/african-guarantee-fund-for-small-and-medium-sized-enterprises/>.
60. NIRSAL (website), accessed February 20, 2019, <https://www.nirsal.com/>.
61. "FAQs," NIRSAL (website), accessed February 20, 2019, <https://www.nirsal.com/faqs.php>.
62. Root Capital, *Financing Farm Renovation: How to Build Resilience Using a Blend of Capital* (Root Capital, 2016), 6, <https://rootcapital.org/wp-content/uploads/2018/01/Root-Capital-CFRI-Learning-Report-Full-Report.pdf>.
63. "Blended Finance: The Fad for Mixing Public, Charitable and Private Money," *Economist*, April 23, 2016, http://www3.weforum.org/docs/WEF_Trending_Blending_The_Economist_April_23_2016.pdf.
64. AATIF (website), updated December 19, 2018, <https://www.aatif.lu/home.html>.
65. *Economist* (April 23, 2016), "Blended Finance."
66. Root Capital (website), accessed February 20, 2019, <https://rootcapital.org>; Root Capital, *Financing Farm Renovation*.
67. Root Capital (website); Root Capital, *Financing Farm Renovation*.
68. "Rice Cultivation in Nigeria—The Olam Ondorie Nucleus Rice Farm" (blog post), Proshare, February 07, 2017, <https://www.proshareng.com/news/Agriculture/Rice-Cultivation-in-Nigeria---The-OLAM-ONDORIE-NUCLEUS-Rice-Farm/33686>.
69. UN, *Value Chain Development Programme (VCDP) Partnership with Olam* (UN, April 22, 2018), https://www.un.org/esa/ffd/ffdforum/wp-content/uploads/sites/3/2018/04/Backgroud-Paper_IFAD-VCDP-OLAM-Farmers-Partnership.pdf.
70. "Success of the Advanced Maize Seed Adoption Program" (video), USAID, October 02, 2014, <https://www.usaid.gov/news-information/videos/advanced-maize-seed-adoption-program>.
71. DuPont Pioneer, "Advanced Maize Seed Adoption Program Helps More Than 100,000 Ethiopia Farmers Enhance Their Income and Transform Production," press release, May 3, 2017, <https://www.pioneer.com/home/site/about/news-media/news-releases/template.CONTENT/guid.35587637-9810-29CD-F38C-2D7E336DF225>.
72. World Bank and IFC, *Agricultural Insurance*.
73. "What is impact investing?," Global Impact Investing Network (website), accessed February 20, 2019, <https://thegiin.org/impact-investing/need-to-know/#what-is-impact-investing>.
74. Syngenta Foundation, "Scaling Potato Seed Production in East Africa" (video), 2018, <https://docs.lib.purdue.edu/scaleup/opening/videos/2/>.
75. "Quality Seed Potato Enables Farmers to Move Beyond Poverty in Africa," in *Annual Report 2017* (CIP International Potato Center, 2017), <https://cipotato.org/annualreport2017/media/quality-seed-potato-helps-farmers-move-beyond-poverty-in-africa/>.
76. Justin Ahmed et al., *Potato Seed Impact Study Report: Interim Study Report on the Impact of Adopting Certified Potato Seed in Meru County, Kenya (2011–2014)* (Syngenta Foundation, 2014), <https://www.syngentafoundation.org/file/2916/download?token=S9YXp7es>.
77. Simon Winter, SFSA, personal communication.
78. Babban Gona (website).
79. Babban Gona (website).
80. Willy Foote, "Meet the Nigerian Entrepreneur Depriving Boko Haram of New Recruits," *Forbes*, May 30, 2018, <https://www.forbes.com/sites/willyfoote/2018/05/30/meet-the-nigerian-entrepreneur-depriving-boko-haram-of-new-recruits/#771c047645b8>.

81. "Countries We Serve," One Acre Fund (website), accessed March 25, 2019, <https://oneacrefund.org/impact/>.
82. Liana Barcia, "How the One Acre Fund Became a \$50M Social Enterprise," Devex, October 16, 2015, <https://www.devex.com/news/how-the-one-acre-fund-became-a-50m-social-enterprise-87098>.
83. David Hong, "One Acre Fund Testifies Before House Foreign Affairs Committee," One Acre Fund (website), October 7, 2015, <https://oneacrefund.org/blog/one-acre-fund-testifies-house-foreign-affairs-committee/>.
84. Johannes Linn, "Session 4 Laying the Foundations for Successful Scaling" (video), September 27, 2018, <https://docs.lib.purdue.edu/scaleup/foundations/overview/1>.
85. Kohl, *Scaling Up of Agricultural Machinery in Bangladesh*.
86. Root Capital, *Financing Farm Renovation*.
87. Root Capital, *Financing Farm Renovation*, 15.
88. Murat Sartas et al., "Effects of Multi-Stakeholder Platforms on Multi-Stakeholder Innovation Networks: Implications for Research for Development Interventions Targeting Innovations at Scale," *PLoS ONE* 13(6) (2018): e0197993, <https://doi.org/10.1371/journal.pone.0197993>.
89. Dieuwke Lamers et al., "Compositional Dynamics of Multilevel Innovation Platforms in Agricultural Research for Development," *Science and Public Policy* 44, no. 6 (2017): 739–752, <https://doi.org/10.1093/scipol/scx009>.
90. Adesina, "Keynote Presentation."
91. David Spielman, "Public Policy Solutions to Advance the Scaling Agenda" (PowerPoint presentation, September 2018), <https://docs.lib.purdue.edu/scaleup/foundations/overview/1>; David Spielman, "Session 4 Laying the Foundations for Successful Scaling" (video), September 27, 2018, <https://docs.lib.purdue.edu/scaleup/foundations/overview/1/>.
92. Joseph Mulambu et al., "Iron Beans in Rwanda: Crop Development and Delivery Experience," *African Journal of Food, Agriculture, Nutrition and Development* 17, no. 2 (2017): 12026-12050, https://www.researchgate.net/publication/318468536_Iron_beans_in_Rwanda_Crop_development_and_delivery_experience.
93. Danielle Resnick, "The Political Economy of Food Price Policy in Senegal," in *Food Price Policy in an Era of Market Instability: A Political Economy Analysis*, ed. Per Pinstrup-Andersen (Oxford Scholarship Online, 2014), <http://www.oxfordscholarship.com/view/10.1093/acprof:oso/9780198718574.001.0001/acprof-9780198718574-chapter-14>.
94. Kohl, *Scaling Up of Sahel Rice Varieties in Senegal*.
95. Mikhail Miklyaev, Majid Hashemi, and Melani Schultz, "Cost Benefit Analysis of Senegal's Rice Value Chains," (Development Discussion Paper, Cambridge Resources International, 2017), https://cri-world.com/publications/qed_dp_301.pdf.
96. World Economic Forum and Bain & Company, "Nigerian Cassava Flour: Broadening Value Chains for Traditional Crops," in *Enabling Trade: From Farm to Fork* (World Economic Forum, 2014), <http://reports.weforum.org/enabling-trade-from-valuation-to-action/enabling-trade-from-farm-to-fork/a6-case-studies-f2f/nigerian-cassava-flour-broadening-value-chains-for-traditional-crops/>.
97. World Economic Forum and Bain & Company, "Nigerian Cassava Flour."
98. Grow Africa, *Fertilizer Subsidy Reform Revives Nigeria's Agriculture: Case Studies on Public-Private Agriculture Investments* (Grow Africa, n.d.), 4, <https://www.growafrica.com/sites/default/files/fertilizer-subsidy-reform-web.pdf>.
99. Katrin Kuhlman and Yuan Zhou, "Seed Policy Harmonization in the EAC and COMESA: The Case of Kenya" (working paper, Syngenta Foundation for Sustainable Agriculture, September 2015), 3, https://www.syngenta.foundation.org/sites/g/files/zhg576/f/seeds_policy_kenya_case_study_sept15_0.pdf.
100. Kuhlman and Zhou, "Seed Policy Harmonization," 3.
101. Trademark is pending for SeedAssure.
102. Jérôme Bossuet, "In Your Seeds I Trust: African Seed Companies Test the SeedAssure Application," CIMMYT (website), October 11, 2018, <https://www.cimmyt.org/in-your-seeds-i-trust-african-seed-companies-test-the-seedassure-application/>.
103. Population Media Center (website), accessed February 21, 2019, <https://www.populationmedia.org/>.
104. "PMC Has Helped More Than 500 Million People," Population Media Center (website), accessed February 21, 2019, <https://www.populationmedia.org/our-approach/impact/>.
105. Kuza Biashara (website), accessed February 21, 2019, <http://www.kuzabiashara.co.ke>.
106. "Who We Are," Shamba Shape Up (website), accessed February 21, 2019, <https://shambashapeup.com/about/who-we-are/>.
107. *Shamba Shape Up*, series 7, episode 16, "Conservation Agriculture, Mangoes, Water Testing," aired [n.d.] on Citizen TV Kenya, <https://shambashapeup.com/series/series-7/ep-16-conservation-agriculture-mangoes-water-testing/>.
108. Digital Green (website), accessed February 21, 2019, <http://www.digitalgreen.org>.
109. CIMMYT and CORTEVA, "Collaboration in Mexico" (PowerPoint presentation, June 8, 2018), <https://docs.lib.purdue.edu/scaleup/marketfinance/markets/1/>.
110. Jane Nelson and Beth Jenkins, *Tackling Global Challenges: Lessons in System Leadership from the World Economic Forum's New Vision for Agriculture Initiative* (Harvard Kennedy School, 2016), <https://www.hks.harvard.edu/sites/default/files/centers/mrcbg/files/NVAReport.pdf>.
111. "It says something that it took so much work and so many experts to identify so few documented cases of interventions that scaled successfully and sustainably." Mark Huisenga, remarks at Purdue University Scale Up Conference, September 2018.
112. This framework was developed under the auspices of the Monitoring and Evaluation Working Group of the Community of Practice on Scaling Development Outcomes (email: scalingCOP@msi-inc.com).

113. Juxtaposed with this is the all-too-common practice of rigid adherence to initial plans, as illustrated by this example cited by Dr. Robert Bertram, the Chief Innovation Officer in USAID's Bureau for Food Security: "I recall a visit in Nepal where we our partners were indeed taking a systems approach around rice, wheat and lentils. Yet in the field, it was clear that chickpea was the legume of choice. When I suggested including that, apparently the contract didn't allow for them to do so, and changing it was not easy." Prepared remarks at Purdue University Scale Up Conference, September 25, 2018.
114. Recent case studies and feedback from scaling experts suggest that it is possible to do a much better job integrating monitoring and evaluation with the data needs of commercial partners that focus on sales, distribution, transaction costs, and profitability.
115. AGRA (website), accessed February 26, 2019, <https://agra.org/>; [Joe DeVries], ["Africa's Private Sector-Led Seed Revolution"] (PowerPoint presentation, Purdue University Scale Up Conference, September 2018), <https://docs.lib.purdue.edu/scaleup/assessing/casestudies/1/>.
116. iDE-B (website), accessed February 26, 2019, <https://www.ideglobal.org/country/bangladesh>; [Tim Prewitt], "Machinery Learning: Translating Assessment into Adaptation toward Scale in Agriculture Mechanization and Beyond" (PowerPoint presentation, Purdue University Scale Up Conference, September 26, 2018), <https://docs.lib.purdue.edu/scaleup/assessing/casestudies/4/>; CIMMYT (website), accessed February 26, 2019, <https://www.cimmyt.org/>; Lennart Woltering and Jelle Van Loon, "Scaling Appropriate Agricultural Mechanization World-Wide: Two-Wheel Tractors and Smallholders Farmers" (PowerPoint presentation, Purdue University Scale Up Conference, September 2018), <https://docs.lib.purdue.edu/scaleup/examples/casestudies/3>.
117. [Rebecka Lundgren], *Promising Practices in Scale-Up Monitoring, Learning and Evaluation: A Compendium of Resources* (Institute for Reproductive Health, Georgetown University, 2013), <http://irh.org/scale-up-mle-compendium-of-resources/>.
118. "Millions Learning," Brookings Institution (website), accessed March 4, 2019, <https://www.brookings.edu/series/millions-learning/>.
119. Larry Cooley and Isabel Guerrero, *The Broken Part of the Business Model in Taking Development Outcomes to Scale* (MSI and Imago Global Grassroots, 2017), http://msiscalingup.wpengine.com/wp-content/uploads/2016/08/BrokenPart_revised_5.pdf.
120. Arntraud Hartmann et al., "Scaling Up the Fight Against Rural Poverty: An Institutional Review of IFAD's Approach" (Global Economy and Development Working Paper No. 43, Brookings Institution, 2010), <http://www.brookings.edu/research/papers/2010/10/ifad-linn-kharas>.
121. Arntraud Hartmann et al., "Scaling Up Programs for the Rural Poor: IFAD's Experience, Lessons and Prospects (Phase 2)" (Global Economy and Development Working Paper No. 54, Brookings Institution, 2013), <http://www.brookings.edu/research/papers/2013/01/ifad-rural-poor-kharas-linn>.
122. IFAD, *IFAD's Support to Scaling Up of Results: An Evaluation Synthesis* (IFAD, 2017), <https://www.ifad.org/documents/38714182/39721352/Scaling+Up+ESR+++Final+report+for+web.pdf>.
123. Linn et al., "Scaling Up the Fight Against Rural Poverty."
124. IFAD, *IFAD's Institutional Efficiency and Efficiency of IFAD-Funded Operations* (IFAD, 2013), https://www.ifad.org/documents/38714182/39711115/efficiency_full.pdf/a781120f-3b52-493d-833a-e8d7fc1075ee.
125. Relevant documentation: "Scaling-up results," IFAD (website), accessed February 21, 2019, <https://www.ifad.org/en/scaling-up-results>; Linn et al., "Scaling Up the Fight Against Rural Poverty"; Hartmann et al., "Scaling Up Programs for the Rural Poor"; IFAD, *IFAD's Operational Framework*; IFAD, *IFAD's Support to Scaling Up of Results*; IFAD, *Scaling Up in Agriculture and Rural Development* (IFAD, September 2018), https://www.ifad.org/documents/38714170/39155737/Scaling+up+in+agriculture_infographics.pdf.
126. Eleanor Crook Foundation, *Grantee Guidance Series: Theory of Sustainability and Theory of Scale* (Eleanor Crook Foundation, October 2018), https://static1.squarespace.com/static/551db914e4b0998e40bbd10d/t/5bc518a971c10b9813d5c1e6/1539643577159/ecf-grantee-guidance_Oct2018.pdf.
127. GIZ, *Task Force on Scaling: Achieving Widespread Adoption of Innovations from Agricultural Research* (GIZ, 2018), <https://cgspace.cgiar.org/handle/10568/97465>.



LARRY COOLEY is Founder and President Emeritus of MSI, a Tetra Tech company. He directed for 11 years the multi-country Implementing Policy Change program and has been involved since 2003 in developing and applying a management framework and set of tools for assessing scalability and accelerating the scaling of development outcomes through public sector and commercial pathways. He has supported more than 100 scaling efforts in a variety of sectors; served as the scaling advisor to the MacArthur Foundation's *100&Change* competition; and is founder and curator, with Johannes Linn, of the Global Community of Practice on Scaling Development Outcomes. Larry is the current Chair of the Governing Council of the Society for International Development and serves on the Boards of Directors of the National Academy of Public Administration, ELMA Philanthropies, and World Learning. Larry holds graduate degrees from Columbia University, Princeton University, and the Cranfield Institute of Technology in the UK.



JULIE HOWARD is an independent consultant on international development issues with a focus on agricultural development, youth employment, and sub-Saharan Africa. She is Senior Adviser (non-resident) at the Center for Strategic and International Studies, serves on the Board of Directors for the World Vegetable Center and the Somali Agriculture Technical Group, and is a member of the Initiative for Global Development's Council of Advisers. From 2015 to 2018, she was senior adviser to the associate provost and dean for international studies and programs at Michigan State University. From 2011 to 2014, Dr. Howard served as the first chief scientist in the Bureau for Food Security at USAID and as senior adviser to the USAID administrator on agricultural research, extension, and education. At USAID, Dr. Howard directed the research, policy, and human and institutional capacity development programs of Feed the Future. Before joining USAID, Dr. Howard served from 2003 to 2011 as chief executive officer for the Partnership to Cut Hunger and Poverty in Africa. She holds a B.A. from the George Washington University and a Ph.D. in agricultural economics from Michigan State University.