



**ISSUE BRIEF NO. 3**

# **Investing in Resilience:**

## **A Shared Value Approach to Agricultural Extension**

## IN THIS BRIEF

<b>Foreword: Creating Shared Value for Smallholder Farmers</b>	<b>2</b>
<b>Foreword: Translating Climate-Smart Science into Action</b>	<b>3</b>
<b>Executive Summary</b>	<b>4</b>
Overview	4
Next steps	5
Sources and methodology	7
<b>1. Introduction</b>	<b>9</b>
<b>2. Providing Extension to Marginalized Smallholder Farmers</b>	<b>12</b>
<b>3. Promoting Climate-Smart Agricultural Practices</b>	<b>14</b>
<b>4. Generating Shared Value in Agricultural Supply Chains</b>	<b>16</b>
Value for the environment	17
Value for farmer livelihoods	17
Value for agricultural enterprises	20
Value for supply chain partners	22
<b>5. Barriers to Delivering Effective Extension Services</b>	<b>22</b>
Knowledge	23
Supply chain dynamics	25
Capital	27
Talent	29
<b>6. A Way Forward</b>	<b>31</b>
<b>Appendix A: List of Interviewees &amp; Reviewers</b>	<b>32</b>
<b>Appendix B: Extension Types</b>	<b>33</b>
<b>Appendix C: Root Capital Impact Study Methodology</b>	<b>34</b>
<b>Appendix D: Criteria for Private Sector Extension Models that Generate Shared Value</b>	<b>35</b>
<b>References</b>	<b>37</b>

# Root Capital

Root Capital is pioneering finance for high-impact agricultural businesses in Africa, Asia and Latin America. We lend capital, deliver financial training, and strengthen market connections so that businesses that serve hundreds, and often thousands, of smallholder farmers can grow rural prosperity. Since our founding in 1999, Root Capital has disbursed more than \$900 million in loans to 580 businesses and improved incomes for more than 1.2 million farm households.

Learn more at [www.rootcapital.org](http://www.rootcapital.org) and on Twitter @RootCapital.

We would like to thank the Citi Foundation and the Skoll Foundation for their generous support of this Issue Brief Series and more generally for their leadership in supporting the development of the smallholder agricultural finance sector.

The Citi Foundation supports the economic empowerment and financial inclusion of low- to moderate-income people in communities where Citi operates. The Skoll Foundation drives large scale change by investing in, connecting and celebrating social entrepreneurs and the innovators who help them solve the world's most pressing problems.

In addition, we extend our gratitude to the Barr Foundation and the Stichting DOEN Foundation for their leadership support of Root Capital's Climate-Smart Agriculture Initiative (CSA).

© 2015 Root Capital. All Rights Reserved.



Citi Foundation



# Foreword: Creating Shared Value for Smallholder Farmers

No issue exemplifies the urgency and power of creating shared value better than the productivity and prosperity of smallholder farmers. The core idea of shared value, after all, is that we cannot solve problems such as poverty, food insecurity, and climate change without fully engaging corporations, and that corporations cannot continue to prosper unless they successfully address these issues.

Around the world, 450 million smallholder farmers grow 80 percent of the food in developing markets — despite realizing yields that are only a small fraction of the potential. Constrained by limited access to agricultural training, farm inputs, markets, and financial services, smallholders languish in this yield and income gap. Many resort to survival tactics such as slash-and-burn agriculture or illegal logging that degrade the environment and lead to a vicious cycle of ecological and economic impoverishment.

But that is only half of the story. The unrealized potential of smallholder farmers also limits the success of global business and society at large. The \$7 trillion food and beverage industry — which includes many of the world's largest companies such as Danone, Mondelez, Nestlé, and Unilever — cannot continue to deliver the financial returns expected by their shareholders without tapping into smallholder productivity. More broadly for society writ large, our food supply must increase by 60 percent or more to feed the projected world population in 2050, an impossible goal without radically increasing smallholder yields and resilience to climate change. Governments and development agencies committed to achieving the United Nations Sustainable Development Goals will never succeed if they do not reach smallholders, who account for most of the world's extreme poor.

In short, the predicament of smallholder farmers reflects the interdependence between business and society that is the essence of shared value. [The Shared Value Initiative](#) and the nonprofit consultancy, [FSG](#), that Professor Michael Porter and I founded, continue to work around the world to inspire, teach, and support corporations, governments, and NGOs in applying the principles of shared value to their own business and societal challenges.

Against this backdrop, Root Capital's issue brief on agricultural extension has rightfully focused attention on a critical point of leverage. As much as we would like to find a technical “silver bullet” to simultaneously increase smallholder yields across the globe, it will be the painstaking work of training and education, farmer by farmer, that leads to change at scale. Root Capital has an enviable track record of helping these farmers access credit. From that vantage point, I am very encouraged by their insights into how shared value approaches to agricultural extension can benefit smallholder farmers, supply chains, and the global communities that depend on them.

Mark R. Kramer  
Founder and Managing Director, FSG  
Senior Fellow, CSR Initiative, Harvard Kennedy School of Government

# Foreword: Translating Climate-Smart Science into Action

The science is clear: climate change is coming. What is less clear is how climate change will impact specific farmers, supply chains, or countries over different time horizons, and how stakeholders should prepare for these impacts.

Indeed, one of the principal challenges of preparing for climate change lies in the temporal and spatial variability of its effects. We expect certain areas to see severe negative impacts in the short-term, while other areas may remain relatively stable for a longer period of time. To make informed decisions, public, private, and civil society actors need greater visibility into how these variable impacts will play out in different contexts.

The good news is that climate scientists can now predict with reasonable certainty the impacts of climate change on crops within a given area, looking over various time horizons. We can even describe the likely form of these impacts in terms of changes in temperature or precipitation patterns. This information can inform decision-making at the farm, supply chain, and ultimately landscape level to mitigate and prepare for this coming reality.

Information alone, however, does not drive action. Climate science must be translated into the day-to-day business of getting food from field to table, so that it can inform the operational priorities and strategies of stakeholders all along the chain. Often, this translation process requires targeted technical support and financing.

At the Climate Change, Agriculture, and Food Security (CCAFS) research program of the Consultative Group for International Agricultural Research (CGIAR), we are increasingly focused on how to facilitate this process. What organizations or individuals can bridge the gap between the climate science and farm-level change?

In this issue brief, Root Capital explores an important channel for distribution of information, technical assistance, and finance related to climate change mitigation and adaptation: small-and-growing rural enterprises. Root Capital describes how these businesses can help promote the adoption of climate-smart practices at the farm level, particularly in developing economies where public extension services are underfunded or non-existent.

From our perspective, this brief suggests one critical path to increasing resilience in smallholder supply chains globally — while recognizing that much remains to be done to identify which climate-smart practices to promote in different contexts, via what delivery mechanisms. Clearly more learning is needed to understand and foster the potential described here. Kudos to Root Capital for taking this first step on what promises to be a necessary and challenging journey with diverse partners. CCAFS looks forward to learning with you.

Mark Lundy  
Agroenterprise Development Specialist,  
The International Center for Tropical Agriculture





Credit: Carly Kadlec, Equal Exchange

---

**Actors interested in building more resilient food systems can help agricultural enterprises overcome barriers to delivering effective extension, while influencing extension to be more climate-smart. In particular, we see an opportunity for global agri-food companies, financial institutions, and climate-focused funders to bring their complementary perspectives and resources to bear, joining the existing community of practice dedicated to strengthening smallholder extension.**

---

## Executive Summary

### Overview

Agriculture is “both a victim of and a contributor to climate change.”<sup>1</sup> As a global community, we need to reduce agriculture’s contribution to climate change while building farmers’ resilience to climate variability and preserving our natural resource base for the future. The Food and Agriculture Organization (FAO) captures these triple objectives under the term “climate-smart agriculture.”

This issue brief focuses on scaling the use of climate-smart practices among smallholder farmers by working through local agricultural enterprises, such as farmer cooperatives or processors.

Aggregating hundreds or often thousands of dispersed smallholder farmers, these enterprises represent a significant, but often overlooked, channel for delivering “last mile” agricultural extension – that is, services that provide farmers with the information and skills they

need to improve their farming practices. For instance, 86 percent of the over 280 enterprises receiving loans from Root Capital provide extension to their smallholder suppliers. Collectively, these enterprises source from more than half a million farmers in Africa, Asia, and Latin America.

In fact, these enterprises are often the primary or only source of agricultural extension for smallholders, due to historic underinvestment, and in many countries disinvestment, in these critical support services. Many agricultural businesses facilitate farmers’ adoption of improved practices, including those considered climate-smart. In impact studies conducted by Root Capital, farmers supplying to enterprises we finance reported both significantly higher access to extension and higher usage of climate-smart practices than unaffiliated farmers with a similar profile.

By promoting the adoption of climate-smart practices, extension can create “shared value”<sup>1</sup> for entire supply chains:

---

<sup>1</sup> Shared value is a business strategy focused on “creating economic value in a way that also creates value for society by addressing its needs and challenges.” See discussion in Section 4 below.



### ENVIRONMENT

Extension can improve environmental health and adaptive capacity at the farm level while contributing to climate change mitigation at a landscape or global level.



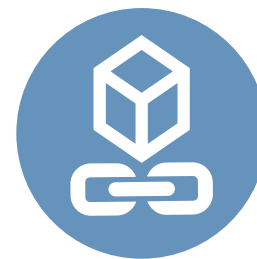
### FARMERS

Extension can increase farmer income by improving crop yields, quality, or farm resilience, with specific impacts dependent on the content and methodology of extension provided.



### AGRICULTURAL ENTERPRISES

Extension can increase enterprise revenue and reduce risk by increasing product volume or quality, growing market share, or increasing supply security.



### SUPPLY CHAIN PARTNERS

Extension can improve the security and traceability of supply for traders, processors, and retailers that purchase from the agricultural enterprise. In this way, extension can address multiple objectives related to procurement, corporate social responsibility, and climate-risk mitigation.

However, most agricultural enterprises in developing markets do not fully realize these benefits. Through interviews with Root Capital staff, borrowers, and partners, we identified four barriers to effective enterprise extension:

- **Knowledge:** Enterprises often do not know how to identify the needs of individual suppliers or tailor service delivery to meet these needs. In particular, enterprises require guidance on how to prepare their suppliers for a changing climate.
- **Supply chain dynamics:** In less formal supply chains, uncertain or inadequate supplier contract enforcement makes enterprises reluctant to invest in extension due to the risk of side-selling.<sup>2</sup> In more formal supply chains, unequal power dynamics result in some enterprises designing extension services to meet the needs of buyers or certifiers rather than smallholders.
- **Capital:** Enterprises underinvest in extension due to pervasive capital constraints in the smallholder agricultural sector, resulting in marginal changes at the farm level.
- **Talent:** Enterprises struggle to find and retain qualified and affordable extensionists, resulting in thinly stretched extension teams without the training or time to adequately address suppliers' needs.

This unrealized potential represents a missed opportunity, not just for individual enterprises and their suppliers, but for entire supply chains dependent on smallholder farmers.

Actors interested in building more resilient food systems can help agricultural enterprises overcome barriers to delivering effective extension, while influencing extension to be more climate-smart.

In particular, we see an opportunity for global agri-food companies, financial institutions, and climate-focused funders to bring their complementary perspectives and resources to bear, joining the existing community of practice dedicated to strengthening smallholder extension.

## Next steps

For our part, Root Capital will combine targeted lending and business advisory with action-oriented research to address specific barriers. As a mission-driven agricultural lender, we consider the health of extension services a core concern of our business and our mission. Effective enterprise extension can advance the positive impact on smallholders and the environment that is our mandate, while mitigating credit risks related to farmer performance. Conversely, weak or absent extension can undermine both enterprise impact and creditworthiness.

We will focus on the role that finance and financial management training can play, while engaging other actors to address barriers that fall outside our area of expertise.

Most immediately, we seek partners in designing, delivering, and funding effective climate-smart extension, informed by analysis of the business case and the social and environmental impact case in different contexts. Greater investment alone will not improve enterprise extension systems; rather, enterprises must invest in the right extension activities. Enterprises and funding partners alike need guidance on projected climate change impacts, cost-effective risk mitigation, and adaptation strategies to design extension activities. Investment plans can then flow from these activities — although additional field research will be needed on the costs and benefits of enterprise extension in various contexts to optimize spending and inform funding strategies.

<sup>2</sup> Side-selling refers to the practice of farmers selling their crop to other buyers, often middlemen, despite having formal or informal purchase agreements in place with an enterprise.



We will pursue two parallel tracks to address these challenges:

## ACTION-RESEARCH

We recently started working with the International Center for Tropical Agriculture (CIAT) and the Sustainable Food Lab (SFL), with support from the U.S. Agency for International Development (USAID), to address knowledge and capital constraints preventing climate-smart investment in smallholder supply chains, via extension, sourcing practices, or other activities. The project seeks to promote greater private sector engagement in climate-smart agriculture by providing investment roadmaps grounded in climate science. Specific activities related to enterprise extension include:

- **Identifying climate-smart strategies for smallholders.** CIAT will evaluate climate risk exposure and resilience gaps within specific geographies to assess vulnerability to climate shocks over different time horizons. CIAT will then translate vulnerability assessments into a menu of context-specific climate-smart practices, based on the scientific literature and field experience. Recommendations will include plans for promoting farmer adoption of identified climate-smart practices through various extension activities.
- **Diagnosing enterprise capacity to deliver effective, climate-smart extension.** Root Capital will develop a diagnostic tool to evaluate enterprise capacity — along agronomic, business management, and financial dimensions — to deliver the proposed extension activities. The tool will also assess the expected return on investment to match proposed activities with funding that has appropriate impact, risk, and return expectations
- **Co-designing extension improvement and investment plans.** Based on diagnostic findings, CIAT, SFL, and Root Capital will co-develop tailored improvement plans with agricultural enterprises to make extension more effective and more climate-smart. With supply chain and government partners, we will then seek partnerships to sustainably fund proposed improvements.

To inform the project above, we also plan to evaluate the costs and outcomes of specific extension programs in our loan portfolio to quantify the business economics and the impact case for enterprises to provide extension to smallholders. We will begin with a subset of the more than 30 coffee enterprises participating in Root Capital's Resilience Fund.

## FINANCE AND BUSINESS ADVISORY SERVICES

The action-research agenda will inform the expansion of existing Root Capital loan products and business advisory services that facilitate or complement enterprise extension activities.

- **Growing debt finance to address capital constraints.** Root Capital provides lines of credit to fund input provision programs and internal credit systems. These revolving loan products allow enterprises to invest in fertilizers, seeds, or other inputs for sale to suppliers, or to provide microloans to farmers for a range of farm investments. We also offer multi-year capital expenditure loans for investments in fertilizer depots or other physical infrastructure that can be used to deliver extension.  
  
To date, we have disbursed over \$20 million in financing for these activities. We are exploring expanding these products, particularly the capital expenditure loans, in response to borrower demand. We expect modest growth in this area, however, due to limited addressable demand—many enterprises simply lack the management capacity to take on multi-year loans. We plan to focus our efforts on expanding the addressable demand through innovative loan structuring or financial management training for prospective borrowers.
- **Expanding business advisory services to address knowledge constraints.** Root Capital provides training on the responsible management of internal credit systems that often complement extension programs. To date, we have provided training on this topic to 34 enterprises in Latin America.

We are also piloting a new advisory service using mobile technologies to capture farm-level data that can inform enterprise activities, including certification compliance, extension, and procurement. In 2016 we will expand this service from the five cooperatives trained in 2015 to more than 20 enterprises across Latin America.

With this issue brief, we seek to share our learning to date and initiate dialogue with like-minded practitioners, donors, and investors. We believe each of these complementary stakeholders has a role to play in helping agricultural enterprises build farmer resilience, and we seek discussion and collaboration in this work.





## Sources and Methodology

To inform this brief, we:

- Analyzed social and environmental due diligence data for 326 Root Capital borrowers with active loans during 2014 or the first half of 2015, totaling more than \$250 million in capital disbursed. These enterprises represent over 535,000 farmers managing roughly 725,000 hectares in Africa, Asia, and Latin America.
- Reviewed findings from Root Capital impact studies with eight borrowers (a subset of the 326 above) located in Bolivia, Guatemala, Nicaragua, and Peru. Collectively, these businesses work with 4,200 coffee and quinoa farmers managing roughly 11,500 hectares of land. During these eight studies, we interviewed 1,141 farmers supplying to Root Capital borrowers, as well as 629 independent farmers as comparison groups. (See Appendix C for study details.) We use pseudonyms for these enterprises throughout the report to protect their reputations and to candidly discuss their achievements, failures, and challenges.
- Conducted a literature review including several dozen source documents, cited throughout this brief, and participated in ongoing extension research efforts under the USAID Modernizing Extension and Advisory Services (MEAS)<sup>ii</sup> program to understand the broader context of our borrowers' activities.
- Interviewed three sets of individuals with direct experience in smallholder extension (see Appendix A for the complete list of interviews):
  - > Managers from six Root Capital borrowers (a different subset of the 326 above) in Ghana, Honduras, Mexico, Peru, and Tanzania;
  - > Fifteen Root Capital staff members responsible for loan underwriting and advisory services in Central America and Mexico, East Africa (Kenya, Rwanda, and Tanzania), South America (Bolivia, Colombia, Ecuador, and Peru), and West Africa (Burkina Faso, Ivory Coast, Ghana, and Senegal);
  - > Nine Root Capital partners, including buyers, smallholder extension providers, and researchers.

Section 1 provides an introduction to the imperative of climate-smart agriculture. In Sections 2 and 3, we present data on the extension activities of Root Capital borrowers and the likely impacts on farmers' use of climate-smart practices. Section 4 uses the concept of shared value to describe how enterprise extension can simultaneously generate economic value for the enterprise and its supply chain partners, livelihood improvements for farmers, and environmental benefits. Section 5 outlines barriers to more effective enterprise extension, drawing from interviews with Root Capital staff, borrowers, and partners. Finally, Section 6 closes with plans for further exploration.

For brevity, we have included additional context in the footnotes and resources in the endnotes.

# Leveraging Blended Capital to Invest in Agricultural Supply Chains

Root Capital’s extension agenda builds on our ongoing work to facilitate private- and public-sector co-investment at the base of agricultural supply chains, most recently through the Coffee Farmer Resilience Initiative (CFRI).

In late 2012, a fungal disease called coffee leaf rust broke out in Central America. Favorable conditions sparked an epidemic affecting more than half of Central America’s coffee-growing area. During the height of the outbreak, analysts estimated that leaf rust would reduce the region’s annual output by up to 40 percent, costing producers approximately \$500 million in lost revenue and eliminating nearly 400,000 jobs.<sup>iii</sup>

The leaf rust outbreak came as a shock to coffee supply chains and revealed pervasive gaps in farmer support systems. In particular, the disease highlighted the “fire drill” nature of many enterprise extension programs, designed to address problems after the fact rather than to proactively build farmer resilience. This reactive approach leaves coffee farmers vulnerable to extreme weather events and pest or pathogen outbreaks, as well as the subsequent market disruptions that often follow.

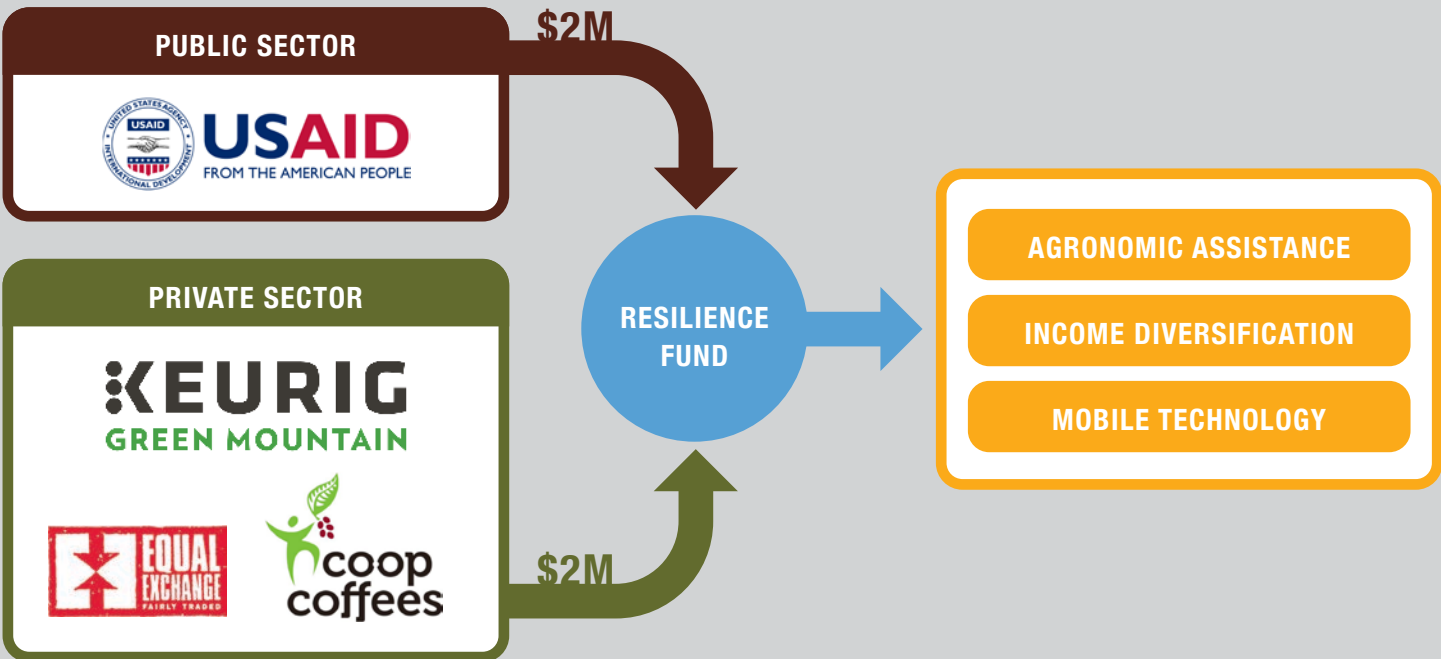
In response to the crisis, Root Capital and private, public, and non-profit partners launched the CFRI in 2013 to provide coffee enterprises with loans and financial and agronomic training to help suppliers rebuild farms affected by leaf rust. Root Capital underwrites and monitors the loans, placing capital invested by coffee buyers, donors, and government institutions interested in increasing farmer and supply chain resilience.

In 2014 we introduced a public–private matching fund, called the Coffee Farmer Resilience Fund, as a subcomponent of the CFRI. The fund enables coffee buyers to co-invest in additional technical assistance needs in their supply chains with peer companies and USAID.



Enterprises supplying to these buyers apply for grants for activities that build resilience to climate change and other shocks. Enterprises share project costs with funders.

In the first year of the Resilience Fund, all but one of 32 enterprise proposals included support for extension activities. The fund highlights the need for greater investment in enterprise extension and suggests models for co-funding by private and public partners. We provide more detail on the extension investments, including cost data, on page 27.







# 1. Introduction

Droughts, floods, rising temperatures, and other effects of a changing climate are already impacting agricultural supply chains. In some of world's most important breadbaskets, yields of key commodity and staple crops such as coffee, maize, rice, and wheat are on the decline.<sup>iv</sup> The poor are most at risk from these disruptions, given that most rely on agriculture for their subsistence or spend a higher portion of their income on food.

At the same time, agriculture accounts for roughly one quarter of global greenhouse gas emissions and is a leading force behind environmental degradation in the form of deforestation, biodiversity loss, and freshwater aquifer exhaustion.<sup>v</sup> Population growth and the corresponding increase in food demand — by 2050, estimated to be 60 percent higher than in 2005 — will compound these threats by increasing pressure to intensify existing production or convert remaining arable land to agriculture.<sup>vi</sup>

Agriculture must change. We need to reduce agriculture's contribution to climate change while building farmers' resilience<sup>3</sup> to climate variability and preserving our natural resource base for the future. The Food and Agricultural Organization (FAO) of the United Nations introduced the term "climate-smart agriculture" in 2010 to capture these triple objectives. Climate-smart agriculture does not refer to a new set of practices, but rather to an analytical framework for

evaluating recognized sustainability measures within the context of climate change, degraded natural resources, population growth, and rural development.

Transitioning to climate-smart agriculture will require massive investment — billions of dollars per year over the next several decades — at the farm, regional, and landscape levels.<sup>vii</sup> Despite the growing supply of capital for climate change mitigation and adaptation as a whole, a significant deficit remains in financing for agriculture. In 2013, roughly two percent of climate finance flowed to agriculture, forestry, or land use activities. Moreover, spending to date has been heavily weighted toward mitigation activities, with little attention to adaptation support for farmers and supply chain partners.<sup>viii</sup>

The world's 450 million smallholder farmers in particular have been largely excluded from these capital flows. Managing around 20 percent of the world's farm land<sup>ix</sup> and producing an estimated 80 percent of the food consumed in developing countries,<sup>x</sup> smallholders must be part of any successful transition to climate-smart agriculture. And because most of these farmers live in extreme poverty,<sup>4</sup> they will not be able to make this transition without both technical assistance and financing. We need greater investment in targeted farmer outreach or "extension" services that provide smallholders with the information, technology, and skills needed to adopt better practices.

3 Resilience is "the capacity of a system [or individual] to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure and feedbacks, and therefore identity — that is, the capacity to change in order to maintain the same identity." When referring to climate change, resilience includes both the ability to manage through the short-term effects of associated weather shocks, and the capacity to adapt to changing climatic conditions in the medium to long term. Folke, C., Carpenter, S.R., Walker, B., Scheffer, M., Chapin, T., and Rockström, J. "Resilience thinking: integrating resilience, adaptability and transformability," *Ecology and Society* 15(4) (2010): 20.

4 The World Bank defines extreme poverty as living on an income of less than \$1.90 a day (updated in October 2015 from \$1.25 a day).





**\$225 Billion**

Estimated amount needed through 2050  
to adapt agriculture for climate change

## The gap in climate finance for agriculture

Researchers from Stanford University estimate the global cost of climate change adaptation for agriculture at around \$225 billion, cumulative from 2013 through 2050.<sup>xi</sup> More investment will be needed to pursue low-emissions development pathways for agricultural communities. Yet only two percent of climate finance – an estimated \$8 billion of \$331 billion – flowed to agriculture, forestry, or land use activities in 2013.<sup>xii</sup>

**\$8 Billion**

Amount of climate finance that  
flowed to agriculture, forestry,  
or land use activities in 2013.

**\$2 Billion**

Of that, \$2 billion was spent on  
adaptation measures.

Yet few smallholders today have reliable access to extension due to persistent underinvestment, even disinvestment, in these support services.<sup>5</sup> The Initiative for Smallholder Finance estimates that global extension spending amounts to roughly \$19 a year per smallholder, generally enough to pay for one day of training, two bags of fertilizer, or three cocoa seedlings.<sup>xiii</sup> To put this in perspective, a cocoa smallholder in Ghana might manage more than 2,500 cocoa trees, and would ideally replace between five and seven percent (i.e., 125 - 175) of these trees each year to maintain productivity.<sup>6</sup>

Access to extension is patchy and erratic. Extension programs are often driven by short-term projects and shifting funder priorities.<sup>xiv</sup> Extension is not spread evenly across smallholder communities but tends to be skewed toward farmers, generally male, who cultivate export crops.<sup>xv</sup> Female smallholders are generally excluded entirely, even though they often cultivate staple crops that are critical for local food security.<sup>xvi</sup>

Finally, the extension that smallholders do receive tends to be ineffective. In particular, research suggests that public extension systems — historically the primary provider of smallholder extension services in Africa, Asia, and Latin America — have largely failed to produce meaningful change at the farm level.<sup>xvii</sup> A global review of government-led extension by the World Bank concluded that

national programs are “failing” and “moribund,” in “disarray or barely functioning at all,” due to limited budgets, outdated staff skillsets, or misguided implementation.<sup>xviii</sup> Moreover, most extension programs have not been updated to reflect 21st-century challenges such as climate change, population growth, and increasing urbanization.<sup>xix</sup>

Existing approaches to extension will not be enough to support farmers in making the transition to climate-smart agriculture, but the path forward is not clear. In most countries, smallholder extension services are now delivered by a diverse mix of actors, including the public sector, non-profit organizations, and for-profit companies. The increasingly diverse or “pluralistic” extension landscape creates opportunities, but also raises challenges around determining the right roles for different providers and coordinating across them.

In particular, debate in the extension community focuses on the role of the private sector relative to the public sector. As a World Bank report summarizes: “Who should sit in the driver’s seat in the extension system — the public sector, the private for-profit sector, the private nonprofit sector, or some combination of the three?”<sup>xx</sup> Many researchers argue that the nature of extension services as either public or private goods, based on objectives and context, should determine whether they are provided and funded by public- or private-sector actors.<sup>xxi</sup>

5 During much of the 20th century, government extension programs were the primary provider of smallholder extension services. Public programs largely declined, however, over the last several decades due to shifting development priorities and funding cuts. Since 2005, this trend has reversed somewhat as public investment in agriculture as a whole has increased. World Bank lending to the agricultural sector, for example, roughly doubled between 2006 and 2009, with a proportional increase in funding for agricultural extension activities. A massive deficit remains, however. For details, refer to Burton E. Swanson, “Global Review of Good Agricultural Extension and Advisory Service Practices,” FAO: Rome, 2008; and Farming First, “Fact Sheet on Extension Services: Position Paper,” June 2012.

6 This is an estimate based on an average reported farm size in Ghana of 2.3 hectares and a common cocoa planting density of 1,100 trees per hectare (3’x3’ meter spacing). Steve Wiggins and Henri Leturque, “Ghana’s Sustained Agricultural Growth: Putting Underused Resources to Work,” Overseas Development Institute, London, 2011; L. Mahrizal et al., “An Optimal Phased Replanting Approach for Cocoa Trees with Application to Ghana,” *Agricultural Economics* 45 (2013): 1-12.

## Definitions

### Agricultural enterprise

In this brief, we focus on small-and-growing<sup>8</sup> agricultural enterprises that source directly from smallholder farmers in Africa, Asia, or Latin America, as this is the population with which Root Capital works. These enterprises work at different points along the supply chain, from crop collection to trading and processing, and source from several dozen to several thousand smallholder farmers. They may operate as private businesses, farmer cooperatives, or, less commonly, nonprofit organizations, and sell into domestic or international markets. We refer to this diverse mix of businesses simply as “agricultural enterprises.”

We speak to the promise of enterprise-led extension broadly, anchoring our discussion with examples of enterprises in Root Capital’s loan portfolio. In 2014, Root Capital disbursed \$178 million in financing to 279 agricultural enterprises in Africa, Asia, and Latin America. Fifty-three percent of these enterprises were structured as farmer-owned associations or cooperatives, and 47 percent as private businesses. Coffee was the primary crop for half of the enterprises, with the remainder working in various export or domestic value chains, including cocoa, cashew, fresh or processed fruits and vegetables, staple grains, and dairy. We provide examples of these various portfolio segments throughout the brief.

While not the focus of this piece, “downstream”<sup>9</sup> agricultural enterprises that do not source directly from smallholders, such as consumer-facing brands or multinational traders, are also providing indirect or direct extension to smallholders in their supply chains. Examples include Starbucks, which manages several Farmer Support Centers for its suppliers; the World Cocoa Foundation, which aggregates the extension efforts of leading cocoa

and chocolate companies through programs like CocoaAction; and Cagrill, which runs over 1,600 cotton schools for farmers in Zambia.

### Agricultural extension

Root Capital adopts the definition of agricultural extension promoted by USAID and the Global Forum for Rural Advisory Services (GFRAS): “All the different activities that provide the information and services needed and demanded by farmers and other actors in rural settings, to assist them in improving their livelihoods by developing their technical, organizational, and management skills and practices.”<sup>xxii</sup> This definition moves beyond a focus on technology transfer toward a commitment to human capacity building, but excludes financing. Common examples include training on production and processing techniques and fertilizer distribution programs. (For examples from Root Capital’s portfolio, see Appendix B.)

We focus on the role of agricultural enterprises as just one distribution channel for extension, operating alongside or in conjunction with other public sector, non-profit, or private sector service providers.

### Climate-smart agriculture

Under the official FAO definition, the objectives of climate-smart agriculture include: “sustainably increasing agricultural productivity and incomes; adapting and building resilience to climate change; and reducing and/or removing greenhouse gas emissions, where possible.” Practices that achieve some or all of these objectives vary based on crop and context. Indeed, the same practice can be a “triple-win” strategy in one setting, yet involve trade-offs elsewhere. For details, refer to the FAO’s Climate-Smart Agriculture Sourcebook.<sup>xxiii</sup>

In this brief, we explore the potential of private extension providers to advance climate-smart strategies that address both private and public objectives. We present private agricultural enterprises, such as farmer cooperatives and traders, as a significant and growing — but often overlooked — distribution channel for extension.<sup>7</sup> We describe how enterprise extension services can serve commercial objectives related to procurement and supply chain risk mitigation, as well as public objectives related to improved farmer livelihoods and climate change mitigation.

To be clear, we are not arguing that agricultural enterprises or the private sector in general should be the sole or primary providers of smallholder extension services. Depending on context and organizational capacity, agricultural enterprises will not always be the actor

best suited to provide extension. And enterprises will always rely on support from other public, private, and civil society actors, particularly for agricultural education and research and, in some cases, initial value chain aggregation or business incubation.

Our goal is rather to highlight the current and potential contribution of agricultural enterprises to pluralistic extension systems and to identify opportunities for greater collaboration. We urge actors interested in building climate-smart food systems to support agricultural enterprises in overcoming barriers to effective extension delivery. In particular, we see an opportunity to leverage climate finance to strengthen enterprise extension services, while also influencing those services to be more climate-smart.

7 Certainly, agricultural enterprises represent only a piece of the extension puzzle, in that they currently reach about 10 percent of the world’s 450 million smallholders farmers. Yet this percentage is growing, as recent trends in both global and regional sourcing — including a greater emphasis on traceability, security of supply in the face of climate change and population growth, and sustainable and ethical sourcing — are creating new opportunities for smallholders and the enterprises that source from them. Dalberg, “Catalyzing Smallholder Agricultural Finance”: 2012.

8 Small-and-growing businesses (SGBs) are defined by the Aspen Network of Development Entrepreneurs as commercially viable businesses with five to 250 employees that have significant potential, and ambition, for growth.

9 In supply chains, “downstream” refers to the direction in which materials or product flow. For example, a coffee consumer is downstream of a coffee roaster, who in turn is downstream of a coffee farmer.



## 2. Providing Extension to Marginalized Smallholder Farmers

Eighty-six percent of the 326 agricultural enterprises receiving Root Capital financing in 2014 and the first half of 2015 provided extension to their suppliers (see Figure 1; see Appendix B for details on extension types, including examples). Collectively, these businesses aggregated over half a million smallholder farmers in Africa, Asia, and Latin America.

These enterprises are often the primary or only source of smallholder extension in their area. In recent Root Capital impact studies with eight enterprises – representing almost 4,200 farmers across four countries – farmers selling to these enterprises reported significantly higher access to extension services than unaffiliated farmers with a similar profile (see Figure 2; see Appendix C for study details). In each study, suppliers receiving enterprise extension and unaffiliated farmers receiving extension from other sources reported a similar number of hours of support, generally ranging from five to 25 hours per year.

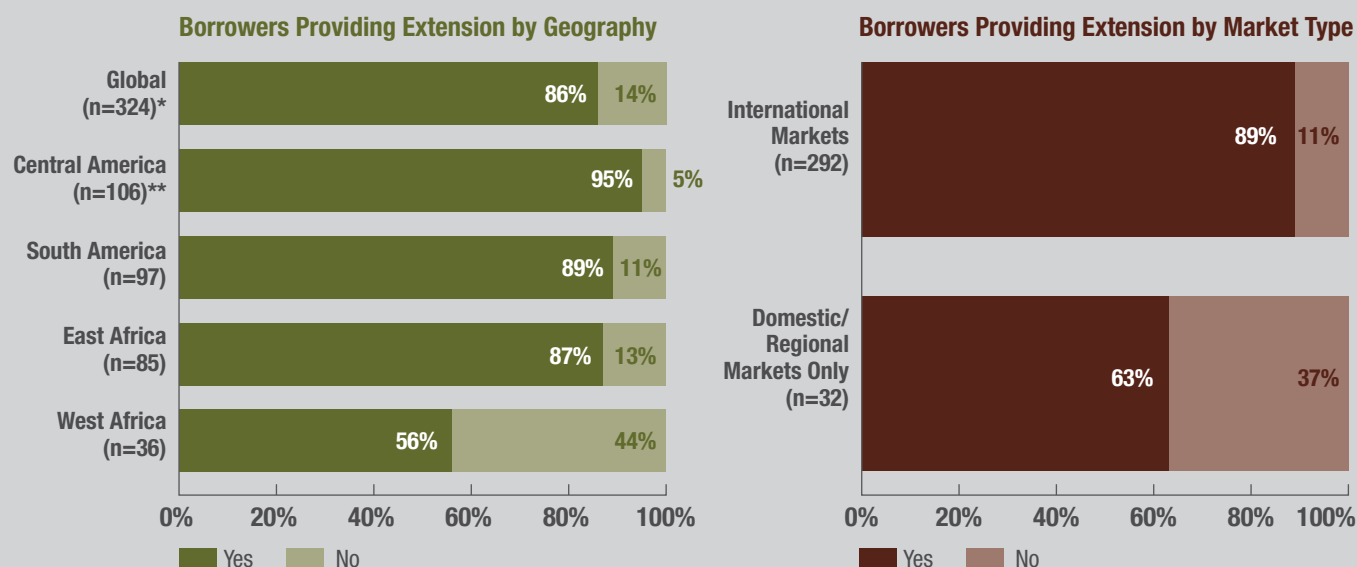
Some enterprises rely on partners to help deliver extension services. For example, 46 percent of the enterprises receiving a Root Capital loan during the first half of 2015 and providing extension services reported working with third parties to provide centralized training or input programs to complement their own activities.<sup>10</sup> Fair trade- and organic- certified enterprises report relying on certification price premiums to cover extension costs.

Other enterprises rely exclusively on third parties to deliver extension, thus serving as conduits rather than providers. This is more common in supply chains that receive substantial public or donor support. As third-party providers often operate on short-term project cycles or are dependent on donations, enterprises reliant on their services risk losing support or receiving uncoordinated service from various actors. Researchers refer to this as the increasing “projectization” of extension services in many developing countries.<sup>xxiv</sup>

<sup>10</sup> We started asking potential borrowers about third-party partnership models in their extension programs at the beginning of 2015. Root Capital loan officers use our Social and Environmental Scorecards to collect this data during the loan due diligence process. The Scorecard templates are available for download on our [website](#).



**FIGURE 1: AGRICULTURAL EXTENSION SERVICES PROVIDED BY ROOT CAPITAL BORROWERS (2014-2015 YTD)**

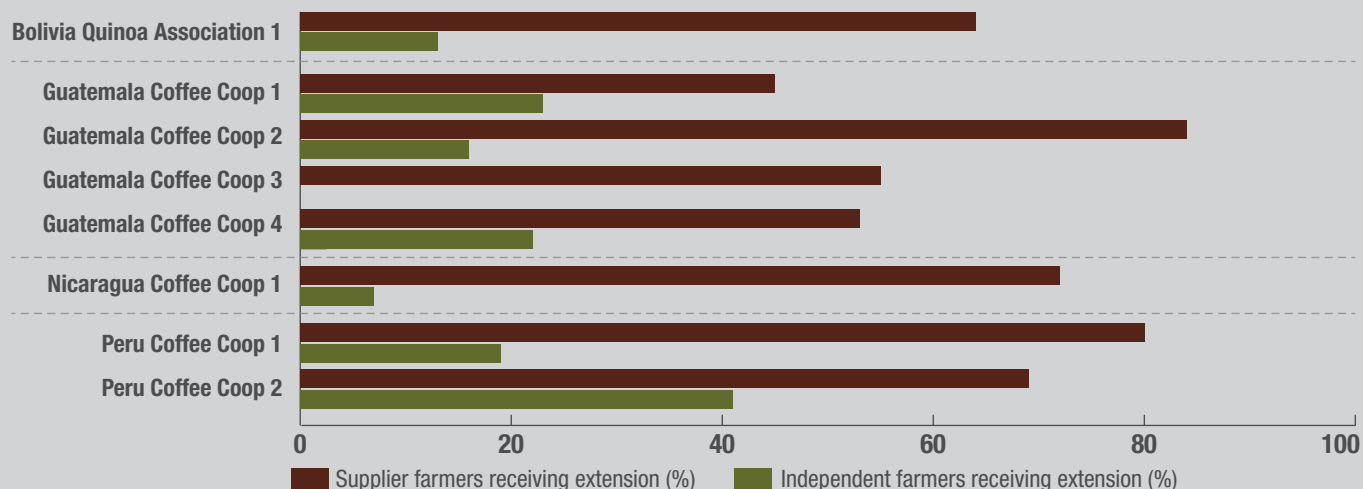


Enterprises supplying to international markets are more likely to provide extension to suppliers. In Root Capital's portfolio, borrowers selling into domestic or regional markets are concentrated in West Africa, likely attributing to the lower percentage of borrowers providing extension in that region.

\*Our global portfolio also includes a small number of borrowers (2) in North America or Europe sourcing from agricultural enterprises in Africa or Latin America; given this brief's focus on enterprises located in developing markets, we do not report on the extension activities of these borrowers. We also did not report on the activities of borrowers in Asia given the small sample size (2).

\*\*Root Capital's Central American lending region includes Mexico and the Caribbean.

**FIGURE 2: PERCENTAGE OF FARMERS AFFILIATED WITH ROOT CAPITAL BORROWERS AND UNAFFILIATED FARMERS RECEIVING EXTENSION**





### 3. Promoting Climate-Smart Agricultural Practices

In Root Capital impact studies, farmers supplying to agricultural enterprises generally reported higher usage of improved practices than unaffiliated farmers, including many considered climate-smart. We saw the most significant improvements in the areas of soil conservation and wastewater management.

By climate-smart practices, we refer to farm-level practices that improve productivity and farmer livelihoods, build adaptive capacity to climate change, and/or reduce or remove greenhouse gas emissions. Practices that achieve some or all of these objectives vary based on crop and context. Indeed, the same practice can be a “triple-win” strategy in one setting, yet involve trade-offs elsewhere. Consequently, in each impact study we adjust the suite of agricultural practices included according to local realities, and we assess whether these practices are climate-smart in that context. In Figure 3, we present findings on common practices in Root Capital impact studies to date. (See Appendix C for study details, including methodology.)

In study focus groups, suppliers attributed the adoption of climate-smart practices to enterprise extension services. As farmers described:

*“[The cooperative] taught us to cultivate coffee. Second, it supported us with fertilizers. Third, we received information [on] farm management from technicians and engineers — how to plant coffee, prune, fertilize, manage shade. And they continue to support us with solar panels, tanks [for coffee wastewater]... and pre-harvest loans.”*

—Peruvian coffee farmer

*“[The association] has given us a person designated to train us... Since that date, we have followed [her instructions]. I became very interested and have always followed what the technician told us. So I have learned about live barriers, to prepare home remedies to fumigate. She has taught us how to always be organic, not to litter, to dig holes or pits for garbage, to use compostable waste for fertilizer.”*

—Bolivian quinoa farmer

*“Now I’m training to be a better coffee farmer... Now we know more about how to plant the coffee, manage shade, and conserve the soil — things I did not know before. Since I have joined the cooperative, I have received this training, and I’m using it.”<sup>xxv</sup>*

—Guatemalan coffee farmer

Notably, we observe these outcomes despite the fact that agricultural enterprises are not explicitly applying a climate-smart lens to their extension activities. As a defined framework, climate-smart agriculture remains largely unknown outside international development and research circles. Enterprises on the ground, however, typically understand that climate change is a threat. As the manager of a Guatemalan cooperative described, “It does not rain normally [now]... And why? It’s because of climate change.”<sup>xxvi</sup> Enterprises are coming up with their own solutions, many of which are climate-smart. Even enterprises less aware of climate change often promote climate-smart practices under a different name, such as risk mitigation, supply chain development, or simply sustainability.

Certainly not all enterprise extension is climate-smart. Indeed, limited knowledge of the climate-smart framework and how to use it to inform extension emerged as a key challenge (see Section 5).

**FIGURE 3: DIFFERENCES IN USAGE OF SELECT CLIMATE-SMART PRACTICES BETWEEN SUPPLIERS TO ROOT CAPITAL BORROWERS AND UNAFFILIATED FARMERS**

	BOLIVIA	GUATEMALA				NICARAGUA	PERU	
	TRADER QUINOA	COOP 1 COFFEE	COOP 2 COFFEE	COOP 3 COFFEE	COOP 4 COFFEE	COOP 1 COFFEE	COOP 1 COFFEE	COOP 2 COFFEE
<b>SOIL CONSERVATION</b>								
<b>Use of Fertilizer<sup>11</sup></b>								
Chemical	N/A	N/A	○	N/A	●	○	●	●
Organic	○	●	○	●	○	●	●	●
<b>Use of Erosion Prevention Measures</b>								
Live Barriers	●	○	●	○	○	●	●	●
Soil Ridges/Terracing or Ground Cover	●	●	●	●	●	●	●	●
<b>WATER CONSERVATION</b>								
Treatment of Processing Wastewater	N/A	●	●	●	○	●	●	●
<b>BIODIVERSITY CONSERVATION</b>								
Agroforestry Production (Degree of Shade)	N/A	○	○	○	○	●	●	
<p>● Statistically significantly higher usage of practice by suppliers than non-suppliers</p> <p>○ No statistically significant difference in usage of practice by suppliers compared to non-suppliers</p> <p>● Statistically significantly lower usage of practice by suppliers than non-suppliers</p> <p>N/A The practice did not apply given business context</p>								

## Investing in the Farm: The Role of Credit in Extension

During impact studies, farmers identified credit for farm investments as a critical complement to extension. Many practices promoted during extension require investment in materials or labor, often beyond what smallholders can afford due to limited savings or access to financing. In response, many agricultural enterprises, including about 45 percent of those in Root Capital's portfolio, have developed a microcredit function to meet suppliers' credit needs. In study focus groups, we heard that farmers used microloans, when available, primarily to invest in their farms rather than cover other household needs. Farmers reported that access to affordable credit often made the difference between adopting recommended practices and deferring them. Most enterprises, however, lack capital to adequately capitalize their microcredit funds.

Root Capital also lends to a handful of microcredit institutions, such as savings and loan cooperatives. Interestingly, some of these institutions complement their lending activities with extension. Local microlenders offer an alternative distribution channel for smallholder extension, with the potential to reach more disaggregated farmers outside of formal supply chains. Peruvian microcredit cooperative **Crediflora**, for example, provides loans and extension to over 3,000 coffee farmers, roughly half of whom do not belong to a coffee export cooperative. For rural microcredit institutions not offering extension, the question becomes whether targeted technical assistance from other extension practitioners or financial institutions could position them to provide extension to their borrowers.

11 Farmers use fertilizers to build soil health by improving fertility and, in the case of organic inputs, soil structure. Fertilizer use and soil health touch on all three objectives of climate-smart agriculture: adaptation, productivity, and mitigation. First, adaptive capacity depends on access to resources, including "natural capital" – natural resources such as soil and water that generate value for society. Agricultural livelihoods in particular rely on the conversion of natural capital for income. Without healthy soils, farmers cannot thrive, let alone manage through or adapt to shocks like climate change. Second, productivity is directly correlated with soil fertility and structure. Finally, fertilizers emit greenhouse gases (GHGs) that contribute to climate change. Both chemical and organic fertilizers emit GHGs after application on the farm, with chemical fertilizers generally releasing greater quantities due to soil acidification. The process of creating chemical fertilizers also generates significant GHG emissions. Experts do not consider intensive use of chemical fertilizers a climate-smart pathway due to the associated GHG emissions and damage to soil structure and productive potential over time. A recent report by the World Wildlife Foundation Germany and the Heinrich Böll Foundation, for example, recommended farmers rely primarily on organic fertilizer, agroforestry, green manure, and intensive fallowing to manage soil health, using chemical fertilizers sparingly. Johannes Kotschi, "A Soiled Reputation: Adverse Impacts of Mineral Fertilizers in Tropical Agriculture," Heinrich Böll Stiftung, WWF Germany, 2013.



## 4. Generating Shared Value for Agricultural Supply Chains

Findings from Root Capital impact studies suggest that enterprise extension services are likely creating shared value for the environment, farmers, agricultural enterprises, and other supply chain partners. Extension generates value by facilitating farmer adoption of practices that increase productivity, product quality, and resilience in the face of climate change or other shocks. As the general manager of a Root Capital borrower in Mexico described,

*“By expanding and improving our extension services, we can improve the supply chain, ensure product quality, secure supply in a timely manner, and improve the quality of life for [members’] families — for these reasons, extension is a major concern and part of our improvement plan.”*

— *Sesame cooperative, Mexico*

Findings to date, however, are largely qualitative and vary based on enterprise context and activities. More research is needed to quantify these impacts and understand factors that drive differences in outcomes.

Moreover, it is important to note that not all private extension models generate shared value. Shared value creation relies on understanding the business and impact benefits of various extension activities, and prioritizing interventions that generate both. In many instances, supply chain dynamics or other structural constraints will preclude shared value strategies. We discuss criteria for enterprise extension that generates shared value in Appendix D.

### What is “Shared Value” in the Context of Agricultural Extension?

Shared value is a concept first articulated by Michael Porter and Mark Kramer in 2011 that focuses on “creating economic value in a way that also creates value for society by addressing its needs and challenges.”<sup>xxvii</sup> The shared value framework recognizes the interdependence of social context and business competitiveness, and brings considerations of social and environmental impact from the margins of business strategy and operations into the center. As Porter and Kramer write:

*“A business needs a successful community, not only to create demand for its products but also to provide critical public assets and a supportive environment. A community needs successful businesses to provide jobs and wealth creation opportunities for its citizens... Shared value creation focuses on identifying and expanding the connections between societal and economic progress... It is about expanding the total pool of economic and social value.”<sup>xxviii</sup>*

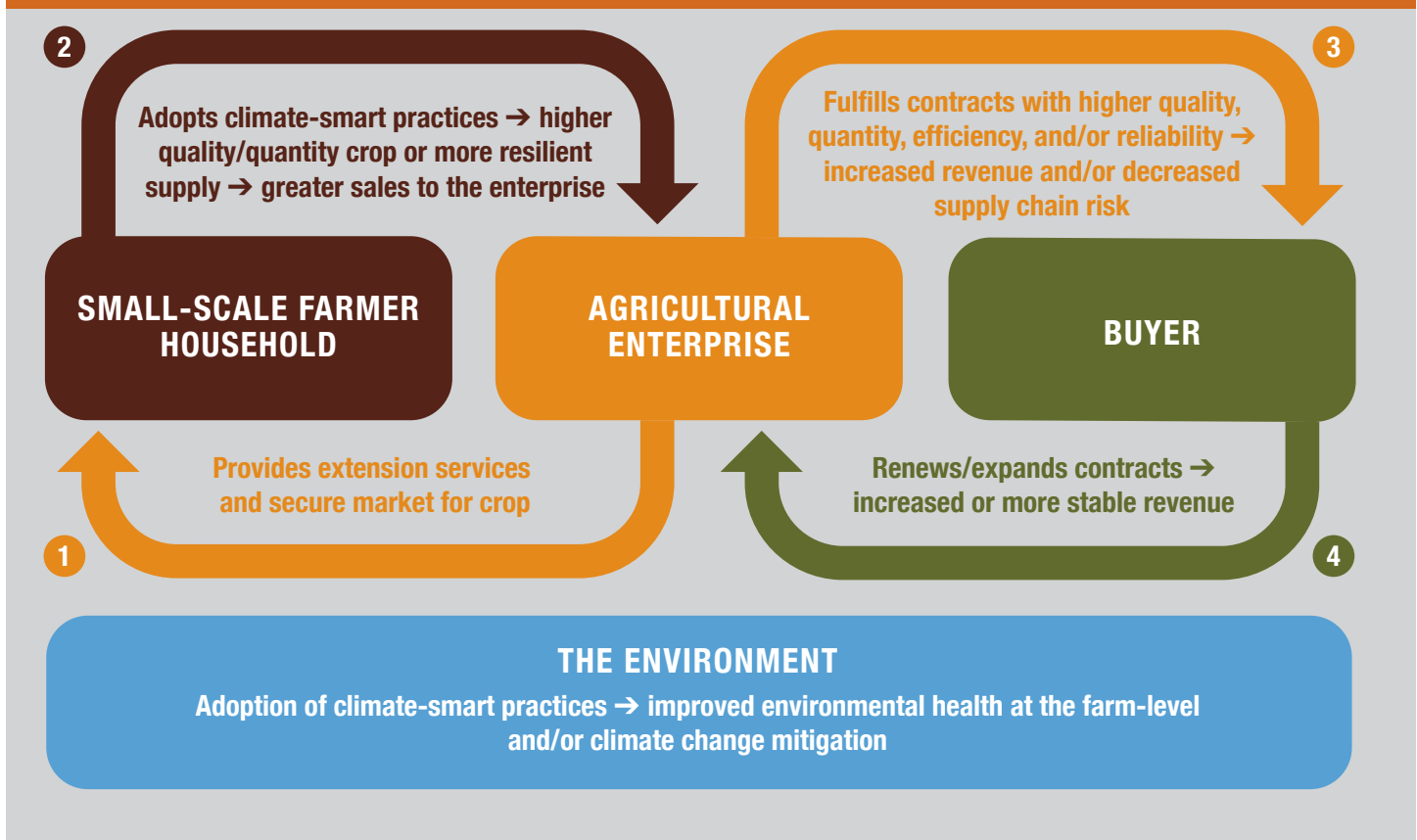
Private extension services can represent a shared value strategy, if they are designed to generate incremental value for the supply chain by addressing unmet farmer needs. Indeed, Porter and Kramer cite agricultural extension as a prototypical exam-

ple of a shared value approach, using specialty coffee company **Nespresso** as an example:

*“Obtaining a reliable supply of specialized coffees is extremely challenging... Most coffees are grown by farmers who are trapped in a cycle of low productivity, poor quality, and environmental degradation. To address these issues, Nestlé [Nespresso] redesigned procurement. It worked intensively with its growers, providing advice on farming practices, guaranteeing bank loans, and helping secure inputs such as plant stock, pesticides, and fertilizers... Greater yield per hectare and higher production quality increased growers’ incomes, and the environmental impact of farms shrank. Meanwhile, Nestlé’s [Nespresso] reliable supply of good coffee grew significantly.”<sup>xxix</sup>*

Nespresso continues to provide extension services to coffee farmers in its supply chain under The Positive Cup initiative. To date, the company has provided extension to over 63,000 farmers in 11 countries.<sup>xxx</sup>

FIGURE 4: THE POTENTIAL OF SHARED VALUE EXTENSION



## Value for the environment

Research generally shows a positive correlation between adoption of practices termed climate-smart and environmental health at the farm level. Evidence gaps remain, however. A recent meta-analysis by a group of international certification organizations identified a need for research across more geographies, over longer time frames, and beyond the farm to better understand variance in practice impacts on environmental health.<sup>xxxii</sup> There is growing momentum, coming largely from the certification community, to fill these research gaps to inform the work of agriculture practitioners.<sup>12</sup>

Evidence on the contribution of specific agricultural practices to greenhouse gas reductions remains more limited, given the relatively new focus on climate change. Research institutes such as the members of the Consultative Group for International Agricultural Research (CGIAR) are working to build the evidence base for climate impacts. Initial findings are promising: in a recent review of 19 self-described climate-smart interventions in Africa, Asia, and Latin America, researchers found that 15 cases “clearly contributed to reducing greenhouse gases from agriculture.”<sup>xxxiii</sup>

## Value for farmer livelihoods

Extension has the potential to improve farmer livelihoods by increasing crop yields or quality or improving farm efficiency, leading to higher incomes. Productivity improvements increase the volume that the farmer can sell to the enterprise, raising farmer revenues. Quality improvements can also increase sales volumes by lowering the farmer’s rejection rate<sup>13</sup>, or can increase the price obtained, particularly in premium markets. Finally, efficiency improvements can reduce the cost side of the equation by cutting unnecessary investments in labor or inputs.

A recent meta-analysis by the Initiative for Smallholder Finance found robust evidence in the literature that agricultural extension improves crop yields or quality and thereby farmer livelihoods, with the caveat that specific impacts are contingent on the extension methodology used.<sup>xxxiii</sup>

12 A consortium of certifiers, academic experts, and business leaders is advancing a research agenda around understanding the environmental and socioeconomic benefits of specific agronomic practices included in certification standards, to fill existing gaps in the scientific literature. Steering Committee of the State-of-Knowledge Assessment of Standards and Certification, “Toward Sustainability: The Roles and Limitations of Certification” (Washington, DC: RESOLVE, Inc., 2012): A-146-A-168; Jeffrey Milder et al., “An Agenda for Assessing and Improving Conservation Impacts of Sustainability Standards in Tropical Agriculture,” *Conservation Biology* 2014.

13 Coffee farmers generally need to deliver first-grade coffee if they want to sell to international markets, which offer higher prices than local markets. Cooperatives, local processors, and traders reject coffee beans with quality defects or purchase them at a lower price.

## Planting Trees to Sequester Carbon, Build Farm Resilience, and Secure Supply

Roughly three-quarters of Root Capital borrowers work in tree crop supply chains, namely coffee, cashew, cocoa, shea, and macadamia. A significant minority of these enterprises provide suppliers with seedlings as part of their extension programs. Enterprises normally focus on crop seedlings, but may include seedlings for shade trees or secondary crops to support reforestation of degraded land or farm diversification. Planting trees can generate shared value by increasing future productivity and likely revenues for farmers, securing crop supply for the enterprise, mitigating climate change by sequestering additional carbon, and providing habitat to foster local biodiversity.

For example, **Root Capital cashew borrowers** in West Africa provide suppliers with cashew seedlings to replace old or diseased trees. One enterprise distributes around 40,000 seedlings each

year. With the new trees, farmers have the opportunity to increase farm productivity, notoriously low in the West African cashew sector. The seedlings also contribute, in a small way, to land restoration in a region threatened by desertification.

Similarly, the specialty coffee company **Starbucks** recently pledged to provide farmer suppliers with one coffee tree seedling for every bag of coffee purchased in participating U.S. stores. Starbucks will contribute \$0.70 — the cost of one tree — to its partner **Conservation International**, which will pass on the funds to seedling nurseries in Starbucks sourcing areas in El Salvador, Guatemala, Indonesia, and Mexico. The effort builds on the company's work in Mexico, where Starbucks distributed over 180,000 disease-resistant coffee seedlings to suppliers in Chiapas.<sup>xxxiv</sup>

**FIGURE 5: THE MOST IMPORTANT BENEFIT OF ENTERPRISE AFFILIATION, AS REPORTED BY ENTERPRISE SUPPLIERS<sup>14</sup>**

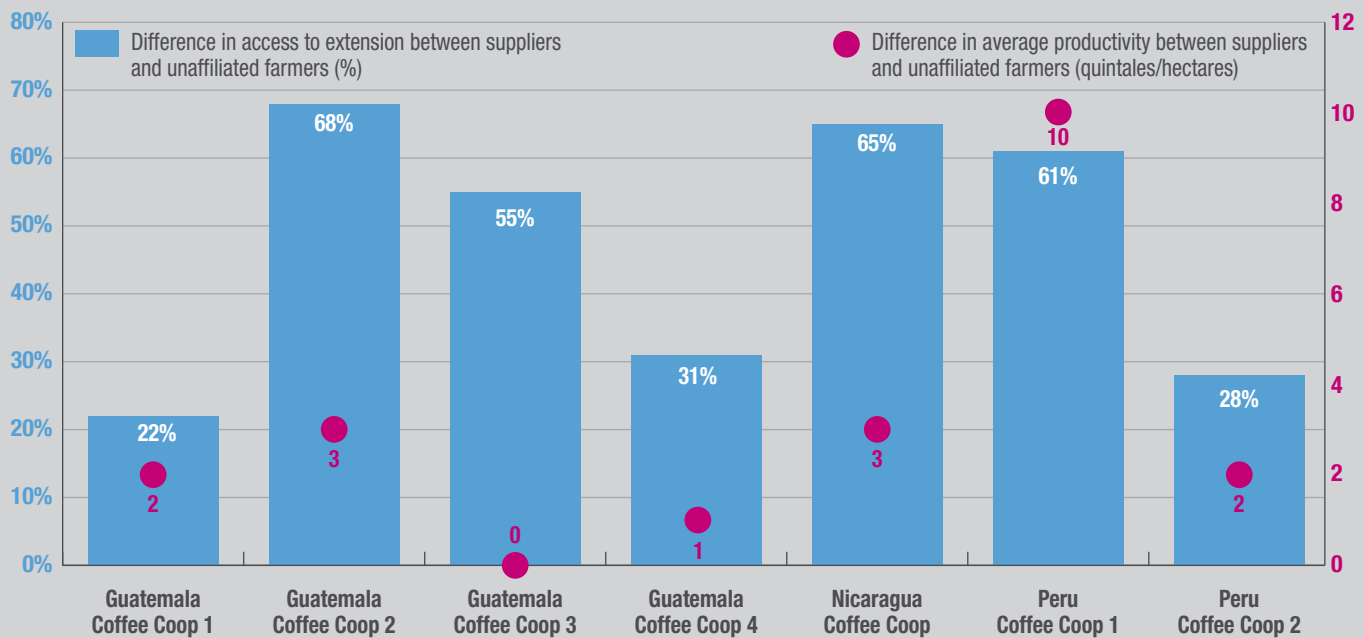
BUSINESS	#1 MENTIONED	#2 MENTIONED	#3 MENTIONED
Bolivia Quinoa Trader	Extension	Price	Organic certification
Guatemala Coffee Coop 1	Credit	Extension	Price
Guatemala Coffee Coop 2	Credit	Extension	Payment advances
Guatemala Coffee Coop 3	Price	Credit	Extension
Guatemala Coffee Coop 4	Links to other organizations <sup>15</sup>	Extension	Price
Nicaragua Coffee Coop	Credit	Price	Extension
Peru Coffee Coop 1	Credit	Extension	Price
Peru Coffee Coop 2	Credit	Extension	Price

<sup>14</sup> We asked farmers in a survey: "For your household, what have been the most important benefits of being a member/supplier?"

<sup>15</sup> This cooperative focused more on attracting donor subsidy than developing its coffee export operations or direct member services. The cooperative viewed itself primarily as a channel to connect NGO programs, including extension, to members, and used these programs to attract and retain members. It is therefore not surprising that farmers cited this linkage role as the primary benefit of cooperative membership. For details, see the full study: "Improving Rural Livelihoods: A Study of Four Guatemalan Coffee Cooperatives," Root Capital, November 2014. Available online at: <http://info.rootcapital.org/guatemalan-coffee-study>.



**FIGURE 6: DIFFERENCE IN ACCESS TO EXTENSION VS. AVERAGE PRODUCTIVITY BETWEEN ENTERPRISE SUPPLIERS AND UNAFFILIATED FARMERS**



Likewise, Root Capital impact studies find mixed, context-specific findings regarding livelihood outcomes of enterprise extension activities. In six out of eight studies, suppliers of Root Capital borrowers reported significantly higher incomes than similar independent farmers, and noted general livelihood improvements. While we cannot directly attribute these improvements to any one enterprise intervention, farmers identified extension as one of the most important benefits of enterprise affiliation. In all eight studies a significant minority or even a majority identified extension as the principal advantage of supplying to the enterprise (see Figure 5).

When we try to tease out the specific benefits of extension for farmers, however, the data is inconclusive.

We see mixed findings related to changes in smallholders' yields from enterprise affiliation. In one (Peru Coffee Cooperative 1) of seven<sup>16</sup> recent studies, enterprise suppliers reported statistically higher crop productivity during the last growing season than non-suppliers with a similar profile, and they linked improvements to enterprise services, including extension. In the remaining six coffee studies, however, suppliers reported no meaningful difference in productivity. (See Figure 6.)

In these six coffee studies, however, we believe coffee leaf rust — a destructive fungus currently affecting coffee tree health and productivity throughout Latin America — may be obscuring long-term

productivity improvements among enterprise suppliers. Indeed, the majority of suppliers to five of these cooperatives reported productivity increases since joining these organizations, prior to leaf rust taking hold around 2012 (see Figure 7; Guatemala Coffee Cooperative 4 was the exception, being a young organization that could not reliably provide services to its members). Members of two cooperatives also reported significantly smaller productivity losses due to leaf rust than independent farmers in the same area. Together, this data suggests that cooperative extension services may well be driving productivity improvements for smallholders; we simply need a longer time horizon, or perhaps a larger sample size, to see the changes.<sup>17</sup>

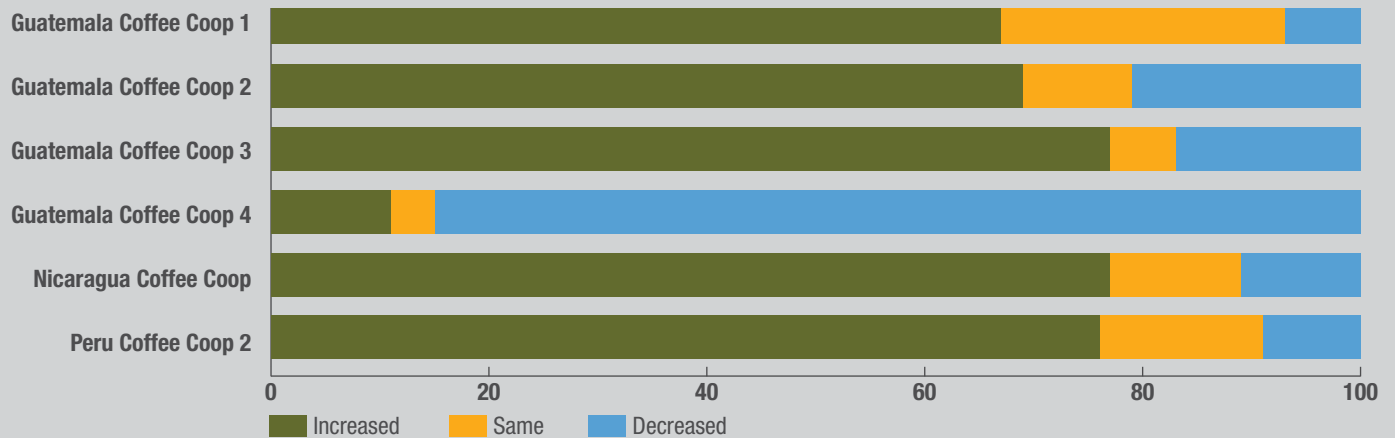
We also see mixed findings related to enterprises' impact on crop quality. We asked about changes in coffee quality in studies with four cooperatives in Guatemala in 2013.<sup>18</sup> The majority of farmers in two cooperatives reported improvements in the quality of their coffee since joining the cooperatives (see Figure 8). Cooperative managers corroborated these statements, noting a decrease in product rejection rates. Farmers attributed quality improvements to enterprise extension services, including training and assistance with fertilizer access, and to compliance with certification standards, facilitated through enterprise extension. In the remaining two groups, quality remained largely stagnant or even decreased, likely due to coffee leaf rust.

<sup>16</sup> Due to a data-entry error, we do not have data on land sizes for farmers associated with our Bolivian quinoa trader client and so cannot calculate productivity. We instead use farmers' self-reported perception of changes in productivity over the last several years.

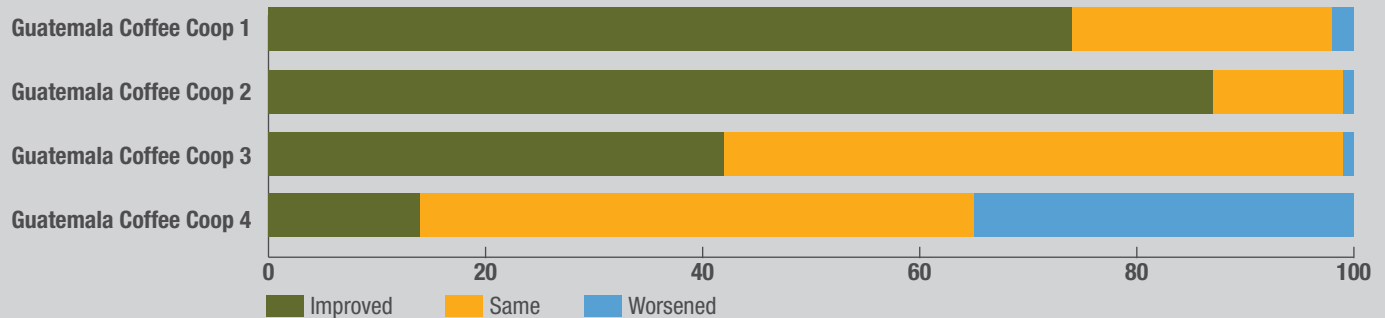
<sup>17</sup> Other factors related to farm context or management may also be confounding the picture, given that productivity is affected by a number of variables such as weather, farm size and location, crop genetics, and consistency of farmers' application of best practices..

<sup>18</sup> We did not include questions related to crop quality in other studies.

**FIGURE 7: SELF-REPORTED CHANGES IN PRODUCTIVITY BY ENTERPRISE SUPPLIERS SINCE JOINING THE ENTERPRISE<sup>19</sup>**



**FIGURE 8: SELF-REPORTED CHANGES IN CROP QUALITY BY ENTERPRISE SUPPLIERS SINCE JOINING THE ENTERPRISE<sup>20</sup>**



## Value for agricultural enterprises

Smallholder extension can allow agricultural enterprises to realize business benefits, including increased revenue from greater product volumes or quality, greater market share or more secure supply, or increased supply chain resilience. In the words of some of our clients:

*“[Our training, fertilizer program, and thresher rental services] have improved the yield [of our smallholder suppliers] over the years from 0.8 tons per hectare to 1.7 tons per hectare... have [made it] easier for the company to track production and supplier quantities, and have also improved supplier delivery times.”*

— *Sorghum private business, Ghana*

*“[Our extension services] have increased the volume of coffee brought to the enterprise. The higher volumes have enabled our services to become financially sustainable, not dependent on external financing.”*

— *Coffee cooperative, Honduras*

In fact, during interviews with managers of enterprises to which Root Capital lends, business benefits emerged as a primary motivator for engaging in supplier extension. Enterprises reporting tangible increases in supply volume or quality from extension tended to place a greater emphasis on these services, investing more money in extension or expanding their service offerings. As one Root Capital staff member based in Kenya stated, “Business performance and impact are hand-in-hand. The business won’t make a decision unless it expects it will help with the volume or quality of the crop.”

<sup>19</sup> We asked farmers in a survey: “Compared to when you joined the cooperative, how has your production changed in general?” Producers selected one of the following responses: increased substantially, increased a little, stayed the same, decreased a little, decreased substantially.

<sup>20</sup> We asked farmers in a survey: “Compared to when you joined the cooperative, how has the quality of your coffee changed, if at all?” Producers selected one of the following responses: improved substantially, improved a little, stayed the same, worsened a little, worsened substantially. While farmers were not asked about a specific quality metric, farmers likely understood “quality” in terms of the criteria assessed by the cooperatives (e.g., number of defects, humidity level, cupping scores).

## Agroemex: Fueling Business Growth Through Extension in Mexico

**Agroemex** is a Mexican cooperative sourcing organic sesame from 150 farmers in the southern state of Oaxaca for sale into the domestic market. The cooperative has a technical staff of 12 who provide monthly group trainings on organic production practices, including the use of live barriers and soil contouring to reduce erosion, the creation of organic fertilizers, and natural pest and disease management. The cooperative complements group trainings with bimonthly farm visits to address individual issues and monitor compliance with organic certification requirements.

Since Agroemex started providing extension in 2011, the enterprise has noticed improvements in sesame quality, including greater compliance with organic standards, an important condition for

farmers to qualify for price premiums under the certification. The cooperative manager also noted that extension has increased “the prestige of the organization” — he sees “greater interest among local producers in linking to the cooperative for the benefits that it offers.” Indeed, cooperative membership and sales volumes have quadrupled over the last four years.

For these reasons, Agroemex sees extension as a key component of its growth strategy. When asked about the future goals of the cooperative’s extension program, the general manager replied: “To increase sesame production and sales volumes by 20 percent per year. To increase the number of field training visits by 30 percent.”

## Supply Chain Partnerships for Improved Extension



**Equal Exchange** is a worker-owned cooperative in the United States that works to build just supply chains by connecting consumers to fair trade products grown by smallholders in Africa, Asia, and the Americas. The company believes that viable smallholder supply chains depend on strong enterprise extension programs that increase productivity and product quality. Equal Exchange staff, however, report that suppliers’ extension programs are generally over-stretched and over-reliant on classroom-style learning rather than experimentation and guidance in the field. In response, in 2010 Equal Exchange launched a project with USAID in Peru, Ecuador, and Dominican Republic to increase the extension capacity of partner cooperatives. The project provides farmers with more frequent and better tailored field-based training, complemented by loans for fertilizers and efficient irrigation systems. Participating cooperatives have reported production increases of over 60 percent in pilot areas.<sup>xxxv</sup>



**Bolivia Quinoa Trader 1** is a trader and processor owned and operated by a large quinoa distributor in North America. The enterprise purchases one-third of its quinoa from 43 producer organizations, representing more than 800 smallholders, and the remainder from local traders. The enterprise and several of its affiliated producer organizations provide extension to quinoa farmers, including training on organic production and processing, and access to inputs at wholesale rates. The enterprise believes that extension builds supplier loyalty within a competitive market, reduces pesticide contamination, enforces quality standards, and reinforces its reputation within the supply chain as a company that “can offer a glimpse into the reality of being a traditional quinoa grower.”<sup>xxxvi</sup>





In some cases, however, we believe agricultural enterprises do not perceive or achieve potential business benefits, either because they lack the capacity to evaluate the financial returns of their extension services, or because those services are not delivered effectively. Persistent low-level investment, for example, or the use of inappropriate delivery methodologies, may result in marginal productivity or quality improvements that are too limited to affect the bottom line. In this scenario, enterprises may in fact be losing money on extension, despite the potential benefits.

Finally, not all enterprises realize business benefits. In particular, extension investments generally do not pay off in regions with rampant side-selling,<sup>21</sup> where extension becomes a public good service rather than a supply chain investment. Here, the critical positive feedback loop between environmental and social progress and business returns breaks down, and a shared value approach is not sustainable. (For more discussion on barriers related to supply chain dynamics, see page 25.)



## Value for supply chain partners

Global agri-food companies are increasingly recognizing the strategic value of investing in smallholders. Companies that previously supported disparate corporate social responsibility projects to boost their public image now make supply chain investments a part of their core business to grow their supplier base, mitigate supply security and quality risks, and access new markets.

Climate change makes these investments more urgent, as increasingly erratic weather and changing climatic conditions will exacerbate supply chain risk.<sup>xxxvii</sup>

## 5. Barriers to Delivering Effective Extension Services

Despite the signs of improved farm performance discussed above, smallholders receiving enterprise extension continue to report imperfect use of climate-smart practices and frequently request more or better extension services.

Through interviews with enterprise managers, and the Root Capital staff and supply chain partners who work closely with them, we identified four persistent barriers — knowledge, supply chain dynamics, capital, and talent — that we believe prevent agricultural businesses from delivering more effective extension services. We discuss these barriers below in rough order of importance. That is to say, we start with what we see as the binding constraint, knowledge, without which enterprises cannot be successful. Improving enterprise knowledge of effective extension approaches would likely improve extension outcomes, thereby strengthening the business case for engagement and attracting additional capital that could be used to address labor shortages and other barriers.

21 Side-selling refers to the practice of farmers selling their crops to other buyers, often middlemen, despite having formal or informal purchase agreements with an enterprise.

## Spotlight on Guatemala

In our impact studies with four Guatemalan coffee cooperatives, we found that all four enterprises have helped farmers improve their production practices, but that use of climate-smart practices in absolute terms remained limited. Even when climate-smart practices were implemented, focus groups suggested that farmers were not using them correctly or consistently, due to financial or knowledge constraints. For example, we learned that farmers limited or deferred fertilizer application when money was tight or the price of coffee too low. As one cooperative member explained, “I wish there were money to improve my plot and produce more, but because I don’t have enough [financial resources], I don’t apply more fertilizer or herbicides.” Farmers requested additional support from the cooperatives, including more credit for fertilizers.

Because Root Capital works with agricultural enterprises, rather than directly with smallholder farmers, we focused our research on enterprise-level rather than farmer-level barriers to extension success. We recognize, however, that farmer-level dynamics also influence extension outcomes, as they can determine farmers’ ability or willingness to adopt innovations promoted by an enterprise or another extension provider.

Given the high percentage of enterprises providing extension in our portfolio, we also focused on barriers to effective service delivery rather than barriers to entry. Note that these barriers refer to challenges of influencing farmer practices in general, rather than difficulties specific to climate-smart practices. These gaps must be addressed for enterprises to scale climate-smart practices or other innovations.

## Knowledge

In interviews, we identified common knowledge gaps that undermine businesses’ ability to design and deliver effective extension services, from planning to monitoring outcomes.

### IDENTIFYING FARMERS’ NEEDS: INADEQUATE FARM-LEVEL DATA

Enterprises often lack the data to determine individual farmers’ extension needs, due to both enterprise- and farmer-level constraints. Enterprises generally lack the infrastructure or skills to regularly collect and analyze supplier data. Smallholders themselves may not be able to fully articulate their extension needs to the business, perhaps being unaware of possible solutions or uncomfortable voicing their concerns.

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 will not suit all suppliers. Farmers need to use different fertilization practices, for example, based on the type and health of their soil. In particular, we believe many enterprises fail to recognize specific barriers facing women suppliers (see page 24).

Without a good read on farmer performance, enterprises also risk misjudging the intensity of need in their supply chain. As one Root Capital staff member stated, “[many businesses] are simply underestimating the amount of work that is needed in the field to really improve the productivity and quality of the crop... The result is ‘fire drill’ extension,” in which enterprises respond to crises rather than proactively build resilience. This approach leaves farmers vulnerable to threats, such as the coffee leaf rust outbreak in Latin America.

### DESIGNING AND DELIVERING THE MESSAGE: GAPS IN TECHNICAL AND PEDAGOGICAL TRAINING

Even when they have a sense of farmer needs, many enterprises lack the technical knowledge to identify “best-fit” extension methodologies tailored to address these needs.<sup>22</sup> Enterprise extensionists are generally not trained to diagnose problems and develop customized solutions, but rather to promote a pre-determined approach without consideration for local context or, in many cases, farmer knowledge and experience. This “transmission” approach, also common in government extension platforms, can result in misalignment between enterprise services and supplier needs. As Root Capital staff noted,

*“There is a total disconnect between the technical services that [many businesses] offer and the financial resources of producers. The assistance can be reasonable according to the organization, but the producer will not adopt the recommendations due to a lack of resources.”*

— Root Capital staff member, Nicaragua

*“[Many businesses] are just running through the motions during their trainings, using a curriculum that is not practical to their suppliers.”*

— Root Capital staff member, Kenya

The information transmitted by extensionists is largely outdated, as most extensionist training programs in developing markets have not been updated to reflect 21st-century challenges such as climate change, population growth, and increasing urbanization. Training gaps stem from underinvestment in educational infrastructure and, more troublingly, locally relevant agricultural research — particularly research related to climate-smart strategies. Indeed, a recent study found that “the most vulnerable countries of the world [developing countries] are largely disconnected from the production and flow of scientific knowledge on climate change,” leaving governments and other stakeholders “with little contextually relevant advice.”<sup>xxxviii</sup>

22 “Best-fit approaches embrace pluralism of approaches and providers rather than one blanket approach or one provider. Best-fit solutions to rural advisory service design are based on local conditions including governance structures, capacity, organization and management, and types of methods used to provide rural advisory services.” Global Forum for Rural Advisory Services, “Five Key Areas for Mobilizing the Potential of Rural Advisory Services,” GFRAS Brief #1, October 2010. Available online: [http://www.g-fras.org/fileadmin/UserFiles/GFRAS-documents/GFRAS-Brief\\_Key-areas-for\\_Mobilizing-potential-of-RAS\\_web.pdf](http://www.g-fras.org/fileadmin/UserFiles/GFRAS-documents/GFRAS-Brief_Key-areas-for_Mobilizing-potential-of-RAS_web.pdf).





## Is Extension Meeting the Needs of Women Farmers?

The FAO reports that, across 97 countries evaluated, female farmers receive only around five percent of extension resources.<sup>xxxix</sup> Researchers refer to this phenomenon as the “gender gap” in agricultural extension.

In seven Root Capital studies with coffee cooperatives in Latin America, we found that cooperatives provided services, including extension, in equal rates to male and female members with no overt discrimination against women — a salient finding in a patriarchal cultural context.

However, we also found that equal access to extension and other services was not enough, given that female farmers faced gender-specific barriers that likely prevented them from fully benefiting from extension. Barriers included more limited agronomic knowledge due to fewer years of farmer experience; lower levels of literacy and education; limited time and ability to travel due to household responsibilities; and cultural norms against participation in public fora.

Enterprises need to take these barriers into account when designing extension so as to maximize impacts for women. Emerging best practice in this area includes offering extension at a time and in a place convenient for women farmers’ schedules; increasing the number of female extensionists, so women feel more comfortable participating; and educating male farmers on the importance of their spouses becoming proficient in crop production activities.<sup>xl</sup>

Root Capital is adapting our financial management training methodology to encourage greater participation by women. Earlier this year, [we designed a tailored training program for a women’s handicraft cooperative](#), organizing the event around women’s schedules and covering childcare costs for participants. We also created internal [guidelines](#) on how to create space for women’s participation during workshops.



## Overcoming Knowledge Barriers with Peer Training Networks

In an interesting parallel to the farmer-to-farmer training approach discussed elsewhere in this report, several Root Capital borrowers rely on peers to fill training gaps among extension staff. One coffee cooperative in Peru, for example, requested funding from Root Capital's Resilience Fund to send staff to another local cooperative

known for its innovative extension program. Similarly, Root Capital partner **Equal Exchange** has paid for several supplier cooperatives to send extensionists to field trainings with **Café Orgánico Marcela S.A.** or COMSA, a Honduran coffee cooperative known for its innovative and effective organic fertilizer program.

Moreover, many enterprises lack the methodological background in adult education required to deliver effective extension. Extensionist training programs have historically emphasized memorization over the formation of critical thinking and facilitation skills that would create space for participatory learning. Extensionists consequently tend to deliver, as one interview participant described, "training by talking at [farmers]," which is generally "good only for a certain type of individual, who can receive that information and do something with it on his own." More commonly, farmers receiving extension in this manner do not adopt recommended practices, or adopt them incorrectly. Farmers sometimes opt out entirely because the methodology is not engaging or appropriate for their context.

Misalignment of incentives for extensionists often exacerbates these challenges. Enterprises generally pay extensionists based on service volume rather than quality. Instead of counting outputs like the number of trainings provided, enterprises should align staff incentives with the outcomes that generate shared value, namely, farmers' adoption of improved agricultural practices.

## Supply chain dynamics

Secondly, supply chain dynamics may result in misalignment between enterprise and farmer interests.

In less formal value chains, we found that uncertain or inadequate supplier contract enforcement makes enterprises reluctant to invest significant resources in supplier extension. Agricultural enterprises typically work in competitive environments, in which suppliers have the option to sell to other buyers. Enterprises also generally lack the bargaining power to sanction suppliers who fail to comply with sourcing agreements or standards. As a result, they run the risk that farmers will side-sell product to other buyers despite formal or informal 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.

Several Root Capital borrowers reported discontinuing extension in response to side-selling. Others reported adjusting their strategy by focusing on farmer communities with low side-selling rates; by providing training and technical support only during the harvest to preempt side-selling as the crop became ready for sale; or by bringing in philanthropy to support the public good aspect of their extension work.

## Dialing Back Extension in the Face of Side-Selling

**Nyirefami** is a private business in Tanzania that processes finger millet flour for the local market. The enterprise lost money when it advanced seeds and fertilizers to suppliers on credit during the planting season, because many farmers sold their maize to other buyers at harvest time. Nyirefami adjusted its extension strategy to provide equipment to assist with the harvest, with the dual motives of ensuring product quality and preempting side-selling. Unfortunately, Nyirefami's suppliers now lack an affordable source of key inputs, illustrating how weak contract enforcement and supply chain relationships can undermine the potential for shared value.





## The Potential of Mobile Technology for Data-Driven Extension

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 an 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. Enterprise staff — usually extensionists — conduct the inspections, often using paper surveys. Given that enterprises may source from several dozen to several thousand farmers, internal inspections can require months to complete each year.

In addition to demonstrating compliance to certification partners, 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.

We have seen strong demand from certified borrowers for information and communication technology solutions to address these pain points. In response, we piloted a service to help certified

enterprises digitize internal inspection forms, perform tablet-based inspections with suppliers, and aggregate and analyze supplier information. In 2015, we provided training to five coffee cooperatives sourcing from more than 1,200 certified farmers. Pilot results indicate that the mobile inspection process has:

- **Improved inspection data quality**, reducing the margin of error during data entry from up to 30 percent using the paper-based method to less than one percent
- **Increased inspection data relevance and usefulness** by shortening the time lag between data collection and analysis and making the data easier to manipulate and analyze
- **Saved enterprise staff time** by reducing the time required to aggregate supplier data from around two months (with two or more extensionists entering data) to less than four hours

Cooperatives now have real-time data on their members to inform extension strategy in addition to their certification compliance and procurement processes.

In more formal supply chains, enterprises may design extension services around the needs of buyers or certifiers rather than those of smallholders. Some interviewees reported that annual monitoring and reporting for certification audits account for most of extensionists' time, detracting from farmer advisory work. As one respondent stated, "When you've been out in the field with [extensionists for a certified business]... and you really ask them about what they do, you generally find they don't spend that much time doing extension... They're really certification people." While certification monitoring data could inform enterprise extension strategy, most enterprises do not have the resources or skills to systematically analyze and act on the information. There is potential, however, to improve this situation using mobile technologies (see page 26).

## Capital

Enterprises are underinvesting in extension. Every Root Capital borrower interviewed cited the lack of extension funding as restricting the breadth and depth of services it can offer farmers.

Root Capital staff have found, for example, that coffee cooperatives in Central America typically devote around five percent of their annual operating budgets to extension services. If we apply this percentage to our 2014 Central American coffee portfolio, this translates to around \$16 in support per farmer each year. These same cooperatives

generally cite difficulties serving all of their members or serving them adequately, suggesting that investment remains well below the level needed to improve smallholders' productivity and incomes.

Underinvestment is primarily a result of pervasive capital constraints in the smallholder agriculture sector, well documented by others.<sup>xii</sup> Most small-to-medium-sized agricultural enterprises in emerging markets suffer from undercapitalization due to limited assets, restricted access to external financing, and an inability to self-finance given thin operating margins.

Undercapitalization is particularly pervasive among farmer cooperatives. The democratic governance structure of cooperatives — combined with the typically precarious economic position of members — frequently results in members voting to distribute surplus revenue to meet short-term cash needs rather than to invest in building long-term resilience through extension or other support services. As a Root Capital staff member in Peru described it, "Cooperatives pass on revenues to members and assume that farmers will use the money to invest in their fields — but farmers often cannot make these investments due to immediate cash needs." Deferred investment becomes the norm. Over several seasons, underinvestment at the farm-level results in an erosion of natural capital, such as soil and plant health, and greater vulnerability to disease and extreme weather events.

## How Much are Enterprises Spending on Extension?

Data on enterprise spending on extension is limited. Anecdotally, we know that spending varies widely. Root Capital's Coffee Farmer Resilience Fund (see page 8) provides a window into enterprise spending. To date, 31 out of 32 funding proposals have included

requests for support for extension. These proposals provide a sense of the ongoing cost of smallholder extension in the context of specialty coffee in Latin America. Note that most proposals include one or two of the items below.

FIGURE 9: AVERAGE COST OF EXTENSION ACTIVITIES OR RESOURCES INCLUDED IN RESILIENCE FUND PROPOSALS (USD)			
ACTIVITY/RESOURCE	CENTRAL AMERICA (GUATEMALA, HONDURAS, NICARAGUA)	MEXICO	PERU
<b>Farmer Trainer Salary</b> Annual salary for farmer suppliers trained as "lead farmers" (see page 30)	\$2,977 (n=4)	\$2,988 (n=2)	\$1,741 (n=1)
<b>Professional Trainer Salary</b> Annual salary for professional field trainers with formal education in agronomy	\$4,837 (n=8)	\$3,750 (n=1)	\$6,543 (n=10)
<b>Specialist Technician Salary</b> Annual salary for specialized technical staff with management and/or content expertise (e.g., project coordinator or disease specialist)	\$6,730 (n=2)	N/A	\$10,410 (n=8)
<b>Farm Visit by Extensionist</b> Direct cost of individual farm training or inspection visit, including travel, food, and equipment; does not include extensionist staff salaries	\$19 (n=1)	\$28 (n=1)	\$13 (n=6)



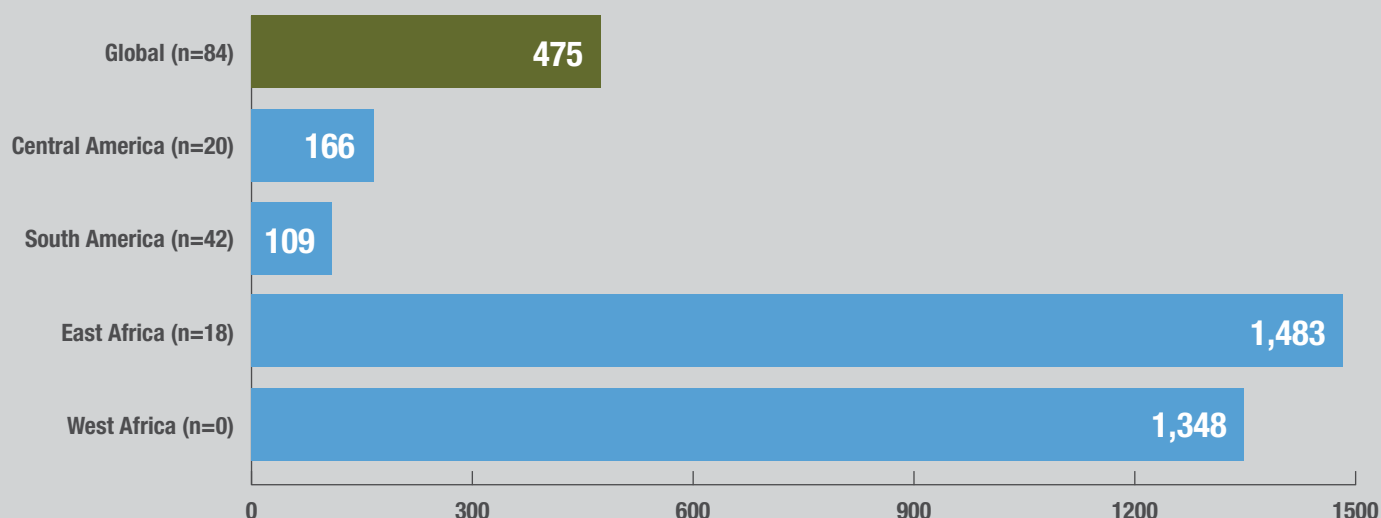


## Overcoming Cost Constraints

To address capital constraints, some enterprises have turned to hybrid funding models that use a combination of reinvested business profits and philanthropy. Enterprises typically identify donors with shared objectives around productivity, farmer livelihoods, and resilience and build multi-year funding partnerships. Some enterprises establish their own nonprofit vehicle to source and manage these donations alongside their commercial activities.

The **Gulu Agricultural Development Company (GADC)** in Uganda, for example, uses a hybrid funding model to provide extension to over 80,000 smallholders — primarily returning war refugees — growing chili pepper, cotton, sesame, and other products for domestic and international markets. The enterprise has 27 staff extensionists working with several thousand “lead farmers,” or trained farmer liaisons to provide suppliers with training and inputs throughout the growing season. GADC secures grants to fund about 80 percent of this work and covers the remainder through business revenues.

**FIGURE 10: RATIO OF FARMER SUPPLIERS PER EXTENSION STAFF FOR A SUBSET OF ROOT CAPITAL BORROWERS<sup>23</sup>**



The high farmer to extensionist ratios are not unique to agricultural enterprises. Public extension systems also remain severely understaffed, often with one agent covering several thousand farmers. A recent review of the national extension network in Ghana, for example, found a ratio of farmers to public extension agents of 2,500 to one.<sup>xiii</sup>

## Talent

Agricultural enterprises struggle to find and retain qualified extensionists at an affordable price point, resulting in thinly stretched technical teams without the training or time to adequately address suppliers' needs.

In interviews, most Root Capital staff, borrowers, and partners expressed frustration over the lack of trained extensionists in rural areas, even in countries with strong agronomic research programs. They reported that agronomists and others with appropriate backgrounds generally do not wish to settle down in rural communities. Even if agronomists are available, enterprises may not be able to afford their services, particularly if they need to compete for talent with larger companies or organizations.<sup>24</sup> Enterprises consequently tend to hire staff with less specialized backgrounds. Cooperatives, for example, often hire member farmers as part-time extensionists and train them by working with third parties, such as government agencies.

Moreover, due to the capital constraints discussed above, businesses tend to hire only a few extensionists. This leads to trainer-to-farmer ratios of one to several hundred or even several thousand, as compared to a recommended ratio of one extensionist for every 30 to 50 farmers (see Figure 10). Businesses may serve each farmer once or a few times each year — or, in larger or more disaggregated supplier networks, not at all. As one Root Capital staff member described,

*“The internal policies and workplans of the organizations state that the extension services are available for all [cooperative] members. In reality, however, the technical staff are not sufficient to cover the many demands [of farmers] and end up seeing to priority cases [such as farmers closer to the cooperative, or with outstanding debt]. In reality, the cooperative can only cover around 30 to 40 percent of its members.”*

— Root Capital staff member, Peru

Finally, enterprises often ask extensionists to juggle multiple responsibilities. For example, extensionists in cooperatives with an internal microcredit function (see page 15) often also serve as quasi-loan officers, prioritizing recipients of enterprise loans for outreach. This may focus extension on farmers with higher assets, who qualify for loans, at the expense of the poorer farmers who might benefit more from extension.

<sup>23</sup> Data is for 84 businesses that received a loan from Root Capital during the first three quarters of 2015. Note that Latin American borrowers are largely primary-level cooperatives sourcing from 500 farmers on average, while African borrowers are largely private processors with an average supplier base of 3,550 farmers (one outlier sourcing from 70,000 farmers was removed from this analysis).

<sup>24</sup> One Root Capital partner described working with a Tanzanian cooperative that hoped to hire five additional extension staff, but could not afford the \$500+ a day fee charged by the few available agronomists. To put this in context, GDP per capita in Tanzania is just under \$700. Root Capital staff have encountered similar situations in Latin America, where daily agronomist fees typically range from \$100 to \$400.





Credit: Carly Kadlec, Equal Exchange

## Overcoming Talent Constraints with Farmer-to-Farmer Extension

Given the difficulties in finding and retaining trained extensionists, many enterprises turn to farmers themselves to help deliver extension. Under this model, referred to as “farmer-to-farmer” extension, enterprises train a subset of suppliers as “lead farmers” who can provide ongoing advice to their peers as a complement to less frequent or more specialized support from the enterprise.

In our portfolio, we have seen several borrowers effectively employ lead farmers. For example, **Café Orgánico Marcela S.A.**, or COMSA, a fair trade- and organic-certified coffee cooperative in Honduras, trains local youth as part-time “community promoters” to complement its eight extension staff. To date, COMSA has trained

23 youth, generally children of cooperative members, to provide ongoing support to its 750 members.

Farmer-to-farmer models are common among other types of extension providers, including government agencies and non-profit organizations.<sup>xliii</sup> **The Grameen Foundation**, for example, employs networks of lead farmers — known as “community knowledge workers” — in Colombia, Guatemala, Ghana, and Uganda to share market and weather information and advice on best farming practices using a mobile application.<sup>xliv</sup> In Uganda alone, over 1,100 community knowledge workers serve 300,000 farmers across several supply chains.<sup>xlv</sup>





## 6. A Way Forward

Agricultural enterprises have the potential to build smallholder resilience, creating value for entire supply chains — but they cannot do so alone. Enterprise investments in extension currently risk going to waste. Yet given the threat of climate change, smallholders and the supply chains that depend on them cannot afford inaction.

We see an opportunity for global agri-food companies, extension practitioners, and funders interested in building climate-smart food systems to partner with enterprises to increase the quality and quantity of extension services. Likewise, we see an opportunity for financial institutions to support the activities of these actors, mitigating climate risk and, in some cases, expanding lending opportunities in the process.

As a lender, we will focus on the role that finance and financial management training can play, while engaging other actors supporting agricultural enterprises to address barriers that fall outside our area of expertise. We will pursue two parallel tracks (see Executive Summary for details):

- **Form partnerships to address knowledge and capital constraints.** Increased investment is not enough — enterprises must also invest in the right extension activities for their context and develop tailored funding strategies to implement them. We plan to work with partners to evaluate and enhance overall enterprise capacity to deliver extension that advances climate-smart objectives, and then develop investment strategies to suit. Most immediately, we are developing an enterprise-level extension diagnostic tool with the International Center for Tropical Agriculture and the Sustainable Food Lab, with support from USAID, to inform climate-smart investments in smallholder supply chains by global agribusinesses and other private-sector actors.
- **Expand existing loan products and business advisory services to support climate-smart extension activities.** Root Capital offers several financial products and advisory services that facilitate or complement enterprise extension activities, such as loans for fertilizer warehouses or for internal credit funds. We seek to expand our lending and advisory services to better address barriers to effective extension. Partnerships with experts on climate-smart agriculture and smallholder extension will inform our activities in this area.

Root Capital believes financial institutions, supply-chain actors, funders, and other extension providers all have a role to play in reducing barriers to effective, climate-smart extension delivery. As a lender, we have much to learn about the science of climate-smart agriculture and the art of extension delivery, and we seek collaboration and shared learning with others. Together with agricultural enterprises, we can advance shared objectives of greater rural prosperity and resilience in the face of climate change.

# Appendix A: List of Interviewees & Reviewers

We thank the following individuals for their time and input.

INTERVIEWEES		
NAME	ORGANIZATION	POSITION
Adalid Canales Aguirre	Beneficio Santa Rosa	Managing Director
Aldo Risco	Root Capital	Loan Officer, Bolivia and Peru
Alexandra Tuinstra	Root Capital	Advisory Services Manager, Central America and Mexico
Ally Jamal Singoi	Root Capital	Loan Officer, Tanzania
Ana Victoria Mansilla	Rainforest Alliance	Trainer
Angel Mario Martinez Garcia	Progreso	Coordinator
Anner Román Román	Cenfrocafé	President
Barbara Ghansah	Root Capital	Loan Officer, Ghana
Carly Kadlec	Equal Exchange	Green Coffee Buyer
Cesar Sunum	Independent Consultant	—
Charles Panyika	Nyirefami	Technician
Charles Wainaina	Root Capital	Advisory Services Manager, East Africa
Christian Mensah	Rainforest Alliance	Manager, West Africa
Eddy Selgado	Root Capital	Agronomic Coordinator
Estuardo Fuentes Gutiérrez	Root Capital	Impact Study Coordinator, Central America
Frank Hicks	Independent Consultant	—
Gerardo Pacheco Ramírez	Agroemex	Managing Director
Justus Kilian	Acumen	Post Investment Manager
Luis Miguel Ormeño	Root Capital (former)	Financial Advisory Services Coordinator, South America
Martín García	Independent Consultant	—
Michael Behan	Root Capital	Senior Impact and R&D Associate
Prosper Achulo	Agriaccess	Senior Field Officer
Robert Nyirenda	Nyirefami	Managing Director
Rosario Castellon	Root Capital (former)	Loan Officer, Nicaragua
Sabino Chan	Root Capital	Financial Trainer
Sebastian Castro-Tanzi	Champlain College	Adjunct Faculty, Division of Education and Human Studies
Sharon Serrano	Root Capital	Loan Officer, Honduras
Sonia Mercedes Vásquez	Café Orgánico Marcala S.A.	Coordinator of Technology
Todd Casperson	Equal Exchange	Head of Purchasing
Tony Poore	Agriaccess	Managing Director
Walter Vargas	Root Capital (former)	Loan Officer, Dominican Republic, El Salvador, and Honduras

REVIEWERS		
NAME	ORGANIZATION	POSITION
Benjamin Mueller	University of Illinois	Chief of Party USAID Associate Award, Strengthening Extension Advisory Services in Georgia (SEAS)
Cristina Liberati	Equal Exchange	Grant Projects Coordinator
Dan Zook	Initiative for Smallholder Finance	Manager
Jessica Murcia	Grameen Foundation	Regional Account Officer LAC
Juan Pablo Solís Viquez	Hivos	Program Development Manager
Kraig Kraft	Catholic Relief Services	Technical Advisory for Coffee and Cocoa for the Latin America/Caribbean
Mark Lundy	The International Center for Tropical Agriculture	Agroenterprise Development Specialist
Mary Kate Wheeler	Cornell University	Research Associate, Dyson School of Applied Economics and Management
Miguel Gomez	Cornell University	Associate Professor, Dyson School of Applied Economics and Management
Pablo Ramirez	Starbucks Coffee Company	Ethical Sourcing Manager
Manu Jindal	Nestlé Nespresso	Sustainability Project Manager
Rick Peyser	Lutheran World Relief	Senior Relationship Manager, Coffee & Cocoa
Simon Winter	Technoserve	Senior Vice President of Development

# Appendix B: Extension Types

Agricultural enterprises provide smallholders with extension at various points during the agricultural cycle. Services generally fall into the following categories: equipment transfer; support with accessing or applying inputs; and training. We describe each category below, offering examples from our portfolio.

## Access to equipment

Enterprises can facilitate smallholder access to equipment that improve farm efficiency, productivity, or product quality. In Root Capital's experience, enterprises tend to focus on equipment needed at the beginning of the production cycle, such as plows or soil analysis kits to support land preparation, or at the end, such as threshers and drying equipment. Enterprises often provide equipment to suppliers on credit against delivery of the crop.

**Quality Food Products**, for example, is a private business in Tanzania that produces sunflower oil from seeds grown by smallholders. The enterprise rents planting machines to suppliers, subtracting the cost from suppliers' final payment after harvest. By providing these machines, Quality Food Products hopes to help farmers plant sunflowers at the correct time using conservation agriculture<sup>25</sup> techniques, such as low- or zero-till cultivation. Conservation agriculture can improve soil structure and reduce labor needs, resulting in higher yields and farmer incomes. According to Root Capital's loan officer in Tanzania, the "enterprise is one of the very few companies [in the area] that has adopted conservation agriculture and has trained 3,000 farmers to adopt zero-tillage farming, crop rotation, soil testing, and proper use of fertilizers — and has managed to improve the old way of farming."

## Access to inputs

Enterprises can provide smallholders with inputs that improve yields or product quality, such as fertilizers, or support climate change adaptation, such as drought-tolerant seeds. Enterprises often serve as "last-mile" providers of these goods, otherwise largely unavailable in rural communities, or they make inputs more affordable for farmers by selling them at discounted rates or on credit.

A number of coffee cooperatives in our portfolio, such as **Chirinos** and **Centrocafé** in Peru, have invested in fertilizer depots for members, sometimes using Root Capital loans. Cooperatives use the depots to collect coffee pulp and other organic materials from members' farms and process them into compost. The enterprises distribute or sell the compost to members, who usually struggle to create or purchase enough fertilizer to meet the needs of their farms.

## Training

Enterprises may provide or facilitate ongoing agricultural training to suppliers. Training typically focuses on the use of good production and processing practices. Enterprises use a combination of centralized workshops and individual field visits, either directly or in partnership with third-party providers. For certified enterprises, training is often tied to compliance monitoring.

The Mexican sesame cooperative **Agroemex**, for example, provides monthly group trainings on organic production practices, including the use of live barriers and soil contouring to reduce erosion, the creation of organic fertilizers, and natural pest and disease management. The cooperative complements group trainings with bimonthly farm visits to address individual issues and monitor compliance with organic certification requirements.

<sup>25</sup> Conservation agriculture refers to "a set of soil management practices that minimize the disruption of the soil's structure, composition and natural biodiversity. Conservation agriculture has proven potential to improve crop yields, while improving the long-term environmental and financial sustainability of farming." See Cornell University, <http://conservationagriculture.mannlib.cornell.edu>.



# Appendix C: Root Capital Impact Study Methodology

Root Capital conducts impact studies to help our borrowers understand their impact, and to contribute to research on the effects of financing on agricultural enterprises and, in turn, the effects of these enterprises on their communities. Specifically, our studies seek to shed light on three questions:

1. What are the impacts of agricultural enterprises on farmers, employees, their consumers, their families and communities, and their local ecosystems?
2. Do Root Capital financing and business advisory services enable these enterprise to increase their impacts, and if so, how and to what extent?
3. What opportunities exist for further engagement and impact on the part of agricultural enterprises, Root Capital, and financial institutions and service providers working with these enterprises?

Our mixed-method studies include surveys and focus groups with direct beneficiaries of the enterprise, including farmers and employees; surveys with a comparison sample, when possible, of unaffiliated farmers with a similar profile; and surveys with enterprise management, board, and technical staff.

In 2013, we launched a series of impact studies in our primary industries and geographies, based on concentration in our lending portfolio. We started with a group of studies on coffee cooperatives in Latin America, given that roughly half of our clients work in coffee and around two-thirds are located in Latin America. We are now expanding into other portfolio segments, including quinoa in South America, cashew in West Africa, and coffee in East Africa. We share the results from our first group of studies in Latin America in this brief; findings from our studies in Africa will be available in 2016.

**FIGURE I: IMPACT STUDIES CONDUCTED TO DATE**

	COUNTRY	INDUSTRY	STUDY STATUS	FARMER SUPPLIERS SURVEYED	UNAFFILIATED FARMERS SURVEYED
1	Benin	Cashew	Data Analysis	34	37
2	Benin	Cashew	Data Analysis	32	42
3	Bolivia	Quinoa	Completed	120	53
4	Burkina Faso	Mango	Completed	14	7
5	Colombia	Coffee	Data Collection	—	—
6	Colombia	Coffee	Data Collection	—	—
7	Guatemala	Coffee	Completed	102	75
8	Guatemala	Coffee	Completed	108	81
9	Guatemala	Coffee	Completed	101	40
10	Guatemala	Coffee	Completed	96	37
11	Haiti	Coffee	Completed	2	0
12	Mexico	Coffee	Completed	21	0
13	Nicaragua	Coffee	Completed	48	0
14	Nicaragua	Coffee	Completed	114	55
15	Peru	Coffee	Completed	115	65
16	Peru	Savings & Credit	Data Analysis	102	0
17	Peru	Coffee	Completed	87	46
18	Rwanda	Coffee	Data Collection	—	—
19	Rwanda	Coffee	Data Collection	—	—
20	Rwanda	Coffee	Data Collection	—	—
21	Rwanda	Coffee	Data Collection	—	—
20	Togo	Cashew	Completed	45	71
				<b>1,141</b>	<b>629</b>

Findings of studies in gray are included in this brief. We do not include names for enterprises participating in impact studies to protect their reputations and to candidly discuss their achievements, failures, and challenges.

For additional information, please refer to the appendices of the report [Improving Rural Livelihoods: A Study of Four Guatemalan Coffee Cooperatives](#), which present our study methodology and tools in greater detail.

# Appendix D: Criteria for Private Sector Extension Models that Generate Shared Value

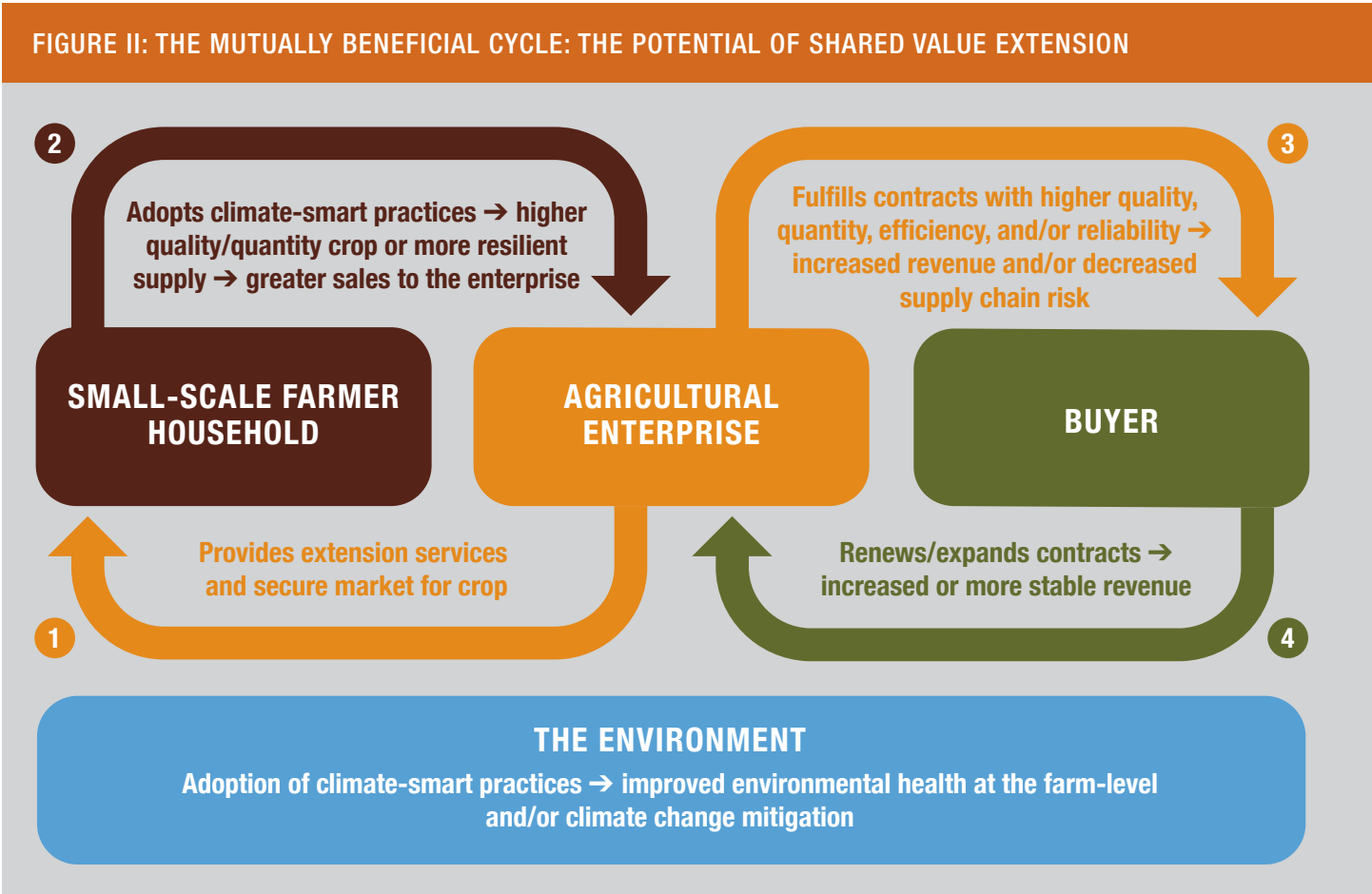
Not all private-led extension models will generate shared value. Shared value extension relies on understanding both the business returns and the impact returns for various extension interventions and identifying which interventions drive a joint return.

If the potential social or environmental benefits from extension are too low, extension returns to a profit-maximizing, “business as usual” operation that overlooks the business risks of unaddressed social or environmental needs — in particular, smallholders’ inability to sustain crop productivity or quality over time. If the potential business benefits are too low relative to the costs of providing the service, then extension will not be financially sustainable without ongoing subsidy.

We identify three criteria for private extension models that generate shared value: alignment between business and farmer interests, accountability, and trust. In Root Capital’s work as an agricultural lender, we have seen that these three conditions often, though not always, define the relationship between agricultural enterprises and their smallholder suppliers in developing markets.

First and most fundamentally, shared value extension requires alignment between the interests of smallholder farmers and their private sector extension provider. Within the context of smallholder agriculture, we see that this alignment generally stems from a common economic interest in a particular crop, mediated through an organized value chain serving a defined market. The key is that both farmers and their extension provider have a vested interest in optimizing and sustaining crop productivity and quality.

Beyond a basic alignment of interests, shared value extension depends on a tight positive feedback loop between business and farmer objectives, in which enterprise returns from extension are linked to crop productivity or quality improvements, and ultimately income improvements, for farmers, and vice versa. Root Capital has written in the past about how this positive feedback loop — what we call “the mutually beneficial cycle” — can characterize the overall relationship between many agricultural enterprises and their smallholder suppliers.<sup>xlvi</sup>



## Optimizing Farm Rather Than Crop Performance

Extension providers typically focus on one or two target crops. Smallholders, however, generally grow a number of other crops on their farms, selling part of their harvest to generate cash for their families and retaining the rest for household consumption. Smallholders do not always seek to maximize the performance of one particular crop, but rather to optimize the performance of their farm as a whole, balancing income-generating opportunities with the need to grow food or timber for their families, or to manage risk through crop diversification. Many farmer households also engage in off-farm income-generating activities, which may be more lucrative or more stable. How farmers balance these livelihood considerations will determine how they allocate their limited resources.

To be truly aligned with farmers' interests, extension providers must understand the role of their target crop(s) within smallholders' mixed-income systems. Otherwise, providers might promote activities that benefit a particular crop, but not the farmer in the long term. In taking a shared value approach, extension providers might promote farm diversification to secure the long-term supply of their target crop by helping farmers withstand market or weather shocks.

When applied to agricultural extension, we see that the mutually beneficial cycle is strongest when the extension provider is linked to smallholders through some sort of purchase agreement, in which the provider agrees, formally or informally, to buy farmers' future crop. The feedback loop tends to be weaker when smallholders are only consumers of products or services, such as seeds or fertilizers, from the extension provider, as the provider is ultimately working to maximize sales rather than crop quantity or quality; in this scenario, the interests of farmers and extension providers may diverge over time.

Supply chain dynamics can affect this relationship. Farmer feedback becomes less powerful in "captive" supply chains,<sup>26</sup> in which farmers lack access to alternative markets. In formal supply chains, enterprises may structure extension to serve buyers or certifiers first, because these stakeholders generally wield more influence over enterprise activities than smallholders.

Due diligence on social and environmental practices<sup>27</sup> can help assess whether and to what extent a mutually beneficial relationship exists between a particular business and its suppliers, setting the stage for shared value strategies. At Root Capital, for example, loan officers use due diligence to look for enterprise- and farmer-level practices that proxy this positive feedback loop. At the enterprise-level, we look for the provision of services designed to improve farmers' livelihoods — primarily credit or advances, extension, and higher pricing — as a signal of an enterprise's commitment to farmers' interests. At the

farmer-level, we look at fluctuations in the number of farmers supplying to the business and at the estimated percentage of crop sold to the enterprise versus other buyers (i.e., the side-selling rate)<sup>28</sup> as indicators of farmers' trust in the enterprise's ability to meet their needs.

Finally, extension services under the shared value framework rely on trust between the extension provider and recipients to ground the relationship — trust on the part of farmers that the extension provider is operating in their best interests, and trust on the part of the enterprise that farmers will reward their investments by honoring purchasing arrangements. Trust develops over multiple production seasons, earned and calibrated as each party fulfills its obligations.<sup>29</sup> Without this trust, the mutually beneficial relationship at the heart of any shared value strategy cannot develop. With trust, shared value extension can strengthen relationships among the participating supply chain actors.

When trust breaks down — for example, when suppliers do not fulfill their sales agreement — enterprises invest less in supplier extension. (See page 25.)

26 In captive supply chains, small suppliers are dependent on a few buyers that often wield a great deal of power and control. The asymmetric power relationship can force suppliers to link to their buyer under conditions that are set by, and often specific to, that particular buyer, creating opportunities for abuse. The high degree of control, however, also makes buyers with captive supply chains more likely to invest in increasing the skills or capacity of their suppliers than those operating in looser chains. "Types of Value Chain Governance," USAID Microlinks, <https://www.microlinks.org/good-practice-center/value-chain-wiki/types-value-chain-governance>.

27 As a mission-driven lender, Root Capital provides credit and financial training to small and growing businesses with the goal of supporting rural livelihoods and sustaining the natural environment. To ensure that our loans further our mission, we conduct due diligence not only on the financial health of the businesses we lend to, but also the health of their relationships with the producers and with the ecosystems that underpin sustainable livelihoods. We refer to this as social and environmental due diligence. For details, please refer to our issue brief on the topic: "Social & Environmental Due Diligence: From the Impact Case to the Business Case," Root Capital, January 2014. Available online at: <http://info.rootcapital.org/social-and-environmental-due-diligence>.

28 Side-selling occurs when farmers sell their crop to other buyers, often middlemen, despite formal or informal purchase agreements with an enterprise. The side-selling rate is generally contingent on farmers' ability to obtain cash at key moments in the agricultural cycle, as well as convenience and loyalty to the enterprise. Side-selling has damaging long-term effects for the farmer and enterprise alike, with the potential to rupture the mutually beneficial cycle between the two.

29 For more discussion on the topic of trust between agricultural enterprises and their smallholder suppliers, refer to our client study: "Improving Rural Livelihoods: A Study of Four Guatemalan Coffee Cooperatives," Root Capital, November 2014 – pages 19–21. Available online at: <http://info.rootcapital.org/guatemalan-coffee-study>.



# References

- i Montpellier Panel Policy Brief, “Farmers on the Climate Frontline: Six Recommendations for Addressing Agriculture in the UNFCCC Negotiations,” 2015.
- ii The Modernizing Extension and Advisory Services program seeks to define and disseminate good practice strategies and approaches to establishing efficient, effective and financially sustainable rural extension and advisory service systems. For details, see [www.meas-extension.org](http://www.meas-extension.org).
- iii International Coffee Organization (ICO), Report on the Outbreak of Coffee Leaf Rust in Central America and Action Plan, May 13, 2013.
- iv Porter, J.R., Xie, L., Challinor, A.J., Cochrane K., Howden, S.M., Iqbal, M.M., Lobell, D.B., and Travasso, M.I., Food security and food production systems, in “Climate Change 2014: Impacts, Adaptation, and Vulnerability,” Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, 2014. Available online: <https://ipcc-wg2.gov/>. Craparoa, A.C.W., Van Astenb, P.J.A., Läderachc, P., Jassogneb, L.T.P., and Graba, S.W., “Coffee Arabica yields decline in Tanzania due to climate change: Global implications,” *Agricultural and Forest Meteorology* 207 (2015):1-10. Available online: <http://www.sciencedirect.com/science/article/pii/S0168192315000830>.
- v IPCC, Summary for Policymakers, in “Climate Change 2014: Mitigation of Climate Change.” Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, 2014. Available online: [http://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc\\_wg3\\_ar5\\_summary-for-policymakers.pdf](http://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_summary-for-policymakers.pdf).
- vi Alexandratos N. and Bruinsma J., “*World agriculture towards 2030/2050: The 2012 revision*,” ESA Working Paper No. 12-03. Rome: Food and Agriculture Organization of the United Nations, 2012. Available online: <http://www.fao.org/docrep/016/ap106e/ap106e.pdf>.
- vii Projected investment needs vary widely. For recent summaries of climate financing estimates, refer to the Policy and Finance section of the “Big Facts” online resource from the CGIAR Research Program on Climate Change, Agriculture, and Food Security, available at <http://ccafs.cgiar.org/bigfacts>; and Shames, S., Friedman, R., and Havemann, T., “Coordinating finance for climate-smart agriculture,” *EcoAgriculture Discussion Paper No. 9*, Washington, DC: EcoAgriculture Partners, 2012.
- viii Buchner, B., Stadelmann, M., Wilkinson, J., Mazza, F., Rosenberg, A., and Abramskieh, D., “The Global Landscape of Climate Finance 2014,” San Francisco, CA, USA: Climate Policy Initiative. Available online: <http://climatepolicyinitiative.org/publication/global-landscape-of-climate-finance-2014>.
- ix Lowder, S.K., Skoet, J., and Singh, S., “What Do We Really Know about the Number and Distribution of Farms and Family Farms in the World?” Background Paper for “The State of Food and Agriculture 2014,” FAO, 2014.
- x International Fund for Agricultural Development, “Smallholders, Food Security, and the Environment,” Rome, 2013.
- xi Lobell, D.B., Baldos, U.L.C., and Hertel, T.W., “Climate adaptation as mitigation: The case of agricultural investments,” *Environmental Research Letters* 8: 015012 doi:10.1088/1748-9326/8/1/015012, 2013.
- xii Buchner, B., et al., op. cit.
- xiii The Initiative for Smallholder Finance, “Briefing 7: Technical Assistance for Smallholders Farmers: An Anatomy of the Market,” November 2014.
- xiv McNamera, P. E., “A Review of Sustainable Financing of Extension Services in Developing Countries,” USAID MEAS Discussion Paper 6, November 2014.
- xv The Initiative for Smallholder Finance, “How Much is Being Done for the World’s 450 Million Smallholder Farmers?” Infographic, <http://www.globaldevincubator.org/initiative-incubator/current-initiatives/infographic-smallholder-finance-technical-assistance>.
- xvi Manfre, C., Rubin, D., Allen, A., Summerfield, G., Colverson, K., and Akeredolu, M., “Reducing the Gender Gap in Agricultural Extension and Advisory Services: How to Find the Best Fit for Men and Women Farmers,” MEAS Discussion Paper 2, USAID, April 2013.
- xvii Swanson, B.E., “Global Review of Good Agricultural Extension and Advisory Service Practices,” FAO, Rome, 2008.
- xviii Anderson, J., and Feder, G., “Agricultural Extension: Good Intension and Hard Realities,” *The World Bank Research Observer* 19 (2004): 41-60.
- xix Simpson, B., and Burpee, C.G., “Adaptation under the ‘New Normal’ of Climate Change: The Future of Agricultural Extension and Advisory Services,” USAID MEAS Discussion Paper 3, January 2014.
- xx Umali-DelInger, D., “Public and Private Agricultural Extension: Partners or Rivals?” *The World Bank Research Observer* 12.2 (1997): 203-224.
- xxi For more on this topic, refer to: Umali-DelInger, D., “Public and Private Agricultural Extension: Partners or Rivals?”; and Feder, G., Birner, R., and Anderson, J., “The Private Sector’s Role in Agricultural Extension Systems: Potential and Limitations,” *Journal of Agribusiness in Developing and Emerging Economies* 1.1 (2011): 31-54.

- xxii GFRAS, "Producer Organizations in Rural Advisory Services: Evidence and Experiences," Position Paper, February 2015.
- xxiii FAO, *Climate-Smart Agriculture Sourcebook*, Rome 2013.
- xxiv McNamara, P.E., op. cit.
- xxv Root Capital, "Improving Rural Livelihoods: A Study of Four Guatemalan Coffee Cooperatives," 2014. Available online at: <http://info.rootcapital.org/guatemalan-coffee-study>.
- xxvi "Climate Change and Coffee Communities in Latin America," master project, Duke University, 2014.
- xxvii Porter, M. and Kramer, M., "Creating Shared Value," *Harvard Business Review*, January 2011. Available online: <https://hbr.org/2011/01/the-big-idea-creating-shared-value>.
- xxviii Ibid. Emphasis is the author's.
- xxix Ibid.
- xxx Personal communication.
- xxxi Steering Committee of the State-of-Knowledge Assessment of Standards and Certification, *Toward Sustainability: The Roles and Limitations of Certification*, (Washington, DC: RESOLVE, Inc., 2012): A-146-A-168.
- xxxii Dinesh, D., Frid-Nielsen, S., Norman, J., Mutamba, M., Loboguerrero Rodriguez, A.M., and Campbell, B. "Is Climate-Smart Agriculture Effective? A review of selected cases," CCAFS Working Paper no. 129, Copenhagen, Denmark: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS), 2015. Available online [www.ccafs.cgiar.org](http://www.ccafs.cgiar.org).
- xxxiii The Initiative for Smallholder Finance, "Smallholder Impact Literature Wiki." Available online: [http://smallholderimpactliterature.globaldevincubator.org/index.php/Technical\\_assistance\\_to\\_farmers,\\_both\\_productivity-\\_and\\_business-related,\\_builds\\_more\\_resilient,\\_productive\\_and\\_sustainable\\_farms](http://smallholderimpactliterature.globaldevincubator.org/index.php/Technical_assistance_to_farmers,_both_productivity-_and_business-related,_builds_more_resilient,_productive_and_sustainable_farms).
- xxxiv Starbucks Corporation, "Starbucks Distributes One Million Coffee Trees to Farmers," September, 18, 2015. Available online <https://news.starbucks.com/news/starbucks-one-tree-for-every-bag-commitment>; and Conservation International, "One Tree for Every Bag." Available online <http://www.conservation.org/stories/Pages/Starbucks-One-Tree-Conservation-International.aspx>.
- xxxv Personal communication.
- xxxvi Personal communication.
- xxxvii Gledhill, R., Hamza-Goodacre, D., and Lit Ping Low, "Business not-as-usual: Tackling the impact of climate change on supply chain risk," *Resilience: A Journal of Strategy and Risk*, PwC, 2013.
- xxxviii University of Copenhagen, "The Most Vulnerable Countries Miss Out on Climate Change Knowledge," October 2015. Available online [http://macroecology.ku.dk/media/news\\_list/2015/10-the-most-vulnerable-countries-miss-out-on-climate-change-knowledge](http://macroecology.ku.dk/media/news_list/2015/10-the-most-vulnerable-countries-miss-out-on-climate-change-knowledge).
- xxxix FAO, "The State of Food and Agriculture 2010-2011: Women in Agriculture," 2011. Available online: <http://www.fao.org/docrep/013/i2050e/i2050e.pdf>.
- xl For additional resources refer to: <http://www.meas-extension.org/resources/gender>; and Huyer, S., Twyman, J., Koningstein, M., Ashby, J., and Vermeulen, S., "Supporting women farmers in a changing climate: five policy lessons," CCAFS Policy Brief no. 10. Copenhagen, Denmark: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) 2015. Available online at: [www.ccafs.cgiar.org](http://www.ccafs.cgiar.org).
- xli Carroll, T., et al, "Catalyzing Smallholder Agricultural Finance," Dalberg Global Development Advisors, 2012. Available online: [http://dalberg.com/documents/Catalyzing\\_Smallholder\\_Ag\\_Finance.pdf](http://dalberg.com/documents/Catalyzing_Smallholder_Ag_Finance.pdf).
- xlii Beatrice Akua Duncan, "Women in agriculture in Ghana," Friedrich Ebert Foundation, Accra, 2004.
- xliii Franzel, S., Sinja, J., and Simpson, B., "Farmer-to-Farmer Extension in Kenya: The Perspectives of Organizations Using the Approach," ICRAF Working Paper No. 181, Nairobi, 2014. Available online: <http://www.worldagroforestry.org/downloads/Publications/PDFS/WP14380.pdf>.
- xliv Grameen Foundation website: <http://www.grameenfoundation.org/what-we-do/agriculture/community-knowledge-worker>.
- xlv Grameen Foundation, "Community Knowledge Worker Uganda Program: Lessons Learned 2009-2014," 2013, Available online: [http://www.grameenfoundation.org/sites/grameenfoundation.org/files/resources/Grameen-Foundation\\_CKW-Lessons-Learned-%282009-2014%29\\_Executive-Summary\\_0.pdf#overlay-context=resource/lessons-learned-2009-2014-community-knowledge-worker-uganda-program](http://www.grameenfoundation.org/sites/grameenfoundation.org/files/resources/Grameen-Foundation_CKW-Lessons-Learned-%282009-2014%29_Executive-Summary_0.pdf#overlay-context=resource/lessons-learned-2009-2014-community-knowledge-worker-uganda-program).
- xlvi Root Capital, "Social & Environmental Due Diligence: From the Impact Case to the Business Case," 2014. Available online: <http://info.rootcapital.org/social-and-environmental-due-diligence>.

[www.rootcapital.org](http://www.rootcapital.org)

