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BRIEFING NOTE

USING COMMERCIAL PATHWAYS TO SCALE UP AGRICULTURAL TECHNOLOGIES



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USING COMMERCIAL PATHWAYS TO SCALE UP AGRICULTURAL TECHNOLOGIES

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ACRONYMS

BFS	Bureau for Food Security (USAID)
IP	Implementing Partner
MSI	Management Systems International
PICS	Purdue Improved Crop Storage
USAID	United States Agency for International Development

EXECUTIVE SUMMARY

The United States Agency for International Development's Bureau for Food Security (USAID/BFS) commissioned five country studies examining the scaling up of agricultural innovations through commercial pathways in developing countries, to understand how the Agency – including its country missions and implementing partners (IPs) – can use donor projects to achieve greater scale and long-term commercial sustainability. This briefing note provides a summary of the lessons and recommendations from those studies. It is intended for the staff and implementing partners of donors, and for other members of the international development community interested in scaling up.

The characteristics of the innovation package itself are important for scaling. Innovations are easier to adopt if they have few components, are upgrades or replacements for existing technology, and do not require large departures from pre-existing agricultural practices. The innovation package must also have a strong business case for farmers in terms of high returns, affordability (i.e., price points), and – especially – low or reduced risks. Savings on production costs (i.e., cash flow), labor, and time can be as important as increased productivity and profits for cash- and credit-constrained farmers.

Scaling is most successful when all parts of the relevant value chain are working. This includes upstream production, distribution, marketing, access to financing, downstream market linkages, and processing. The capacity of the value chain must be able to grow in tandem with increases in productivity and production. While it is possible to create demand for the increased output that results from large-scale adoption of the innovation, scaling is more likely to be successful when the increased output can fit into an established market without adversely affecting prices. There need to be private-sector actors who have the commercial expertise, resources, and market infrastructure to support and drive scaling and serve as partners to donor projects. Finally, a minimum of public policy support is essential, preferably translating into programmatic support. Where subsidies are involved, ideally they would be targeted and time-limited for the innovation.

The key drivers for successful scaling through commercial pathways are:

- **A strong business case for all value-chain actors**, from upstream production and distribution to downstream marketing and processing of increased outputs. The *sine qua non* of successful scaling through commercial pathways is that adoption of the innovation has to make good business sense.
- A donor project or set of projects that **create the foundations for the market to become self-sustaining by building a critical mass of early adopters and strengthening the value chain or market system**. This type of programming includes: (i) covering the costs of refining innovation packages, including ensuring feasibility, usability, and viability for adopters; (ii) demonstrating the business case for all actors; (iii) mitigating risk (e.g., discounts or promotions for early adopters); (iv) awareness-building activities; (v) ensuring that there are actors with the capacity and incentives to produce and supply the innovation through a distribution, sales, and marketing system, and downstream linkages as needed; (vi) addressing financing, input quality, and certification and compliance; and (vii) as needed, providing a commercially sustainable long-term source of technical assistance or extension support. Since strengthening the value chain can take years, it is highly preferable that scaling up be integrated into the project from the outset.
- **Lead IPs that have strong business skills and experience and an entrepreneurial, opportunistic philosophy**. Organizations with technical capacity can provide support to refine, adapt, and modify innovations.
- **Flexible partnerships between IPs and other actors, especially commercial actors**. IPs need to have the flexibility to choose the best partner for a given task or role, whether the partner is a non-governmental organization, or in the public or private sector. For commercial scaling, private-

sector partnerships are essential and must be created on a money-making basis and include capital investment from commercial partners. The best results are obtained when commercial actors are also prepared to invest their own money, and it is important that contract terms do not undermine the leverage of IPs in negotiating such partnerships.

Donors and IPs pursuing scaling up through commercial pathways should include the following practices and activities in their strategies:

- **Reduce risks by absorbing the initial costs of investment** in public goods, such as initial information dissemination, awareness building, and providing extension services to early adopters. Current USAID practice often does this, but focuses more on training and demonstrations than on making linkages to private-sector marketing and sales efforts.
- **Short-term donor subsidies** can play a major role in increasing the size and speed of early adoption by reducing the costs of trying the intervention. Currently, initial adoption is often completely subsidized, which undercuts the market and undermines the business case as adopters are reluctant to pay for something they or others got for free.
- **Apply an adaptive, flexible, and phased approach that is responsive to market feedback.** IPs need maximum flexibility built into their contracts and targets to test and refine multiple innovations and to decide which sectors/value chains, geographic areas, and commercial partners hold the most promise. Adaptive management is also essential because work plans, strategies, and tactics must change frequently in response to market feedback and unanticipated events. This contrasts with current practice of having rigid strategies and work plans that are often copied from initial designs and do not adapt to market developments.
- **Initially target larger, emerging farmers** – preferably those growing cash crops – when it is not feasible for small farmers to take on the risks of being early adopters. Once the market is established and commercial partners enter, smaller or poorer farmers will enter the market. If selling to smaller or more remote farmers is not commercially viable, donors or host-country governments need to subsidize outreach to marginalized communities or extend physical and market infrastructure to poor or remote farmers to reduce transactions costs and risk. Current donor practice often starts with smaller poor farmers, even when they lack the means and risk-taking profile to be early adopters or serve as exemplars for others, pressuring implementing partners to provide subsidies that undermine long-term commercial viability.
- **Extend the duration of scaling projects beyond the standard five-year timeframe, using a phased approach.** Most donor projects are currently limited to five years at most, which is usually too short to achieve sustainable scale. This creates incentives to take shortcuts to reach targets that undermine market incentives. A phased approach could use intermediate milestones; market testing of multiple innovations; selecting scalable innovations; reaching a critical mass of early adopters; value chain strengthening; and going to full scale. This approach could include the release of funds contingent on the achievement of intermediate outcomes.
- **Use a portfolio approach to achieve multiple objectives.** Commercial scaling combines the advantages of long-term sustainability and a viable exit strategy with low adoption levels in the first few years and risks of failure. For donors with minimal scale objectives, it can be useful to balance commercially-oriented projects with more traditional approaches to achieve targets and with other projects that focus on policy, research, and value-chain strengthening.
- **Use monitoring and evaluation systems that generate commercial market information** for adaptive management purposes. Key indicators include: the geographic/demographic characteristics of adopters; the number of indirect adopters relative to direct adopters (indicative of self-sustaining scaling); the viability of value chain components; and the profitability of adoption for all value chain actors.

INTRODUCTION

USAID and other donors have invested substantial resources in research and initial dissemination of innovations to help smallholder farmers and achieve food security. To realize these objectives and the potential impact of these investments, technologies need to reach significant scale. If the scale of technology adoption is limited to that achieved by donor projects that have limited resources in comparison to the need, the scale achieved is often well below potential and unsustainable as such efforts tend to lack commercial viability. Despite multiple efforts to replicate the Green Revolution, there are few examples in the last 25 years of sustainable large-scale adoption of new agricultural technologies. The big question for the international development community is how to achieve large-scale, lasting, and sustainable adoption of agricultural innovations. What drivers, strategies, and activities do donor projects need to incorporate to successfully scale up agricultural innovations through commercial pathways?

At the request of the United States Agency for International Development's Bureau for Food Security (USAID/BFS), a team from Management Systems International (MSI) under USAID's E3 Analytics and Evaluation Project prepared five case studies of successful cases of scaling up¹ of agricultural innovations through commercial pathways in developing countries, and a cross-country summary paper.² The rationale for focusing on commercial pathways is that in most low- and low-middle income countries, public institutions and non-governmental organizations do not have the resources and experience to continue with scaling or sustain scale. Hence, the common strategy of transferring innovations at project's end to in-country public research institutions, ministries, parastatals, or non-governmental organizations has meant that many farmers never adopt the innovation.

USAID/BFS commissioned this series of studies to develop an approach to scaling up that the Bureau and other donors could use to translate their extensive investments in promising agricultural innovations into large-scale impact. The research sought to identify cases in which commercial scaling had occurred; examine the underlying factors that were important to the scaling outcome; and then develop guidance for the Agency, its Implementing partners (IPs), and other donors. This Briefing Note summarizes those findings and suggests how projects can achieve greater scale and foster long-term commercial sustainability.

This briefing note summarizes the lessons and recommendations from those reports. It is divided into four sections: Characteristics of the Innovation, Characteristics of the Country Context, Scaling Drivers and Strategies, and Recommendations for Project Design, Contracting, and Implementation. As these headings imply, not all innovations can be scaled up in every country or region.

¹ "Scaling up" here refers to scaling up of agricultural innovations through commercial pathways in low-resource countries.

² A summary of the case studies can be found in the cross country synthesis report available at:

<https://agrilinks.org/sites/default/files/resource/files/BFS%20Scaling%20Cases%20Synthesis%20Report%20508%203-9-17.pdf> The case studies examined were: (i) agricultural machinery in Southwest Bangladesh (<https://agrilinks.org/sites/default/files/resource/files/BFS%20Scaling%20Review%20-%20Bangladesh%20Report%20FINAL%20508.pdf>); (ii) Purdue Improved Crop Storage hermetic storage bags Kenya (<https://agrilinks.org/sites/default/files/resource/files/BFS%20Scaling%20Review%20-%20Kenya%20Report%20REVISED%20508%2011-16-16.pdf>); (iii) a package of innovations in the irrigated rice sector in the Senegal River Valley (<https://agrilinks.org/sites/default/files/resource/files/BFS%20Scaling%20Review%20-%20Senegal%20Report%20FINAL%20508%2011-6-16.PDF>); (iv) Kuroiler chickens in Uganda (<https://agrilinks.org/sites/default/files/resource/files/BFS%20Scaling%20Review%20-%20Uganda%20Report%202-13-17%20508%20Final.pdf>); and (v) hybrid maize seed in Zambia (<https://agrilinks.org/sites/default/files/resource/files/BFS%20Scaling%20Review%20-%20Zambia%20Report%20REVISED%202-8-16.pdf>). The first three innovations were scaled up in the context of USAID-funded projects.

CHARACTERISTICS OF THE INNOVATION

In almost all cases, an agricultural innovation is, in fact, a *package* containing multiple components. The package usually combines the new or improved technology with other technologies, products, or good agricultural practices that are necessary to realize the effect of the innovation. In most cases, full potential impact is only realized when the package is adopted in its entirety and implemented correctly, although the package and practices will need to be adapted to different contexts. In low-resource contexts, partial/gradual, incorrect, or incomplete adoption of the innovation package can be expected, even when it has been modified for local conditions. As such, the impact of scaling will often differ from that experienced in research stations or field trials and this must be taken into account in assessing whether there is a viable business case for potential adopters, especially those with below-average resources.

Innovation packages that are more robust (i.e., they will generate significant benefits even if adoption is 'imperfect')³ are preferable for scaling up in the development context. For example, the innovation package based around hybrid maize includes the use of nitrogen fertilizer. Using less than the recommended levels of this fertilizer, common among lower-resourced farmers, reduces and eventually almost eliminates the benefits of hybrid seed. Poorer or smaller farmers who can only afford to adopt some components of the package, or adopt them partially, will experience fewer benefits (although in some cases this may be rational). If imperfect or partial adoption does not generate sufficient results to provide a solid return on investment, these farmers will likely abandon the innovation.

The implications of robustness can be summarized in a few points:

- The **fewer the number of components in the package and the simpler it is**, the easier it is to approach comprehensive adoption and realize the full benefits of the innovation for adopters at scale. Innovations that require substantial training and extension support tend to be less robust, and providing essential support can be challenging for commercial partners from a business perspective. Indirect adopters are also likely to experience less than full impact.
- Innovation packages in which **the core technology upgrades, replaces, or leverages existing ones** are more viable for adoption and scaling. This was the case in Zambia, where many farmers already had familiarity with hybrid maize because many had used it in the 1980s; and in Bangladesh, where farmers already used diesel-powered engines for their pumps and more easily adopted the more efficient axial flow pumps.
- Innovations that **address a clear need and have tangible and visible non-financial benefits**, such as savings in time, labor, or cash flow, are more likely to successfully scale. Purdue Improved Crop Storage (PICS) bags in Kenya and elsewhere largely eliminate post-harvest losses, and in Southwest Bangladesh, most of the new machinery helped ameliorate acute labor shortages that farmers experienced during land preparation, planting, and harvesting.
- The **price point of the innovation affects affordability for potential adopters**, which is critical to successful scaling up since many potential adopters – especially small farmers – face cash and credit constraints. Even with a high return on investment, innovation packages with high costs, relative to income and wealth, are difficult to scale. In Bangladesh, for example, machines were offered at multiple price points and the less expensive ones were easier to scale even though they had lower returns. This was because farmers could pay for them from existing resources, or could

³ “Robustness” here refers to how much the impact of adoption decreases with partial or incorrect adoption of the innovation package (i.e., only some of components of the innovation package are adopted, or the components – especially good agricultural practices – are not implemented in line with recommendations). While components, implementation guidelines, and good agricultural practices often need to be modified for different agro-ecological zones and other conditions, those innovation packages that are more ‘robust’ across different agro-ecological zones and conditions are more likely to be successfully scaled up and have greater potential scale.

borrow from family members, and there was also less risk involved. Innovations that can be tried in small amounts imply less risk and more affordability.

- **Strong financial benefits in terms of returns and, especially, low or decreased risk** are essential for successful scaling up. An important source of risk reduction is diversification across crops, time, and space (i.e., innovations that can be used for multiple crops or seasons). In Senegal, the introduction of government-subsidized crop insurance was part of the innovation package for high-yielding rice and reduced the risk of production loans for both farmers and lenders. In Zambia, the large number of hybrid varieties in the maize seed package allowed farmers with sufficient land to plant two or three varieties with different risk-return profiles relative to rainfall patterns, *de facto* using a portfolio approach of varieties based on low co-variance.
- Early adoption is facilitated when an innovation package **can be used to grow cash crops, as cash earnings can be used to repay borrowing or finance further investment**, especially for comprehensive adoption of all components in the package.

CHARACTERISTICS OF THE COUNTRY CONTEXT

Some countries have more favorable policy and institutional contexts for scaling up. While in many cases organizations that make up the value chain can be created or strengthened, this is almost always time consuming and resource intensive. This is especially the case when organizational capacity is initially weak or absent, and the objective is to ensure that new or existing organizations can increase capacity or throughput on pace with scaling up.

Final Demand and Downstream Linkages

Widespread adoption of the innovation package typically leads to increased output for the final product, (e.g., crops). It is **easier to scale up when market demand for the increased output already exists**; creating demand is much more difficult. In Kenya, Senegal, and Zambia, the innovations examined resulted in an increase in net production of staple cereals, of which all three countries were net importers, so there was import substitution potential. In all five countries studied, the output was familiar and the most 'exotic' innovation – Kuroiler chickens in Uganda – was tested first to ensure that the chickens were acceptable to local tastes.

Final demand alone is insufficient without the intermediate linkages of marketing and/or processing, and farmers will not adopt the innovation if they cannot sell the additional production that it generates. This was true in the Casamance of Senegal, where farmers did adopt more productive rice varieties but were unable to get the rice to market in Dakar. Kuroiler chickens in Uganda provide both positive and negative examples of the importance of market linkages. Markets for eggs and chickens did exist, which facilitated scaling, but had limited absorption capacity because of the absence of downstream market linkages to urban areas, despite excess demand in those areas.

Structural Factors Driving Need for the Innovation

In most of the countries examined, structural factors drove greater demand for the innovations. These factors included labor shortages (or rising rural wages), significant losses from adverse weather and disease, and post-harvest losses. In Bangladesh and Senegal, significant rural outmigration made labor scarce at a key land-preparation and harvesting time. Two of the three machines introduced in Bangladesh had significant labor-saving benefits.

Existing Technology and Infrastructure

The adoption of technology often requires, or is facilitated by, the **existence of complementary infrastructure or other technology**. For example, many technologies require the presence of year-round water, e.g., through irrigation, because they would not be profitable if only used part of the year for rainfed agriculture. In Senegal, scaling was initially constrained to the irrigated areas of the Senegal River Valley, and it remains to be seen whether current efforts to extend to the rainfed areas of Southern Senegal will be successful. The scaling up of newer technology axial flow pumps in Bangladesh took advantage of the existing base of diesel engines for irrigation. The same was true for power tiller attachments, as there was a large base of installed power tillers.

Relevant Value Chains with Strong Organizations and a Commercial Orientation

A favorable context for scaling includes the existence of a cash-crop sector in which the innovation can be applied. Innovations are easier to scale in cash-crop sectors where farmers have money to pay for the innovation (and any associated inputs and costs), and are likely to have shifted from a safety-first to a profitability/return on investment mentality. The targeted sectors in all five countries examined included an element of production for sale. Most maize farmers in Zambia and Kenya sold at least some of their production. In Bangladesh, horticulture and fish farming – both cash-crop sectors – drove early adoption. While scaling can be done with poor subsistence farmers, it is much more challenging given their limited cash incomes.

Scaling up is facilitated when **existing value-chain organizations are robust; have the capacity to produce, market, and distribute** the tangible components of the innovation package; and **can increase throughput as demand for the innovation increases with scaling**. In Zambia, scaling up was easier because a large supply of certified hybrid seeds (produced for export) was already available and met increased demand, as domestic demand represented only a fraction of total seed production.

The **density and geographic coverage of market infrastructure is important because it lowers transaction costs**. In Senegal, most early adopters lived close to the Dakar market in areas with dense input supply infrastructure. In Kenya and Zambia, early adopters lived close to major towns or roads where they could buy inputs and sell outputs with minimal travel. Adoption rates fall off steeply when distance raises transaction costs.

Depending on the innovation, scaling up is enabled by having **complementary services** in place, such as financing, machinery services, veterinary services, or after-market service and repair. This is particularly true for less robust innovations in which quality of implementation and good agricultural practices are essential to generate most of the benefit. Financing is only relevant when the cost of the innovation package is beyond the immediate means of the potential adopter. Sustainable, commercially viable financing of innovation packages for smallholders remains a challenge in most cases.

Public-Sector Support

In every country examined, **broad public policy support** was essential to successful scaling. At a minimum, the government's agricultural strategy and policy stance need to be favorable to the introduction and scaling of the innovation, even if this does not translate into programs or resources. In Bangladesh, partnerships with key government institutions were vital because of these entities' roles as gatekeepers and regulatory authorities, rather than the value-added they provided.

Public-sector subsidies, especially for early adopters and early producers, can be critical for scaling up. Subsidies can also play a key role in extending scaling to more marginalized farmers or communities, especially those further from market infrastructure and with higher transactions costs. However, government programs that facilitate scaling by increasing affordability or reducing risk are not without problems. In Senegal and Zambia, ongoing public-sector support for inputs and output prices played a critical role in scaling up, as did subsidized crop-production financing and insurance in Senegal. While the subsidies are fiscally sustainable in Senegal, they are not in Zambia and are likely to be cut back, leading to a decrease in the long-term scale of hybrid maize utilization. In both countries, subsidies created significant market distortions in other parts of the value chain.

Public-sector institutions can play a key role in providing **quality control, establishing standards, and enforcing intellectual property rights and branding**. This is vital for innovations in which counterfeiting can undermine adoption and create negative reputation effects.⁴ Sometimes this can be done through private-sector associations, but it often requires at least some public-sector role.

One area where **the public sector cannot be expected to play an important role is in providing extension support, especially at scale**. Most public extension services lack the necessary resources to provide large-scale extension services. Innovations that require substantial training or continuous extension support are more difficult to scale unless it is profitable for private actors to provide such support or low-cost extension methods can be utilized (e.g., training videos that can be distributed through mobile networks with wide rural coverage; tablets at point of sale).

The **absence of direct government (or parastatal) production** is essential, especially when it substitutes for and discourages private production. This is different from subsidies to the private sector, which do not create vested interests that can undercut the private sector and lack incentives to produce efficiently. In Senegal, credit subsidies and bailouts of bad debt created moral hazard problems in bank lending, and interference in output markets squeezed profit margins for wholesalers. In Zambia, government output purchase programs largely eliminated private maize processing. In Bangladesh, the government is heavily involved in supplying rice seed at subsidized rates, making it difficult for commercial seed producers to compete.

In many of these areas, private-sector partners can help ensure that the public sector is engaged and supportive of the initiatives and is accountable for the efficient allocation of subsidies. In their partnerships with the private sector, donors can initiate public-private or multi-stakeholder partnerships that create strong governance and transparency structures and new vested interests that can ensure the political sustainability of these structures and therefore accountability. In Zambia, input and output subsidies for maize were effectively challenged by the private sector because they consumed almost the entire agriculture budget, crowded out other important commercial crops, and were fiscally unsustainable. Private partnerships with the USAID project in Senegal created a political counterweight to government subsidies, but it remains to be seen if these interests will prove strong enough to curtail subsidies, given that currently the fiscal costs are sustainable. The viability of this approach thus depends significantly on fiscal sustainability and on the local political economy and rent-seeking behaviour.

⁴ Counterfeiting is distinguished from copycatting, as the latter can play an important role in introducing competition, driving down price, increasing access, and offering multiple price points for similar products.

SCALING DRIVERS AND STRATEGIES

While flexibility and adaptability are essential to successful scaling up, it is also critical to have a scaling strategy from the beginning as opposed to waiting to develop an exit strategy in the last year or two. As Hartmann and Linn note, drivers for scaling can "... move a development intervention forward on the path from inception or pilot to a larger scale."⁵ Leadership, vision, and incentives/accountability appear to be key drivers of scaling agricultural innovations through commercial pathways.⁶

Drivers

The most important driver of scaling up in the market and policy contexts is leadership. Leadership in this sense refers to one or more organizations (e.g., implementing partners, agricultural research institutions, private-sector firms) that have the skills and motivation to take on the responsibilities and activities involved in pushing the scaling process forward.

A donor project that has an **IP with a strong commercial orientation** can function as the primary driver in the early stages of scaling. In Bangladesh and Senegal, USAID's IPs played these roles. The IP for Bangladesh was a non-governmental organization with extensive market facilitation experience. In Senegal, the IP's chief of party had many years of private sector experience. Commercial actors can also be the leadership drivers. This was the case in Zambia, where private seed companies led the process. For a commercial actor to lead usually requires that the business case be strong from the beginning, the risks are low, and the value chain needs little or no strengthening. It is unusual for a public sector or parastatal agency to be the driver of commercial scaling; Uganda was the only one case study where this was tried, and it proved problematic. The case studies highlighted the importance of a supportive public-policy environment and public programs to drive scaling.

Having a **scaling up vision** helps drive the scaling process. If the vision is to reach a significant percentage of all potential adopters, strategies and activities are needed to ensure that scale is commercially sustainable for adopters and all relevant value-chain actors. This is different from projects for which scale is simply targeting a fixed number of adopters that tends to be limited. A good example of this was in Bangladesh, where the USAID-funded project successfully pursued scaling of high-yielding rice varieties through public sector production and distribution to many adopters. The same activities from this traditional approach proved not viable for scaling agricultural machinery through the private sector, and required private-sector partners and activities to ensure profitability for the entire value chain.

Aligning incentives and creating accountability are critical for scaling up to ensure long-term sustainability. For adopters and value-chain actors, this means making sure that there is a strong and viable business case. For the public sector, it means ensuring that scaling goals are aligned with public policy and bureaucratic incentives. In Senegal, for example, there was strong alignment between targets for greater irrigated rice production and the incentives for public actors, which helped drive the scaling process.

For donors and especially their IPs, it is essential to have **the right indicators and targets** to incentivize commercially sustainable scaling up. In addition to traditional project indicators, scaling indicators could include: number of indirect adopters (who learn about and adopt the innovation through non-project sources); extent of adoption and fidelity of implementation; profitability and impact of adoption (over

⁵ Arntraud Hartmann and Johannes F. Linn. Scaling Up: A Framework and Lessons for Development Effectiveness from Literature and Practice. Wolfensohn Center for Development Working Paper 5, October 2008: p. 16: https://www.brookings.edu/wp-content/uploads/2016/06/10_scaling_up_aid_linn.pdf.

⁶ Characteristics of the innovation or the country context, as discussed above, are also effectively drivers, e.g., strong market demand for output, structural demand for the innovation package, and innovations that reduce or help farmers manage risk.

time, for different uses); and the willingness of value-chain actors to invest their own money to participate in scaling and develop capacity.

Scaling-up Strategies

Successful strategies for scaling up have the following components:

Build in scaling up from the beginning using a phased, adaptive approach

Scaling considerations need to be included at the project design stage, although the path and goal of scaling will evolve over time. The Senegal and Bangladesh cases used a phased, adaptive approach, with strategies and activities evolving in response to market feedback. Staff from the USAID-funded Bangladesh project noted that it could have saved time and effort had it integrated scaling considerations from the beginning.

These studies highlight four important tasks for the initial ‘design’ phase:

1. **Determine** the right innovation package: what needs to be included to achieve robust results from the technology *and* make it as easy and affordable as possible for adopters to implement it;
2. **Understand** the whole market system and value chain;
3. **Test** the innovation in the market (and not just at research stations and/or field plots managed by experts) in terms of feasibility, usability, and viability (human-centered design), and modify the innovation based on market feedback; and
4. **Estimate and verify** the innovation’s potential market size (e.g., numbers, geography, demographics) based on relevant agricultural products and agro-ecological zones.

In determining the right innovation package, scaling organizations need to make tradeoffs between potential impact and effectiveness; ease of adoption; the number and complexity of components in the package; affordability; and riskiness of adoption. Many cash- and credit-constrained small farmers would gladly trade improved productivity or returns for reduced risk (i.e., a truncated distribution of returns).

Assess the major commercial players in the market and identify which would make good private-sector partners

Partnerships are essential for commercial scaling up, especially those with the private sector.⁷ To be effective, private-sector partners need to have the knowledge, experience, and resources to contribute to scaling and **the interest** in taking up a good business proposition.⁸ All of the four cases examined already had large potential parts with some or all of these characteristics: large agricultural machinery companies in Bangladesh, a private rice mill investor in Senegal, a commercial agricultural inputs supplier in Kenya, and several major multinational and domestic hybrid maize seed producers in Zambia.

The case studies showed that private-sector partnerships need to be organized as early as possible, preferably before scaling and implementation begin. In Bangladesh, these partnerships were negotiated in the year prior to the project. This allows private-sector partners to be involved in the selection of which technological innovations have the most scaling potential, which modifications and refinements will increase usability for adopters, and which accompanying components (e.g., extension services, after-service sales) will be needed. Private-sector partners should also be involved in market studies and the design of the marketing, scaling, and value-chain strengthening strategy, especially for production and distribution.

⁷ Partnerships with farmers’ associations/producer organizations can be important in promoting the adoption and mastering of new technology by lowering the costs of training and extension support.

⁸ Unless donors are willing to create commercial actors *de novo* and take equity positions, i.e., support greenfield investment through venture philanthropy or impact investing.

Focus first on getting a critical mass of early adopters, regardless of their size, crops, or location

The main goal of early-stage commercial scaling is to create a critical mass of adopters, meaning (1) a minimum efficient market size to be profitable for private-sector partners to take over and drive scaling, and (2) enough direct, early adopters to drive spontaneous scaling through indirect (i.e., second-round) adoption. Minimum market size translates into lower unit costs, assures a viable nascent distribution and sales network, and proves to private-sector partners (and other market entrants) that there is a viable business case. For spontaneous scaling, a critical mass creates the basis for numerous contact points and a demonstration effect for other indirect adopters.⁹ In the scaling up of PICS bags, both were achieved fairly rapidly, which allowed the private-sector partner to become the primary driver of going to full scale.

This phased approach must be accompanied by an understanding that **it often takes time to see the impact of scaling**; the numbers may look weak for the first few years. **Insisting on quick wins and big early numbers can create perverse incentives for IPs** to distort market incentives at the cost of long-term commercial sustainability. PICS bags are an exception because of their low unit cost and repayment period within one year. In Senegal and Bangladesh, the process has taken several years, especially as supply of the innovation had to be created simultaneously and in lockstep with each other.

Target as early adopters those farmers who have a high-risk preference, financial means, a commercial orientation, and the largest demonstration effect

These farmers tend to be younger (if less experienced), larger, or emerging farmers growing cash crops and selling most of their output. The case studies showed that **younger farmers are more open to adopting newer technologies**. Even if small farmers growing staple crops represent the ultimate target, **it likely makes more sense to start with emerging farmers or those producing high value-added products**. Similarly, it may be best to target areas for early adoption that are **closer to input and output markets – where transaction costs are lower** and population densities are higher – before moving to more remote rural areas that may be the ultimate target zones. In Senegal, the irrigated rice package was initially scaled in the area closest to Dakar, where returns were highest, infrastructure the densest, and transaction costs lowest. Even so, there is no guarantee with sufficient market size that it will be profitable for commercial actors to reach smaller, poor farmers or more remote areas, in which case infrastructure construction or public subsidies may be necessary.

Include broad information dissemination, awareness-building, and marketing activities

For the simplest innovation packages, like PICS bags and hybrid maize seed, awareness building and adoption promotion through marketing-logistics sensitive demonstration sites alone can be sufficient, as this information can spread through social networks and word of mouth. For more complex innovation packages that have less obvious advantages, awareness-building efforts need to use multiple marketing tools, including mass media, sales agents (to follow up on demonstrations), fairs, road shows, farmer field days, and branded materials. Agricultural companies are increasingly using aspirational advertising and other sophisticated marketing techniques such as promotional deals, giveaways, and sample sizes. These approaches and techniques proved useful in encouraging adoption of agricultural machinery and machinery services in Bangladesh.

⁹ Along with strengthening the value chain institutions.

Demonstrate the business case for all value-chain actors

Farmers and private-sector partners will not invest in or adopt a new technology unless it is clear, both on paper and through experience, that it makes good business sense for them to do so. For many actors, especially those who work on credit or are cash-flow constrained, **the risks associated with adoption are as – if not more – important than increased productivity or returns.** Farmers and distributors are both concerned with their ability to repay credit (or meet accounts payable) and cover the purchase of inputs for the next season. In Bangladesh, agricultural machinery that could be used across multiple crops and seasons was more readily adopted because it lowered risk.

In successful commercial partnerships, the introduction and scaling of the innovation are aligned with the private sector partner’s business strategy

If scaling up an innovation package is a good deal for a private-sector partner, then it should be willing to invest its own capital. The USAID IPs for the Senegal and Bangladesh projects both successfully insisted on this; not doing so is a good indication that there is something wrong with the actual or perceived business case or the viability of the partner.

In some countries, insisting on capital investment from private-sector partners can be difficult because donors have historically not required such investment. Bangladesh is a perfect example; in the past, donors often pressured IPs to have commercial partners. The Bangladeshi private sector learned that IPs were contractually obligated to find private-sector partners, and they used this knowledge to their advantage by extracting project resources while not committing any of their own funds. Many large Bangladeshi companies have development partnerships as a major risk-free profit center. This type of risk-free partnership can only be changed by holding the line and allowing IPs to walk away, if necessary, so they have equal bargaining power.

Private-sector partners are attracted when the deal is presented to only one partner, at least initially, so that early partners can leverage first-mover advantages. In Senegal, initial partnerships were with one rice miller and one machinery leasing company. Once the business and market cases are established, donor projects can and should bring in additional partners to increase competition and improve coverage, access, and distribution. A strong commitment from the private-sector partner’s senior management is needed, especially an internal champion who has the authority, responsibility, and incentive to ensure that middle- and low-level employees are equally motivated and cooperative. The partnership terms need to ensure that the incentives are aligned for private-sector partner staff at all levels, and the necessary resources – especially non-financial – are made available. In Bangladesh, senior management was onboard but hands off and middle management had neither the incentives nor the direction to work effectively with the USAID project.

Donors contribute to adoption by underwriting startup costs, providing public goods, and mitigating initial financial risks

Donor projects often cover startup costs including financing or market studies, refining the product and innovation package in the light of market feedback, strengthening value-chain institutions and addressing gaps, and initial information dissemination and awareness building. This reduces the risks for early adopters and private-sector partners by underwriting attractive pricing through promotions and discounts, which need to have an explicit phase-out strategy so that the market is aware that these will not be available to later adopters and adversely affect future adoption.

Create supply and demand simultaneously to reduce the risks for producers and adopters

There is a chicken-and-egg problem in scaling up. Commercial actors will not produce, promote, or distribute without a market, and farmers will not demand – let alone purchase – an innovation that they cannot first try and see its results. This problem should be solved by keeping both supply and demand in relative balance, supporting supply or demand creation as necessary. In many cases, this looks like a virtuous spiral, as constraints will appear and need to be addressed as new levels of scale are reached. In Senegal, the USAID project worked hard to keep in balance the supply of certified rice seed, rice production, access to machinery services, and rice milling capacity.

Donors play a vital role in addressing weaknesses or gaps in the value chain

Usually no private-sector actor has the incentive, let alone the skills and resources, to create quasi-public goods (i.e., strengthening the value chain will also benefit competitors). Examples of missing or weak value-chain institutions include quality certification (and enforcement) agencies (for hybrid maize in Zambia and rice seed in Senegal), product standards and related regulations, distribution chains (Bangladesh), physical infrastructure (Senegal), new financial and insurance instruments (Senegal), downstream market linkages (Senegal and Zambia), and other complementary production services (agricultural mechanization and spare parts in Senegal and Bangladesh).

As this kind of institution building and strengthening can take years, it needs to be initiated at the beginning of the scaling effort. New constraints will usually be discovered and need to be addressed during scaling up, especially limits on the quantitative or throughput capacity of value-chain institutions as scale increases. This requires flexibility in regular project work plans and intermediate goals, as well as an appreciation that the institution-building process requires a significant amount of IP management time since creating sustainable institutions can only be done in partnership with domestic actors (or multinationals with a long-term domestic presence.)

Anticipate and proactively address potential commercial and political losers from scaling

Even though scaling up almost always provides great net social benefits, some key stakeholders and constituencies may lose and scaling strategies need to anticipate and proactively address this outcome. This can include public and private providers or users of existing or alternative technologies, as well as policymakers and politicians with interests in supporting those constituencies. In Senegal, government subsidies for lower-quality agricultural machinery made it more difficult for private machinery sellers and service providers to compete.

RECOMMENDATIONS FOR PROJECT DESIGN, CONTRACTING, AND IMPLEMENTATION

- 1) Introduce a focus on scale at the outset of the project design and procurement phase.** Project scopes of work should be as general as possible and focus on ultimate results, not on specific pathways to achieve them. IPs should have the flexibility to choose locations, sectors, private-sector partners, innovations, and the sequencing of beneficiaries or target markets. Mandating specific public or commercial partners can place unnecessary constraints on IPs and undermine their negotiating power.

- 2) **Adopt a phased approach to enhance the quality of project design and build this into contract incentives and duration.** There are three phases of scaling up: inception/design, creating the foundations for scaling, and going to scale.
 - The *inception/design phase* should be used to identify and negotiate collaboration with private and government actors, field test (and modify) innovations to narrow them down to the most promising ones, and identify the potential market.
 - The *creating the foundations phase* involves strengthening the market system and building a critical mass of adopters.
 - The *going to scale phase* involves supporting indirect adoption, continued strengthening of the market system if necessary – especially to increase capacity – and ensuring coverage of less-profitable adopters. As these phases are likely to extend beyond the normal five-year project lifespan, longer contracting mechanisms should be considered with funding tranches released only upon achievement of specified intermediate objectives or milestones.
- 3) **Select innovations for scaling based on scalability assessment tools or screens.** These tools should include criteria such as: reduced costs, increased productivity, affordability, extent of change from existing practices, risk and potential for risk mitigation, and potential for time and labor savings. Strong preference should be given to robust innovations.
- 4) **Include resources for developing or strengthening the value chain and market system.** Many projects have historically underestimated the extent of strengthening required, especially for increasing upstream and downstream market access for smaller farmers and bringing down transaction costs. Project planners should presume that, especially in low-income countries with weak market systems, these efforts will be significant and time consuming.
- 5) **Contracting mechanisms should allow for flexibility in project design and implementation.** More important than the specific type of mechanism is having flexibility within the mechanism to adjust strategies, work plans, and activities while holding desired outcomes constant. Annual work plans should not be cut and pasted from early project documents, but co-created annually by IPs and donors based on assessments of constraints, opportunities, and progress against outcomes. Work plans need to be complemented by frequent ongoing communication between donors, IPs, and private-sector partners, implying timely course corrections. Budget categories should also not be overly constrained, allowing for reallocation across categories.
- 6) **Monitoring and evaluation for commercial scaling is different from most current donor systems and should incorporate commercially-oriented indicators.** Existing indicators for donor agricultural projects are typically good for ensuring accountability but inadequate for supporting the flexible decision-making and adaptive management necessary for scaling up. At a minimum, IPs should be encouraged to **use monitoring systems that include commercial indicators that any business would use to track and refine its sales and marketing strategy**, especially customer demographics. This can be real-time regular feedback mechanisms from field staff, more formal and in-depth follow-up marketing and user studies, or both.
 - Monitoring needs to be able to identify real-world challenges, such as activities not being implemented correctly, value-chain gaps, and barriers to adoption including financing constraints, and indicators of commercial sustainability.
 - Monitoring should also track indirect adopters and the social networks or other mechanisms that connect direct and indirect adopters, and measure levels of adoption (i.e., who, how, where, and why).

- 7) **Ensure that at least one IP – preferably the lead partner – has commercial experience.** The IP must behave entrepreneurially, know how to identify good deals and make the business case, understand value chains and market systems, negotiate and manage partnerships with the private sector, flexibly address challenges and opportunities as they arise, and hold the joint goals of achieving impact on poverty and commercial sustainability (with judicious use of co-funding and subsidies). In this regard, donor projects must put in place incentive structures and accountability mechanisms to ensure the productive use of co-funding and other subsidies.
- 8) **Research organizations can support commercially-oriented implementing partners by making improvements in response to market feedback and providing technical assistance.** These organizations should be encouraged to remain connected and actively involved in implementation of their innovation, and have a continuing responsibility for developing and refining the innovation after transfer to the country context.
- 9) **Donor facilitation of private-sector partnerships is critical to scaling and needs to be done early in the scaling process.** Donors should re-examine existing practices of either mandating specific private-sector partners or expecting that it is easy to achieve authentic private-sector involvement simply by requiring it in project designs. It takes time to build private-sector relationships, demonstrate the business case to private-sector partners, and identify partners for which scaling the innovation is consistent with their corporate goals, skills, and resources. Instead of mandating specific partnerships, donors can facilitate interaction and ensure that subsidies and co-financing by projects are aligned with long-term commercial sustainability.
- 10) **Integrating scaling up into donor programming has significant implications for the selection and training of staff in field missions and national capitals.** Direct-hire staff can play a meaningful and satisfying role in developing viable partnerships, supporting locally owned changed processes, ensuring coordination with the host-country government and with other donors, and supporting adaptive management. To play these roles effectively, a donor should:
 - Encourage a greater focus on business perspectives by recruiting staff with significant business background and providing in-service training on commercialization and commercial pathways;
 - Find ways to bridge any separation within donor agencies between research and market development, both internally and with research partners;
 - Develop guidelines, templates, checklists, and training programs that support staff in integrating commercial scaling considerations into projects and programs;
 - Equip country support officers with the knowledge and skills to support country mission staff in scaling up; and
 - Educate contracting officers in the need for contracting flexibility to support scaling, and if necessary, review regulations and procedures that prevent or inhibit flexibility.