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SCALING IMPACT:

EXTENDING INPUT DELIVERY TO SMALLHOLDER FARMERS AT SCALE

LEO
Leveraging Economic Opportunities

REPORT NO. 7

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ACRONYMS

ADVANCE	Agricultural Development and Value Chain Enhancement
ASI	Agribusiness Systems International
CLUSA	Cooperative League of the USA
DAI	Development Associates, Inc.
DFID	Department for International Development
GIZ	German Society for International Cooperation
Ha	Hectare
LEO	Leveraging Economic Opportunities
MSME	Micro, small and medium enterprises
MT	Metric ton
OAF	One Acre Fund
PCE	Projet Croissance Economique
PMK	Propcom Mai-karfi
PROFIT	Production, Finance and Improved Technology
PrOpCom	Promoting Pro-Poor Opportunities in Commodity and Service Markets
USAID	United States Agency for International Development
VVBA	Village-based agricultural advisors

EXECUTIVE SUMMARY

Smallholder farmers represent a majority of the world's farmers and a majority of the world's poor. Low agricultural productivity is often a key driver of their poverty. Yet while the application of improved inputs such as fertilizer, agrochemicals, and seeds can increase both agricultural yields and farmer income, improved input access by smallholder farmers across their mix of crops remains low.

This report strives to inform the efforts of donors and implementers of market systems development activities to increase smallholder farmer access to and adoption of commercial inputs. It builds on previous studies that have focused their research and guidance on input supply to smallholders, by concentrating on cases where donor funding has facilitated market change. In so doing, it considers a diversity of models and focuses particularly on those that have reached significant scale.

To provide a common basis for analysis, this report looks at four dimensions of scale and performance:

1. **Outreach**—the number of farmers commercially acquiring inputs;
2. **Outcomes**—the results (i.e., increased yields or income) achieved by smallholder farmers due to acquiring and using inputs;
3. **Sustainability**—the market system's continued capacity to provide appropriate inputs on a commercial basis to smallholder farmers; and
4. **Equity**—the extent to which disadvantaged or excluded groups (e.g., smallholder farmers, women, low-income households) acquire inputs.

The findings in this report are based on a review of 47 projects and a deeper analysis of nine cases.

A. KEY BARRIERS TO SCALABLE INPUT DELIVERY

A number of factors impede efforts to achieve input delivery to smallholders at scale. In the absence of public or project subsidies, smallholder farmers, particularly those residing in areas with low population density and weak infrastructure, are often unable to access inputs at affordable prices. Smallholder farmers are further limited by their input purchasing capacity, influenced by low and irregular cash flows, a lack of access to savings and credit products and a lack of input purchase options. These make it difficult for them to purchase inputs when they are needed. In cases where financing is available, smallholders may not choose to go into debt to purchase inputs, as they do not have a guaranteed market at a price that covers the cost of inputs and provides a reasonable return. Even when farmers have access to financing, inputs are affordable, and there is a strong output market, smallholders may not be aware of how to properly apply inputs, and so do not benefit from increased returns.

Input suppliers—including seed and fertilizer companies, wholesalers, and retail suppliers—face a related set of barriers. First and foremost, smallholder farmers represent a risky and geographically disbursed market with high transaction costs. Shaped by commercial norms and biases, input suppliers have often built their input distribution networks to serve small numbers of large clients (e.g., government procurement orders) and do not have the systems, inclination or risk tolerance to invest in the smallholder farmer market. Input suppliers targeting smallholder farmers (generally small suppliers with close geographic proximity to smallholder farmers) rarely achieve scale due to limited management, technical, and/or financial capacity. Small input suppliers may also face cash flow and

credit limitations, constraining their ability to expand their inventory of inputs that farmers require when farmers require them.

A third set of barriers relate to the formal and informal rules and relationships (or lack thereof) between market actors. Typically referred to as the enabling environment, these rules greatly influence the behaviors of all market actors. Low levels of trust between input sellers and farmers increase the perceived risks of pre-financing farmers' production, at a time when they are cash-short. Input sellers focused on each individual transaction, rather than on building a longer term relationship with farmer clients, hinder the emergence of greater trust. Finally, government seed and fertilizer policies often distort the incentives for private input suppliers and smaller scale agro-dealers by either offering competing inputs at a subsidized price, or failing to ensure delivery of inputs when farmers need them.

B. TYPOLOGY OF INPUT SUPPLY DRIVERS

An important difference among the selected cases was the type of market actor that took the greatest responsibility for driving the supply of inputs. Five types were identified: input suppliers, village-based microentrepreneurs, lenders, farmer collectives, and buyers. An analysis of the cases suggests that each type differed in its potential for scaling, challenges, incentives and risks. Although in most of the cases an NGO or development contractor was temporarily facilitating change within the market system, the focus of this study is on those private actors positioned to play a permanent role in the sustainable delivery of inputs to smallholder farmers.

Input suppliers were the principal drivers in five of the nine cases. The other four drivers were active in one to two cases each. This report analyzes each driver in terms of their primary incentives, the scale and performance of the relevant cases, common risks, and lessons learned.

C. RESULTS

While outreach numbers—and the methods for calculating these numbers—varied from case to case, the cases with outreach data reached at least 25,000 farmers, with some reporting outreach as high as 1.7 million. Input supplier models such as the Production, Finance and Improved Technology (PROFIT) project in Zambia and the PrOpCom Project in Nigeria, reported reaching 180,000 farmers and 1.7 million farmers, respectively. The Projet Croissance Economique (PCE) in Senegal, which used a producer collective-driven model, reported nearly 45,000 farmers benefiting from its project activities. While outreach provides an understanding of farmer input acquisition through commercial transactions, it does not inform an understanding of a project's effectiveness, which must be looked at in terms of outcomes, sustainability and equity.

Project outcomes, generally measured as the impact on crop yield and/or farmer income, also varied across the nine cases. While some cases, such as the Sunhara project, emphasized improvements in crop yields, reductions in post-harvest losses, and decreases in the cost of production, others such as PROFIT focused on the income effect of adopting improved seed. Still others, such as PCE calculated outcomes based on an increase in gross margins per hectare of land. For most selected projects, monitoring and evaluation data are not disaggregated by project activity, making it difficult to attribute results entirely to the input interventions focused on here, as they are assumed to contribute to overall project results.

These preliminary findings highlight the need to standardize and clarify methods for calculating outreach and outcomes. Methods for calculating outreach varied from case to case, with some counting a household as a single beneficiary and others counting all household members. Furthermore, some cases counted only direct beneficiaries, whereas others included indirect beneficiaries such as those imitating the project model. The cases also varied in terms of the level of impact required to be considered a beneficiary; while some defined outreach as the number of farmers receiving improved inputs, others counted only farmers who demonstrated income or yield gains from these inputs.

Given the preponderance of ongoing projects, definitive conclusions on sustainability could not be extracted from this phase of the research. More is expected from the field-based investigations in phase 2.

Few results could be synthesized on equity of access to and benefit from input markets. While some projects reported certain information on female participation, few projects disaggregate their data enough to adequately address the degree to which various disadvantaged groups (e.g., women, youth, or poorer farmers) benefitted. This inhibited an evidence-based analysis of the selected projects.

D. LESSONS LEARNED

Despite these methodological inconsistencies, the nine cases examined reveal several findings relevant for both policy and project design:

1) *Private-sector driven input delivery models have tremendous potential for scale, but take time.* The cases examined demonstrate that private-sector driven models have the potential to reach significant scale. However, outcomes may not be realized until several years following the project start.

2) *Multiple approaches can successfully facilitate input delivery at scale.* The cases indicate that multiple types of actors can facilitate widespread access by smallholders to inputs. As a result, the strategies to use and the market actors to facilitate will depend on the context of the market system, including the capacity of entities within the system, historical relationships between groups, and information flows. In some cases, as was demonstrated by the PCE case, it may be appropriate to simultaneously support two or more models for improving input delivery. In a weak market, supporting a single model may limit the system's resilience and capacity to withstand common shocks (e.g., a change in corporate leadership, global commodity price drops). The dominance of input supplier-driven models among our selected cases may suggest that this model is more broadly applicable, but further research is needed to explore the opportunities and risks associated with it.

3) *Large firms appear most capable of autonomously expanding their outreach.* Although a resilient system will typically include a diversity of firm sizes, a comparison of the performance of project partners in the selected cases shows larger firms (e.g., input manufacturers or wholesalers, exporters) have proven better able to continue growing their outreach post-project compared with smaller entities. Conversely, those actors more attuned to the needs of disadvantaged farmer groups (e.g., microentrepreneurs, producer collectives, or buyers) are less likely to have the capacity to manage ongoing input delivery past a project's completion.

4) *Larger firms may not prioritize business strategies that reach smallholder farmers.* While larger firms driving input supply appear to have greater potential for growth post-project, the cases suggest in-

terest in the smallholder farmer market among these firms can be difficult to generate and sustain. Although larger firms have more capacity than do the smaller firms operating in rural areas, they also typically have access to a greater number of opportunities, thus threatening their long-term engagement.

5) *Projects should consistently define outreach, and consider their wider systemic effects.* The nine cases used vastly different measures and definitions to report their results. Moving forward, it will be important to reach consistent definitions of outreach in order to interpret direct and systemic results across projects. Projects should look to a wider indicator set that captures imitation by non-targeted smallholder farmers to understand their full impact.

6) *Input application knowledge is an important complement to input access.* Without knowledge of appropriate application, and the incentives to apply them, the delivery of improved inputs will have minimal or even negative effects. This harms farmer livelihoods in the short-term and leads to a mistrust of input suppliers in the long-term. It is essential that those investing in input delivery invest simultaneously in extension services to address this significant barrier to scale. The ability of farmers to access and benefit from extension services will also be greatly influenced by the inclusiveness of the extension delivery model.

7) *Context-specificity and flexibility are important.* Facilitators need to understand the operating context and the drivers of poor performance in the input market system prior to selecting a specific model to promote. Facilitators should maintain flexibility to test multiple approaches or shift strategy based on early signals.

8) *Strong crop demand is a necessary but insufficient condition for input demand.* Without confidence in their ability to sell their crops at attractive prices or adequate risk sharing mechanisms, smallholders will hesitate to buy higher quality inputs, particularly if this necessitates going into debt. Intervention design should therefore assess the existence and accessibility of ready markets for farmers, and consider the risks and incentives associated with investments in inputs.

9) *Equity receives limited attention by market systems facilitation programs.* This gap means that very little evidence exists on the extent to which these projects have reached and benefited the very poor, women, and other groups. More needs to be learned on the reasons for this gap and the risks for projects and other market actors of not better understanding their customers and suppliers.

E. RESEARCH AGENDA

The findings of this initial review suggest several areas for investigation as part of a subsequent research phase. These include:

- Identifying systemic drivers of the behavior patterns of key market actors (e.g., smallholder farmers, input suppliers).
- Expanding the evidence base around lender-driven, buyer-driven and producer collective-driven models by incorporating additional cases.
- Testing the sustainability of market system facilitation by conducting field research on completed projects.
- Identifying early indicators of implementation success to inform practitioner efforts.

- Increasing understanding of how to alter commercial norms that impede market systems development, drawing from current projects.
- Expanding the understanding of the equity of market systems facilitation programming.
- Evaluating the unaddressed barriers to input access, including government policy and low or declining returns to input investment.

I. INTRODUCTION

Smallholder farmers—those owning or renting less than two hectares of land—represent both the majority of the world's farmers and the majority of the world's poor (Nagayets 2005). In addition, smallholder farmers constitute half of the malnourished population globally, and three quarters of the malnourished in sub-Saharan Africa (Hazell et al. 2007). Consequently, improving the lives of smallholder farmers is critical to global poverty alleviation.

Low agricultural productivity is an important contributor to poverty and hunger among smallholder farmers. Numerous studies have shown a correlation between increased yields and higher household income, lower food prices, and reduced poverty (DFID 2004, Thirtle et al. 2003). The Brookings Institution, for example, examined yield and income data for farmers in 85 countries over a 40-year period, concluding that a half-ton increase in the staple yields of smallholder farmers generated on average a 13 to 20 percent increase in GDP per capita (McArthur et al. 2014).

Improved yields, however, rarely occur in the absence of improved inputs (e.g., seeds, fertilizer, and agrochemicals). Several studies have demonstrated the strong positive link between the two, even when controlling for factors such as human capital and land-labor ratios (McArthur et al. 2014, Nyangena et al. 2014, Muzari et al. 2012, Martey et al. 2014). However, the vast majority of smallholder farmers have yet to adopt improved inputs. For example, average fertilizer use per hectare in sub-Saharan Africa has stagnated at 5 to 10 kilograms per hectare, less than 10 percent of the global average (The New Partnership for Africa's Development 2011).

This paper, commissioned by the Leveraging Economic Opportunity (LEO) project (see textbox), strives to inform the efforts of donors and implementers of market systems development activities to increase smallholder farmer adoption of commercial inputs at large scale. It does so by reviewing nine projects that have accelerated input adoption. For each project, this research seeks to answer the following questions:

1. What are the constraints that impede the commercial acquisition of inputs by smallholder farmers?
2. What models have successfully facilitated the acquisition of inputs at scale?
3. What results have these models achieved? What lasting changes have these models created in the target market systems?

LEVERAGING ECONOMIC OPPORTUNITIES

Leveraging Economic Opportunities is a three-year contract to support programming that fosters ***inclusive growth*** through markets. Building on USAID's value chain approach, LEO focuses on:

(1) ***a systems approach*** to markets, acknowledging the complex interrelationships among market actors, market and household systems, climate change, nutrition, the policy environment, and sociocultural factors, including poverty and gender; and

(2) ***inclusion***, recognizing the role that a spectrum of actors—from resource-poor households and small-scale enterprises to larger and more formal firms—play in catalyzing market change and growth that benefits the poor.

A number of previous studies on smallholder farmers and input delivery informed this research. For example, the Monitor Group documented market-based solutions to poverty in sub-Saharan Africa; the study drew on over 400 cases to recommend three models that have proven successful to date, as

well as three emerging models that may accelerate poverty alleviation in the future (Kubzansky et al. 2011). Miller et al. (2010) examined agricultural value chain finance in developing countries, looking specifically at how financing impacts smallholder farmers.

This report differs from previous studies in three ways: first, it focuses specifically on the role of donor-funded initiatives in facilitating market system change. Second, it analyzes a diversity of models and methods for improving input delivery, ranging from input supplier-driven models to buyer-driven models. Third, this report seeks to focus on projects that achieved results at large scale, with an emphasis on projects that achieved durable systemic changes.

This paper is structured as follows: Section II describes the research methodology, including challenges encountered. This is followed by a description of the implicit theories of change used for establishing the various models. Section IV reviews the major challenges suppressing smallholder adoption of commercial inputs. The following section presents a typology of approaches to increasing smallholder adoption of commercial inputs. Section VI describes lessons learned, and the concluding section offers recommendations for future research.

II. METHODOLOGY

A. CASE SELECTION

This research drew from a set of 35 cases received from a USAID call for submissions (Annex 1) and an additional 12 recommended by key informants. From this list, the research team selected the nine cases that 1) were most relevant to the research objectives, 2) had already achieved substantial outreach to farmers, and 3) represented a diversity of models in order to maximize learning. While the selected cases worked on as many as nine value chains, the research team often focused on results in a specific value chain for each case in order to facilitate analysis.

Of the nine cases examined, five were funded by USAID while the remainder were funded by DFID, the Bill and Melinda Gates Foundation, GIZ, or multiple donors. Slightly more than half (56 percent) of the projects were still operating as of November 2014. The selected cases are briefly described below.

Agricultural Development and Value Chain Enhancement (ADVANCE): The ADVANCE project was a USAID/Ghana-funded project that operated from 2009 to 2014. As part of its suite of activities, the project focused on supporting village-based nucleus farmers to provide inputs, services, and output market linkages to smallholders. ADVANCE was implemented by ACDI/VOCA.

Bayer Greenworld: Initiated by Bayer with funding from GIZ, the Bayer Greenworld program ran from 2006 to 2010, and focused on improving agrodealer marketing, sales, and service capacity in Kenya and Tanzania through a training and brand certification program called *Bayer Greenworld* for 200 agrodealers.

MSME and MSME II: Operating in two phases between 2005 and 2012, the USAID-funded and DAI-implemented project aimed to strengthen relationships and build linkages between market actors within nine value chains in Cambodia. For the purpose of this report, only MSME's activities in the swine value chain are examined.

NAFAKA: The NAFAKA[1] project is focused on improving livelihoods for rice and maize smallholders in central Tanzania between 2011 and 2016. As part of its input supply expansion activities, the project has focused on developing Village Based Agricultural Advisors (VBAAs). These microentrepreneurs provide a range of inputs and services to farmers. NAFAKA is funded by USAID and implemented by ACDI/VOCA.

One Acre Fund (OAF): OAF is an NGO operating since 2006 offering East African farmers an integrated loan package that includes training, reliable input supply (i.e., fertilizer, seeds), and insurance. OAF has multiple funders that subsidize a portion of the cost of providing the loan package.

Zambia Production, Finance and Improved Technology (PROFIT): The PROFIT project was funded by USAID from 2005 to 2010 and implemented by CLUSA. It developed a sales agent network model in collaboration with first one and then several input suppliers.

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[1] NAFAKA means 'grain' in Swahili.

Projet Croissance Economique: In operation in Senegal from 2009-2015 and implemented by Engility Corporation, PCE is focused on the rice, maize and millet value chains with the dual objective of increasing farmer incomes and improving their food security by connecting them to credit, commercial supply chains, and emerging market opportunities.

Promoting Pro-Poor Opportunities in Commodity and Service Markets (PrOpCom) and Propcom Mai-karfi[2] (PMK): PrOpCom, implemented by Chemonics between 2002 and 2011, worked with fertilizer companies in Nigeria to market one-kilogram fertilizer sachets to farmers through networks of agents. This has been continued by its successor project, Propcom Mai-karfi, which is operating from 2012-2018 and implemented by GRM.

Sunhara: The Sunhara project was a four-year project funded by the Bill and Melinda Gates Foundation from 2009 to 2014. It focused on improving horticultural (especially potato) production and marketing in Uttar Pradesh, India's largest and most populated state. As part of the project, Sunhara worked with a private sector wholesale input supplier to develop an agrodealer franchise program. Sunhara was implemented by Agribusiness Systems International (ASI).

B. EVIDENCE BASE

A variety of sources were reviewed for each case, including project documentation such as progress reports and external evaluation reports. These reports were supplemented by phone and email correspondence with implementing entity project managers and staff, partners, and beneficiaries. The full list of documentation reviewed for this report is presented in Annex 2.

C. UNDERSTANDING SCALE AND PERFORMANCE

Although every project reviewed for this report reported the number of smallholder farmers it had reached, there was little consistency in what was counted. A standard way to assess the level of scale reached was thus required that could be applied across the cases. The selected measure was **outreach**, defined as the total number of farmers who acquired inputs through a commercial transaction. This definition guided the research to review projects that worked through commercial mechanisms and exclude those that provided inputs directly to farmers. This measure informs our understanding of the extent to which the selected projects increased access by smallholder farmers to agricultural inputs and overcame barriers to adoption.

While outreach provides an understanding of farmer input acquisition, it does not inform an understanding of a project's effectiveness. The purchase of inputs may do little to create the ultimate results (e.g., better earnings) that a project is seeking, or may only benefit better-off groups. Increased input purchases may be short-lived if fundamental aspects of the market system have not evolved. Consequently, the research also examined three other aspects of scale for each case:

- **Outcomes**—the results (i.e., increased yields or income) achieved by smallholder farmers due to acquiring and using inputs;

[2] Mai-karfi means 'stronger' in Hausa.

- **Sustainability**—the market system's continued capacity to provide appropriate inputs on a commercial basis to smallholder farmers
- **Equity**—the extent to which disadvantaged or excluded groups (e.g., smallholder farmers, women, low-income households) acquire inputs.[3]

These four aspects built from and modified work developed by Creevey et al. (2011) and Dunn (2014).

D. METHODOLOGICAL CHALLENGES

Several challenges were encountered in the course of the research. First, the selection of several active projects impeded the assessment of their sustainability given that their activities were still ongoing. Second, the research process relied primarily on information provided by the implementing agencies (e.g., progress reports, key informant interviews). For projects that had not yet ended, no independent evaluations were available to verify the information provided. This risked presenting an inappropriately positive portrayal of those projects' results. Third, most monitoring and evaluation data did not disaggregate reach or impact by activity, but instead measured it for the project as a whole. As a result, it was impossible to isolate the impact of just the input supply model studied here from the broader impact of all project activities.

[3] According to a review of empirical literature conducted by Peterman, Behrman, and Quisumbing (2010), women are less likely to have access to agricultural inputs than men, despite a similar propensity for adopting new technologies such as fertilizer and improved seed varieties.

III. THEORY OF CHANGE AND KEY ASSUMPTIONS

Each of the selected cases had explicit or implicit theories of change for the linkages between interventions and expected impact. These were typically quite detailed and naturally differed greatly depending on the context. There was consequently no overall theory of change that could effectively represent the variety of change pathways the selected projects pursued. Nevertheless, the cases shared two common assumptions at the highest level of their theory of change, driven by the challenges they set out to address.

First, the examined initiatives expected that improving smallholder farmers' appropriate use of quality inputs would increase their crop yields. This did not imply that higher application of inputs always results in higher yields; rather, they expected that correctly applying an appropriate quantity of inputs would improve yields. Available evidence across multiple contexts validates this assumption. For example, a recent study from the Brookings Institution finds the appropriate application of fertilizer, modern seeds, and water boosts agricultural yields; according to this study, a 1 kg/ha increase in fertilizer application on average leads to a 3.14 kg/ha increase in yields, and a one percentage point increase in modern seed use is associated with an additional 10 kg/ha yield. While the benefits of increasing input application are influenced by the entire systemic context, this research clearly demonstrates the potential they can have as part of an effort to strengthen market systems.

The second assumption of the examined projects was that improving yields would ultimately improve farmers' incomes (and often also food security). Current literature broadly confirms this. For example, Thirtle et al. (2003) examine data from 58 developing countries and conclude that a 1 percent increase in yields reduces the number of people living on less than $1 per day by 0.6 to 1.2 precent. Datt and Ravallion (1998) explore the various mechanisms through which agricultural productivity affects income, and conclude that higher yields coupled with higher farmer wages reduce absolute poverty. Finally, in a recent study, McArthur et al. (2014) find that increasing yields from 1.5 MT/ha to 2.0 MT/ha generates a 13 to 19 percent increase in income per capita. McArthur et al. find that improved productivity promotes growth via a decrease in the share of labor in agriculture as well as an increase in total factor productivity.

Data from the projects studied for this report varied in focus and quality, so this theory was not able to be fully confirmed for each case. An independent evaluation of the PROFIT project analyzed latitudinal income differences between farmers who adopted improved inputs and those that did not. It found that adopting farmers' incomes were $190 higher than non-adopting farmers. Results from the other projects were consistent with this theory of change: although they did not deploy the same analytical rigor in analyzing income differentials between adopters and non-adopters, they assessed overall increases in adoption, yields, and incomes, or some combination thereof, across the beneficiary populations.

IV. ADDRESSING THE CHALLENGES TO INPUT ACQUISITION

A host of challenges affected the functioning of the agricultural inputs market system in the contexts where the selected cases sought to intervene. The difficulties fell into three broad categories: those facing smallholder farmers, those facing input providers, and those in the broader rules and enabling environment.

A. CHALLENGES FACING SMALLHOLDERS

A significant number of smallholder farmers in the examined contexts were not purchasing inputs when the selected initiative began operating. Common challenges are described below.

1. SMALLHOLDER PERCEPTION OF LOW AND/OR DECLINING RETURNS TO INPUT INVESTMENT

Input application is not always profitable for smallholder farmers and, even when it is, there is often a perception among farmers that investment in new inputs will not be worth the cost or risk. Evidence from Kenya and Uganda suggests that the high price of inorganic fertilizer—driven by poor infrastructure and other factors—makes the optimal application level either nil or very little (Matsumoto or Yamano, 2009). Several trends are exacerbating this issue. Rural population growth and shrinking farm sizes are reducing the duration of land fallowing to two or three years or less in many parts of Africa—an inadequate period to maintain soil fertility. With the misuse of inputs, monocropping and inappropriate land preparation practices, research suggests African soils are in many places severely depleted. While inorganic fertilizer is a common solution to low yields, these issues have made soils increasingly unresponsive (Kelly and Naseem, 2009). When the response rate drops sufficiently, the expected yield increases no longer justify the investment. Similarly, changing weather patterns in many areas are making farming less predictable, increasing the likelihood of crop losses, and reducing the attractiveness of input purchases (Lobell et al. 2011, Vermeulen et al. 2014).

2. LIMITED PURCHASING CAPACITY

For farmers who wish to acquire inputs, a limited ability to purchase them at the appropriate time is a common constraint. This is particularly true for farmers earning most of their money from a single harvest and who lack liquid savings options, credit sources or significant non-farm income (e.g., from labor, remittances). This challenge is exacerbated when other system actors have not adapted their offerings to match the cash flow periods and quantities demanded by smallholder farmers.

3. KNOWLEDGE AND ATTITUDE GAPS

Smallholder farmers' weak demand for inputs is driven in part by two kinds of knowledge deficiencies. A lack of awareness of the potential benefits of inputs is one. An analysis of barriers to adoption conducted by PROFIT in Zambia found that smallholder farmers who were not using certified seeds were significantly less aware of the yield and quality benefits than those who were. A second

knowledge gap among farmers is knowing how to effectively apply inputs. Research from Malawi suggests the significant variation in fertilizer efficacy on maize yields among farmers is due in part to differences in farmers' skills in application (Snapp et al, 2014).

Even for farmers who have received important information on good agricultural practices, other factors (e.g., social pressure, the way that information is presented and by whom, aspirations) have a critical role in influencing application. In some contexts, smallholder farmers do not operate their farming activities to maximize their returns. Other goals, such as asset accumulation or risk mitigation, are often more important. This was the case in the Cambodian swine sector when MSME started operating; farmers did not view pig rearing as a business and consequently rarely sold their pigs. This attitude towards farming greatly limited the demand for inputs and thus the potential market for input suppliers.

B. CHALLENGES FACING INPUT PROVIDERS

Input providers as a category encompass a wide range of value chain actors, from large-scale input 'origination' firms (seed, chemical, and fertilizer companies), through wholesale and ultimately retail suppliers. While the following challenges were observed across all levels in the cases studied, the constraints became more acute for those actors located closer to the retail level.

1. COMMERCIAL ORIENTATION

Predominant commercial norms and biases within the input distribution sector shape the behavior of input suppliers. For motivations including risk mitigation and short-term profit maximization, input suppliers in many contexts have built their input distribution networks to serve small numbers of large clients (e.g., government procurement orders) and do not have the systems or risk tolerance to invest in the smallholder farmer market. Where these tendencies exist, input suppliers often seek to maximize their returns from each transaction with smallholder farmers, even selling adulterated or fake products that carry higher margins. For example, in Cambodia MSME found input sellers were travelling door-to-door, relatively indifferent to generating repeat sales if customers were displeased with their product. Such environments create distrust among both buyers and sellers, impeding the customer-oriented strategies (e.g., customer education on product use) that can drive forward sustained adoption of quality inputs.

2. UNKNOWN, LOW OR FRACTURED DEMAND

The diffused and opaque nature of smallholder demand for inputs limits the supply response by input sellers. Given narrow margins, poor infrastructure, and high transportation costs, sellers are reluctant to supply areas where they lack information on the size or timing of input demand, and this leads most suppliers to ignore smallholders as a potential market. This lack of focus on smallholders has limited commercial innovations that could unlock their market potential. For example, the PROFIT project found input wholesalers were unaware of smallholder farmers' strong demand for inputs. Retail agrodealers in Kenya and Tanzania cited a fear that investing resources in marketing to smallholder farmers would not be profitable because of low desire or ability for those farmers to pay for seed and fertilizer.

3. MANAGEMENT INTEREST AND CAPACITY

In many contexts, the single biggest determinant of a model's success was the commitment and capacity to respond to challenges as they arose, and proactively manage the complex logistics of active marketing. Particularly at the retail level, even basic business practices such as double-entry record keeping, inventory management, and shop branding proved challenging. In Zambia under the PROFIT program, the single biggest determinant of whether or not a shop maintained its network was the frequency with which retail managers proactively reached out to their agents to preemptively identify and address problems.

4. CASH FLOW / CREDIT LIMITATIONS

Many input suppliers and agrodealers are constrained by a lack of access to finance for working capital and to make larger investments. In Tanzania, several large input suppliers cited credit constraints as impeding their ability to invest in additional staff, promotional activities, additional stores, and inventory.

5. UNCERTAIN OR INADEQUATE CONTRACT ENFORCEMENT

For suppliers of inputs, another challenge encountered is the lack of confidence that contracts will be enforced. In the Tanzanian and Zambian cases, this was cited as one of the primary barriers to inventory credit at all levels of the value chain. Knowledge that contracts were not a sufficient protection against default on inventory credit raised the risk substantially for the lender. Without reasonably priced working capital products, entrepreneurs throughout the input supply system were severely restricted in their growth.

C. CHALLENGES RELATED TO RULES AND THE ENABLING ENVIRONMENT

The nature of the enabling environment, relationships between market actors, and the rules or lack thereof within the market system shaped the nature of input acquisition. In many cases, system-level institutional and normative deficiencies enabled the constraints mentioned above to be perpetuated.

1. TRANSACTIONAL BUSINESS PRACTICES AND LACK OF TRUST

The seasonal, periodic nature of input sales, which may occur as infrequently as once per year, incentivizes many suppliers to adopt a transactional approach to selling inputs: that is, they seek to maximize the returns from each transaction, rather than trying to build a long-term relationship with the smallholder customer. This is particularly prevalent where consumer feedback loops are non-existent and farmers' knowledge of inputs is poor. In Cambodia, for example, itinerant input suppliers would frequently sell ineffective counterfeit products. In other cases, suppliers sold more inputs than farmers actually needed. These negative experiences led farmers to become highly distrustful of inputs sellers. The result of poor input performance for swine-rearing farmers in Cambodia was often the discontinuation of purchasing inputs.

2. DISTANCE AND INFRASTRUCTURAL DEFICIENCIES

Limited or weak transportation infrastructure increases the transaction costs of supplying inputs. This reduces the places where it is economically viable to supply inputs and increases the cost of access for smallholder farmers. It is particularly significant for bulky commodities; given its weight,

freight represents the second largest contributor to the cost of fertilizer (Chemonics and IFDC, 2007). Several studies have proven that the expansion of road systems into previously isolated agricultural areas has led to increased adoption of improved inputs (Stifel et al, 2003; Binswanger et al 1993; Ahmed & Hossain, 1990).

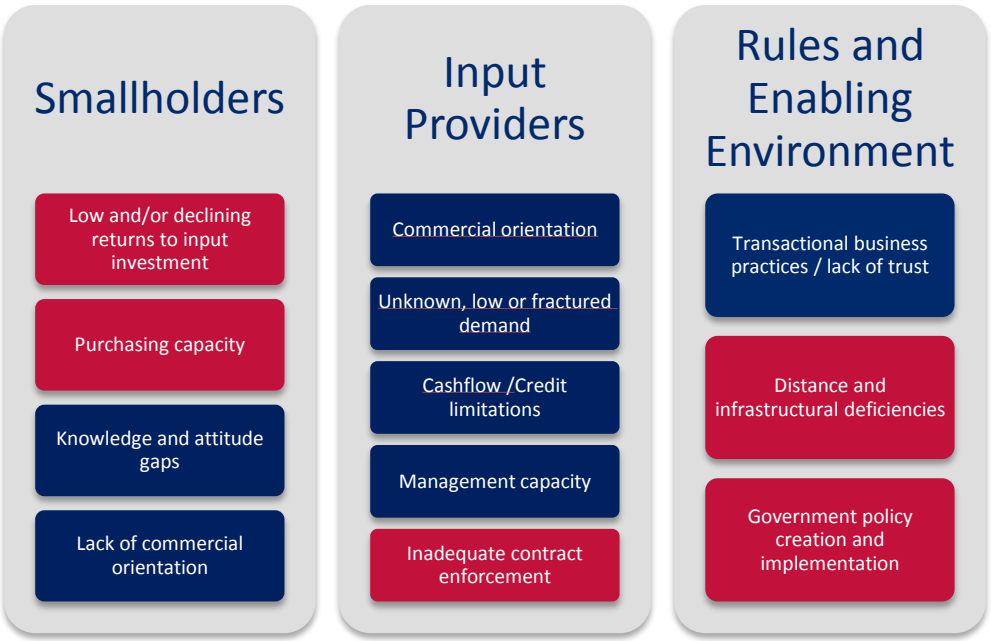
3. GOVERNMENT POLICY CREATION AND IMPLEMENTATION

Government policy and the nature of its implementation strongly influence access to inputs in some contexts. In Nigeria, the government bought inputs from the private sector with the intention of distributing them to farmers, yet frequent misallocations impeded farmers' access. Conversely, the ease of selling into the government system and the availability of subsidized inputs in the market crowded out private-sector provision of inputs through their own supply chains. This difficult, quickly-shifting policy environment challenged the ability of the PrOpCom and PMK projects in Nigeria to interest private-sector players in investing in their own supply chains.

D. ADDRESSING THE CHALLENGES

The selected nine cases varied in the constraints they addressed. Some constraints were addressed by all or nearly all projects, including smallholders' knowledge and attitudinal gaps, transactional business practices and lack of trust, and the management capacity of input providers. Others were addressed by just a couple projects or none at all. These included farmers' credit constraints, distance and infrastructural deficiencies, policy development and implementation, inadequate contract enforcement, and low and/or declining returns to input investment. The figure below demonstrates both the constraints that were more commonly addressed (in blue) and those that were addressed less frequently or not at all (in red).

Figure 1: Constraints Addressed by the Selected Cases



V. TYPOLOGY AND RESULTS OF MODELS

From an understanding of the constraints that impeded the commercial acquisition of inputs by smallholder farmers, and the steps taken by the selected cases to address them, it became clear that several distinct models were being employed. An important difference among the selected cases was the type of market actor that took the greatest responsibility for coordinating the supply of inputs. Five types were identified: input suppliers (e.g., wholesalers, manufacturers), village-based microentrepreneurs, lenders, farmer collectives, and buyers. An analysis of the cases suggests that each type differed in its potential for scaling, challenges, incentives and risks. Although in most of the cases an NGO or development contractor was temporarily facilitating changes within the market system, this typology only considers the private-sector actors who will have a permanent role in driving change within the market system.[4]

Among the nine cases examined in this first phase of research, input suppliers were drivers in five. The other four types of drivers were active in one to two cases each. The following table summarizes the driver of each model, their primary incentives, considerations, and associated case studies. Each is subsequently presented in further detail. The scale and performance of each selected case is summarized in Annex 3.

[4] One Acre Fund is technically registered as an NGO, though it describes itself as a social enterprise and is directly engaged in the market system as a service provider.

Table 1: Summary of the Selected Cases by Model Type

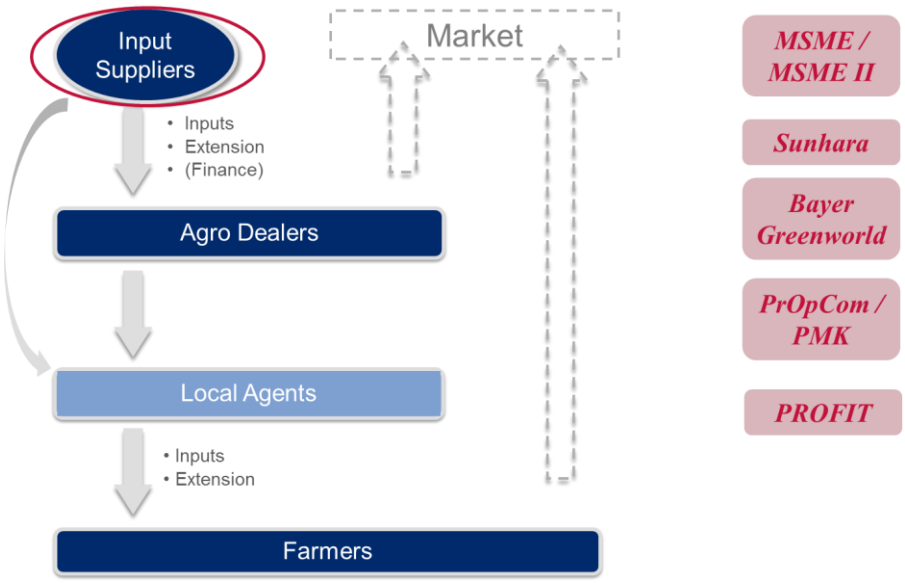
Driver	Primary Incentive(s) for the Driver	Considerations	Associated Case Study/Studies
Input supplier-driven	Increasing input sales	Relevant in many contexts given the pervasiveness of input suppliers.	MSME, Sunhara, Bayer Green-world, PrOpCom, PROFIT
Microentrepreneur-driven	Generating income from input and service sales	Unclear capacity to continue coordinating input supply post-project.	ADVANCE, NAFAKA
Lender-driven	Increasing loan portfolio	Depends upon a strong financial services company with interest in the agricultural sector.	One Acre Fund
Producer collective-driven	Improving services to members Generating income	Most viable when strong collectives are already in place. Management capacity of collectives is often a challenge.	PCE
Buyer-driven	Increasing quantity and/or quality of crop sales	Buyers often discontinue input supply following shocks (e.g., falling output prices) and only supply inputs for the crop they are purchasing.	PCE[5]

[5] PCE used both buyer-driven and producer collective-driven models.

A. INPUT SUPPLIER-DRIVEN MODELS

Input suppliers drove changes in the input supply system in the following five cases: MSME/MSME II, Sunhara, Bayer Greenworld, PrOpCom/PMK, and PROFIT. Typically, the driving incentive for input wholesalers or manufacturers was to increase their sales. To overcome the distance and infrastructural barriers outlined above, input suppliers in all of the selected cases worked through independent business entities that operate closer to smallholder farmers. In some cases those entities had a physical retail location (i.e., an agro dealer), while in others they did not (i.e., a local agent). These local entities sometimes already existed but in other cases were supported to launch by the project and input supplier. Such localized retail networks can greatly reduce an input supplier's costs, while simultaneously offering a better, more available service. These local entities typically conducted marketing, sales, and customer support. The input suppliers supported these entities with a range of services that could include short-term inventory financing, and technical information on their products. The partnerships varied in their exclusivity; in some cases local entities could only offer the products of a single input supplier, while in others they worked with multiple companies. In all of these models, credit for input purchases was not extended to smallholder farmers.

Figure 2: Input Supplier-Driven Model



1. ENABLING CONTEXT FOR SUCCESS

Analysis of the cases suggested agro dealer and local agent networks were only viable when certain pre-conditions existed. Mobile phone coverage was necessary for cost-effective communication. In several of the selected cases, mobile phones permitted input suppliers to greatly reduce the transaction costs of managing their supply chain, bulking orders, and coordinating delivery. Beyond the basic considerations for expansion (e.g., population density, per capita income), agro dealers' and agents' level of capacity was also important. In Kenya, Bayer limited its franchise network to 200 after deciding that the required training investment for adding additional agro dealers would not be profitable.

2. SCALE AND PERFORMANCE

Outreach

The outreach of the selected input supplier-driven models was generally substantial. And where the private sector bought in and invested significantly in a smallholder-friendly business model, scale-up occurred quickly. For example, the number of farmers purchasing 1 kg fertilizer sachets in Nigeria grew from 2,050 in Year 1, to 940,000 in Year 3, and 1.7 million in Year 4. The PROFIT project in Zambia ultimately reached 180,000 farmers through the sales agent network. The MSME project in Cambodia reached 3,849 smallholder-operated enterprises directly through their vaccine activities in the swine value chain, and influenced another 125,076 farmers to imitate good practices. Sunhara's partner input suppliers reached over 10,000 farmers.

Outcomes

The selected cases generated substantial results for smallholder farmers. Farmers who purchased the fertilizer sachets in Nigeria increased their yields by 53 percent and each earned an additional $6 in profit compared with farmers who did not purchase the fertilizer. Zambian farmers who adopted improved seed through the agent networks earned an average of $190 more than non-adopters. In India, farmers who engaged in the Sunhara project increased their potato yields by 80 percent and reduced their cost of production by 18 percent compared to their baseline level. Project-assisted pig producers supported by MSME II saw their average incomes increase by 169 percent over their value at the start of the project.

Sustainability

Input suppliers in most of the cases continued to coordinate inputs to the smallholder farmers that they targeted with donor-funded support even after the end of donor funding. However, their ongoing use of local actors (e.g., agrodealers, local agents) for outreach varied. Some companies continued to maintain their networks post-project while others discontinued the model or stopped investing in its expansion. The experience of the Agro Inputs project in Uganda (not included in the selected case studies) and the PrOpcom and PMK projects in Nigeria suggest that input supply companies may neglect their agent networks without continued external encouragement. In the Uganda case, the companies viewed their agents as simply an extended sales network. Consequently, the agents did not drive changes in the input suppliers' overall business practices, and ultimately the companies discontinued investing in the growth and development of the networks.

As another sign of sustainable impact, the performance evaluation for the MSME II project identified strong evidence of systemic change in the imitation of a project-supported business model by other farmers. On average, over 30 other farmers replicated the good practices taken up by each farmer directly aided by the project.

Equity

Most of the selected cases lacked detailed information on the profile of the smallholders who were reached. The cases analyzed for this study that worked with local agents were focused on rural smallholders as the customer base. Most of the agents were male; in the Sunhara project all 37 franchise shop owners were men. Some projects, such as the PrOpCom and PMK projects, were clearly reach-

ing poor farmers as input consumers based on the nature of the product they were promoting. Projects did not track or were not able to report their client base disaggregated by demographics that would enable the research to analyze equity, such as gender, age, or income range. This prevents an evidence-based analysis of the equity of the models, and in some cases, reflects the limited investment by market actors in understanding their customer base and tailoring product development, delivery, and marketing to reach this base.

3. RISKS

The most significant risk to input supplier-driven models is a lack of ongoing commitment and investment in the model by input suppliers. As noted above, several suppliers that have tested this model did not continue to expand it and even allowed some of their network to atrophy. PMK found that when input suppliers stopped seeking to expand their network, they were also prone to reduce investment in farmer training. This suggests that they viewed farmer training as primarily a tool for customer acquisition, and that long-term provision of information should not be assumed.

4. DRIVER-SPECIFIC LESSONS

Input suppliers often have control over the package sizes of their products. One innovation that can increase outreach to smallholders is the reduction of product sizes. Standard 20-50 kg packaging for seed and fertilizer is excessive for many smallholders. In Nigeria, PrOpCom promoted the development of 1 kg packages of fertilizer to enable firms to target smallholders as a customer base. Similar sachet sizing was implemented in Tanzania under the NAFAKA project.

Attempting pilots with multiple input suppliers simultaneously leverages peer competition as an additional incentive for the suppliers to succeed. Once multiple input suppliers are implementing the model, either through partnership with the project or 'crowding in,'[6] the resilience and sustainability of the model seems more certain. Although the PrOpCom project in Nigeria strived repeatedly to encourage other input suppliers to sell micro-sized fertilizer sachets, just one firm consistently invested in their promotion and sale. Consequently, when a supply disruption caused that company's fertilizer production to drop dramatically in 2013, so did national availability of the small sachets.

The viability of input supplier–local entity (agro dealer or agent) relationships can be strengthened by ensuring local entities have a diversity of products to sell. Their product mix should enable sales throughout the year, with a mix of lower and higher cost items (e.g., solar lamps, agro vet supplies) that permit regular engagement with customers. Encouraging only seasonal agricultural sales may conflict with the period when the local entities are most busy with their own farm responsibilities. In Zambia, the agents who discontinued engagement were typically generating the lowest profit from commissions or were operating in places where all sales work came at the same time as the agent needed to plant her or his own field.

The vision and managerial and logistical capacity of the implementing company appears to be an important determinant of the sustainability and long-term growth of input supplier-driven models. SAPPL, the most successful partner company from the Sunhara project in India, proactively designed

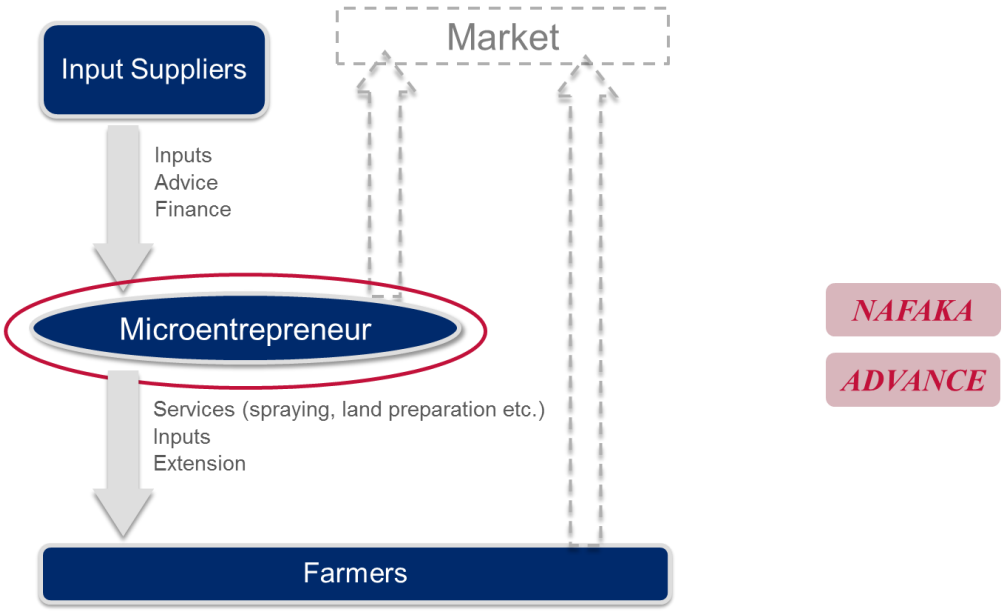
[6] 'Crowding in' refers to the imitation by other firms of a business model or practice initiated by a company with the support of a project.

systems to evaluate potential franchisees, monitor payment or trade gaps as they began to arise, and adapt the franchise model to solve these issues. Following the end of its pilot with Sunhara, SAPPL continued expansion of the franchise model from seven initial locations to more than 120 franchises across three provinces in northern India. In the process, SAPPL doubled its annual sales to approximately US $6 million. SAPPL's decision to apply its franchise model to a more rural area than it had previously done, while also targeting a smallholder population, was dependent on a shift in vision by their General Manager to assume the risks of doing so.

B. MICROENTREPRENEUR-DRIVEN MODELS

Microentrepreneurs drove input supply in two of the selected cases: NAFAKA and ADVANCE. In contrast to the input supplier-driven cases profiled above, where large firms managed input distribution, in these cases microentrepreneurs took responsibility for acquiring and selling inputs to their local communities. The main incentive for the microentrepreneurs was to increase their earnings. They did not extend finance to their farmer customers, nor did they typically receive finance from their suppliers. The microentrepreneurs frequently bundled information on input application alongside input sales.

Figure 3: Microentrepreneur-Driven Model



1. ENABLING CONTEXT FOR SUCCESS

Microentrepreneur input retailers tend to thrive in contexts in which aggregate demand for a diversity of inputs is growing but full-time businesses have not yet been established to supply inputs and auxiliary services (e.g., tractor services, spraying services). Where such full-time businesses exist, the efficiencies of such businesses can crowd out microentrepreneurs. The model also requires the existence of interested entrepreneurs in rural areas, adequate working capital to procure inputs, and sufficient business capacity or the means to acquire it. Under the ADVANCE model, the microentrepreneurs were already market-active businesses, mostly emergent farmers providing tractor-services to smaller-

scale producers, or farm-gate traders. Under the NAFAKA model, almost no VBAAs were previously active as entrepreneurs, but were simply smallholders who demonstrated entrepreneurial potential.

Potential market opportunities need to be at the appropriate geographic and market segment scale for the profile of entrepreneur engaged. In Ghana, the market opportunity identified was built around leveraging the services nucleus farmers could provide to farmers as a mechanism to encourage input adoption through semi-formal outgrower arrangements. This opportunity by necessity required a higher level of sophistication on the part of the entrepreneur. In Tanzania, by contrast, the market opportunity was based on leveraging the VBAAs' social capital and geographic proximity to reduce transaction costs and build market share. The specific activities, focused around promotional seed distribution, extension, and transaction-based sales, did not require the same level of sophistication as the nucleus farmer model.

2. SCALE AND PERFORMANCE

Outreach

The NAFAKA and ADVANCE projects were able to reach 41,586 (to date) and 34,121 smallholder farmers respectively, but do not disaggregate the number of farmers who commercially acquired inputs. Nevertheless, the projects reached significant numbers of farmers through a microentrepreneur-driven model. NAFAKA's village-based agricultural advisors each reached an average of 196 farmers, while ADVANCE's nucleus farmers each reached an average of 273 farmers. The experience of these projects suggests that once the business case for a microentrepreneur has been proven, it can be replicated with other entrepreneurs very quickly during the lifetime of the project.

Outcomes

Both NAFAKA and ADVANCE conducted a number of activities besides supporting microentrepreneurs, so the specific contribution of the model cannot be determined. Sixty percent of beneficiaries in Tanzania, and 84 percent of beneficiaries in Ghana adopted some improved production technologies on their land. In Ghana, crop yields rose between 50 and 300 percent, depending on the crop. In Tanzania, paddy rice yields doubled (though maize yields declined, but in the context of a broader drought that saw crop failure in the region). This translated into a 91 percent increase in income for beneficiary rice farmers in Tanzania.[7]

Sustainability

The absence in this model of a driver with strong managerial capacity that can support the replication of the model among additional agents limits the potential for continued expansion post-project. Rather, success post-project seems more likely to occur in terms of the addition of new services and expansion of sales by microentrepreneurs.

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[7] Maize farmers have actually seen a 68 percent decline in gross margin relative to the baseline year in the context of a severe multi-year drought. The NAFAKA project is in the process of determining if the improved technologies have made a difference relative to yields of farmer who did not adopt any improved inputs.

Equity

Information was not collected on the poverty profile of the beneficiaries in the NAFAKA and ADVANCE projects. The ADVANCE program found that when working through nucleus farmers who were buying directly from smallholder women with little or no previous market engagement, additional capacity building for those women was necessary relative to their male peers to enable them to successfully negotiate and fulfill their sales agreements. Though neither ADVANCE nor NAFAKA has studied this phenomenon independently, studies conducted under similar projects have also shown that smallholder women tend to have less access to inputs and markets due to social norms discouraging travel far from home (PROFIT+, 2013). Thus microentrepreneur models, if they involve bringing goods, services, and extension advice to the farmgate, can increase the gender-based equity of benefits for women who are more geographically constrained than their male counterparts (which is the case in both northern Ghana and Tanzania).

3. RISKS

A significant risk of supporting microentrepreneurs as a driver of input supply is that their capacity gaps may not enable ongoing operations over time. The absence of linkages to a larger entity in the market system—such as exist under the input supplier-driven model—prevents access to certain services (e.g., inventory financing, technical information on good agricultural practices) that would allow them to grow and improve their businesses, and withstand shocks. This creates a risk for farmers that the technical information they receive on input selection and application is inadequate. Conversely, working through microentrepreneurs directly provides more certainty that outreach targets will be achieved, given the project's direct control over implementation, as compared to working with the other drivers profiled in this report that may ultimately not agree to piloting innovative new approaches.

4. DRIVER-SPECIFIC LESSONS

Where larger firms are unwilling to invest in new systems and business models to expand their outreach to smallholder farmers, microentrepreneurs can act as an initial driver. With time, they could potentially be linked to larger players as their capacity and sales volumes grow. Under the NAFAKA project, several VBAAs are now acting as marketing and informal sales agents for large-scale seed companies. These companies found that VBAA marketing and extension activities led to significant increases in demand for their seeds in rural areas previously beyond their market interest, leading them to increase investment in linkages with the VBAAs to continue building market share.

Similar to the local entities linked to input suppliers, microentrepreneurs are more successful when they offer a diverse product mix that increases the frequency of interactions with farmers. This repeat business strengthens the quality of their relationships and builds trust.

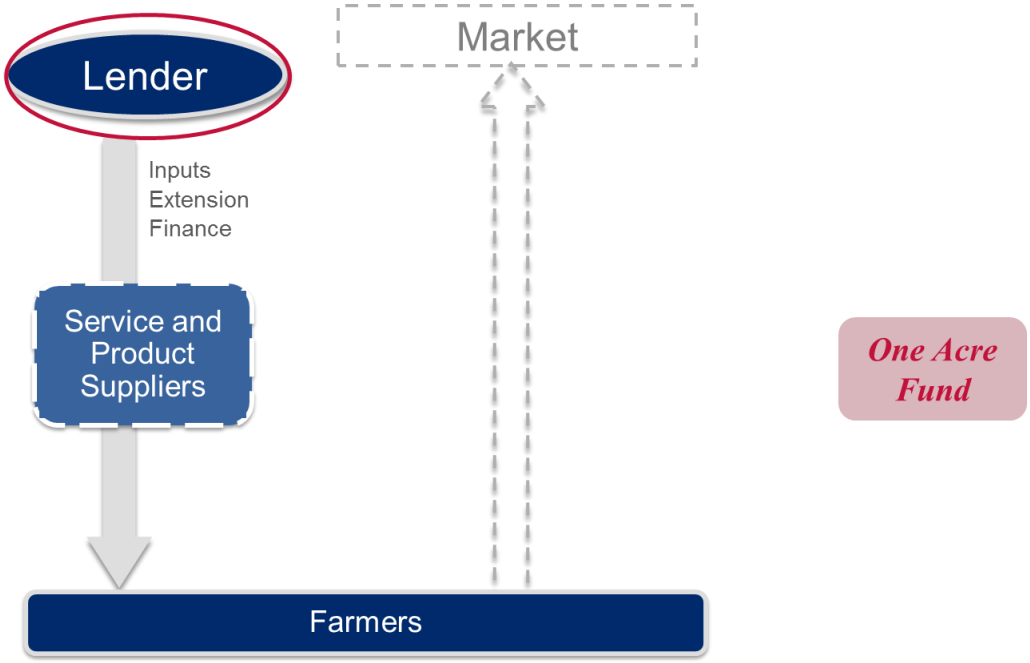
The NAFAKA and ADVANCE cases suggest that the process of attracting and setting up new microentrepreneurs can be done relatively quickly, allowing projects to rapidly scale their outreach. However, given the capacity challenges faced by microentrepreneurs, their potential for autonomous growth post-project is comparatively low.

C. LENDER-DRIVEN MODELS

Financial service providers are a possible driver of input supply. From among the selected cases, the One Acre Fund in East Africa suggests how this model may function. However, because it is registered as an NGO and uses donations to fund a significant portion of its total expenses, OAF does not have the same incentives and perspectives as companies engaged in input lending to smallholder farmers. Additional cases will be sought to complement the experience of OAF.

Where lenders drive input supply, their objective is to expand and often diversify their loan portfolio. To do so, lenders offer loan products that match the timeframe and credit demands of the crop(s) the inputs will be applied to. Other services (e.g., insurance) and complementary products (e.g., tree seedlings) may be bundled with the loan. Payment is typically structured so that all or a majority of it is due following the harvest. Lenders may reduce the risk of diversion of loan funds for other purposes by providing the inputs themselves, rather than cash. In some cases, the financial institutions organize or coordinate the delivery of extension or other services as part of the financial package. They may also provide a link to markets or even purchase the crop themselves, though the latter is rare.

Figure 4: Lender-Driven Model



1. ENABLING CONTEXT FOR SUCCESS

Several conditions are critical for this model to function effectively. Most important is the existence of a financial provider with adequate financial and technical capacity and interest in the smallholder agricultural sector. Knowledge by the lender of the agricultural sector is important for profitable operations. Another factor is strong demand by smallholder farmers for inputs that has been unrealized for lack of adequate funds during the purchase period. Finally, the model appears to work best where

rural population densities and rainfall levels are high, thereby lowering transaction costs and increasing the reliability of crop harvests. OAF has expanded only into areas with adequate rainfall to grow the crop that it primarily targets, maize.

2. SCALE AND PERFORMANCE

Given OAF's status as an NGO, it is imprudent to draw general conclusions about lender-driven models from OAF's experience. For illustration, the following results have been achieved through OAF's model.

Outreach

In 2013, after seven years of operations, OAF provided loans for input acquisition to 128,400 producers in Kenya, Tanzania, Rwanda and Burundi. That was down from 135,000 in 2012 due to a severe drought in maize growing areas of East Africa. OAF has projected that it will reach 200,000 farmers in 2014.

Outcomes

By comparing the yields of a sample of OAF borrowers with a sample of comparable non-borrowers and multiplying by an average crop price, OAF derived an average increase in economic benefit per borrower of $139 in 2013. Given that many farmers consume a portion of their increased production, this does not reflect an actual amount of increased income. Yield data for project borrowers is not released.

Sustainability

Theoretically, there is strong potential for sustainability given the alignment of incentives between lenders and borrowers, both of whom would prefer an ongoing credit relationship. The selection of OAF as a case study does not answer the long-term sustainability of the model, however. At the time of publication, OAF covered approximately three-quarters of its field-based operating costs, so its operations remained donor subsidized. A concern for the overall health of the market system is the possible displacement of other market actors by OAF, through the use of donor funds to subsidize operations and offer services at commercially-unsustainable prices. No information was available on the extent to which this occurred.

Equity

The poverty level of OAF's clients was not measured, and thus definitive conclusions cannot be drawn. As a proxy, OAF cited the average land size of its borrowers as 1.67 acres, which suggests that it reached downmarket. The potential of lender-driven models to achieve equity needs to be assessed through the review of additional cases, given that OAF's non-profit status enables it to focus on poorer producers than might be possible or desirable for a profit-seeking entity. Further examination of the practices of for-profit lenders would indicate the extent to which they struggle with a trade-off between loan size and their own profitability.

3. RISKS

This model's reliance on issuing credit to smallholder farmers creates default risks for both lenders and borrowers. If lenders are unable to adequately manage the risks associated with agricultural lending, such as adverse weather conditions and policy shifts that support non-repayment, they will endure significant losses and may discontinue lending. This is exacerbated by the lack of credit history of most smallholder farmers, which limits lenders' ability to assess credit worthiness and default risk. In cases where a loan package includes multiple items, interest rates may not be transparently stated to borrowers. This can make it impossible for borrowers to assess the true cost of financing, though this did not appear to have slowed uptake of OAF's loan package.

4. DRIVER-SPECIFIC LESSONS

Diversification of a lender's portfolio across climatic zones and crops is important to reduce their risks, as is the development of mechanisms that reduce the likelihood of default by smallholders (e.g., group guarantee mechanisms). OAF has found continual experimentation and then roll-out of new agronomic practices is an important practice to drive improvements in farmer performance in maize production. Consequently, in their longest running program in Kenya, over 95 percent of client farmers typically adopt OAF-recommended practices.

OAF has also learned the importance of focusing on crops like maize that engage large quantities of farmers. Such crops are better suited for reaching scale—given the need to tailor aspects of their program around the nature of each crop—rather than higher income but less common crops (e.g., horticulture). The two key drivers of operational profitability for OAF are the interest rate they charge to farmers and their staff productivity (i.e., farmers per field officer).

D. PRODUCER COLLECTIVE-DRIVEN MODELS

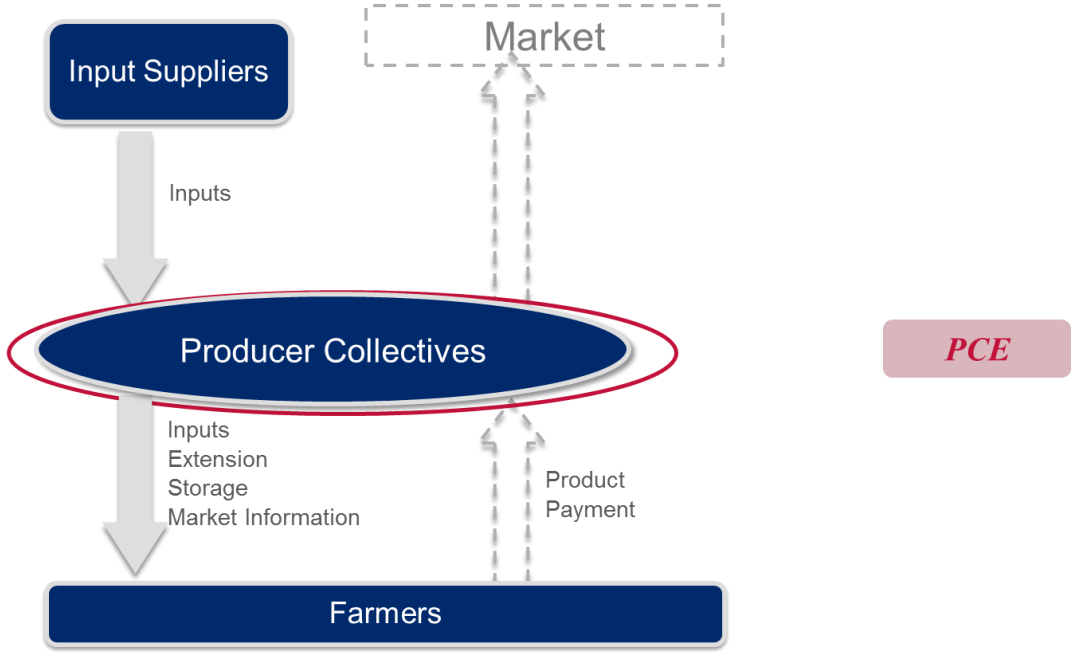
Producer collectives drove input provision in one of the selected cases: PCE in Senegal. Where producer collectives are the drivers, they assume the responsibility of coordinating input access for their members and often non-members. They may also provide other complementary services, including extension, storage, market information, or crop marketing. Collectives include groups with varying degrees of formality, such as cooperatives, associations, and informal groups.

1. ENABLING CONTEXT FOR SUCCESS

This model generally requires the pre-existence of farmer collectives at the launch of the intervention, given the significant time required to set up strong collectives and the risks inherent in donor-incentivized collective creation. PCE worked with water users' associations, which had already been in operation for years prior the start of the project.

Collectives require strong management capacity to effectively coordinate input access. A minimum level of societal acceptance of cooperatives and available infrastructure is also helpful. In the PCE case, the existence of rural storage facilities enabled collectives to provide crop storage services to their members, thereby increasing their attractiveness to prospective members.

Figure 5: Producer Collective-Driven Model



2. SCALE AND PERFORMANCE

Additional cases are needed to judge the scale and performance of collective-driven models. PCE's results are given below.

Outreach

PCE had reached 44,755 farmers as of 2014 across all of their interventions. These results were not disaggregated to determine the quantity of farmers that commercially acquired inputs through the collective-driven model.

Outcomes

PCE did not specifically disaggregate the outcomes for those farmers who acquired improved inputs as a result of its efforts. Across its entire farmer base, gross margins increased by 56 percent over the baseline year, from $469 to $732 per hectare.

Sustainability

PCE observed their producer collective partners steadily assume greater responsibility over time for managing input supply. They increasingly took the initiative in their collaboration with PCE.

Equity

Though farmer income and poverty levels were not directly measured, more than 95 percent of the farmers reached through PCE had landholdings of under 2 ha. While the project asserts that efforts were made to include women as participants within the structured farmer networks, no statistical information was available on the gender equity of PCE's outreach, nor on other elements of equity (e.g., age).

3. RISKS

Inadequate managerial capacity of producer collectives to drive input supply to their members is a significant risk. Evidence from other projects beyond the selected case studies suggested many collectives are unable to maintain their services following the withdrawal of external facilitators. Consequently the risk created for smallholder farmers is determined by their reliance on the collectives to access inputs and the consequences of the collective no longer functioning. For farmers without other options, the consequences of the collective collapsing are severe.

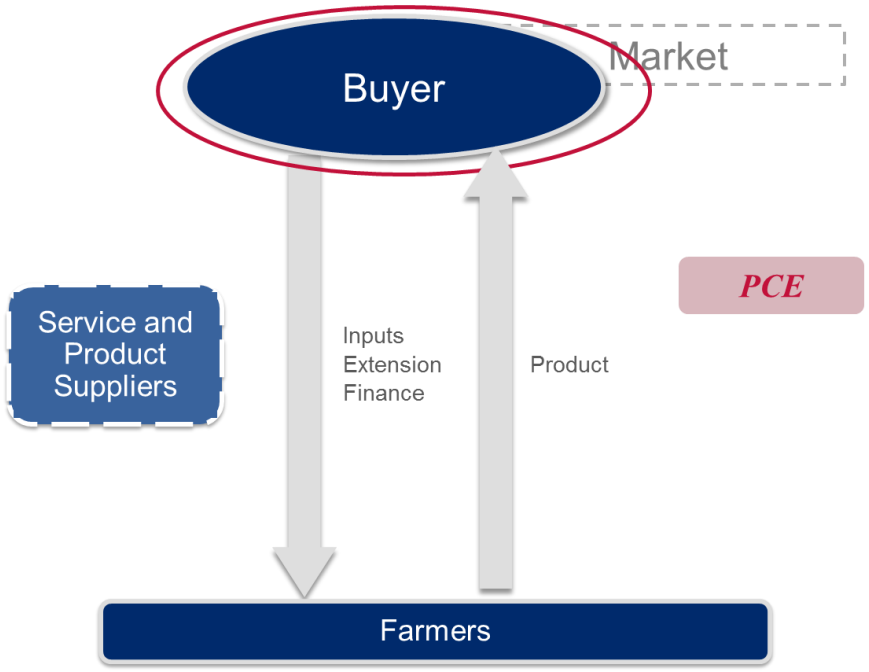
4. DRIVER-SPECIFIC LESSONS

Information management can enable the coordination of input supply. By registering relevant information about growers (e.g., land size, quantities of inputs demanded), collectives are able to improve the efficiency of suppliers' response.

E. BUYER-DRIVEN MODELS

PCE also applied a buyer-driven model. In this model, the buyer of a crop facilitated access by farmers to inputs in order to secure the crop for purchase. Common buyers include processors, millers, exporters, supermarkets, large institutions and traders. Inputs are delivered to farmers at the beginning of the season, usually on credit, on the understanding that farmers will sell their crop to the buyer upon harvest. The credit may be provided by buyers themselves or by a financial institution. Buyers may use formal or non-formal contracts to ensure they receive the crop (Miller et al. 2010).

Figure 6: Buyer-Driven Model



1. ENABLING CONTEXT FOR SUCCESS

Buyer-driven models function best where there is a crop that is difficult for buyers to procure through spot markets. Such may be the case when the quality requirements of buyers are high or the

crop is very specialized. This model requires that buyers have adequate capital to finance farmers' inputs. Buyer-driven models perform better where side-selling is less likely to occur, such as in cases where buyers have strong market power or contracts can be enforced.

2. SCALE AND PERFORMANCE

PCE's performance is presented above under the collective-driven model, so is not repeated here. The specific numbers on the outreach of the buyer-driven model versus the collective-driven model were not available. The literature highlights several examples of buyer-driven models that achieved significant outreach (albeit without the involvement of an external facilitator), including Hortifruti in Costa Rica and NFC in the Philippines (Miller et al. 2010). The provision of inputs on credit enables farmers who cannot self-finance the purchase of inputs to still access them. With respect to sustainability, the model is vulnerable to side-selling, as buyers will often pay less to account for their delivery of inputs. The experience of PCE suggests that buyer-driven models may face challenges in adequately responding to farmers' needs. Rice farmers in Senegal complained that the millers who were providing inputs to them did not prioritize timely delivery, with negative consequences for their agricultural productivity. They consequently opted to coordinate input delivery via producer collectives rather than rely on the rice millers.

3. RISKS

Buyer-driven models have a greater exposure to external risks than the other models profiled above. The continuance of buyer-driven models depends upon the profitability of the crop that the buyer is procuring. Ultimately, supplying inputs is not a core business for buyers, as it is for input suppliers. As such, buyers may discontinue input provision even if the input delivery system is working well, for reasons such as declines in crop prices or shifts in management focus. This creates a risk for farmers who depend on obtaining inputs through buyers, and who may struggle to find an alternative supplier.

Many buyer-driven schemes involve the provision of inputs on credit, with the understanding that the cost will be deducted upon purchase. This creates a risk for the buyer that farmers will sell their crop to others, causing them to lose the value of their loan. Finally, buyers typically only provide inputs for the crop that they wish to purchase. This creates the risk that farmers will divert a portion of the inputs they receive for application on their other crops, and consequently harvest lower quantities than they would have if the entire input package had been applied to the target crop.

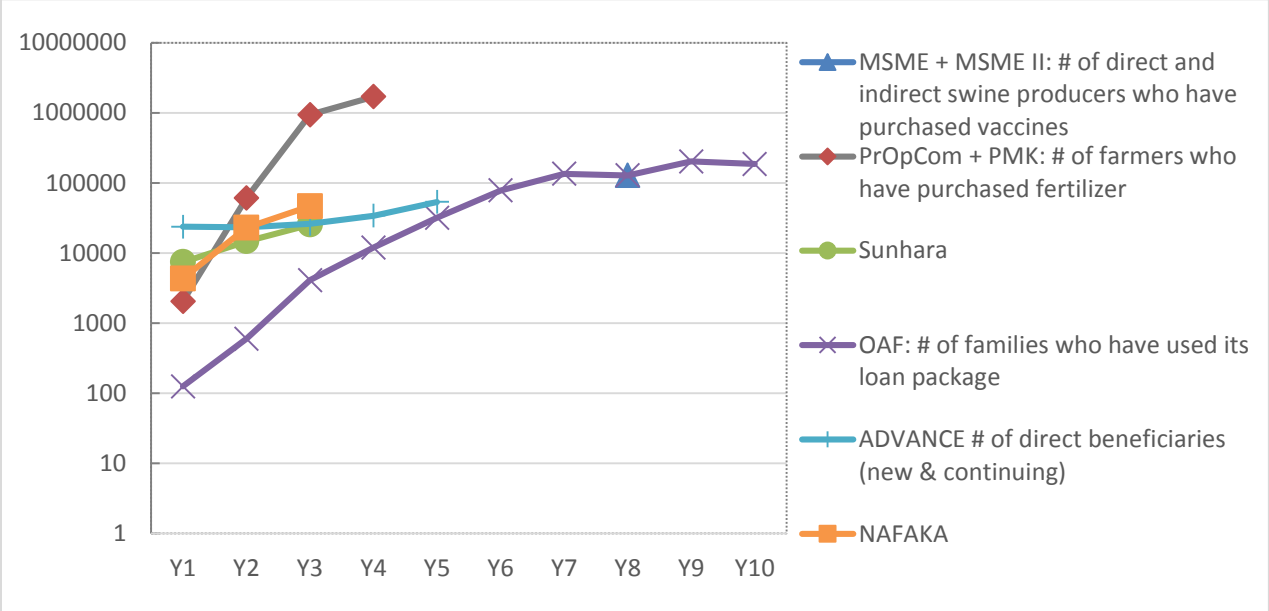
VI. LESSONS LEARNED

Drawing from the case study analyses performed under this research, several lessons emerge that are more broadly relevant to facilitating access by smallholder farmers to inputs at scale.

1. LEVERAGING PRIVATE SECTOR-LED BUSINESS MODELS HAS TREMENDOUS POTENTIAL FOR SCALE, BUT REQUIRES TIME

The cases that were examined confirm that private sector-driven models have the potential to reach significant scale. Figure 7 shows the quantity of farmers who acquired inputs through commercial channels among the selected cases that collected this information (the projects that are not shown did not disaggregate their figures to reveal the number of smallholders who had access to inputs). All cases facilitated at least 25,000 smallholder farmers to purchase inputs, with some reaching many times more.[8]

Figure 7: Number of Farmers Acquiring Inputs through Commercial Channels



The outreach trend lines depicted above demonstrate that projects typically require several years to achieve significant outreach. This is understandable, given the time needed for the private sector to buy-in to new approaches, pilot, assess and ramp-up their investments, and for other market actors to crowd in. Expectations therefore need to be tempered in terms of how quickly this can occur. Where scaling targets are too aggressive in the first couple of years, projects are incentivized to undertake interventions that deliver short-term results but not longer-term sustainable impact.

[8] Sunhara's partners reached approximately 10,000 farmers during the project, but this has subsequently grown to over 25,000.

2. MULTIPLE APPROACHES CAN SUCCESSFULLY FACILITATE INPUT DELIVERY AT SCALE

The cases indicate that multiple types of actors can facilitate widespread access by smallholders to inputs. Consequently, the nature of the context (e.g., capacity of entities within the system, historical relationships between groups, information flows) will determine which model(s) are most appropriate. In some cases, as was demonstrated by PCE, it may be appropriate to simultaneously employ two models for improving input delivery. In a weak market, supporting a single model may limit the system's resilience and capacity to withstand common shocks (e.g., a change in corporate leadership, global commodity price drops). The dominance of input supplier-driven models among our selected cases may suggest that this model is more broadly applicable, but further research is needed to explore the opportunities and risks associated with it.

3. LARGER FIRMS APPEAR MOST CAPABLE OF AUTONOMOUSLY EXPANDING THEIR OUTREACH

In agricultural market systems, larger firms typically include input manufacturers or wholesalers, supermarket chains, exporters, and processors. These firms tend to be more sophisticated and have stronger management capacity than the smaller entities that are located physically close to farmers (e.g., retail shops, microentrepreneurs, producer collectives). The selected cases suggest that larger firms have been better able to continue growing their outreach post-project compared with smaller firms. The Sunhara model is a case in point. The wholesale input supply company, SAPPL, had the resources, logistics, and management capacity to successfully pursue a market opportunity for input supply. Four years after the project's end, the company has continued to grow its business and projects annual expansion of 10 percent.

In contrast, the microentrepreneurs and producer collectives in the selected cases were drawn from the existing base of smallholder farmers. They had much weaker managerial and strategic capacity. Consequently, they were less likely to expand and more likely to discontinue operations in the face of difficulties. For example, only three of the 212 VBAAs supported by NAFAKA in Tanzania hired additional employees. Several of these local entities in NAFAKA and PROFIT stopped operating because of limited management and financial capacity to withstand shocks or troubleshoot problems.

One explanation is that many of the individuals engaged by these projects are likely to be what Antoinette Schoar (2009) describes as "subsistence entrepreneurs:" individuals who lack the capacity and/or ambition to scale up their business. The enterprises run by such individuals typically remain small and rarely transform into growth-oriented businesses. This suggests that input supply systems in which larger firms (e.g., input suppliers, lenders or buyers) are driven by transformational entrepreneurs may have better prospects for sustainable growth following the end of project assistance. The implications of this distinction suggest that working with smaller entities is less likely to result in continued outreach post-project. Rather, their operations may be most effective if they can draw on the support and assistance of larger entities in the market system. Bayer in Kenya, for example, built the knowledge of the franchisees, educated potential customers and offered support for marketing.

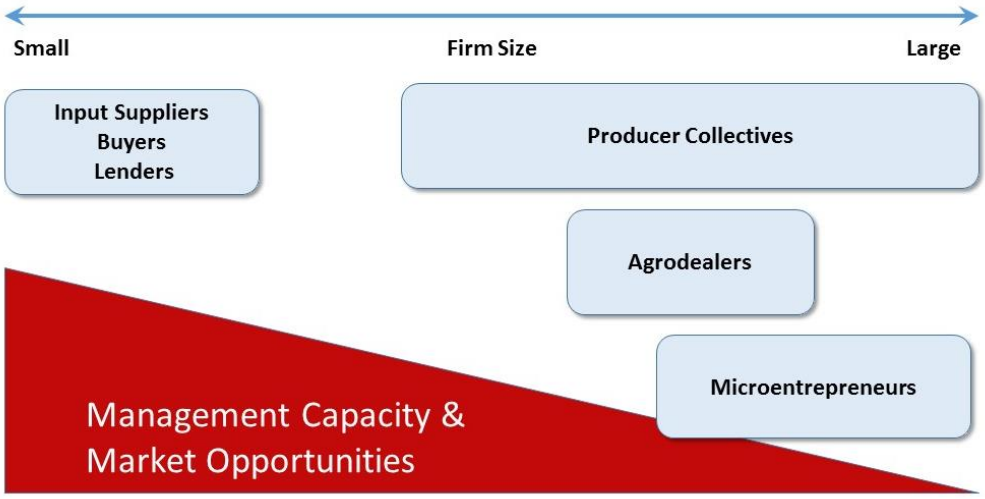
4. LARGE FIRMS MAY NOT PRIORITIZE BUSINESS STRATEGIES THAT REACH SMALLHOLDER FARMERS

While large firms driving input supply appear to have greater potential for growth post-project, the selected projects suggest it can be difficult for them to start or maintain enthusiasm for targeting

smallholder farmer markets. Such firms can be difficult to initially engage; the Sunhara project found that the largest Indian input suppliers were not attracted by the margins they could earn by selling to smallholders relative to their other markets. Even if large firms do become interested, the cases suggest initial enthusiasm is often not sustained. Thus in many cases these firms underinvested in pursuing and/or maintaining their focus on reaching smallholder farmers, even if they had already experienced promising results. This was often in order to pursue other promising opportunities. In spite of their capacity advantages over small firms, inadequately skilled managers and leadership oversight limited the firms' ability to simultaneously pursue many business opportunities. Consequently, when other prospects emerged that appeared more attractive than their smallholder-driven models, some companies shifted focus.

For example, in Nigeria the firm that had led the introduction of small-sized fertilizer sachets, Notore, decided in 2012—despite very high sales—to forego investment in expanding to more farmers in order to pursue a large government tender opportunity. In this case, PrOpCom's successor project PKM was able to use targeted incentives to influence the firm's behavior and cause it to recommit resources for project expansion, but such a strategy would clearly not be possible once donor-funded programming has ended. It is not clear that the project's facilitation efforts have yet supported a shift in the system that reinforces smallholder-focused business strategies. Thus, although large firms have more capacity than do the smaller firms operating in rural areas, they also typically have access to a greater number of opportunities that threatens their long-term engagement. Figure 8 describes this trade-off.

Figure 8: Trade-off between Smallholder Targeting and Management Capacity



Such cases indicate the resilience of traditional business models—often oriented around serving larger-scale clients—and suggest the importance of management perception and vision in maintaining commercial strategies over the medium-term and long-term.

5. PROJECTS SHOULD CONSISTENTLY DEFINE OUTREACH AND CONSIDER THEIR WIDER SYSTEMIC EFFECTS

The outreach numbers that the selected case studies reported to their stakeholders were informed by very different definitions of a beneficiary. Definitions varied in three main ways. One was in the directness of benefit. Some reported the individuals, households or enterprises that directly used inputs, while others included individuals' family members as well.

A second variation was in the inclusion or exclusion of "indirect" beneficiaries who benefited via systemic changes facilitated by the project. Imitation by other market actors (e.g., copying of business models that the project supports) generated a significant portion of the full change in many cases. For example, nearly all (97 percent) of the total outreach identified by the MSME evaluation came through farmers who copied an approach they observed from a neighboring farmer. This suggests that projects should look to a wider indicator set, tracking indirect beneficiaries, adoption spillover effects, and impacts further up and down the value chain.

A third variation was in the depth of benefit required to be classified as a beneficiary. Some projects used a relatively low standard, such as those who had received free goods from the project, while in other cases, projects only reported on those who had earned additional income due to the project's efforts. Although this research specifically focused on the number of households who acquired inputs via market mechanisms, collecting this information was often difficult to obtain. A consistent definition of outreach is important to interpreting results across projects and hence worth the consideration of donor agencies.

6. INPUT APPLICATION KNOWLEDGE IS AN IMPORTANT COMPLEMENT TO INPUT ACCESS

For inputs to increase farm yields, the appropriate types of inputs must be used at the right time in the correct quantities. Information on application is therefore an important complement to input access, because it ensures that farmers are reaping the associated benefits and helps to drive ongoing (and expanding) demand for input supply. Without it, inputs will have minimal or negative effects, harming farmer livelihoods in the short-term and leading to discontinued use and mistrust of input suppliers in the long-run. All the successful approaches studied for this report invested heavily in extension information delivery, either at the point of sale (through sales agents), or on-farm training and demonstration. Training in proper application of agrochemicals, fertilizer, and planting/maintenance practices around improved seed were a core part of the value addition that the donor interventions brought to these models. In Kenya, Bayer staffed a set of extension agents that provided traveling support to the franchised agrodealers and their customer base. In Tanzania under NAFAKA, Ghana under ADVANCE, and Zambia under PROFIT, training to agrodealers, sales agents, VBAAs, and nucleus farmers focused on ensuring they were providing appropriate advisory services to farmers.

7. CONTEXT-SPECIFICITY AND FLEXIBILITY ARE IMPORTANT

The cases demonstrate how dramatically the challenges facing the agricultural inputs market system differed between contexts. In some areas, farmers lacked physical access to inputs, while in others quality was a greater concern. Facilitators need to understand their context and the drivers of poor

performance in the input market system prior to selecting a specific model to promote. The development and regular refinement of a nuanced theory of change that takes into account the context and learning can support the selection of approaches that are appropriate to the local environment.

Case experience suggests flexibility is a valuable principle for facilitating input access at scale. For PCE, operating across diverse contexts and being attuned to the learning of market actors meant facilitating several models and evolving its approach. Where farmers recognized a buyer-driven model was not delivering inputs at a satisfactory pace to smallholders, the project worked with farmers to launch a collective-driven model.

8. INPUT DEMAND IS CORRELATED TO CROP DEMAND

Without the ability to sell their crops at attractive prices, smallholders lack the incentives to buy higher quality inputs. In India, the wholesale input supplier rolling out its franchises developed its own market with several buyers wanting to purchase improved varieties of potato seed, and leveraged this to provide a buy-back opportunity for smallholders. This gave farmers a ready market for their product, encouraging adoption of the new seed and complimentary products (e.g., fertilizer, chemicals). In Cambodia, rapid economic growth spurred significant end-market demand for pork products, incentivizing farmer investment to expand pig production. Intervention design should therefore assess the existence and accessibility of ready markets for farmers, and consider the risks and incentives associated with investments in inputs.

9. MARKET SYSTEMS FACILITATION PROGRAMS AND MARKET ACTORS HAVE PLACED LITTLE FOCUS ON EQUITY

Little evidence exists on the extent to which the selected projects reached and benefited low-income households, women, and other disadvantaged or excluded groups. More needs to be learned on the reasons for this gap and the implications for projects and other market actors of not better understanding their customers and suppliers.

VII. RESEARCH AGENDA

This paper summarizes initial findings based on a desk review of nine case studies. While the evidence is preliminary, this review suggests several areas for investigation as part of a subsequent research phase.

1. ADDING LENDER-DRIVEN, BUYER-DRIVEN AND COLLECTIVE-DRIVEN CASES

The selected cases provided limited evidence on three of the identified drivers of improved input supply: lenders, buyers and producer collectives. Finding and incorporating additional cases involving these drivers will expand the evidence base and enable further conclusions to be drawn about the engagement of these actors by market systems facilitators.

2. IDENTIFYING SYSTEMIC DRIVERS OF THE BEHAVIOR PATTERNS OF KEY MARKET ACTORS

The phase 1 research process identified the actions taken by key market actors in the systems targeted by the selected projects and their influence on project objectives. However, the desk-based methodology did not easily yield insights on the characteristics of the systems that shaped those decisions, such as the role historical relationships between input suppliers and smallholder farmers have in shaping responses to new opportunities.

3. TESTING THE SUSTAINABILITY OF MARKET SYSTEMS FACILITATION

Drawing on lessons from existing practice was made difficult by the lack of substantial evidence on the sustainability and resilience of market systems facilitation following project closure. All of the external evaluations of selected case studies were conducted prior to project closure or immediately afterwards. While this approach is logistically simpler, it does not permit an understanding of how targeted market systems evolve following the withdrawal of an external facilitator and the longer-term durability of donor-funded models. Field-based investigations of the projects that have now ended—MSME, PROFIT, ADVANCE, Sunhara—would offer the opportunity to see how their targeted market systems have evolved following project closure, and the adaptation of the models by project-supported market actors. While methodological challenges exist (e.g., subsequent investments by other donor or government actors), the learning opportunities are significant.

4. IDENTIFYING EARLY INDICATORS OF MODEL SUCCESS

Relying on a project's final evaluation to understand a project's results and conclude whether its model(s) worked does not permit project learning and evolution. This objective would be better served by performance indicators that give an early indication of effectiveness. Feedback from practitioners at LEO-facilitated practitioner sessions in October 2014 suggested a preliminary set of indicators, several of which are included in the measures of systemic change identified in Fowler and Dunn (2014):

- The model generates new customers
- Market actors perceive the transactions to be fair
- Market actors engage in repeat transactions

- Competitive pressure is created for systemic change (e.g., imitation or adaptation by other market actors)
- The model is simple and easy for the driver of input supply to manage

Testing and refining the above list with ongoing projects can inform effective practice.

5. UNDERSTANDING HOW TO ALTER COMMERCIAL NORMS THAT IMPEDE MARKET SYSTEMS DEVELOPMENT

In contexts where farmers and suppliers do not trust each other, and established business norms are oriented towards maximizing short-term profits rather than creating longer-term customer relationships, failing to address these structural issues can limit the effectiveness of a project's interventions. Several currently active projects have sought to address these issues. One, in Uganda, has sought to do so by enabling input suppliers to better understand its customer base. Another, in Kenya, has established a customer hotline that creates consequences for firms selling adulterated inputs and a feedback loop for businesses to reflect on their strategy. As implementation of these projects continues, lessons will begin to emerge about the impacts of these systems on the functioning of the input supply system.

6. UNDERSTANDING THE EQUITY OF BENEFITS OF MARKET SYSTEMS FACILITATION PROGRAMMING

The review of selected projects revealed a relatively persistent lack of attention to questions of equity of benefit flows. Field-based research will dig into the poverty, gender and other aspects of equity that could not be uncovered through a review of project documentation. Further research should also examine the potential incentives (e.g., analyzing customer demand, targeting customer training to the ultimate user) and disincentives (e.g., cost) to collecting this information.

7. EVALUATING THE UNADDRESSED BARRIERS TO INPUT ACCESS

Several of the most common barriers to input access (e.g., government policy creation and implementation, contract enforcement, low and/or declining returns to input investment by smallholder farmers) were not really addressed by the selected projects. The decision not to address these constraints needs to be better explored, to understand whether the constraints can be resolved through other strategies, need further attention (possibly by other donor initiatives), or are less important for improving input access.

ANNEX 1: CALL FOR PAPERS—SCALING UP

Leveraging Economic Opportunities (LEO) is a three-year contract to support USAID programming that fosters inclusive growth through markets. LEO is contributing to learning in a number of interrelated technical areas (see text box), including scaling up technology adoption and beneficiary outreach.

LEO is seeking to identify and document successful strategies and models of scale up, and to understand both the operating principles, and factors in the market system and socio-political environment that enabled them to succeed. These examples, complete with qualitative and quantitative measures of scale of impact, will be widely disseminated to USAID missions and operating bureaus, as well as to project implementers, to strengthen learning in this area.

The LEO Learning Agenda

The learning agenda includes:

- documenting models that allow the poor to participate in growth opportunities
- tailoring facilitation approaches to meet the needs of the extreme poor
- identifying project modifications to promote economic multiplier effects
- categorizing strategies to empower women
- applying a systems approach to policy reform to ensure sustainability
- discovering ways in which market forces effectively drive technology adoption
- monitoring and evaluating changes in mar-

Examples of interest may fall into one or both of the following categories:

1. ***Proven models for reaching beneficiaries at scale.*** Many business and/or market systems models developed through USAID projects have proved successful in reaching scale, even with the rural poor. Models such as input and output agent networks and nucleus farmer arrangements have the potential to reach large numbers of marginalized and poor populations through sustainable, commercial incentives. Since models always need to be tailored to the local context, learning about what made these models effective can be highly informative. This includes tactics to manage loyalty between buyer and supplier, build capacity, manage risk, stimulate change while avoiding dependence on subsidy, etc.
2. ***Successful strategies for scaling up technology adoption.*** Technologies can have a transformative effect, enabling leaps forward in the ability of individuals, firms and communities to achieve food security, withstand shocks, and experience economic growth. Successful technology uptake requires clear social and/or economic incentives, an enabling policy environment, and commercially sustainable market services that reach into poor rural areas. Analysis of successful examples of technology scale-up should inform learning in areas including, but not limited to, how to give momentum to the adoption process, the effectiveness of retail promotional strategies, and how to stimulate local adaptation.

Value chain and market systems development practitioners are warmly invited to submit brief synopses of project examples that fit within one or both of the categories described above. These examples must have quantitative and qualitative evidence of reaching scale.

Submissions should be brief (less than 500 words) and should include the following:

- Project title, duration, location and implementer
- Brief description of model or technology
- Scale and impact reached
- Major lessons learned

Funding will be made available for the more comprehensive documentation of selected examples determined to be of particular interest to USAID. Successful submissions will be featured in an upcoming report to USAID missions and operating units on lessons learned in scaling up; and may also be featured in future presentations to USAID and its implementing partners.

Submissions should be sent to rcampbell@acdivoca.org by March 31, 2014.

The LEO team looks forward to learning with you in this important area.

ANNEX 2: REFERENCE LIST

EXTERNAL RESOURCES

Ahmed, Raisuddin and Mahabub Hossain. 1990. "Developmental Impact of Rural Infrastructure in Bangladesh." Research Report 83. Washington DC: International Food Policy Research Institute.

Binswanger, Hans, Shahidur Khandker, and Mark Rosenzweig. 1993. "How Infrastructure and Financial Institutions Affect Agricultural Output and Investment in India." *Journal of Development Economics*, Vol. 41, Issue 2: 337 - 366.

Chemonics International and The International Center for Soil Fertility and Agricultural Development. 2007. "Fertilizer Supply and Costs in Africa."

Creevey, Lucy, Elizabeth Dunn and Elisabeth Farmer. 2011. "Outreach, Outcomes, and Sustainability in Value Chain Projects." USAID Accelerated Microenterprise Advancement Project. Washington, DC: ACDI/VOCA.

Datt, Guarav and Martin Ravallion. 1998. "Farm productivity and rural poverty in India." *Journal of Development Studies*, 34(4): 62-85.

Department for International Development. 2004. "Making agricultural markets work for the poor." London: Renewable Natural Resources and Agriculture Team, DFID Policy Division.

Dunn, Elizabeth. 2014. "Driving Innovation to Scale in Agricultural Market Systems." Presentation to USAID. Washington DC: ACDI/VOCA.

Fowler, Ben and Elisabeth Dunn. 2014. "Evaluating Systems and Systemic Change for Inclusive Market Development." USAID/MPEP Leveraging Economic Opportunity project. Washington DC: ACDI/VOCA.

Graham, Marine, Daria Kaboli, Malini Sridharan and Shireen Taleghani. 2012. "Creating Value and Sustainability in Agricultural Supply Chains: Models for Delivery of Crop Improvement Services to Smallholder Farmers in Africa." Cambridge, MA: MIT Sloan School of Management.

Hazell, Peter, Colin Poulton, Steve Wiggins, and Andrew Dorward. 2007. "The Future of Small Farms for Poverty Reduction and Growth." Washington, DC: International Food Policy Research Institute.

Kelly, V.A. and A. Naseem, 2009. "Fertilizer Use in Sub-Saharan Africa: Types and Amounts." Encyclopedia of Life Support Systems, Agricultural Sciences Volume II. Paris, France: Eolss Publishers.

Kubzansky, Michael, Ansulie Cooper and Victoria Barbary. 2011. "Promise and Progress: Market Based Solutions to Poverty in Africa." The Monitor Group.

Lobell, David, Wolfram Schlenker and Justin Costa-Roberts. 2011. "Climate Trends and Global Crop Production Since 1980." *Science* Volume 333: 616 – 620.

Martey, Edward, Alexander Nimo Wiredu, Prince Etwire, Mathias Fosu, S.S.J. Buah, John Bidzakin, Benjamin Ahiabor and Francis Kusi. 2014. "Fertilizer Adoption and Use Intensity Among Smallholder Farmers in Northern Ghana: A Case Study of the AGRA Soil Health Project." Sustainable Agriculture Research, Vol. 3, No. 1: 24 – 36.

Matsumoto, Tomoya and Takashi Yamano. 2009. "Soil Fertility, Fertilizer, and the Maize Green Revolution in East Africa." Policy Research Working Paper, Japan's National Graduate Institute for Policy Studies & The World Bank Development Research Group.

McArthur, John and Gordon McCord. 2014. "Fertilizing Growth: Agricultural Inputs and Their Effects in Economic Development." Washington DC: The Brookings Institution.

Miller, Calvin and Linda Jones. 2010. "Agricultural Value Chain Finance: Tools and Lessons." Warwickshire, UK: Food and Agriculture Organization of the United Nations and Practical Action Publishing.

Muzari, Washington, Wirimayi Gatsi and Shepherd Muvhunzi. 2012. "The Impacts of Technology Adoption on Smallholder Agricultural Productivity in Sub-Saharan Africa: A Review." Journal of Sustainable Development, Vol. 5, No. 8: 69 – 77.

Nagayets, Oksana. 2005. "Small Farms: Current Status and Key Trends." The Future of Small Farms Research Workshop. Kent, England.

The New Partnership for Africa's Development. 2011. "The Abuja Declaration on Fertilizers for an African Green Revolution: Status of Implementation at Regional and National Levels." Comprehensive Africa Agriculture Development Programme.

Nyangena, Wilfred and Ogada Maurice Juma. 2014. "Impact of Improved Farm Technologies on Yields: The Case of Improved Maize Varieties and Inorganic Fertilizer in Kenya." Environment for Development Discussion Paper Series.

Production, Finance, and Improved Technologies Plus (PROFIT+) Project, Barrier Analysis Final Report, September, 2013.

Schoar, Antoinette. 2009. "The Divide Between Subsistence and Transformational Entrepreneurship." NBER Innovation Policy and the Economy Paper Series.

Smale, Melinda and Nicole Mason. 2014. "Hybrid seed and the economic well-being of smallholder maize farmers in Zambia." Journal of Development Studies, Vol. 50, Issue 5: 680 - 695.

Snapp, Sieg, T.S. Jayne, Wezi Mhango, Todd Benson and Jacob Ricker-Gilbert. 2014. "Maize-Nitrogen Response in Malawi's Smallholder Production Systems." Paper prepared for the National Symposium, Bingu International Conference Center, Lilongwe.

Stifel D., Minten B., and Dorosh P. 2003. "Transaction Costs and agricultural productivity: Implications of isolation for rural poverty in Madagascar." IFPRI Markets and Structural Studies Division Discussion, Paper 56, Washington DC.

Thirtle, Colin, Lin Lin and Jenifer Piesse. 2003. "The Impact of Research Led Agricultural Productivity Growth on Poverty Reduction in Africa, Asia and Latin America." Durban, South Africa: 25th Conference of the International Association of Agricultural Economists.

Thirtle, Colin, Xavier Irz, Lin Lin, Victoria McKenzie-Hill and Steve Wiggins. 2001. "Relationship between changes in agricultural productivity and the incidence of poverty in developing countries." London: Department for International Development.

Vermeulen, Sonja, Pramod Aggarwal, Bruce Campbell, Edward Davey, Elwyn Grainger-Jones and Xiangjun Yao. 2014. "Climate change, food security and small-scale producers." Montpellier, France: Consultative Group on International Agricultural Research.

PROJECT DOCUMENTATION

Development Alternatives, Inc. 2012. "Cambodia MSME 2/BEE Project: Final Report." Bethesda MD: DAI.

Development Alternatives, Inc. 2012. "Cambodia MSME 2/BEE Project Final Results Measurement Report." Bethesda MD: DAI.

Development Alternatives, Inc. 2008. "Strengthening Micro, Small, and Medium Enterprises in Cambodia." Bethesda MD: DAI.

International Resources Group. 2013. "Economic Growth Project: FY 2013 Annual Report." Chantilly VA: International Resources Group.

International Resources Group. 2012. "Economic Growth Project: FY 2012 Annual Report." Chantilly VA: International Resources Group.

Mendez, England & Associates. 2012. "Final Performance Evaluation of USAID/Cambodia Micro, Small and Medium Enterprises II/Business Enabling Environment Project." Bethesda, MD: Mendez, England & Associates.

Nonprofit Investor. 2012. "Independent Research for Philanthropy: One Acre Fund." San Francisco CA: Nonprofit Investor.

One Acre Fund. "2013 Annual Performance Report." Bungoma Kenya: One Acre Fund.

PrOpCom. 2011. "Making Fertilizer Markets Work for the Poor in Nigeria: a PrOpCom Case Study." Maitama-Abuja Nigeria: PrOpCom and DFID.

PrOpCom. 2011. "Promoting Pro-Poor Opportunities in Commodity and Service Markets: Project Completion Review." Maitama-Abuja Nigeria: PrOpCom and DFID.

Propcom Mai-karfi. 2014. "Education and lasting access to fertilizer: how Nigerian smallholder and businesses are prospering together." Maitama-Abuja Nigeria: PrOpCom and DFID.

ANNEX 3. SCALE IN THE SELECTED CASE STUDIES

Name of case, (value chain), country, proponent, donor, budget, dates and type of model	Outreach	Outcomes	Sustainability	Equity	Evidence
Micro Small and Medium Enterprise (MSME) (Swine) Cambodia DAI and Nathan Associates USAID/Cambodia $5 million (Phase 1), $21.5 million (Phase 2) 2005 – 2008 (Phase 1), 2008 – 2012 (Phase 2) Input supplier-driven	MSME overall benefited 3,849 smallholder-operated swine enterprises directly and 125,076 indirectly through copying.	Project-assisted pig producers' average incomes increased by 169% over the baseline value in Phase 2 [2008-2012]. Average annual animals held per project-assisted producer increased from 2 to 30 pigs in Phase 1, and 30 to 48 pigs in Phase 2.	Input models are reportedly continuing to be practiced following MSME's closure in 2012. 14 input providers not targeted by the project began providing swine input supplies as a result of the project. MSME created strong benefits for others in the market system. Project-assisted veterinarians' revenue increased by 335% compared to the baseline, while project-assisted pig trader income increased by 1,245% against the baseline value in Phase 2.	Although the project was designed without a specific focus on marginalized groups, approximately 11% of the Phase 2 evaluation respondents in the swine value chain were project-assisted enterprises owned by women.	Project Monitoring Data and Reports In-depth interviews Project Evaluations of Phase 1 and Phase 2

PrOpCom and Propcom Mai-karfi (Fertilizer) Nigeria Chemonics and GRM DFID 2002 - 2011 (Phase 1), 2012 – Present (Phase 2) £16.6 million ($27.5 million) (Phase 1), £27 million ($45 million) (Phase 2) Input supplier-driven	In 2012, an estimated 1,700,000 smallholders purchased fertilizer in small packs as a result of the activity.	Farmers who used the new fertilizer increased their yields by 53% at the end of PrOpCom in 2011. In 2012, farmers who benefited due to PMK's influence on Notore earned on average an extra ₦928 ($6.15) per season in profit, compared with similar farmers who did not buy Notore fertilizer. The total net income growth for farmers due to the project in 2011 approximated $4,970,000.	Despite a few challenges, the original lead firm has demonstrated buy-in through a number of innovations. However, there is limited crowding in of other fertilizer companies despite continued efforts by the project.	The fertilizer pack size is specifically designed for smallholder farmers who cannot afford or do not need a larger pack size. In 2011, 7% of direct beneficiaries were women.	Project Monitoring Data and Reports Project Evaluation of Phase 1 In-depth interviews
Projet Croissance Economique (Rice) Senegal Engility Corporation USAID/Senegal $61.8 million 2009-2015 Producer collective-driven	44,755 farmers benefitting from project activities. (No numbers are available on the number of farmers who have purchased inputs through the market system.)	PCE calculated a 56% increase in irrigated rice farmers' gross margins in FY2013 from the FY2010 baseline, to $732/ha from $469/ha	$47 million in investment and seasonal financing available to value chain actors without project guarantees. The value chain financing model that the project established withstood the effects of a 2011 drought that severely impacted farmer incomes and has expanded significantly in subsequent years.	No data is available.	Project Monitoring Data and Reports In-depth interviews

One Acre Fund (Maize) East Africa One Acre Fund Various donors ~$90 million 2006 – Present Lender-driven	130,400 farm families in 2013 used OAF's financial package	The average financial impact on an OAF borrower in 2013 was estimated at $139. This was derived by estimating the average increase in yield for a sample of OAF borrowers and valuing it at prevailing crop prices, net of loan costs, then comparing this with the yields of a sample of non-borrowers. OAF does not disclose their data on changes in producers' yields.	Maize borrowers maintained profitability even during a very poor harvest in Kenya, moving from a 100-160% increase over baseline in 2012 to 52% in 2013. In 2013, OAF's loan revenues covered 73% of its field expenses on average; the balance is covered by donor funding. Farmer dropout rates are not reported by OAF. Unclear impacts on other actors (e.g., input suppliers, lenders) in the market system.	Primary customer base is farmers with an average 1.67 acre of land. No other information on gender or poverty levels of participants is available.	Project Monitoring Data and Reports
Sunhara India Agribusiness Systems International Bill and Melinda Gates Foundation 2009-2014 $4.1 million	10,000 farmers reached	18% decrease in cost of production; 80% increase in potato yields; 40% decrease in post-harvest losses; 70% of farmers adopted new tech.	Wholesaler continues to expand franchises (37 as of end of project, with additional 21 planned for following year).	Information on farmers not available. All franchise owners were male.	In-depth interviews Project evaluation documentation SAPPL self-reported finances

Input-supplier (Agro-dealers)					
Bayer GreenWorld Kenya Bayer GIZ $200,000 2006-2010 Input Supplier (Agro-dealers)	N/A. Farmer data not tracked (200 agro dealers were reached)	N/A. Outcomes for farmers were not tracked. Sales for participating stores increased 40% on average.	Program no longer expanding, but the 200 agro dealers have been maintained by Bayer. Some of the extension agents that were funded under the project have been retained by Bayer to support capacity of farmers.	N/A.	Independent Assessments (small sample size) Project Reports In-depth interviews
Zambia Production, Finance and Improved Technology (PROFIT) Zambia CLUSA USAID/Zambia $15 million 2005-2010 Input Supplier (Agents)	180,000 smallholders reached	Average income for farmers adopting improved seed was $190 higher than for farmers without it. Increased household food security through higher food consumption.	15 companies, representing the majority of the input supply sector in Zambia, either joined the project or crowded in to the model, hiring more than 2,500 agents. The total number of agents has declined since the end of project, however.	Rural smallholders were the primary customer base reached through sales agents. Female agents increased adoption of improved inputs by female farmers.	Independent Impact Assessment In-depth interviews Project Monitoring Data and Reports

NAFAKA Tanzania ACDI/VOCA USAID/Tanzania $30 million 2011-2016 Microentrepreneur	41,586 smallholders reached through 212 VBAAs	Paddy rice yields more than doubled relative to baseline in 3 years* 17,000 farmers adopted new technology on 110,000Ha*	Currently 3 VBAAs have established commercial operations linking wholesale suppliers to smallholders with no project subsidy. Currently processing grants to replicate the model for 12 additional VBAAs.	New customers of the VBAAs are smallholder farmers.	In-depth interviews Project Monitoring Data and Reports
ADVANCE Ghana ACDI/VOCA USAID/Ghana $32 million 2009-2014 Microentrepreneur	34,121 smallholders through 125 Nucleus Farmers	84% of smallholders adopted new technologies. Crop yields increased from 50—300% between 2011 and 2013 depending on the crop.*	All of the project's nucleus farmers are still operating and providing expanded services. There is anecdotal evidence of crowding in by other actors.	Customers of the nucleus farmers are smallholder farmers earning little income.	In-depth interviews Project Monitoring Data and Reports

U.S. Agency for International Development
1300 Pennsylvania Avenue, NW
Washington, DC 20523
Tel: (202) 712-0000
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