01

SDM Series

FARMER AND LOCAL TRADER-LED SERVICE DELIVERY MODELS

An Analysis of Opportunities

The study was conducted by Root Capital and NewForesight
on behalf of IDH The Sustainable Trade Initiative

February 2019

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1.0 INTRODUCTION

FOREWORD - IDH

IDH'S SDM APPROACH TO MARKET TRANSFORMATION

IDH works to create inclusive and sustainable value chains, that are profitable for both businesses and smallholder farmers. Our starting place is leveraging private sector companies, to ensure there is market demand and a business case for investment. Since 2008, we have leveraged over 100 M EUR in both food and cash crop value chains to reach 2.5 million smallholder farmers with improved services.

Part of this journey began in 2015, when IDH developed a data driven methodology to analyze service models and improve the quality of our investments. We wanted to better understand the conditions that make services to smallholder farmers even more efficient, effective, sustainable and scalable. Now, with over 45 models of service delivery analyzed, in 18 countries, and with 145 KPIs monitored, we are able to identify the key drivers that build economically viable and inclusive service delivery models. As the database grows, we continue to gain new insights and develop new partnerships that together can transform smallholder agriculture.

PARTNERING WITH ROOT CAPITAL

In Root Capital, we found a like-minded organization, keen on continually learning and using data for growth. In particular, Root Capital is a front runner in the challenging and much needed area, of long term finance for renovation and rehabilitation of tree crops. And IDH was keen to understand the conditions that contributed to their success. Through this partnership, we have had the opportunity to analyze "farmer and trader-led local SMEs" active in both cash and food crops, a first deep dive for us in this partner group and a key player in the renovation and rehabilitation of tree crops.

KEY INSIGHTS

The key insight uncovered in these deep dives; is that farmer organizations and local SMEs mostly use internal funding to offer services to smallholders, and that these services have a positive impact on improving livelihoods, but do not raise smallholder farmers out of poverty. Market volatility plays an important role in this. The farmer and trader-led local SMEs that offer integrated service packages (combining i.e. extension with inputs on credit) have a larger impact at farmer level and a positive effect on the viability of the service delivery model. Those that offered longer term investment support in renovation and rehabilitation were seen to have a large positive impact, but do need external funding to be able to offer such services to a larger number of farmers.

We also learned that the farmer and trader-led local SMEs analyzed could further improve their service delivery if they also collected farmer data (including data on the behavior and attitude of farmers). This data could be used to segment their farmers and then tailor service packages based on the needs of different segments. Partnerships could further be leveraged to fulfill some of the needs identified for services.

LOOKING FORWARD

We hope that the insights from this report are inspiring others to step into this area of digital data collection, farmer segmentation and integrated service packages. Many more brave organizations are needed to crack the nut on the ideal long-term support for renovation and rehabilitation of tree crops, in these times of challenging market conditions.

Iris van der Velden

Director of Learning and Innovation,
IDH the Sustainable Trade Initiative

FOREWORD - ROOT CAPITAL

Root Capital believes that small-and-growing agricultural enterprises, like farmer cooperatives or private traders, represent a significant, but often overlooked, channel for smallholder service delivery. By providing market access and agronomic extension, agricultural enterprises can give farmers the resources and incentives needed to transition to more sustainable production practices.

In 2014, Root Capital launched a research effort to evaluate the impacts of extension programs provided by enterprises in its lending portfolio, as well as opportunities for improvement. Root Capital's initial round of research consisted of an analysis of Root Capital portfolio data, interviews with over 30 agricultural enterprises and partners, and a literature review; and culminated in the release of an issue brief – "Investing in Resilience: A Shared Value Approach to Agricultural Extension" – in 2015.

Root Capital found that agricultural enterprises are indeed improving smallholder performance and livelihoods, in value chains as diverse as coffee and sorghum. In many geographies, agricultural enterprises are the primary or only source of extension for smallholder communities, due to historic underinvestment or disinvestment in these critical support services.

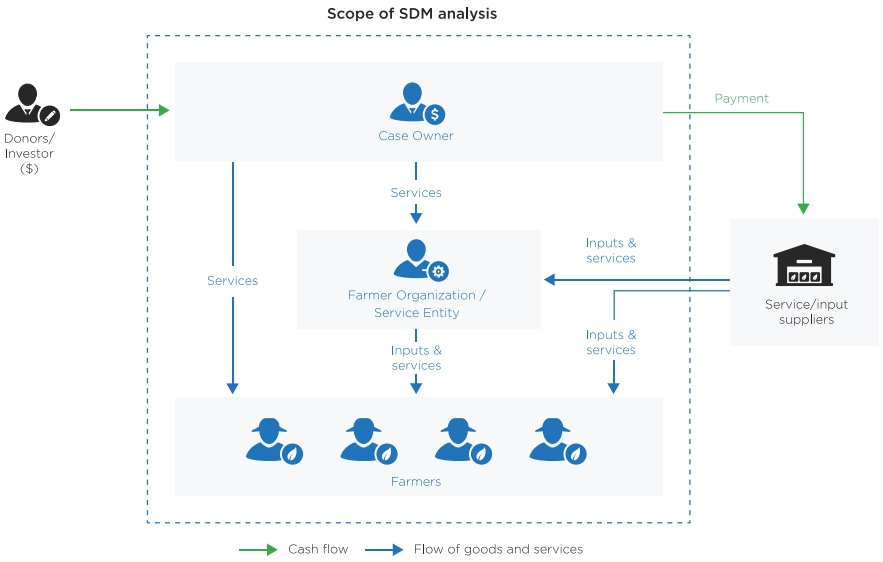
Root Capital also found, however, that enterprise extension programs generally do not deliver optimal extension services, in that they do not fully realize potential benefits to farmers, to other supply chain actors, or to the environment. The unrealized potential of enterprise extension services represents a missed opportunity, not just for individual enterprises and their suppliers, but for entire supply chains dependent on smallholders. Root Capital identified four main barriers to effective enterprise extension: knowledge, capital, talent, and supply chain dynamics.

Root Capital embarked on these 10 case studies with IDH to dig deeper on the question of capital constraints for farmer- and trader-led extension models. Root Capital sought to understand the current economic sustainability of extension services in its portfolio and gain insight into opportunities to support borrowers in intensifying or scaling these farmer services.

1.1

IDH'S PROCESS AND APPROACH TO ANALYZING SDMS

When we start working with a new service provider, the first step is to create a clear picture of the model's structure, including key actors, and flows of goods, services, and cash.



We then look at the costs and benefits for all those involved: farmers; service providers; and investors. Next, we compare the returns on investment for farmers in the model with farmers that are not, to get insight into the effect. This immediately gives us an indication as to whether or not the farmer is benefiting from the services provided. Additionally, we also run several sensitivity analyses to understand how vulnerable the model is for changes in external factors like crop price and labor and input costs. Taken together, this information allows for a better understanding of the conditions that create either a positive or negative business case for stakeholders. In the end, the outcome of this process is delivered to the service providers a case study.

As the methodology is data based, data availability is a key driver for the findings and recommendations. In each case study analyzed, our data collection has been dependent on the data that could be provided by the main service provider, and where possible supplemented by a literature review.

Data collection for the analysis occurs at both farm and service delivery model levels. Service provider data tends to be easily available, since it is extracted from their financial accounts. Due to the high regard service providers place on our service delivery model analysis, they are more open to providing increased access into their financials, which further improves the quality of our analysis.

Data at farm level is far more challenging. There is a lack of farm level data in many of the SDMs, which makes assessing the effectiveness of service delivery difficult. Luckily, in contrast to many other SDMs, the Root Capital SDMs analyzed have been able to provide good data at farmer level, coming from a combination of enterprise business documents and Root Capital impact studies with farmers.

1.2

KEY PARTNERS AND CLIENTS

IDH and Root Capital are ongoing collaborators, having partnered in the past to pursue shared learning agendas related to the coffee sector, conservation finance, and other themes. These case studies mark the first formal collaboration under the Smallholder Innovation Platform.

Root Capital selected 10 borrowers in its loan portfolio for the case studies, including eight coffee cooperatives in Latin America and two private sorghum traders in Africa. As an ongoing service provider to these enterprises, Root Capital leveraged business data from past lending and advisory activities, and conducted additional interviews as needed.

1.3

KEY LEARNING QUESTIONS

The vision of IDH is that a successful Service Delivery Model creates value both for farmers and the service provider. A successful SDM should increase farmer profitability and resilience while at least covering its costs at scale. The benefits for farmers and service providers are interlinked – models cannot be sustainable if they are not performing on either farm or service provider level.

In our first report "Service Delivery Models – Insights for continuous improvement & farm impact", released in September 2015, we shared key insights on the performance and success of 10 SDMs in coffee and cocoa. These first insights on performance were helpful, but at that time we were not yet able to explain the "why" - why for example did certain models have a larger impact at farm level, lower risk levels, lower costs, higher value generated for investors - and we did not have insight into the role of the enabling environment for the success of service supply.

In a second report "Driving innovations in smallholder engagement" (to be published in August 2018), we explore key questions that need to be answered to realize our vision of successful Service Delivery Models:

- How to increase farmers' resilience
- How to best drive down costs associated with service models
- How to best and sustainably finance a SDM
- How to create a supportive enabling environment

In addition to the above questions, by having assessed 10, relatively comparable SDMs from the portfolio of Root Capital, we have been able to look into the similarities and differences among cases on a more granular level. Additional questions we have been looking at are:

- How do services offered by and beneficiaries of the SDM differ?
- How do sources of funding differ?
- What drives efficiency of service delivery?
- How do revenues mechanisms differ?

We hope that this report inspires our readers to collaborate on innovative sustainable services that support the development of smallholder farmers and build an enabling environment that can facilitate best practices in service delivery.

2.0

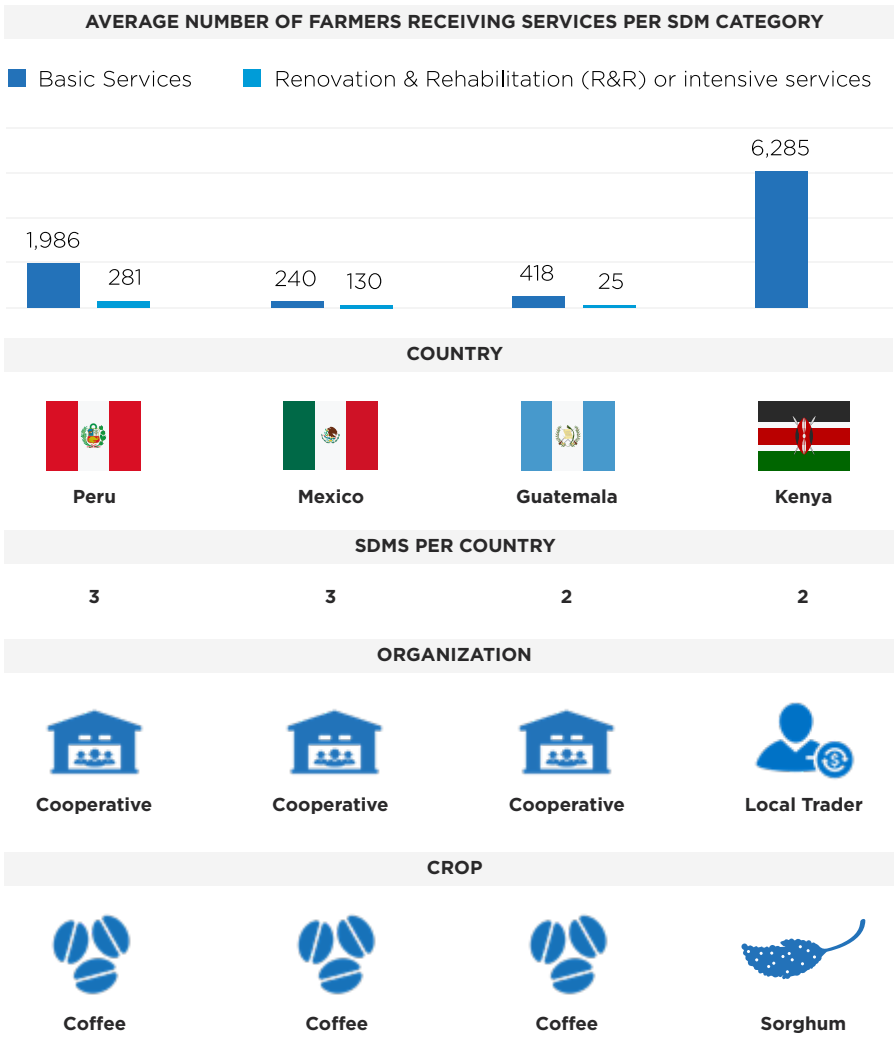
INTRODUCING THE SDMS

2.1

GENERAL CHARACTERISTICS

The Root Capital cases fall into two general clusters: farmer-led models within the specialty coffee supply chain in Central and South America, and local trader-led models within the sorghum supply chain in East Africa.

FIGURE 1: KEY SDM CHARACTERISTICS PER COUNTRY



Fundamental differences between the two crop supply chains impact the SDMs discussed. Coffee is a perennial tree crop, requiring significant upfront investment; ongoing care over the decades-long life of the coffee tree; and regular rehabilitation and/or renovation (replanting) to replace aging, unproductive trees. Coffee is an export-oriented supply chain, heavily impacted by fluctuations in international demand and pricing. Sorghum, on the other hand, is an annual grain crop, requiring minimal upfront investment yet replanting of seeds each year. Sorghum is a local supply chain, with the crop consumed by farmer households or sold to local brewers interested in replacing imported hops with native grain. Given the important differences between the two supply chains, we largely discuss findings from the coffee and sorghum cases separately.

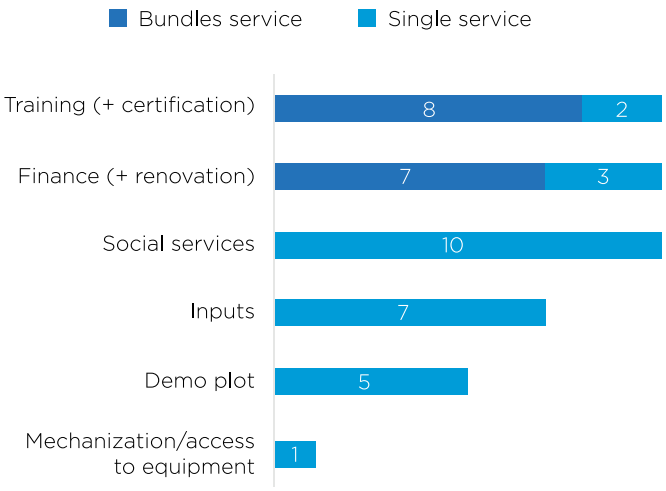
2.2

SERVICES OFFERED

All SDMs center on agronomic extension or technical assistance for smallholder farmers. Services offered range from training; to the provision of inputs like crop protection, fertilizers, and seeds; to the establishment of demonstration plots.

All SDMs include direct farmer training. Otherwise, services vary widely across the 10 cases (see Figure 2). We note the existence of complementary farmer services, namely finance and social services (e.g., community programs, like support for healthcare initiatives), but do not discuss them in detail in this report.

FIGURE 2: NUMBER OF CASES PROVIDING SERVICES



2.3

SERVICE OFFERING AND DELIVERY MODE

In all 10 cases, enterprises provide extension services on an ongoing basis as farmers enter their supply chains.

COFFEE CLUSTER

Farmer cooperatives deliver services to their members directly through in-house extension staff. Cooperatives may also link farmers to third-party service providers, such as input providers.

SORGHUM CLUSTER

Local traders deliver services to their farmer suppliers through a combination of modes: both directly through their in-house extension staff, and indirectly through training lead farmers from farmer group representing suppliers.


COFFEE
IS
OPPORTUNITY

3.0
FARM IMPACT

To estimate enterprise SDM impacts on farmer suppliers, we compare the performance of enterprise suppliers and non-suppliers in the same sourcing region.

On average, farmers started receiving extension between 5 and 15 years ago. As a result, the cases do not present a clean picture of farmer performance before and after affiliation with the 10 enterprises discussed here. Rather, the cases present a midstream snapshot of enterprise service offerings and supplier performance at the time of data collection.

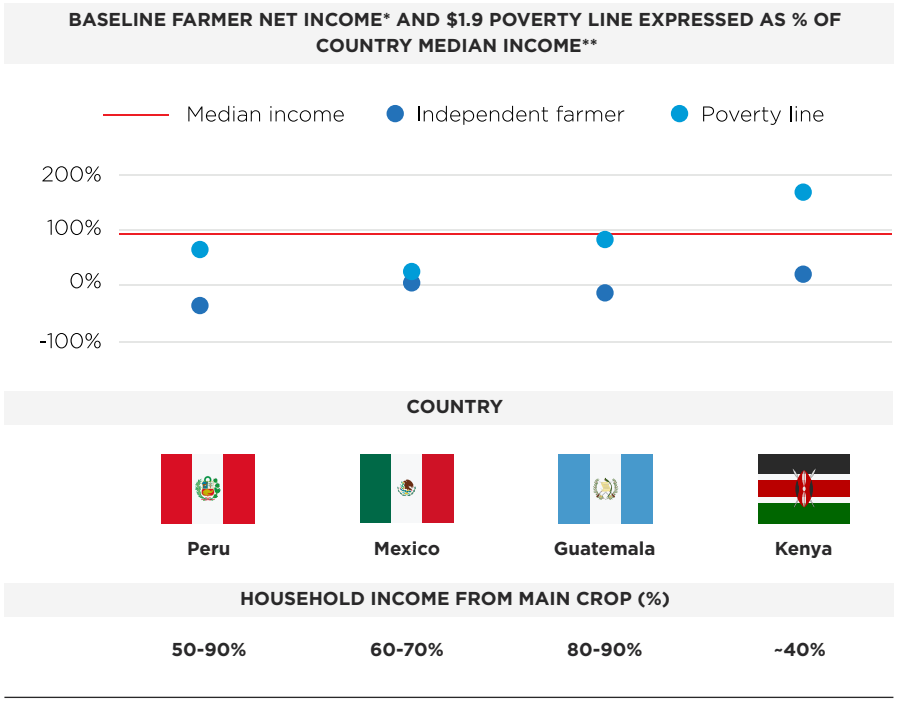
To proxy suppliers' starting "baseline" – or performance before entering the enterprise SDM – we compare present supplier performance to the performance of independent farmers with similar demographics from the same area.

Note this comparison is imperfect, as some suppliers may have started from a better position than independent farmers. Particularly in the eight coffee cases, some independent farmers may not qualify for cooperative and SDM participation: they cannot produce enough quality crop to meet cooperative membership criteria due to smaller land sizes, poor production practices, or more limited household income. As one independent coffee farmer in Peru told us,

> *"[I am independent] because I don't have enough quality coffee for the cooperative. To get quality coffee, I would need money to fumigate and fertilize my coffee… but I don't have money, so I sell my coffee to whoever comes to my house to buy it."*

3.1 BASELINE

FIGURE 3: COMPARING BASELINE FARMER NET INCOMES ACROSS COUNTRIES



** Net income includes income derived from cultivation of main crop (coffee, sorghum) within scope of this study only. Additional household revenues and expenses are not taken into account. ** World Bank $1.9 poverty line corrected for average country household size as reported by Gallup Institute.*

3.1.1

COFFEE CLUSTER

Across the eight coffee cases, the typical coffee farmer is a man in his 40s, married with four to six members in his household. He manages between six and 10 hectares of land, roughly half of which is dedicated to coffee; he also cultivates fruit or cocoa for sale, corn and beans for household consumption, and perhaps small livestock for both sale and consumption. He keeps a sizeable portion of his land in forest.

Farmers in the communities of Peru 3, Guatemala 1, and Guatemala 2 are outliers in this group. In the case of Peru 3 and Guatemala 1, the typical farmer manages significantly more land, 10 to 14 hectares on average, keeping between 50 and 75 percent as pasture for livestock or as uncultivated fields or woods. On the other hand, a typical farmer in the communities of Guatemala 2 manages only two hectares, with less than one hectare on average devoted to coffee. These differences derive from regional variations in land availability and management practices.

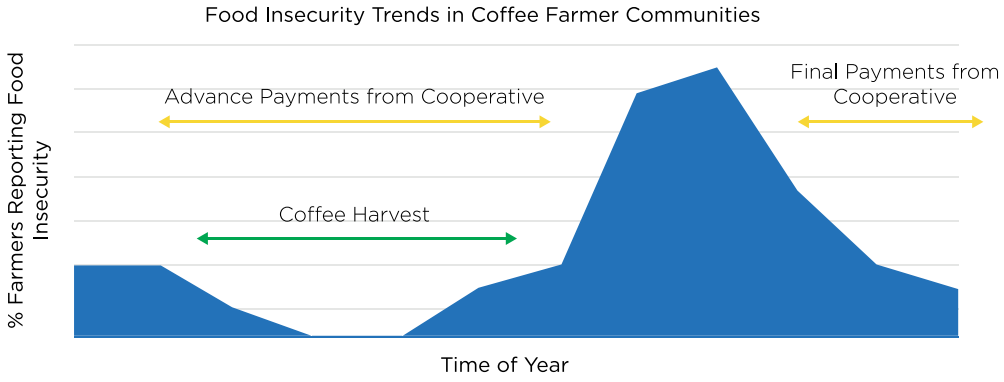
The typical coffee farmer has produced coffee for 10 to 20 years. Coffee is the primary source of income for farmer households, accounting for 60 to 95 percent of total income on average.

Yet farmer incomes remain low. In half the cases, 25 to 45 percent of cooperative members likely live on less than $2.50 per day per family member, according to the Poverty Probability benchmark.[1] Moreover, a sizable minority of households likely suffer from periodic food insecurity[2], suggesting these households lack the income to cover basic needs.

Guatemala 1 is an exception. On average, farmers earn $8 to $13 per day per household member and report greater food security. Guatemala 1 is located in a region of Guatemala with a higher standard of living (i.e., lower poverty rate), compared to the other businesses profiled.

1. The Poverty Probability Index, developed by the Grameen Foundation, is a standardized survey tool that estimates the likelihood that a household lives below a particular poverty line, based on 10 questions about their assets, household composition, and other factors statistically linked to poverty.

2. Many coffee-growing communities experience "lean months" of food insecurity, generally several months after each year's coffee harvest. The leans months are generally caused by a confluence of factors: First, producer households rely heavily on the cultivation of maize and beans for their subsistence, yet generally cannot produce enough of either crop to last throughout the year. Second, households generally lack enough disposable income throughout the year to purchase supplemental food or meet other household needs. Farming families often experience a particular cash crunch several months after each harvest, as households have depleted their coffee payments yet need cash to invest in their farms in preparation for the next harvest.



3.1.2

SORGHUM CLUSTER

In the two sorghum cases, the typical sorghum farmer is a woman in her 40s, married with 4 to 6 members in her household. She and her family manage between six and 10 acres of land, roughly 40 percent of which is dedicated to sorghum. The household also cultivates corn, beans, and perhaps small livestock for both sale and consumption.

The typical sorghum farmer has produced sorghum for years, but in limited quantities exclusively for household consumption. (As the only cereal indigenous to Kenya, sorghum is produced throughout much of the country, even in areas with low agricultural potential.) Starting around 2010, however, farmers started selling sorghum into the brewery supply chain, as Kenyan breweries sought to transition from expensive, imported hops to native sorghum. Many farmers, including some in these cases, increased the amount of land devoted to sorghum to meet the demand of this new market.

Yet farmer incomes remain low. In the case of Kenya 1, for example, farmers in the business' sourcing communities had an 18% likelihood of living below $1.90 per day, and a 48% likelihood of living below $3.10.[3]

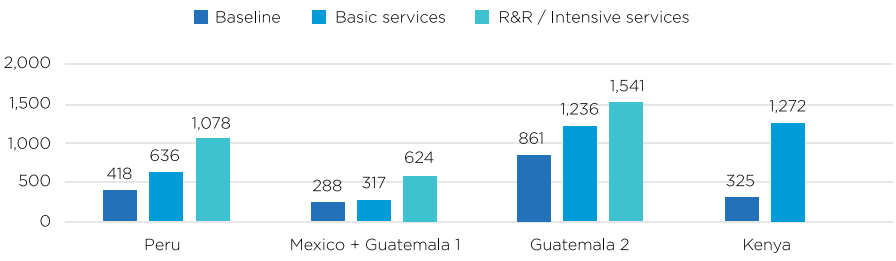
3.2

IMPACT

We modeled two key farmer impact indicators – productivity and income – over a 10-year period. In all cases, models are projections, in which Year 0 corresponds to the time of data collection (between 2014 and 2016).

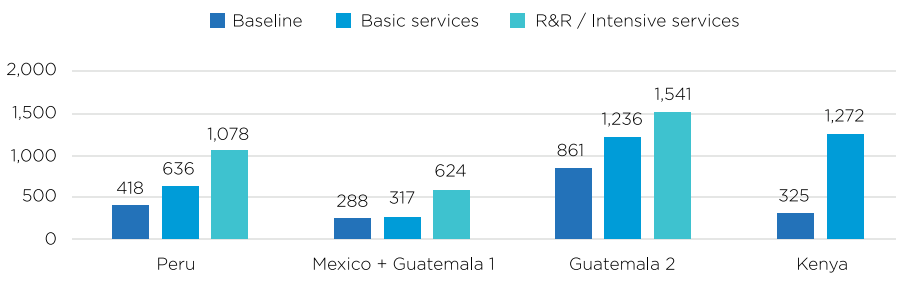
Across all 10 cases, our models suggest enterprise SDMs will increase farmer productivity and incomes, in some cases significantly, compared to independent farmers in their communities. Again, note we cannot fully determine which differences derive from enterprise affiliation, and which derive from preexisting or unobservable differences between suppliers and independent farmers.

FIGURE 5: CHANGE IN PRODUCTIVITY PER SEGMENT (KG/HA)



3. We use the new international poverty lines from the World Bank of $1.90 and $3.10 per day.

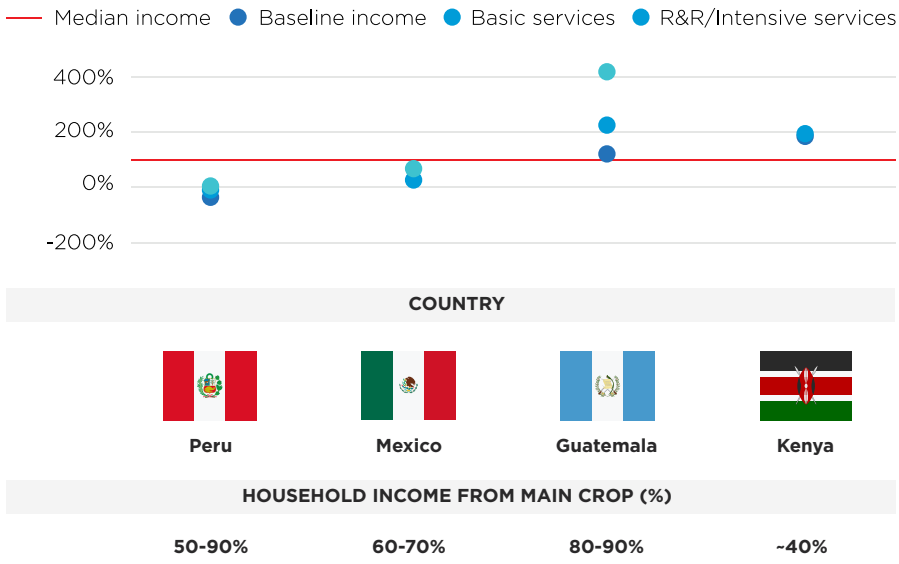
FIGURE 6: CHANGE IN NET INCOME PER SEGMENT (USD/HA)



While enterprise SDMs likely improve farmer performance and quality of life, most have not lifted farmers out of poverty. In large part, current supplier performance reflects the challenges of pervasive farmer poverty, rural enterprises with limited resources, and weak enabling environments. Guatemala 1 is the exception, where cooperative suppliers report average incomes above the median national income.

FIGURE 7: COMPARING SDM FARMER IMPACT ACROSS COUNTRIES

BASELINE FARMER NET INCOME* AND $1.9 POVERTY LINE EXPRESSED AS % OF COUNTRY MEDIAN INCOME**



** Net income includes income derived from cultivation of main crop (coffee, sorghum) within scope of this study only. Additional household revenues and expenses are not taken into account.*

*** World Bank $1.9 poverty line corrected for average country household size as reported by Gallup Institute*

3.2.1

COFFEE CLUSTER

Across the eight coffee cases, our models suggest cooperative SDMs drive meaningful increases in farmer productivity and incomes.

In Guatemala and Mexico, cooperative suppliers currently report roughly 45 percent higher productivity, on average, than independent coffee farmers in their communities. Across the three Peru cases, this number rose to 70 percent. Higher productivity, particularly when combined with price premiums from certification, drive higher net incomes for coffee cooperative suppliers across all eight cases.

However, despite relatively higher productivity and incomes, cooperative members continue to report razor-thin profit margins due to suboptimal productivity and low prices relative to the cost of production. While cooperative SDMs explicitly target farmer productivity, pricing remains largely outside of cooperative control.[4] Given the outside influence of price fluctuations on farmer profitability, recent low coffee prices raise questions about the long-term success of farmers and cooperatives in these SDMs. Basing price discovery in the local cost of production would be a step toward improving the business case for coffee farmers in this SDM and elsewhere.

FIGURE 8: PRICE SENSITIVITY

Showing impact of change in price and quality on 10-year average net income for an average member

High-quality *(primera)* production (%)

Coffee farm gate price (soles / QQ)	60%	70%	80%	90%	100%
187	-8,604	-8,170	-7,735	-7,300	-6,865
280	-5,284	-4,849	-4,414	-3,980	-3,545
373	-1,964	-1,529	-1,094	-659	-224
466	1,357	1,791	2,226	2,661	3,096
560	4,677	5,112	5,546	5,981	6,416

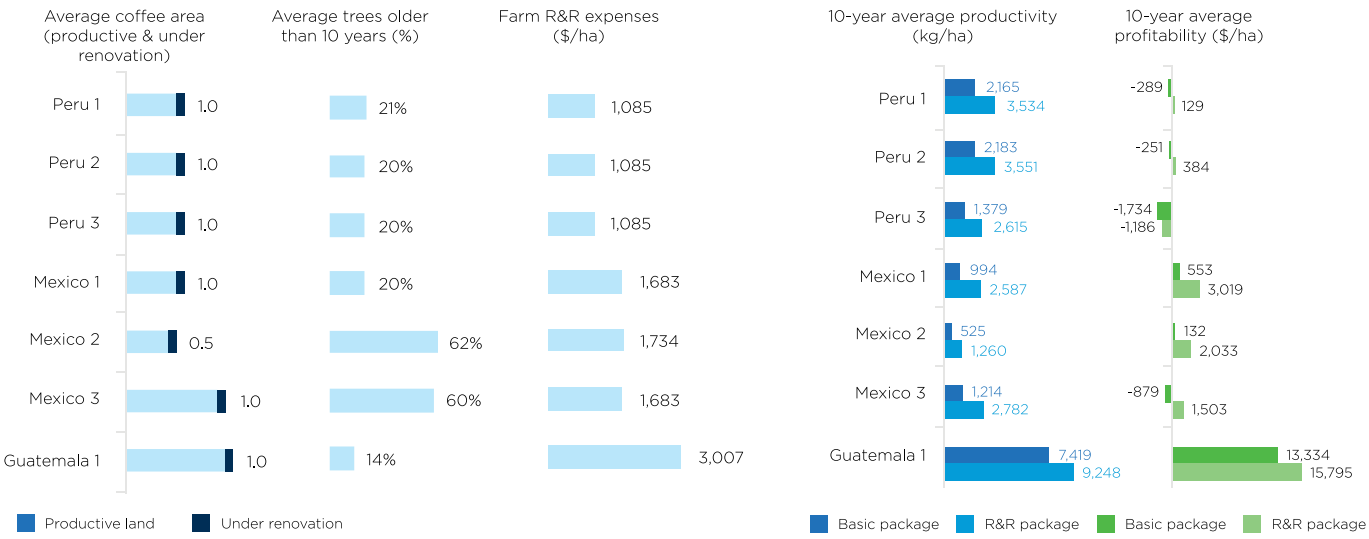
4. Coffee prices are largely set by global commodities exchanges, with premiums for quality, certain geographic origins (tied to desirable flavor profiles), and social and environmental performance (via certifications). Prices are highly volatile, fluctuating based on global trading. In most cases, coffee farmers and cooperatives are "price takers," with little power to negotiate prices offered by buyers.

FARM RENOVATION & REHABILITATION

In addition to providing services related to basic good agricultural practices, all eight cooperatives also provided a subset of farmers with targeted support around farm renovation and rehabilitation (R&R)[5]. Cooperatives seek to help suppliers replant unproductive trees affected by the recent coffee leaf rust outbreak or simply past their prime producing years.

By providing farmers with training, seedlings, and, in many cases, finance to cover the significant upfront costs of R&R, the cooperative SDMs will likely contribute to higher farm productivity, income, and disease resilience in the medium to long term. Our model suggests farmers receiving R&R support will out-perform farmers receiving just the basic service package, in terms of average productivity and profitability per hectare over the next 10 years.

FIGURE 9: SCALE, COST AND IMPACT OF R&R ACTIVITIES



5. Renovation refers to entirely replacing diseased, aging, or otherwise unproductive trees with new seedlings. Rehabilitation refers to grafting, stumping, or pruning to rejuvenate diseased, aging, or otherwise unproductive trees.

Our models also suggest coffee farmers will not be able to sustain profits without ongoing R&R. Intensive renovation – defined here as the replanting of 25 percent or more of coffee farm area in one season – provides a short-term boost in farm productivity. Scenario modeling indicates, however, that farmers must continue to regularly replace or rehabilitate older trees to sustain productivity. Regular, more gradual R&R should be the norm rather than irregular intensive renovation, which should be reserved as a practice of last resort in response to major pest/disease outbreaks or damaging weather events.

FIGURE 10: R&R SCENARIOS – ANNUAL FARMER NET INCOME

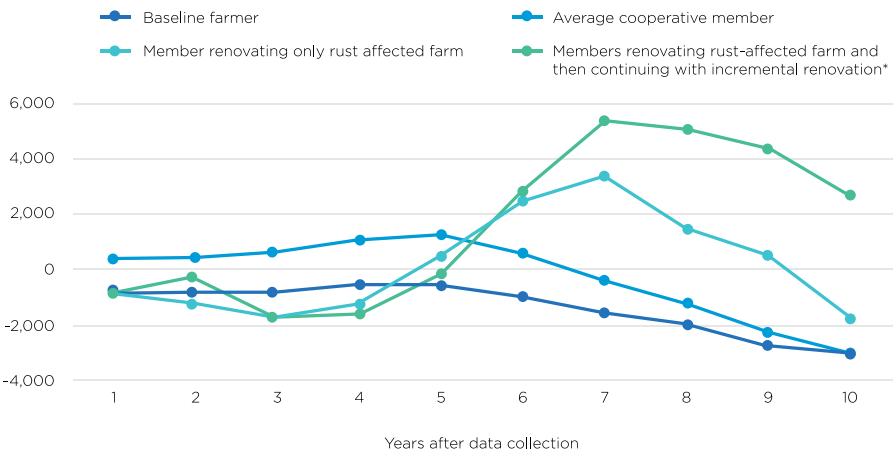
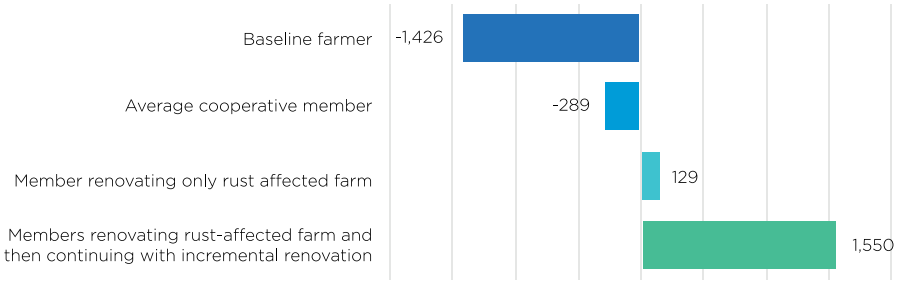


FIGURE 11: R&R – AVERAGE FARMER NET INCOME



** Gradual R&R refers to continuous year-on-year renovation beyond only the rust affected trees in order to regularly refresh farm productivity. Across cases examined here, R&R rates (i.e.% of trees renovated) range from 20% to 50% during the two-year "intensive" renovation push, followed by rates of 2% to 8% in subsequent years for farmers pursuing gradual renovation.*

3.2.2
SORGHUM CLUSTER

In the two sorghum cases, our models suggest trader SDMs drove significant increases in farmer productivity and incomes.

In an impact study with Kenya 1 conducted by Root Capital in 2016, suppliers to Kenya 1 reported productivity levels roughly three times that of the national average. Farmers attributed the productivity increases to Kenya 1's extension program. As one farmer told us:

> *"For my case, I can say my production has increased because of using fertilizer... We were taught during one of the field meetings that were organized by the enterprise [Kenya 1] on which fertilizer to us after about 3 to 4 weeks after planting. We also use pesticides. We usually spray several times because of the insects. Because if you just spray at once, you won't harvest anything. We were told during the training to spray more times and for our crop, we usually spray three times, which protects our crop from insects."*

In addition to the influence of the trader SDMs, the incredible increase in productivity likely reflects sorghum's ongoing transition in Kenya from a largely neglected subsistence crop to a managed cash crop. As the local commercial market for sorghum develops, farmers plant more of their land in sorghum, invest more in management during the growing season, and achieve higher productivity and overall higher production.

The productivity improvements drove corresponding increases in household income from sorghum. Again, our model suggests that sorghum farmers supplying to Kenya 1 and 2 earned almost three times more from sorghum than independent peers.

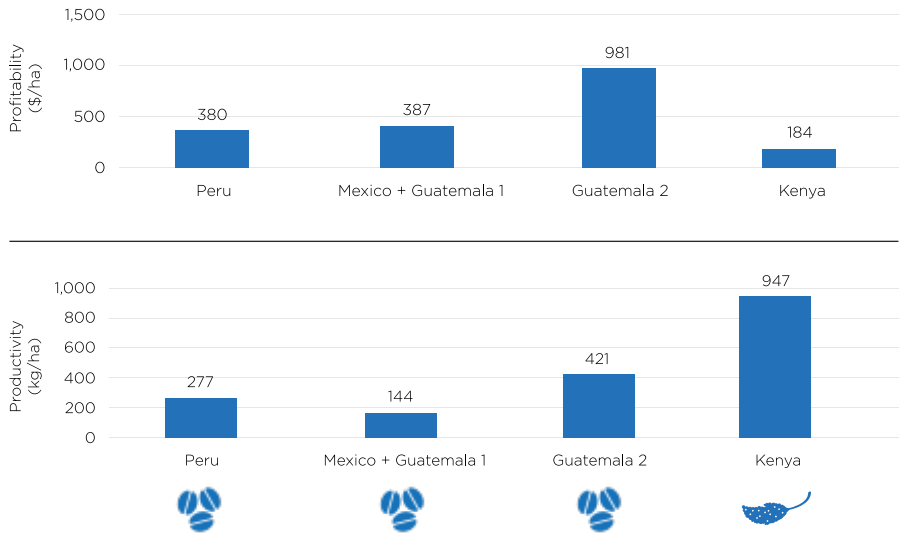
4.0
COSTS

4.1

COMPARING COUNTRIES

Costs varied widely across the 10 cases, even within the eight coffee cases. Overall, we saw the lowest costs per farmer in the sorghum cases in Kenya, and the highest costs in the coffee cases in Mexico. Profitability numbers are modeled based on a typical farmer profile informed by data from a sample of farmers, rather than calculated for each individual farmer.

FIGURE 12: COMPARING PRODUCTIVITY AND PROFITABILITY ACROSS COUNTRIES



4.2

COMPARING SDMS

Total SDM spend ranged from a low of $25,000 to a high of $78,000 per year.

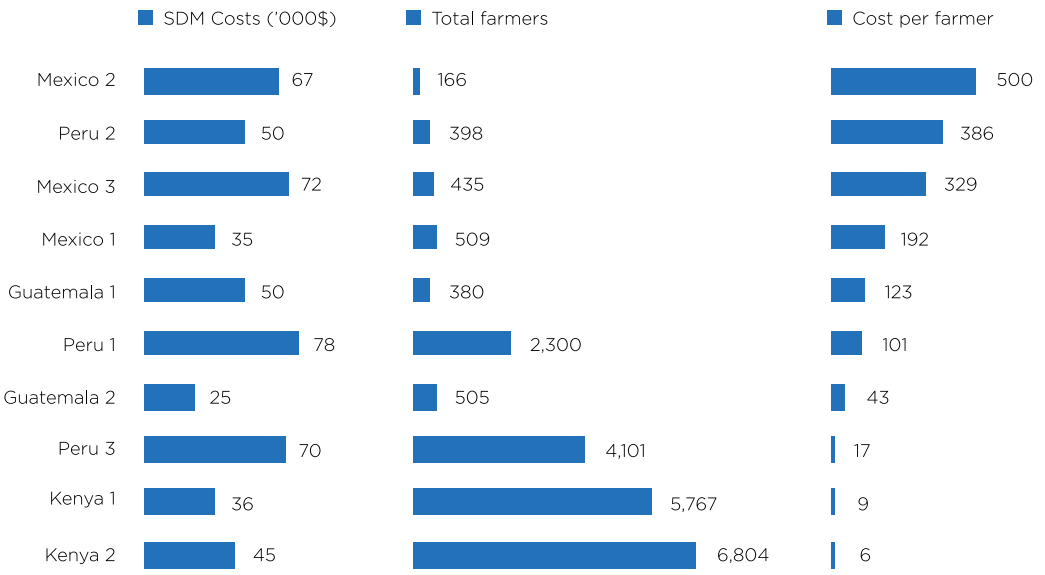
Within each industry cluster, total spend scaled with enterprise net revenues rather than the number of suppliers. Guatemala 2 was a slight outlier, under-spending relative to its coffee cooperative peers.

Spending per farmer ranged from a low of $6 per farmer in Kenya 2 to $500 per farmer in Mexico 2. The average spending across all 10 cases was $171 per farmer – or $211 per farmer for the coffee cases, and $8 per farmer for the sorghum cases.

The significant difference in USD spending between the African sorghum traders and the Latin American coffee cooperatives likely reflects meaningful differences in industry dynamics; enterprise size (on average, the supplier base of the Kenyan traders is six times that of the Latin American coffee cooperatives); and in the local costs of goods and services.

FIGURE 13: COST ACROSS CASES

Comparing scale, number of farmers and cost per farmer



4.3

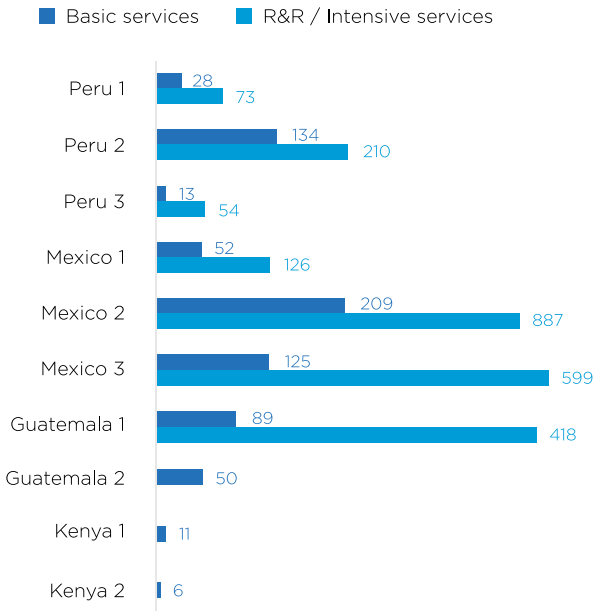
COMPARING SEGMENTS

SDM spending per farmer increases with the intensity and sophistication of the service.

Across all enterprises providing a basic and an intensive SDM, per farmer costs jumped by 75 percent or more with the introduction of the additional service package. In general, the intensive services involved more expensive and/or frequent farmer touchpoints. Again, within these cases, intensive packages addressed coffee farm renovation.

FIGURE 14: COMPARING COSTS OF BASIC AND INTENSIVE SERVICES

Showing cost per farmer (usd) for all SDMs

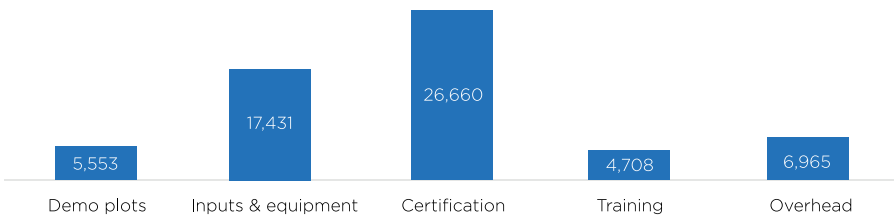


4.4

COMPARING TYPES OF COST

Enterprises spend the most on certification – predominantly on staff[7], equipment, and field costs for annual compliance monitoring – followed by inputs and equipment. Within each service category, we see significant variation in costs, driven by differences in service emphasis across the 10 cases.

FIGURE 15: AVERAGE COSTS PER SERVICE (USD/YEAR) ACROSS SDMS



7. Note we assume extension staff for certified enterprises spend on average 80 percent of their time overseeing certification compliance, unless otherwise indicated by the enterprise. This assumption is based on Root Capital's field experience, including a review of portfolio extension activities conducted in 2015.

5.0
SUSTAINABILITY

In this chapter, we discuss a key topic in our work on Service Delivery Models; the financial sustainability of the service structures and how an SDM can be best financed. We start with defining financial viability, then provide insights on the financial sustainability of our 10 cases.

5.1

FINANCIAL SUSTAINABILITY & COMMERCIAL RETURNS

Financial sustainability drives the success of SDMs for farmers, service providers, and investors. We define financial sustainability as:

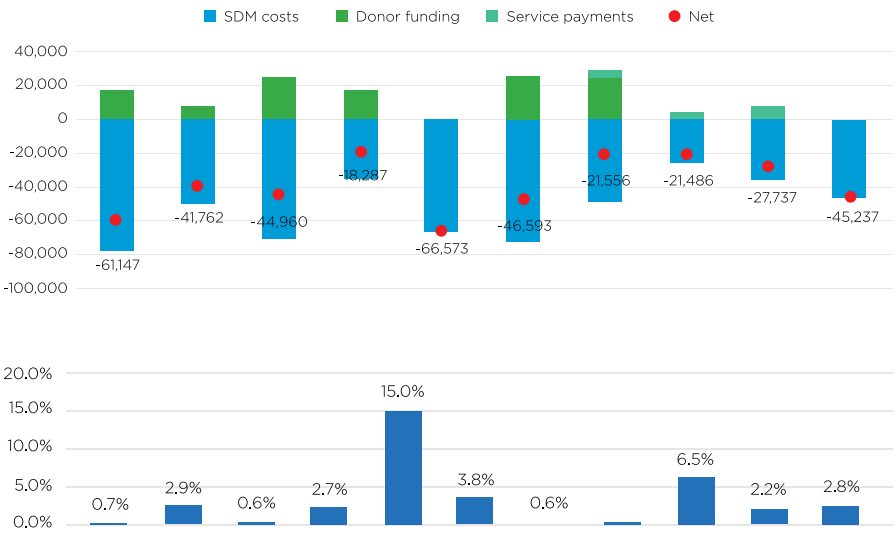
- The SDM runs at least at break-even and / or with profit. The costs of the SDM are covered through service revenues (farmers paying for services) and / or through commercial revenues (sourcing of higher volumes / higher quality).
- There is a positive return on investment for the key actors in the SDM: the farmers, service providers and investors (in case there are external investors involved that invest in the model).
- The SDM offers sufficient value for farmers to continue to make use of the services offered, for service providers to continue to offer the services and for investors to continue investing (when applicable).

Models that reach financial sustainability on short(est) term are characterized by:

- High impact at farmer level (high value creation leading to payment capacity of farmers);
- Cost-efficient service supply (lowest cost possible for both farmers and service providers);
- Strong internal revenue drivers (through service fees / commercial revenues (in case of sourcing) which lowers the dependency on external funding);
- Supportive enabling environment.

Across all 10 cases, we believe SDMs are financially sustainable.

FIGURE 16: COMPARING P&LS (USD/YEAR) AND BREAKEVEN MARGINS (%) OF ALL SDMS



Financial sustainability is most certain when enterprises provide services that drive higher production at the farm level, namely at the farmer value – namely the Kenya sorghum SDMs and the intensive, R&R-focused coffee SDMs. In these cases, enterprises generated significant value for farmers and for their bottom lines through increased productivity and covered SDM costs through a combination of commercial and service revenues.

In Kenya 1, for example, on average the trader spends $4 per farmer per year, which can be covered by farmers producing an additional 125 kilograms of sorghum per year. Kenya 1 suppliers produce over 2,000 kilograms more than the national average, suggesting sufficient growth in production volumes for Kenya 1 to cover ongoing SDM costs over the past several years.

Similarly, Peru 1 spends $24 per renovating farmer per year, which can be covered by farmers producing an additional 100 kilograms (approximately 2 quintales) per year. Renovating farmers planted on average one hectare of new coffee trees in the first year of the intensive SDM. They expected to increase production by roughly 1,400 kilograms (approximately 25 quintales) by the end of the three-year SDM – more than covering the enterprise service costs.

The financial footing of the ongoing, basic coffee SDMs remains less clear. While costs per farmer are lower than the intensive SDMs, the ongoing productivity and quality improvements may not be sufficient to recover annual enterprise investments in the form of commercial revenues. While costs per farmer are lower than the intensive SDMs, the ongoing, year-to-year productivity and quality improvements may not be sufficient to recover annual enterprise investments.

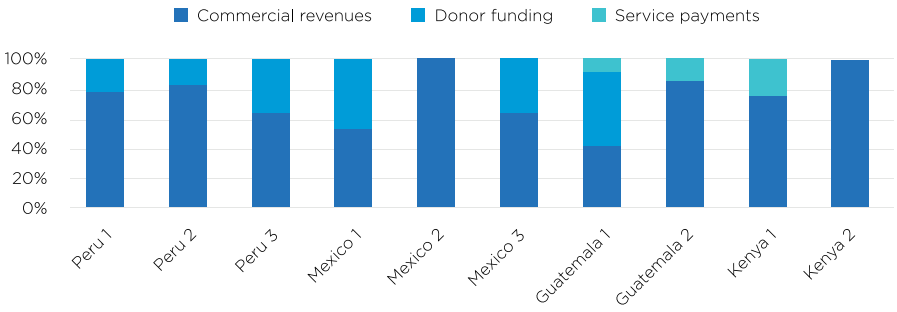
Returning to our Peru 1 example, the cooperative spends $9 per farmer per year in basic extension related to certification compliance and general good agricultural practices. The cooperative would need to collect an additional 40 kilograms per farmer per year to recoup this ongoing investment. With current production levels across a typical coffee farm size of three hectares, this represents roughly a one-percent increase in production each year. Farmers may be able to achieve regular, gradual production improvements for several years, but will likely “top out” at some point after mastering the basic extension recommendations. The cooperative would then need to consider providing farmers with a more advanced and more targeted service or discontinue basic services. As most enterprises do not currently tailor SDM delivery to individual farmer performance, cooperatives like Peru 1 are likely losing money on repetitive services to “graduated” farmers who have received the same technical content for 5+ years.

Given the low cost per farmer, however, cooperatives can likely cover the costs of basic extension services through a combination of new revenue from increased production from newer farmers; certification premiums; and, in some cases, external grant funding from government or nonprofit sources.

5.2

FUNDING SOURCES

FIGURE 17: COMPARING FUNDING SOURCES OF ALL SDMS



Enterprises rely on a blend of business revenues, direct service revenues, and donor funding to resource their SDMs. No enterprise covered all SDM costs via service revenues.

Enterprises relied primarily on revenues from their core coffee or sorghum business. Among the coffee cases, most cooperatives also participated in a challenge grant program administered by Root Capital, in which qualifying cooperatives could receive up to $25,000 a year to deepen or expand services related to R&R. A minority of cases also covered a subset of SDM costs via service revenues, general for specific services like equipment rental..

Note many enterprises were reluctant to share the details of their SDM funding sources due to the perceived commercial sensitivity of this data, or unable to share details due to a lack of granular accounting of extension service costs..

6.0

CONCLUSIONS

6.1

EXTENT OF VERIFICATION / PROOF OF PATHWAY IMPACT

Our 10 cases looked at a common impact objective: to increase farmer profitability through improvements to farm productivity, quality, and/or management efficiency. In all 10 cases, our models suggest the enterprise SDMs are on track to achieve this objective, with enterprise suppliers out-performing independent farmers in the same sourcing regions, who do not have access to enterprise extension or, in some cases, any alternative extension services.

However, despite likely productivity and income improvements, enterprise members continue to report razor-thin profit margins due to suboptimal productivity and low prices relative to the cost of production. While cooperative SDMs likely improve farmer performance and quality of life, most have not lifted farmers out of poverty. In large part, current supplier performance reflects the challenges of pervasive farmer poverty, volatile commodity markets, enterprises with limited resources, and weak enabling environments.

More intensive, specialized SDMs, such as those profiled in several coffee cases, suggest potential to further improve farmer productivity and net income over the medium to long term. These models, however, generally cost more per farmer due to the greater depth or frequency of service.

In summary, our analysis suggests farmer- and trader-driven SDMs are driving change and carry enormous potential to transform farmer livelihoods if enterprises can intensify and customize their services to address unmet, urgent farmer needs (e.g. renovation). Many enterprises will require more technical and/or financial support to take the next step in service delivery.

6.2

KEY DRIVERS FOR SUCCESS

Across the 10 cases, key drivers for success include:

- **Reliance on internal funding ensures continuity of service.** All enterprises rely on business and/or service revenues to fund core SDM activities, ensuring direct control over and continuity of service activities. However, internal funds may not be sufficient to provide the desired depth or scale of service – enterprises may need to bring on external funds to intensify their SDMs using a project-based structure.
- **Access to high-value markets, with premium pricing and formal purchase agreements.** Enterprises depend on reliable product offtake, formalized via advance purchase agreements, and price premiums relative to the local market to fund all business activities, including their SDMs.
- **Integrated service packages.** All enterprises provide farmers with packages of complementary extension services, generally combining training on best practices with capital and/or inputs to support practice adoption. In Root Capital impact studies, farmers noted the importance of receiving both knowledge and material resources to support on-farm investments, particularly as lack of resources rather than lack of knowledge is often the binding constraint to practice uptake.
- **Customized service provision.** In the coffee cases, several enterprises started complementing their "basic," ongoing extension services with advanced services focused on a particular issue, namely renovation and rehabilitation. Our models suggest the intense focus on a narrow, urgent need will have a greater impact on suppliers and enterprises than a lighter focus on a number of topics.
- **Partnerships with external experts.** Finally, all enterprises relied on partnerships with a number of external organizations for expertise or resources. Enterprise allies included government actors, like public extension agencies; non-profit organizations, often with expertise in particular technical topics; and donors, who provided grant funding for SDM improvements. Partnerships often complement enterprise SDM activities, allowing enterprises to expand or deepen their services.

6.3

KEY RISKS

The service providers profiled here face a number of risks that threaten the success of their SDM programs. Risks fall into three broad categories:

- **Mismatch between SDM content and farmer need.** Lacking good farm-level data, many enterprises design one-size-fits-all extension services based on the perceived needs of the "average," rather than the individual, supplier. This blanket approach – generally the approach of the "basic" SDMs profiled here – will not suit all farmers. Farmers need to use different fertilization practices, for example, based on the type and health of their soil. This one-size-fits-all approach, also common in government extension platforms, can result in misalignment between enterprise services and supplier needs and failure to move the needle on supplier performance.

  Enterprises should design their SDMs based on supplier performance and needs.

- **Farmer under-performance.** Enterprises face the risk that farmers will not reach the anticipated level of performance in terms of crop productivity and quality. Farmers may decide not to adopt recommended practices or may adopt them incorrectly, resulting in suboptimal performance. Often, farmers' uptake of improved practices relies in large part on conditions outside the enterprise's control, such as farmers' level of education, attitude toward innovation, or access to affordable credit; or market volatility. In the coffee sector, for example, the low and/or unreliable price of coffee relative to the cost of production disincentives farmer investment in improved practices.

  Enterprises should be aware of the enabling conditions operating (or not operating) in their supply chain when determining realistic SDM objectives and targets.

- **Leakage of SDM benefits.** Enterprises face the risk that farmers adopting improved practices will sell their product to other buyers (side-sell) despite formal or informal purchase agreements. When side-selling is extensive, enterprise investments end up supporting farmers who might not remain in their supply chain. Extension becomes a public good, rather than a business investment that flows back to the enterprise.

  As enterprises generally lack the bargaining power to sanction suppliers who side-sell, they should discount expected SDM benefits based on typical side-selling rates within their supply chain.

6.4

KEY AREAS FOR IMPROVEMENT

All 10 SDMs profiled in this report have room for improvement. Many of the gaps and risks discussed above lie outside the control of these enterprises. Here, we focus on opportunities to improve both SDM impact and cost-effectiveness that lie within the mandate of the SDM providers.

- **Adopt a data-driven approach to SDM design and delivery.** SDM providers should focus their services to fit the needs of individual suppliers or at least supplier typologies rather than the "average" supplier. By adjusting service content and delivery methodology based on actual supplier data, providers can increase the relevancy and ultimately the impact of their SDM.
- **Reconsider ongoing services.** In some cases, SDM providers deliver the same technical package year after year to the same farmers. Even if the spend per farmer is relatively small, the costs add up. Providers should reconsider the utility of ongoing services. Providers might consider re-focusing the package based on needs identified by recent supplier surveying (per above), going deeper on advanced topics. If providers cannot or do not wish to provide a more advanced service package, they may consider only continuing the basic service with new or laggard suppliers, and discontinuing it with high-performing suppliers.
- **For perennial crops, focus more on mid- to long-term performance.** For perennial crops like coffee, we see an enormous need for farm R&R to ensure long-term productivity and profitability of farms – not just in these 10 cases, but on smallholder plots around the world. SDM providers and farmers must transition from a short-term focus on immediate productivity and quality improvements, to a long-term focus on sustainable farm planning. Ultimately, farmer (and industry) success relies on transitioning from periodic renovation crises requiring intensive replanting, to ongoing, gradual pruning and replanting. SDM providers have a key role to play in this transition by providing ongoing R&R training and resources.

6.5

KEY FACTORS IN REPLICATION / POTENTIAL GAME CHANGERS

Information and communications technology (ICT) represents one potential game-changer for enterprise SDM models. In particular, ICT solutions like remote surveying can provide resource-constrained enterprises with an affordable way to collect supplier data to inform SDM design and delivery, per recommendations in Section 6.4.

A subset of Root Capital coffee clients, for example, now use mobile technology to collect and analyze supplier data during the certification inspection process[8] to inform annual extension decision making. Compared to the past paper-based process, mobile-enabled inspections allow enterprises to access real-time supplier data on an ongoing basis. Enterprises conducting mobile-enabled inspections have reported:

- **Better data quality.** Digital surveys reduce the margin of error during data entry from around 30 percent under the paper-based method to less than one percent.
- **Increased data relevance and usefulness.** Digital surveys shorten the time lag between data collection and analysis, and make the data easier to manipulate.
- **Reduced staff costs.** Digital surveys reduce the time required to aggregate data from around two months (with two or more extensionists entering data daily) to less than four hours.

Other ICT solutions, like satellite monitoring, have similar potential to provide enterprises with real-time or near real-time data on suppliers to inform SDM strategy and improve SDM efficiency and impact.

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8. Certification standards such as Fair Trade, organic, and Rainforest Alliance require certified enterprises to maintain a robust internal monitoring system to ensure supplier compliance. This system generally includes a (paper-based) annual inspection of certified farms or processing facilities that covers household demographics, farm location and characteristics, production or processing practices, and past and projected yields and sales. Inspection data could inform business planning and strategy, particularly around extension. In our experience, however, few enterprises have the resources to aggregate and analyze the paper-based data to inform decision making.

7.0
APPENDIX

7.1

CASE LIST

Case #	Country	Crop	Scale (# of farmers)
1	Peru	Coffee	400
2	Peru	Coffee	2,300
3	Peru	Coffee	4,000
4	Mexico	Coffee	160
5	Mexico	Coffee	450
6	Mexico	Coffee	450
7	Guatemala	Coffee	380
8	Guatemala	Coffee	500
9	Kenya	Sorghum	7,000
10	Kenya	Sorghum	8,000

7.2

KPI LIST

Information about each individual SDM case study as mentioned in this report has been collected and reported in a standardized way following an extensive list of KPIs. An extract of KPIs relevant for this final report is presented below. The full list of KPIs is available upon request.

#	Category	Definition	Methodology
C1.01	Case owner	Case owner	The name of the case owner
C1.02	Case owner	Type of organization	Type of organization of the case owner
C1.03	Case owner	Function in the value chain	The function of the case owner in the value chain
C1.04	Case owner	Scope of operations	The scope of operations of the case owner
C1.05	Case owner	SDM staff: Overhead	Number of employees dedicated to managing the SDM
C1.06	Case owner	SDM staff: Services	Number of employees dedicated to specific service operations within the SDM
C2.01	Scope & context	Continent	The continent the SDM is operating in

#	Category	Definition	Methodology
C2.02	Scope & context	Country	The country the SDM is operating in
C2.03	Scope & context	Household size	Household members
C2.04	Scope & context	Total number of farmers	The total number of farmers in the SDM
C2.05	Scope & context	Main crop	The main crop the SDM is organized around
C2.06	Farmer segmentation	Segmentation	Are farmers within the program segmented (i.e. receiving different services)
C2.07	Farmer segmentation	Number of segments	The number of different farmer segments
K1.01	Farmer economics	Productivity (end versus start)	Change in farm productivity (production per ha) after 10 years in the SDM versus baseline production
K1.02	Farmer economics	Profitability (end versus start)	Change in farm profitability (net income) after 10 years in the SDM versus baseline net income
K1.03	Farmer economics	Productivity (10-yr average)	Change in average farm productivity (production per ha) over 10 years in the SDM versus average baseline production over 10 years
K1.04	Farmer economics	Profitability (10-yr average)	Change in average farm profitability (net income) over 10 years in the SDM versus average baseline net income over 10 years
K1.05	Farmer economics	Poverty (SDM farmer)	Ratio of SDM farmer income to poverty line defined by World Bank ($1.9/day regardless of country)
K1.06	Farmer economics	Poverty (baseline farmer)	Ratio of baseline farmer income to poverty line. To compare against indicator 1.05
K1.07	Farmer economics	Median income (SDM farmer)	Ratio of SDM farmer income to median country income
K1.08	Farmer economics	Median income (baseline farmer)	Ratio of baseline farmer income to median country income. To compare against indicator 1.07
K2.01	Efficiency	Total cost per farmer	Total SDM costs (duration of the SDM) per farmer, net of service revenues received but excluding donor funding and commercial revenues
K2.02	Efficiency	Total cost per farmer (excl. service payments)	Total SDM costs (duration of the SDM) per farmer, excluding service revenues, donor funding and commercial revenues
K2.03	Efficiency	Total cost per farmer (as % of value of production)	Total cost of the SDM per farmer (KPI 2.01) as a percentage of the total value of crop revenues per farmer
K2.04	Efficiency	Total cost per farmer (as % of value of product sourced)	Total cost of the SDM per farmer (KPI 2.01) as a percentage of the total value of crops sourced per farmer
K2.05	Efficiency	Cost per farmer per year	Average annual SDM costs per farmer
K2.06	Efficiency	Cost per adopting farmer per year	Average annual SDM costs per adopting farmer
K2.07	Efficiency	Change in cost per farmer	Change in average annual SDM costs per farmer between the first and last year of the SDM
K2.08	Efficiency	Baseline sourcing	Baseline sourcing

#	Category	Definition	Methodology
K2.09	Efficiency	Change in sourcing	Change in sourcing per farmer over 10 years in the SDM versus baseline sourcing. Sourcing is defined as the total amount of produce sold per farmer
K2.10	Efficiency	Cost per MT sourced	Average annual SDM costs per MT sourced
K2.11	Efficiency	Change in cost per MT sourced	Average annual SDM costs per MT sourced
K2.12	Efficiency	Loyalty rate (baseline)	Baseline loyalty rate
K2.13	Efficiency	Change in loyalty rate	Change in loyalty per farmer over 10 years in the SDM versus baseline loyalty. Loyalty is defined as the percentage of production that is sold to the case owner
K3.01	Adoption	Adoption measured	Indication of whether case owner does or does not keep track to what extent farmers adopt practices
K3.02	Adoption	How adoption is measured	Indicates how adoption is measured in the SDM. This can be baseline study, on-going data collection, end-line study.
K3.03	Adoption	Adoption rate	Percentage of farmers receiving services that implement practices in the field
K4.01	Sustainability	Total SDM cost	The total net income of the SDM, including service revenues and donor funding, and excluding commercial revenues
K4.02	Sustainability	Total SDM cost (excluding donor funding)	The total net income of the SDM, including service revenues, yet excluding donor funding and commercial revenues
K4.03	Sustainability	Percentage costs recovered from donor funding	Percentage of SDM expenses recovered by donor funding (duration of SDM)
K4.04	Sustainability	Percentage costs recovered from donor funding. First half of SDM	Percentage of SDM expenses recovered by donor funding in the first half of the SDM. Comparing to 4.03, this can show a change in funding sources as the SDM matures
K4.05	Sustainability	Percentage costs recovered from donor funding. Second half of SDM	Percentage of SDM expenses recovered by donor funding in the second half of the SDM. Comparing to 4.03, this can show a change in funding sources as the SDM matures
K4.06	Sustainability	Percentage of SDM costs recovered from payment for services	Percentage of SDM expenses recovered by revenues from SDM services
K4.07	Sustainability	Percentage SDM costs recovered. First half of SDM	Percentage of SDM expenses recovered by revenues from SDM services in the first half of the SDM. Comparing to 4.05, this can show a change in funding sources as the SDM matures
K4.08	Sustainability	Breakeven margin (5 years)	Additional margin on top of farm-gate price required to break even on SDM expenses, assuming payback period of 5 years and 150% increase in farmer production versus baseline
K4.09	Sustainability	Breakeven margin (10 years)	Additional margin on top of farm-gate price required to break even on SDM expenses, assuming payback period of 10 years and 150% increase in farmer production versus baseline
K4.10	Sustainability	Value creation at farm level - 5 years	Total value created at farm level (over 5 years) per dollar invested in the SDM. Includes adopting and non-adopting farmers
K4.11	Sustainability	Value creation at farm level - 10 years	Total value created at farm level (over 10 years) per dollar invested in the SDM. Includes adopting and non-adopting farmers


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