CONCLUSION

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1 – Lessons About Scaling Seed Systems

Our ability to scale the adoption of technologies among smallholder farmers plays a critical role in determining whether we can meet global food demands in the coming decades. The challenges facing the world's agricultural production system are well-known. 9 billion people will need to be fed by 2050, requiring an estimated 60% increase in available food and almost 20% more water (UN, 2013; FAO, 2012b). Changing diets, moving from cereal-based food supplies to the consumption of more animal products, are resulting in greater demands for resources. Climate change is introducing new variability into farming systems, with exceptional difficulties for those farming on rain-fed or marginal land. In a very short period of time, we are facing the formidable problem of growing a lot more food, on less land, with fewer resources. Smallholder farmers are central to the solution, providing 80% of the food supply for Asia and sub-Saharan Africa (FAO, 2012a). But they need better technology.

Many good technologies exist with the potential to increase incomes, reduce risks and improve nutrition in the households of smallholder farmers. These technologies include improvements in seed, irrigation, fertilizer, animal health, soil diagnostics, post-harvest solutions, access to finance, extension services, mechanization and many others. Collectively, they represent billions of dollars of investment over years of research and development. Yet the international development community has struggled to increase the numbers of farmers adopting even the most basic technologies. Particularly in sub-Saharan Africa, our failures are staggering: 80% of sub-Saharan farmland is still cultivated with a hand-hoe (Sims et al., 2012); land productivity remains some of the lowest in the world (Fuglie and Rada, 2013); only 4% of agricultural land is irrigated (Burney et al., 2013).

Learning how to scale the adoption of agricultural technologies needs to take center stage in international development. Responsible stewardship of public resources directed to the problems of global poverty requires that we turn our attention beyond research and development to include commercialization strategies. That is not to discount the continued importance of new research, advancing our potential to impact the lives of smallholder farmers, but we can no longer afford to ignore commercialization issues as a principal part of agricultural development.

The *Planning for Scale* project was designed to examine cross-cutting elements of commercialization, drawing together the common threads of what we know about *how to scale* the adoption of agricultural technologies among large numbers of smallholder farmers. We kept our focus on seed in sub-Saharan Africa, but included lessons applicable more broadly with the hopes that this work would spark larger discussions across multiple technologies and geographies.

To begin, we tapped the wisdom of many practitioners and experts and developed a set of *Crowd-Sourced Lessons About Scaling Seed Systems*. Although it was the beginning of the project and our team had yet to dig deep into these issues, that advice remained by far the best summary of lessons. Collectively the advice of that crowd represents centuries of experience and acumen in understanding what we need to do to increase adoption of improved varieties of seed among smallholder farmers. We recommend it as reading (available online at www.apxc.org), but we also include in this brief five of the lessons that we found were most commonly repeated throughout our work.

Top five lessons in scaling adoption

Farmers first. Farmers, whether large-scale or small-scale, know their own risks and returns. They calculate the impact of technology adoption based on the knowledge and information available to them. But commercialization and adoption strategies often fail to pivot around the needs, desires and knowledge of the farmer. Somehow, farmers get left as the *recipients* of technology, instead of being central drivers in the commercialization process. We will have better adoption rates when our business models and technologies are not *supply-driven*, but instead integrate the demands of the market all the way through our strategies for scaling up adoption.

One size will never fit all. Commercialization strategies must be tailored to a bewildering array of changing factors, often requiring national or local adaptation. No strategy can be effective across countries, cultures, languages, agro-ecological zones, policy frameworks and political climates. There are certainly common principles and key processes that can be used scale up our success, but the heterogeneity in rural markets defies standardized solutions. In seed this is even more true, given the diversity among crops and varieties.

Knowledge underpins adoption strategies. Much of our work in the *Planning for Scale* project focused on commercialization of products and services, but we need to recognize the powerful role of knowledge in adoption. Very few technologies scale into rural markets without an accompanying backbone of information, knowledge and training. This backbone is not easy to build or manage, and successful scaling requires a sort of dual strategy –

scaling the adoption of *knowledge* as an essential complement to the *product* or *service*.

Scaling cannot be achieved without the private sector, but the public sector remains paramount. The private sector provides critical resources for scaling agricultural technologies that benefit smallholder farmers. Building out channels that deliver goods and services that farmers value, and having those channels continue to grow over time, cannot be achieved without the private sector. Significant untapped opportunities exist where the interests of the private sector align with the social and environmental goals of the public sector. That alignment shifts over time and public organizations have key roles to play in how it shifts. But there is never a complete alignment to serve the needs of the poor. In seed, for example, there will always be geographies, communities, crops and varieties that are critical to food security, but not commercially viable. Here, the public sector's responsibility to tackle poverty remains paramount.

Don't underestimate the impact of shifting policies and laws. Scaling strategies need to focus on immediately implementable plans. They need to engineer success while operating within the policy and legal framework at hand. But strategies also need to include a set of targets for longer-term work aimed at changing the enabling environment. Advocacy is needed to document and communicate the practical impacts of policies and laws that constrain commercialization of technologies for smallholder farmers. Likewise, there are key investments to be made that improve local and national *implementation* of policies and laws. But at the end of the day, real scale in adoption among smallholder farmers depends on the long-run investments to change the enabling environment.

2 – Where do we go from here?

In concluding a large project like *Planning for Scale* that has been full of analysis and gathering lessons together, the big question is: *how do we stop talking about scale and start doing it?*

Here are three equally big answers.

Get the metrics right

The single most important investment donors can make is to redefine their metrics in ways that incentivize commercialization and scale. Good metrics will drive behavior change throughout value chains, creating systemic shifts towards scale. We have noted the impacts, for instance, of changing from measuring *tons of seed produced*, to measuring farmers' demand for that seed. The old metric does not require us to think about whether the product

is useful to the farmer, or how we can make it more useful. Neither does it require us to develop sustainable supply channels that are based on the market as a driver. Changing the metric away from one belonging to the old era of *supply-driven* commercialization, brings in a new rigor to the commercialization strategy process.

Good metrics can also allow donors to understand whether the structure of an investment is working in relatively real-time, without having to wait years for an impact evaluation. Moving from after-the-fact impact evaluations to include more real-time collection of data will allow greater insight into how scaling is working and whether it can be done better. To be effective, commercialization strategies need to adapt as they are implemented. Products or business models may need to be changed, target markets may need adjusting, or partnerships may need to altered. Well-chosen metrics are the basis for feedback loops that inform changes in commercialization strategies during implementation.

Aside from the impacts of implementing a good metrics strategy, the *process* of developing metrics can be hugely beneficial, requiring stakeholders to think deeply about what success means and how to incentivize change. Metrics discussions in international development, however, need leadership to ask hard questions about current frameworks and design metrics tailored to commercialization and scale. Long-winded debates that delve into the weeds of outputs, outcomes and impact evaluation measures should be recast as we focus on integrating:

- ➔ cost-effective metrics
- ➔ real-time operations metrics
- ➔ metrics to measure how demand-driven systems are
- ➔ prudent use of crowd-sourcing in metrics
- ➔ metrics that survive the interface between public and private sectors
- ➔ metrics that anticipate the advances that lie ahead in mobile phones, remote sensing and wireless sensor networks

Invest in more strategic scaling tools

Practitioners need to access resources and expertise to be able to create scaling strategies. Planning to scale the adoption, for instance, of drip irrigation among smallholder farmers is a highly complex task if you do it right. Many organizations responding to an increased focus on scaling agricultural technologies lack the capacity to create commercialization strategies. This is especially true of aid agencies, non-profits, foundations, universities and governments.

Mismatches in available talent, as ever, can be met by building capacity within organizations, hiring-in expertise or some combination of the two.

Immediate investments can be made to train practitioners. Opportunities can be created for the transfer of knowledge between, for instance, companies that have experience in scaling products in rural markets and international development practitioners. Both sides derive value if these exchanges are well-structured. Targeted resource materials in commercialization and scale for practitioners can be developed. In addition to building capacity, there also exists, however, at least a temporary need to hire-in outside expertise to support the immediate need for design and implementation of scaling strategies.

Change the enabling environment

The third priority for figuring out how we *stop talking about scale and start doing it* relates to changes in the enabling environment. In *Planning for Scale Brief* #6, we defined the enabling environment as the set of governing laws, policies, regulations and standards. However, in this last brief, we use the same term in a broader sense to examine the potential for cross-cutting changes that shift how easy or how difficult it is to scale agricultural technologies.

Many examples can be found in the *Access to Finance* brief. Reaching more farmers with a greater diversity of insurance products, for example, will reduce risk and drive greater technology adoption. These types of investments are not linked to the scaling of one particular technology, but instead work to increase adoption across a range of technologies. Clearly, efforts to improve the fabric of laws, policies, regulations and standards also fall into this category, but there are other cross-cutting investments that deserve attention.

- Building resources for brokering partnerships is a key area of investment that will catalyze scale. The Planning for Scale vignette describing scale in the Pan-African Bean Research Alliance includes our thinking on five functional areas in which we need better resources to broker partnerships (Sperling and Boettiger, 2013).
- Management and collection of data resources have been highlighted in this work as another high-impact investment (see Brief #2: Scaling Demand). The cost and availability of market information, in particular, may change radically in the next decade and donors will find that successful scaling depends on access to better data.
- Another cross-cutting investment lies in improving exchanges of knowledge between public and private sectors. This can take the form of programs like Partners in Food Solutions that bring industry expertise to the challenges of rural markets, but there are many other possibilities, given widespread increases in interest among companies seeking to expand their capacity to reach rural markets.
- Investments in information and communication technologies (ICTs) will be necessary to support an agenda for scaling up the adoption of agricul-

tural technologies among smallholder farmers in a demand-driven way. ICTs can be used to bring down the cost of the information flows required to understand markets and translate the demands of farmers back up the commercialization pathway.

- ➔ Practical training or educational resources focused on business models for scale in rural markets are largely unavailable. Developing a set of materials describing the basic 'translation' of business practices when working in rural markets with smallholder farmers as customers would move forward our collective ability to design better scaling strategies.
- ➔ There are many other areas where investments will have cross-cutting implications that catalyze scale, but the last we mention here is one relating to education of the donors themselves. It is an unfortunate truism in international development that some donors remain removed from the realities of on-the-ground implementation to such an extent that their theories of change, grant priorities, ability to support partnerships, metrics frameworks and much else can work against achieving the impacts they seek. Investments in organizational learning to shift our thinking about scale are also important to implement at the donor level.

3 – Scaling in rural markets

Commercializing products and services in the rural markets of developing and emerging economies is an uphill battle. Many factors work *against* scale, including, for example: the heterogeneity of customers, long distances and expensive transportation, poor infrastructure, multiple languages and illiteracy. In more developed markets, classic economies of scale can be achieved that incentivize growth. These economies of scale are often elusive in rural markets that serve smallholder farmers and we continue to struggle with the challenges.

We have moved past some of the naiveté found in early 'bottom of the pyramid' literature with claims of a hidden fortune for those companies that successfully bring products and services to very poor people in developing countries. Many in the business and international development communities have accepted that this literature glossed over important challenges and that it often targeted households that lie just above the 'bottom of the pyramid.' In our *Access to Finance* brief, we referenced Rabo Development's term for an 'emergent' commercial farmer. Variations of this term are now common and they illustrate revised thinking about what segment of the market can realistically be engaged in scale, and how the under-served can best be reached.

The business community's understanding about how to serve these markets is growing fast and delivering incredible insights that are useful to those focused on the widespread adoption of technologies among smallholder farmers. Companies of all sizes are exploring the benefits of expanding operations to

serve these markets. There is a long list of possible reasons for a company's interest in reaching closer to the 'bottom of the pyramid.' These include, among many others: market expansion, market diversification, reverse (or 'frugal') innovation opportunities, corporate social responsibility achievements, access to resources, exploration of new business models and improving brand equity in anticipation of future market opportunities.

The international development community has much to learn from a new wave of commercial scaling of products into rural markets. This is particularly true in countries outside Africa, where there has been more progress. The influx of private partners into markets serving smallholder farmers also highlights, however, a key role for the public sector in stewardship of the public interest and a continued focus on issues of poverty. The *Planning for Scale* work has tried to convey the limitations of the private sector in these markets and the evolving, fundamental role of the public sector in the future.

4 – Demand-driven scaling

The importance of shifting innovation systems in international development to be more demand-driven cannot be under-estimated. The largest constraint to scale we have faced, historically, has been our supply-driven practices in research, development and deployment of agricultural technologies for smallholder farmers. These practices have led to inefficient investments, sometimes in the wrong technologies, poorly adapted for use by smallholders. Supply-driven thinking has also supported our tendency to settle for publicly-funded channels of manufacturing and distribution that are not sustainable in the long run. That is not to suggest that the public interest impacts of technologies improving the lives of smallholder farmers can be met entirely through private commercial channels, but there is great room for improvement in moving away from our supply-driven past.

We have discussed how to begin the shift, but it requires, ultimately, a change in how donors, researchers, policymakers and practitioners *see* smallholder farmers. If smallholder farmers are not appreciated for their commercial acumen, their ability to calculate risks and returns, their creativity in the face of adversity and their willingness adapt, then the shift towards more demand-driven innovation, and therefore improvements in our capacity to scale agricultural technologies, will be slow.

5 – Moving on

These *Planning for Scale* briefs have laid a foundation for further action. We have drawn together a collection of recommendations for investments that will make a difference. Some of them are smaller and can be accomplished

in the near future, others will take longer and larger commitments of resources. We hope a further result of this work will be to improve the quality of *individual scaling strategies* developed to commercialize particular agricultural technologies. The translation from general to specific is not an obvious one, though. We have noted above that applying the ideas here to the development of a single scaling strategy is unlikely to happen without further resources and expertise. Someone needs to ask the right questions, access available data, and develop evidenced-based hypotheses. There are further tools that must be developed to help practitioners develop commercialization strategies for rural markets.

Development of these tools requires a special set of skills. Ideally, resources will be built on cutting edge knowledge about: rural marketing, the applications of information and communication technologies in rural markets, how intellectual property rights work in developing and emerging markets, adoption economics, how to broker deals between and private partners and much more. There is a growing depth of expertise in these fields and turning this rising talent to focus on the issues of scale could provide us with a powerful toolkit for future success.

The resources created here, including these eight briefs, a set of case studies, an annotated bibliography and the summary document *Crowd-Sourced Lessons About Scaling Seed Systems* will remain available online. We expect to find ample opportunities to add to these materials, and welcome collaborations to that end. We hope this *Planning for Scale* project sparks constructive discussions among donors, policymakers and practitioners, because figuring out how to scale products, services and knowledge in ways that improve the lives of smallholder farmers is central to whether our future global food system can feed a rapidly expanding population.

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