THE COSA MEASURING SUSTAINABILITY REPORT

COFFEE AND COCOA IN 12 COUNTRIES

COSA

The Committee on Sustainability Assessment (COSA) is a neutral global consortium whose mission is to accelerate sustainability in agriculture via partnerships and assessment tools that advance our understanding of social, economic, and environmental impacts. COSA advises and works together with important institutions and world-leading companies to accelerate the use of sound metrics and the effective management of sustainability efforts.

COSA Partnerships and Collaborations

COSA recognizes the complicated challenges of sustainable agriculture in developing countries. We work together with important institutions and world-leading companies to advance the ability to understand and manage sustainability efforts. A better understanding and management of sustainability will only come from the collaborative effort of a diverse and global group such as this. Therefore, as an open organization, we welcome different views in our process of learning. We invite your inputs and your partnership to understand and accelerate sustainability. Benefits of working together include:

Balanced Understanding of the Challenges of Sustainability **-** COSA's years of experience with nearly 18,000 surveys conducted and electronic data management systems, gives our Partners a distinct advantage navigating the complexities of sustainability in the challenging realities of developing countries.

Optimized Metrics for Standardization and Benchmarking **-** With a large collection of agricultural sustainability data, COSA's indicators help optimize planning and management with results that are comparable across countries and over time. COSA's metrics are increasingly applied by leading public agencies, private firms, NGOs and producer groups, resulting in low-cost comparisons and more credible reporting.

Integrating Diverse Perspectives **-** COSA is a participatory process that integrates many different stakeholders in balanced ways. It gleans expert input from an array of scientists, producer groups, private firms, NGOs, and development agencies thus ensuring widespread acceptance and recognition.

Local Partnerships **-** COSA engages leading institutions as Partners in each country, rather than outside experts and consultants, to ensure greater contextual validity.

Science and Global Credibility **-** Our International Scientific Committee is distinguished and diverse. To help ensure transparency and global acceptance, COSA aligns with dozens of important multilateral and multi-stakeholder instruments, ranging from the Bellagio Sustainability Assessment and Measurement Principles and the Rio Declaration to the ILO Core 8 Labor Standards and the OECD Economic Guidelines.

Adaptable and Customizable Tools for Management **-** Clients and researchers can customize indicators and benefit from COSA's long international experience in the design and testing of standardized processes. COSA's practical approach to data functions as a management tool that identifies the impact pathways for transforming farming and its related supply chains.

The COSA Measuring Sustainability Report

Coffee and Cocoa in 12 Countries

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COSA
Committee On
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Major Supporters

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State Secretariat for Economic Affairs SECO

iisd International Institute for Sustainable Development

UNCTAD

FORDFOUNDATION

Federación Nacional de Cafeteros de Colombia

IDB MIF Multilateral Investment Fund Member of the IDB Group

IFC International Finance Corporation World Bank Group

Solidaridad network

USAID FROM THE AMERICAN PEOPLE

ACDI VOCA Expanding Opportunities Worldwide

Norad

entwined

MISTRA

International Trade Centre

Glossary and Terms

Organizational acronyms used in this report, and glossary of terms.

CATIE	Centro Agronómico Tropical de Investigación y Enseñanza
CIHEAM	International Centre of Advance Mediterranean Agronomic Studies
CIRAD	Centre de Coopération Internationale en Recherche Agronomique pour le Développement
COSA	Committee on Sustainability Assessment
CRECE	Centro de Estudios Regionales Cafeteros y Empresariales
EAER	EAER Swiss Federal Department of Economic Affairs, Education and Research
ESRF	The Economic and Social Research Foundation
IAMB	Istituto Agronomico Mediterraneo di Bari
ICCRI	The Indonesian Coffee and Cocoa Research Institute
ICRAF	The World Agroforestry Centre
IDB	Inter-American Development Bank
IEP	Instituto de Estudios Peruanos
IFPRI	The International Food Policy Research Institute
IIED	International Institute for Environment and Development
IISD	International Institute for Sustainable Development
INA	The Institute of National Affairs
ISSER	The Institute of Statistical, Social and Economic Research (University of Ghana)
ITC	International Trade Centre
KPI	Key Performance Indicator
NRI	Natural Resources Institute
RA	Rainforest Alliance™
SECO	Swiss State Secretariat for Economic Affairs
UNCTAD	United Nations Conference on Trade and Development
WASI	The Western Highlands Agroforestry Scientific and Technical Institute

Certification is a subset of Voluntary Sustainability Standards that has a codified set of standards for production and management practices. Certification programs optimally include third party auditing to confirm that the standard's requirements are being met. Organic, Fair Trade, UTZ certified, and Rainforest Alliance are examples of certification programs referenced in this report. Other certification programs include Forest Stewardship, Marine Stewardship, and GoodWeave for forestry products, seafood, and rugs respectively.

Control is an essential component of a balanced investigation that adopts a scientific approach. In social science research, a control is a group of people who are similar to the Target group (see Target below) in as many dimensions as possible – except for the component being investigated. In this report, control typically refers to farmers who do not have a sustainability certification, or are not part of a sustainability initiative.

Counterfactual is the situation that would exist in the absence of an intervention or investment, and is thus estimated to understand whether the observed results may be due to the particular intervention or to other factors. Example: After one farmer receives training his crop yields improve by 15%, while a similar farmer receives no training (counterfactual) and her crop yields also improve by 15%; this suggests that the training may not be the cause of yield improvement.

Ecolabel is in some cases used to describe any sustainability-oriented claim accompanied by a particular identification mark or label although the term is more accurately applied specifically to those with an emphasis on the environmental dimension. They can be public or private, rigorous or baseless, and only a few have substantive documented requirements.

Impact Assessment is simply defined as the intended or unintended longer-term effects (both positive and negative) that can be attributed to a specific intervention or investment and can include aspects such as competitiveness, ecosystem health, or consistently different income levels. COSA further distinguishes its impact assessment by actively looking beyond single dimensions to include the environmental, social, and economic manifestations of change so as to better understand the relation of an impact to balanced sustainability.

Interventions, activities, or outputs such as training can lead to an impact but training is not usually considered an impact of a project or investment. If the expected impact such as yield increase occurs after training on productivity, then the causal pathway is more clear and the results more likely attributable to the training intervention, assuming that similar untrained farmers did not have similar yield results.

Indicator is a sustainability value derived from a series of observed facts that captures an important characteristic and its relative change over time (e.g., net income, yield, food security, biodiversity). An indicator may require one or sometimes multiple observations or survey questions to determine it and a specific (consistent) means of measuring it.

Intervention is a specific effort or activity undertaken, often as part of a project, investment, or initiative, whose outcome can be measured. This could be one or more activities such as training or a combination of training and credit or input provisions.

Initiative is a sustainability program such as a certification initiative or application of a code of conduct or a particular standard, whether certified or not. This includes the activities and interventions associated with it.

Metric is the specific approach or means of measuring an indicator and the formula that includes the following: a) the units of measure (e.g., kg per hectare); b) the specific calculation (e.g., total crop revenue less total cost of production = net crop income); and c) how it is gathered (e.g., surveyor observation and measurement of x at 3 representative points per ha.).

Principal Component Analysis (PCA) is a mathematical procedure used to reduce the complexity of a dataset by combining related variables to form one simple component. It captures the variance of those factors and creates a set of values (or components) that explain a portion of the variance in the data. The PCA method is used here to develop an index with weights determined by the model that ranges from 0 to 100 (0 being the lowest value).

Propensity Score Matching (PSM) is a statistical matching technique used to more accurately compare groups by estimating the effect of a policy initiative or intervention (treatment) by accounting for factors that may predict receiving the initiative or intervention and could therefore affect indicator performance. PSM helps address the issue of possible correlation between selection into treatment and other exogenous characteristics of the agents making the choice, by conditioning treatment on these characteristics. In other words it accounts for possible dissimilarities in these characteristics between the two groups. The implementation of this is noted throughout this report using (†).

SMART indicators are some of the key characteristics of COSA Indicators that include being: specific, measurable, attainable, relevant, and time-bound. In the careful forging of each indicator using hundreds of expert inputs and years of field tests, we add other characteristics to what an indicator captures or represents such as "actionable for investment policy decisions" or preferences for performance-based rather than practice or policy-based indicators.

Survey Question The specific observation made by the surveyor or the specific question that is asked of the subject (farmer, farm manager, or co-op) to collect data that informs an indicator.

Sustainability Measurement Module is a complete and ready-to-go system for obtaining and interpreting data that allows companies and other organizations a straightforward internal system to measure sustainability themselves. This allows for benchmarking or "auditing" as necessary, and facilitates the gathering and reporting of the most important sustainability data in a reasonably credible way. It includes: a set of appropriate indicators, a survey, field data gathering technology (COSATouch software), structured database, data query functions, and basic assistance with analysis. The Module also includes advisory services and tech support.

Statistical significance is a notation used to understand the robustness of differences seen in the analysis. It gives the level of confidence to help verify that the noted differences are not, from a statistical perspective, due primarily to chance. The presentation of findings follows this convention, using one to three asterisks as follows: * p<=0.10 or at least 90% level of confidence; **p<=0.05 or at least 95% level of confidence; ***p<=0.01 or at least 99% level of confidence. "P" indicates the probability of observing similar results in two samples with no statistical difference. These are calculated using t-tests.

Target (sometimes referred to as treatments) is used

to denote the entities that are assessed as part of an initiative or intervention to measure the outcomes they experience.

Theory of Change is a written outline of the inputs, processes, interventions, and actors needed to meet both specific objectives and broader goals and a common component of impact assessment. A carefully constructed theory of change can help identify the actions and resources needed to begin implementation of a sustainability initiative, and acts as a hypothesis to be tested and refined as data are gathered to confirm or contradict the assumptions.

Voluntary Sustainability Standards (VSS) are codified production and management requirements related to sustainability for agricultural production systems which, when met, can confer on the farm or the products a seal or certification denoting that the Standard's criteria have been met. VSS are by definition not legally required for trade, but can serve to differentiate the verified products from similar goods on the market. Examples include public certification programs such as Organic, Fair Trade, UTZ Certified, and Rainforest Alliance, but may also include standards which lack formal certification or are privately managed.

Executive Summary

The Main Issues

In the past two decades, markets grew to accommodate no less than 435 "eco-labels" claiming some aspect of sustainability. Some have ushered in new models for sustainable production, energy use, and trade. Yet no matter how thorough or rigorous a sustainability label is, sustainability is not synonymous with any one particular sustainability standard or label.

Products bearing the most visible sustainability labels such as Organic, Fair Trade, Rainforest Alliance, and UTZ Certified are widely recognized in the more developed markets. Their presence is the result of heightened consumer awareness and the leadership of food companies who believe they need to integrate more sustainable practices into their supply chains. The world's largest food and beverage companies, such as Mars, Mondelēz, McDonalds, Unilever, PepsiCo, and Nestlé have made public commitments to such initiatives and now routinely buy and market at least some certified or verified products.

All of the eco-labels and programs aim to promote sustainable development, yet their processes and their impacts differ significantly. It may be difficult to discern the differences in part because even the word "impact" is used loosely in many reports to indicate what is basically an intervention for instance, training or achieving a certification. Impact is simply defined as the "intended or unintended longer-term effects (positive and negative) that can be attributed to a specific intervention or investment." In fact, the credible scientific data about the impacts or performance of most initiatives is limited (i.e. using good protocols, counterfactuals, statistical significance). The data that have been collected are often not easily comparable to other data on the same topic because researchers tend to follow their own individual definitions and inclinations.

Sustainability is a dynamic process - not a static point - especially in agriculture. To have any hope of managing the process of agricultural sustainability we must first have practical ways to reliably measure and understand the key factors at a reasonable cost. There is a clear need for science-based mechanisms to help understand which initiatives and interventions improve sustainability and which do not.

COSA and our Contribution

The Committee on Sustainability Assessment (COSA) is a neutral and non-profit global consortium with a mission to accelerate sustainability in agriculture via the advancement of transparent and science-based assessments. Its objective is to provide practical measurement tools and to help interpret reliable data for firms, producers, and policymakers to better manage their efforts.

COSA employs solid and simple approaches that can inform and influence the choices that are made on a daily basis. Our approaches are relatively low-cost and immediately useful for strategic and common sense decision-making. This is equally important for businesses, policy makers, and producers, as well as Voluntary Sustainability Standards (VSS).

"COSA" refers to both the collaborative grouping of dozens of organizations and hundreds of contributing experts and to the COSA system. The system offers multiple tools for gathering, comparing and sharing information, including SMART indicators, field technologies, and implementation and analysis methodologies[1]. We have now worked in 12 countries and collected nearly 18,000 farm and village-level surveys, and will substantially escalate this work.

Evaluation and Impact assessment are moving toward more evidence-based protocols and the integration of approaches that better capture the systemic aspects of sustainability. Of course, no single aspect of sustainability functions by itself or operates in a vacuum. Understanding sustainability implies that we must consider the intertwined economic, social, and environmental aspects of the systems we study. For example, if the primary objective is increased yields and higher incomes then it is vital to also understand if those are achieved at a social cost such as child labor or to the detriment of the local environment. We must also be able to compare findings and mutually build on knowledge and this means moving away from just having discrete individual research procedures and always varying indicators toward fostering the common use of some important consistent basic indicators.

1 SMART indicators and the technologies are explicitly covered in Chapters 3 and 4.

COSA supports management decision-making by providing a sound basis for comparison and evaluation of the effects of sustainability interventions for corporations, policy makers, and farmers. Multi-criteria analysis and a commitment to understanding results in more than one dimension (i.e., more than just economic results) help to more fully explain outcomes so that interventions can be better informed and better executed. Although our work is applicable to any initiative, our considerable work with VSS forms a large part of our recent agenda and findings.

Research Findings

While the desire to compare initiatives to one another is common, we can learn more by comparing initiatives to a valid control group over time and assessing the counterfactual (what happened in the absence of an intervention). This helps to more accurately measure and understand the impacts of VSS and other initiatives. The data in this report offers some useful lessons in terms of relationships and trends but, since a number of the projects have only one or two years of observations to date, these are still insufficient to provide a thorough assessment of impacts.

Overall, looking at these data, one of the clearest understandings emerging from COSA's work is that the success of a sustainability intervention is often dependent on the particular context. As the impacts of standards and initiatives unfold over time, more conclusive evidence will continue to emerge from the multi-year comparisons with our Partners, reducing the bias that can result from single-year views. With reliable data about their results, VSS or other initiatives have meaningful insights into opportunities for improvement and perhaps a clearer incentive to improve.

Certification programs are certainly not the only route to achieve sustainability. Nevertheless, in today's complex marketplace, the Voluntary Sustainability Standards are the only codified and readily verifiable means to communicate key aspects of sustainability such as production practices or trade conditions. A number of these VSS and their certifications therefore serve as unparalleled market mechanisms to convert the desires and expectations of paying consumers and firms into real incentives at the farm level. However, they do not always do so and COSA strives to measure how well these initiatives meet their objectives in multiple dimensions.

> "Decisions to help ensure long-term sustainability can only be as robust as the information upon which they are based.

The VSS are often, though not always, associated with diverse economic, social and environmental benefits. These benefits are challenging to compare with the total costs of compliance since many of the benefits can be hard to monetize and the costs incurred are often not direct costs. In many cases, little of the consumer price premium reaches producers down supply chains and so while sustainability initiatives can help reduce poverty and risks in important ways, they cannot consistently overcome the low economic value of many commodities. For this reason, it is important to look at the range of benefits and costs (monetary or otherwise) when looking at the impacts of VSS or other initiatives.

Economic Dimension

Data collected thus far reveals that, on balance, farms that are part of a sustainability initiative (typically certification) are experiencing better economic performance compared to conventional and uncertified control farms. Many producers also tend to have a more positive perception of their economic situation. Technical efficiency was higher among producers who were part of an initiative for a range of countries, although there is ample room to improve. Average net income per hectare, the single best measure of farm-level economic viability, was higher across many of the major certification initiatives observed, but not by very large margins. Higher income was typically driven by multiple factors: higher yields, lower costs of production, and occasionally, higher prices.

Caveats: Future outcomes will not necessarily offer the same positive results, especially in terms of income. In most cases the cost of entry and training for VSS is at least partly paid by external partners that range from development agencies and NGOs to the buyers and traders of these commodities. However, it is not clear that continued funding will be available as larger numbers of producers enter. A substantial number of the producers we observed were already somewhat qualified at the start to meet the requirements of

a particular VSS. We have sometimes noted these distinctions from measuring control groups in the samples and it is probable that fewer such qualified producers will be available in the future. Further, the price premiums that buyers pay for the major certifications ranged widely and it could be that the market signal that is sent by consumers (higher price) is often not directly transmitted to producers.[2]

Possible Consequences If consumers or external partners do not continue to fund the costs for new producers to participate, some positive impacts seen here may diminish or even reverse course. As the more capable and closer-to-market producers become fully integrated into the VSS, there will be additional costs for integrating the more distant and arguably less prepared producers. It is likely that some of the lessons learned from outcomes with more entrepreneurial producers may not fully apply to a second wave of farmers, a group whose economic and environmental sustainability may be more challenging.[3]

Social Dimension

Farmers participating in initiatives promoting sustainability tend to have more training and more diverse training on a variety of topics such as good agricultural practices and environmental stewardship. In contrast, certified farmers were slightly less likely to utilize protective gear when applying agrochemicals or prohibit their application by vulnerable persons.

We see some relationship between producer education and yields but this is unlikely to be attributable to certification. In one country example, certified producers relied less on child labor in cacao than conventional control producers but this area of work needs to be deepened. The perception of producers in terms of their social situation, economic situation, and environmental situation was consistently higher for producers that were part of an initiative in many of the countries sampled. The evolution of this finding will be among the more interesting ones to track over time.

However, there were occasionally unexpected low levels of social benefits. Food security was often better on certified farms, but not always, and it is worth noting that many certified producers faced significant challenges in meeting their food needs even when their income was higher than that of conventional producers. The indicators of crop diversification and resource use efficiencies can shed more light on this issue moving forward.
We found that Producer Organizations offer a very diverse range of services and, recognizing the value of their good governance for both producers and the community, COSA is refining a tool specifically to better assess and understand Producer Organizations and their impacts. Within this process, we are evaluating the lessons of our experience and initiating new collaborations with experts and relevant institutions to integrate best practices from around the world.

Caveats: While the certified farmers we sampled clearly get much more training and we note the valuable avoidance of some negative practices such as child labor, they do not appear to be consistently or substantially different than control farmers when measured for other indicators in the social dimension.

Possible Consequences: Key areas of work such as strengthening producer organizations, gender-oriented inclusion (training, credit, land tenure), or preparing the next generation of farmers, are often left untended and thus reduce the chances of sustainable outcomes in the long term in many producer communities.

Environmental Dimension

The environmental practices and conditions found on farms that participate in sustainability initiatives tend to be somewhat better than those on conventional farms. They are more likely to use soil and water conservation measures such as soil cover, contour planting and terracing, drainage channels, and soil ridges around plants. We found more training in environmental practices and in one example, a three year study linked the training efforts of the initiative to the use of improved practices among Mexican farmers.

There is a positive relationship between productivity and environmental practices as well as between productivity and the more general environmental

2. We can capture the premiums paid but we have not been able to fully capture other transmission of this benefit given the non-monetary value and sometimes unreported costs (training, records, etc.) that the supply chain incurs for certification-related efforts.
3. Due to possible remoteness that often correlates with greater proximity to areas of higher biodiversity value and the likelihood of greater poverty.

index. However, this is not linear and varies between the countries we sampled. We note considerable differences in renovation rates for productive trees between producers that are part of an initiative and those that are not. The renewal rate of perennial farm plantings is an important point to consider when analyzing the economic data especially. Producers that are part of an initiative are also more likely to have higher levels of biodiversity that can lead to increased long-term viability.

Caveats: In a number of cases, we only see modest differences between those participating in initiatives and control groups. There may be several reasons for this that remain to be explored. These include the time lags between certification and noticeable environmental impacts or where projects started shortly before the surveys were conducted or that there may be insufficient incentives to make substantial environmental investments. As with any project it is also difficult to assess the larger regional or landscape-level impacts.

While better environmental stewardship in the form of conservation practices may correlate with yield, this is not always the case. Looking across several countries we see that the relationship between specific practices and higher yields can vary considerably.

Possible Consequences: As the realities in the field become apparent, there is some evidence of participation in training on good environmental practices and, if adopted, these practices may result in greater impacts that can be measured in the future. If we fail to understand and communicate where there may be correlations between environmental practices and positive incentives such as yield, well-being, or income it will be difficult to foster and support good environmental practices.

The Path Forward

It is not reasonable to expect that these initiatives – typically managed by modestly funded NGOs – will, in just a few years, single-handedly create the sustainable livelihoods, environment, and societies that billions of dollars of targeted aid from governments and development agencies have failed to achieve over the last five decades. As the metrics for measuring sustainability advance, becoming standardized and globally comparable, we already see several of these initiatives engaging COSA information to improve their ability to deliver the desired outcomes.

There are many paths to achieving sustainability, and for agricultural producers the fundamental routes must involve the optimization of productivity, the conservation of functional ecosystems, and the support of healthy social conditions. Measuring results, in a cost-effective and practical manner, is critical for effectively achieving these goals. This document highlights some of the main findings and lessons from COSA's recent work to develop and apply practical measurement tools.

The results presented are substantive but by no means complete and should therefore be considered as a window into the potential of the data now being gathered. Over time, this process will allow more rigorous impact analysis and hopefully inspire thoughtful and informed dialogue that can enhance more practical decision-making and help to make the future of agriculture a more sustainable one..

Chapter 1

Purpose and Structure of this Report

The purpose of this Report is to present an overview of the evolution of COSA and the recent scientific findings of the Committee's work between 2009 and 2013 in Africa, Asia, and Latin America.

Our intent is to:

1. Reveal useful lessons in understanding the effects of efforts to develop more sustainability in agriculture

2. Show how COSA and its partners have applied these lessons in its indicator development and selection, data collection tools, analysis methods, and presentation to create a process for measuring that is that is scientifically credible, while low-cost and practical and

3. Illustrate a sampling of the more salient findings, and indicate the possibilities ahead.

Intended Audience

This document is primarily written for professionals in the field, yet its relatively concise nature makes it accessible to the general reader. Readers who desire deeper insight into processes and results can find technical data and methodological details at www.thecosa.org.

Those who will find this document most useful are:

- Policymakers
- Business community
- Producer groups and individual farmers
- Scientific community
- Development community
  - Multilateral agencies such as the World Bank and IDB
  - Bilateral and foundation donors such as USAID, GIZ, SECO, Bill & Melinda Gates Foundation and Ford Foundations
  - The standards bodies that manage the Voluntary Sustainability Standards
  - NGOs such as TechnoServe, Oxfam, and Grameen Foundation

Structure of the Report

The main Chapters include the following

Chapter 2. Sustainability and its Recent Evolution
The contextual background on the trends in sustainability and the need for reliable measurement.

Chapter 3. About COSA
The rationale for COSA, explaining the basic structure, history, partners, and approach to the work of measuring sustainability. Includes an outline of COSA Systems and its operational framework.

Chapter 4. COSA Methodology
The diverse coordinated approaches COSA uses to collect and analyze data to make assessments.

Chapter 5. COSA Findings
A sampling of the many ways that COSA information can be useful, including results from several years of research conducted in a dozen countries.
It is arranged by Economic, Social, Environmental and Producer Group findings.

Chapter 6. Lessons Learned and Next Steps
A summary of key lessons and COSA plans for action.

Chapter 2

Sustainability and its Recent Evolution

Agriculture is at the center of global sustainability discussions. Nearly one-third of the world's population (up to 2.5 billion people) live and work on small farms in low and middle-income countries.[4] The World Bank notes that, of the world's 1.1 billion extremely poor people, about 74 percent live in marginal areas and mostly rely on small-scale agriculture.

While food security is still not a reality for many hundreds of millions, agriculture will have to sustain an additional 2 billion people over the next 30 years from increasingly fragile natural resources.[5] For example, agriculture accounts for 70% of all of the world's fresh water use and a substantial part of its greenhouse gasses.[6] Sustainability is indeed the most important topic in food and agriculture globally. With that in mind, the past two decades have been marked by the emergence of new ideas about sustainability and a plethora of initiatives to promote it.

> "The worst levels of poverty, hunger, and environmental degradation actually prevail in the rural areas of developing countries: they are hotspots of global poverty.

Sustainability is a dynamic continuum and can be best perceived as an ongoing process rather than a static achievement. Sustainability has been defined in several ways: this report uses the term in the generally accepted form of the international development community, stating that ***in order to achieve sustainability, long-term environmental, social, and economic needs must be met in an integrated manner without compromising the ability of future generations to meet their own needs.***[7]

Even the world's largest food and beverage companies are routinely and publicly pursuing sustainable production, manufacturing, and trade efforts. Many of these participate in public-private partnerships and have created Corporate Social Responsibility (CSR) programs. Many others market the products certified by Voluntary Sustainability Standards (VSS) such as Organic, Fair Trade,[8] Rainforest Alliance Certified, UTZ Certified and other initiatives. By 2012 there were 435 registered eco-labels claiming some aspect of sustainability.[9] These eco-labeling initiatives all share the objective of promoting sustainable development, although their approaches and success vary widely.

Figure 2.1 Examples of Eco-labels: 435 Standards Now Making Claims to Sustainability

Clearly, as these initiatives penetrate mainstream markets, their economic effects are significant. Yet the question persists: Do these initiatives improve livelihoods, trade, or the environment? To date, the nature and distribution of these impacts remain

4 See: Conway, Gordon. 2012. "One Billion Hungry: Can We Feed the World?" Ithaca, NY: Cornell University.
International Fund for Agricultural Development. 2011. "Rural Poverty Report". Rome: IFAD
Christen, Robert and Jamie Anderson. 2013. "Segmentation of Smallholder Households: Meeting the Range of Financial Needs in Agricultural Families." Focus Note 85. Washington, DC: CGAP

5 Giovannucci, Daniele, Sara Scherr, Danielle Nierenberg, Charlotte Hebebrand, Julie Shapiro, Jeffrey Milder, and Keith Wheeler. 2012. "Food and Agriculture: The Future of Sustainability. A strategic Input to the Sustainable Development in the 21st century (SD21)" Report for Rio+20. New York: United Nations Department of Economic and Social Affairs Division for Sustainable Development

6 United Nations. 2006. Second UN World Water Development Report: "Water, a shared responsibility." Rome: Food and Agriculture Organization of the United Nations and the International Fund for Agricultural Development

7 United Nations World Commission on Environment and Development. 1987. "Report of the World Commission on Environment and Development: Our Common Future." Oxford University Press. Also known as the Brundtland Commission Report.

8 Fair Trade is promoted by a number of organizations that use some spelling variation of the name; we use this form to reference any and all of the standards including Fairtrade International members and Fair Trade USA.

9 http://www.ecolabelindex.com/ecolabels/

mostly unknown. To the extent that data on the impacts of different initiatives exists, it has been often piecemeal or anecdotal, leaving the major questions of overall sustainability and global effects unanswered.

The absence of a more expansive and rigorous information base leaves policy makers, consumers, supply chain decision-makers and, worst of all, producers, increasingly challenged as they attempt to determine when and where investment in such initiatives is warranted and where it is not.[10] To further add to the challenge, over the past several decades, the reduction or elimination of rural institutions and extension services has left producers more exposed to risk and external standards. [11]

The Origins and Purpose of Voluntary Sustainability Standards (VSS)

The establishment of specific standards for agricultural sustainability emerged from somewhat different original concepts. The Organic standard (first certified 1967) sought to foster a productive landscape that is in harmony with the ecosystem. Fair Trade (first certified 1988) sought to improve the welfare and livelihoods of small and disadvantaged producers. The Rainforest Alliance (first certified 1992) sought to preserve biodiversity and the forests that contain it. UTZ Certified (first certified 2002) staked its approach to sustainability as improved productivity with good social and environmental practices. Each of these has evolved to address some of the characteristics of the others as their understanding of sustainability has developed.

These standards emerged from limited and mostly niche markets as larger firms, particularly consumer-facing multinationals, engaged standards as part of their corporate social responsibility agenda.[12] The dynamic development of corporate responses and the interaction with the different stakeholders resulted in a cascade of new codes of conduct embracing sustainability principles.[13]

These standards and accompanying eco-labels blossomed during the first years of the millennium when it became increasingly clear, even at the consumer level, that the agricultural processes upon which we all depend were not addressing the most pressing needs of rural people and their communities. For example, despite decades of policy reform and investments in agriculture and rural development, levels of global hunger remained persistent in the early part of this millennium while other economic and environmental indicators in many developing countries also remained dismal.[14]

10 UNFSS. 2013. "Today's Landscape Issues and Initiatives to Achieve Public Policy Objectives." Geneva: United Nations Forum on Sustainability Standards

11 Feder, Gershon, Regina Birner, and Jock R. Anderson. (2011) "The Private Sector's Role In Agricultural Extension Systems: Potential And Limitations." Journal of Agribusiness in Developing and Emerging Economies 1.1: 31-54

12 See for example, Giovannucci, Daniele, Oliver von Hagen, Joseph Wozniak. Forthcoming 2014. "Corporate Social Responsibility and the Role of Voluntary Sustainability Standards." Voluntary Standards Systems – A Contribution to Sustainable Development. (Eds C. Schmitz-Hoffmann, M. Schmidt, B. Hansmann, D. Palekhov) Berlin: Springer Publishing. Hartmann, M. (2011) "Corporate Social Responsibility in The Food Sector." European Review of Agricultural Economics, 38 (3): 297-324.

13 Muradian, R. and W. Pelupessy, 2005. "Governing the Coffee Chain: The Role of Voluntary Regulatory Systems." World Development 33 (12), 2029–2044. Petkova, I., 2006. "Shifting Regimes of Governance In The Coffee Market: From Secular Crisis to a New Equilibrium?" Review of International Political Economy 13 (2), 313–339.Kolk, A., 2005. "Corporate Social Responsibility in The Coffee Sector: The Dynamics of MNC Responses and Code Development." European Management Journal 23 (2), 228–236.

14 World Bank. 2007. "World Development Report: Agriculture for Development." 2008 Washington, DC: World Bank. McIntyre, Beverly, Hans Herren, Judi Wakhungu and Robert Watson (Eds.). 2009. "International Assessment of Agricultural Knowledge, Science and Technology for Development". Washington, D.C: IAASTD

The Expectations of Voluntary Sustainability Standards

The emergence of standards and the subsequent certification of compliance to them, have been seen by many as an avenue for improving the environment and reducing poverty levels among agricultural producers. The social and environmental standards in particular are intrinsically different from the more common trade facilitation standards because they aim to serve the public interest and are often less tangible to measure. The Voluntary Sustainability Standards (VSS) have been thought to reduce poverty and improve livelihoods through several mechanisms, for example:

1. Specifying more rational and resource-efficient environmental practices and farming practices can lead to improved yields, lower personal and ecological health risks, and lower costs

2. Compliant producers may improve market access or command higher payment for their products

3. Social relations are encouraged to be just and can lead to benefits such as safe working conditions, non-discrimination, and freedom to associate.

However, certification processes sometimes create considerable additional costs, including costs of compliance, required investments, and adoption of new practices, all of which producers must bear. Further, the expense of running a credible certification process is not small, and includes the costs of criteria setting, governance, monitoring, and enforcement, to name a few.

Decisions to help ensure long-term sustainability can only be as robust as the information upon which they are based. As such, there is a need to complement the growing wave of sustainability claims and initiatives with a reliable system designed to ensure sustainability efforts are indeed effective. The OECD notes in a recent review that "misleading information … could also lead to a lower effectiveness of all schemes and to possible trade distortions." [15]

"Decisions to help ensure long-term sustainability can only be as robust as the information upon which they are based.

Early VSS such as Fair Trade, Organic and Rainforest Alliance, were founded on the belief that consumers lacked information on the upstream (farmer community-level) impacts of the products they purchased, and that by providing products with this information, consumers could promote sustainable development through their purchases. In order to fulfill this vision, the conceptual justification of these early standards was to provide monitoring and enforcement mechanisms to ensure sustainability claims were substantiated by a robust certification or verification process.

Two decades ago, a small group of VSS struggled to achieve measurable market shares. Today they are in mainstream markets with more than 18% of managed forests globally certified by one of the two main sustainable forest certification initiatives.[16] Similarly, an estimated 17% of global coffee production is compliant with one or more standard, while approximately 20% of banana exports are certified "sustainable".[17]

Recent commitments to sustainable sourcing and procurement by commercial giants such as Unilever, Mondelēz International, McDonald's Corporation, Mars Incorporated, Kraft Foods Group, and Wal-Mart suggest that current market shares may be only the beginning of a new period of growth for sustainability standards. This aligns with the emerging understanding about the factors of long-term competitiveness, elaborated by Porter and Kramer among others, that include integrating supply-chain sustainability principles as a shared value.[18] Recent research suggests that sustainable companies significantly outperform their counterparts over the long-term, both in terms of stock market and accounting performance.[19]

15 Gruère, G. 2013. "A Characterisation of Environmental Labelling and Information Schemes," OECD Environment Working Papers, No. 62. OECD Publishing
16 Potts, Jason, Jessica van der Meer, Jaclyn Daitchman. 2010. "The State of Sustainability Initiatives Review 2010: Sustainability and Transparency." Winnipeg, Canada: IISD
17 Note that production is not the same as exports as cited in State of Sustainability Initiatives. Forthcoming. SSI Review 2014. Winnipeg, Canada: IISD
18 Porter, M., and M. Kramer. 2011. "Creating Shared Value." Harvard Business Review, 89 (1/2): 62-77
19 Tracking market performance for 18 years, the authors find that sustainable firms have annual performance that is 4.8% higher than conventional or traditional firms. In real terms, this translates to a return of $7.1 for every $1 invested (in 1993) in a sustainable firm, compared to $4.4 return with a portfolio of conventional firms (based on ROA). See: Eccles, Robert, Ioannis Ioannou, and George Serafeim. 2011. "The Impact of Corporate Sustainability on Organizational Processes and Performance." Working Paper 12-035. Boston, MA: Harvard Business School

Maintaining Trust: New Challenges

Given this context, there is growing consensus on the need for improved information about the actual sustainability impacts of such initiatives and indeed of development efforts in general.[20] One may wonder: How are the rural poor being affected? Are producers in developing countries being integrated or excluded from such markets? Are these programs significantly improving environmental conditions? Are workers being treated better? Is access to basics, such as food security and education, improving? Is it even fair or useful to put these expectations onto the VSS whose scope and resources are all quite limited?

As market mechanisms, VSS rely almost completely on market trust and acceptance. In the beginning, an altruistically inclined network of adherents insured credibility primarily through direct transactions. As they expanded to new markets and new supply channels, more formal mechanisms became necessary. Today, accredited third party certification is the most reliable means of verifying such standards.

While these voluntary standards provide a much-needed framework for monitoring, managing, and enforcing the application of sustainable practices, most systems (to date) rely primarily on the specification and inspection of management practices rather than performance outcomes. Since no VSS has the capacity to continually support or enforce best practices across all contributors to its supply base, there is considerable room for a wide range of impacts – positive or negative.

The Evidence of Sustainability Impacts: VSS in Developing Countries

Even though every major sustainability certification accounts for billions of dollars in retail trade, review after review suggests that there is limited concrete evidence to assess the results or effectiveness of VSS.[21] While a growing number of research papers on the impacts of individual initiatives have emerged in recent years, research and analysis that has been done is primarily based on cross-sectional linkages or correlations, and as a result, much of it does not attempt to control for common confounding factors. Because counterfactuals[22] are seldom rigorously evaluated, most existing research cannot say much about possible causation. Often, the data is not collected over a number of years and so does not allow for panel studies to assess change over time - an important component of sustainable practices. Finally, the lack of consistent or comparable measurements, even for simpler subjects like the costs of production, severely limit the ability to learn and compare best practices.

In one meta review of existing literature on the field-level impacts of sustainable-coffee initiatives, the authors found that only 14 of 37 relevant studies used methods likely to generate credible results, such as applying a counterfactual analysis that would allow attribution of impacts associated with participation in a sustainability initiative.[23] Even when research is well-done, findings can still be at odds with each other and difficult to decipher because they use different approaches to evaluate questions under different sets of assumptions and contexts. Although such studies have value and diverse views are necessary, the inability to compare answers to the same basic questions in the same way makes learning slower and more difficult.

Consider, for example, the Blackman and Rivera review in 2010 of published research about Fair Trade coffee,[24] one of the most written-about VSS. This review includes the following:

- Arnould, Palestina and Ball found that Fair Trade certification is positively correlated with the coffee volume sold and price obtained, but less consistently correlated with indicators of educational and health status.[25]
- Fort and Ruben found that while Fair Trade farmers have lower incomes and productivity, they have higher levels of some assets and investments than conventional farmers. [26]

20 Clemens, Michael and Gabriel Demombynes. 2013. "The New Transparency in Impact Evaluation: Lessons from the Millennium Villages Controversy." CGD Working Paper 342. Washington, DC: Center for Global Development

21 Tallontire, Anne, Valerie Nelson, Jami Dixon and Tim Benton. 2012. "A Review of the Literature and Knowledge of Standards and Certification Systems in Agricultural Production and Farming Systems." NRI Working Paper Series on Sustainability Standards No. 2. Chatham: University of Greenwich

22 Counterfactual is what would likely have happened in the absence of an intervention or investment (see Glossary)

23 Blackman, Allen and Jorge Rivera. 2010. "The Evidence Base for Environmental and Socioeconomic Impacts of 'Sustainable' Certification." Washington DC: Resources for the Future

24 While one cannot expect consistent results from studies conducted during different years or in different parts of the country, having at least some consistent indicators and measurement methods would allow trends and lessons to be more readily discerned.

25 Arnould, E., A. Plastina, and D. Ball. 2009. "Does Fair Trade deliver on Its Core Value Proposition? Effects on Income, Educational Attainment, and Health in Three Countries." Journal of Public Policy and Marketing 28 (2): 186–201

26 Fort, R., and R. Ruben. 2008. "The Impact of Fair Trade on Coffee Producers in Peru." In R. Ruben (ed.) The impact of Fair Trade. Netherlands: Wageningen Academic Publishers.

- Sáenz Segura and Zúñiga-Arias found that Fair Trade farmers have lower incomes, profits, and household expenditures and worse perceptions of the functioning of their cooperatives than conventional farmers. [27]
- Raynolds, Murray, and Heller suggest that Fair Trade contributes to the regulation of sustainability over the long term. [28]

Table 2.1 Changing Information Needs to Advance Sustainability

CURRENT STATE OF INFORMATION TYPICALLY	NECESSARY INFORMATION
Case studies – typically a snapshot of one place and time	Longitudinal study data observing change over time
Less rigorous methods, sometimes partisan, sometimes relying on essentially anecdotal evidence or small samples and failing to consider adequate comparison or control groups	- Replicable research allowing confirmation of findings and transparent methods to improve quality - Control groups to understand counterfactuals - Methods to ensure reasonable attribution - Inclusion of some quantitative methods and statistical significance
Diverse methods and protocols that are not widely vetted and are not consistent with others	- A coherent, tested, and broadly shared approach to research and analysis that can be scaled - Consistency allowing wide-spread adoption, learning and use - Transparent approaches that result in comparable data
Single topic or narrow focus on a few topics of interest, excluding important factors or not addressing influential variables	- Multi-dimensionality to include the environmental, social, and economic manifestations of change and both positive and negative effects whether intended or unintended

We can see a similar situation for Organic coffee certification, the oldest VSS for which, even after decades of studies, very divergent results are commonly reported even for the same crop and country. Reviews of studies conducted by the Natural Resources Institute (NRI) similarly show limited methodological rigor and divergent results.[29] The International Institute for Environment and Development (IIED) review of the published evidence for VSS comes up with a number of mixed results as well.[30] Blackman and Rivera note that such studies make it very difficult or impossible to compare results and leaves them subject to questions that are difficult to answer.[31] These examples suggest that we have left the strategic questions about the sustainability impacts of VSS largely unanswered.

27 Sáenz Segura, F. and G. Zúñiga-Arias. 2008. "Assessment of the Effect of Fair Trade on Smallholder Producers in Costa Rica: A Comparative Study in the Coffee Sector." In R. Ruben (ed.), The Impact of Fair Trade. Netherlands: Wageningen Academic Publishers
28 Raynolds, Murray and Andrew Heller. 2007. "Regulating Sustainability in the Coffee Sector: A Comparative Analysis of Third-Party Environmental and Social Certification Initiatives." Agriculture and Human Values 24 (2): 147-163
29 Nelson, V and A. Martin. 2011. "Impact Evaluation of Social and Environmental Voluntary Standard Systems (SEVSS): Using Theories of Change." Natural Resources Institute, University of Greenwich: Chatham
30 Blackmore, E. and J. Keeley with R. Pyburn, E. Mangus, L. Chen, and Q. Yuhui. 2012. "Pro-poor certification: assessing the benefits of sustainability certification for small-scale farmers in Asia." London: IIED

> When nearly every study on sustainability has a distinct form of measurement and analytical methodology, it is likely to take much longer to sort out the important lessons.

Emergence of Improved Analytic Approaches

The Committee on Sustainability Assessment (COSA) is using quasi-experimental, empirical approaches[32] and innovative technologies to expand the understanding of sustainability in practical ways. Today, a number of leading researchers and innovative organizations are now altering what we look at and how we look at it. We recognize the need to continuously improve and recognize several leaders that have influenced COSA's efforts. The International Initiative for Impact Evaluation (3IE), MIT's Jameel Poverty Action Lab and Yale's Dean Karlan are among the prominent proponents of quantitatively-oriented experimental methods that include randomized control trials – an area in which we want to be more active. Ruerd Ruben (now part of the Dutch Government) has championed the use of more sophisticated controls to address, for example, the counterfactual. Bob Piccioto (now at Kings College), advising the world's major development agencies, encourages the use of mixed methods that integrate qualitative and quantitative approaches as necessary in order to get a realistic overall perspective. The World Bank's Martin Ravaillon continues to advocate for rigorous methodology, while testing shortcuts (few work) and acknowledging that there is no substitute for thorough work. There are, of course, many others that could be mentioned. On a practical level, more than one working group of institutions is adopting the idea that sharing common approaches to measuring basic indicators is beneficial (COSA's standing axiom).[33] They agree that there are at least three reasons to do this:

1. Greater efficiency and effectiveness for most stakeholders that are asking similar fundamental questions and are looking for guidance on the most appropriate indicators that will be credible and consistent

2. Reduced burden and costs on suppliers and farmers if providing similar data

3. A better informed community of learning when we standardize the way we collect and understand similar data

Ways to Understand Sustainability

There are different ways to understand sustainability, from self-assessments to independent impact assessments. Any choice essentially represents a compromise between the accuracy or credibility of the information and the level of cost or effort that is required. The options are by no means mutually exclusive and the optimal approach often integrates a mix of speedy and low-cost information gathering with more rigorous knowledge of impacts and their pathways for action. Appendix V succinctly outlines the characteristics of the approaches that are commonly used today.

When selecting complementary strategies for understanding and managing sustainability, such as Performance Monitoring and Impact Assessment, it will be important to have a common classification or taxonomy for the indicators. This helps to ensure that they cannot only be well-integrated and clear for the project or the investment but also so that they can be reported or discussed with stakeholders, if that is desirable.

31 Blackman, Allen and Jorge Rivera. 2010. "The Evidence Base for Environmental and Socioeconomic Impacts of 'Sustainable' Certification." Washington, DC: Resources for the Future

32 Quasi-experimental research is used to assess the causal impact of an intervention or initiative and while similar to experimental design using randomized controlled trials, it does not randomly assign treatments (targets) and controls.

33 Sustainable Food Laboratory. "Towards a Shared Approach for Smallholder Performance Measurement: Common indicators and metrics." Internal document.

Chapter 3

About COSA

Our mission, as a neutral and non-profit global consortium, is to accelerate sustainability in agriculture via mutual partnerships that advance transparent and science-based assessment tools to understand and manage social, economic, and environmental impacts.

Our Principles

We each hold different ideas about what is "sustainable" and this is expected. Yet, in practical terms, we can only advance a discussion on sustainability if we understand the same "language" or at least some common metrics and definitions. Just as tools have been developed and standardized to facilitate the communication about so many things from weather to generally accepted accounting practices, COSA members believe that we benefit from standardized tools to measure and communicate sustainability. Our three principles reflect our values and serve as the foundation of what we do.

1. Non-profit and neutral global collaboration to share learning

COSA is fundamentally structured as an open consortium dedicated to mutual learning and collaborating with dozens of institutions and leading firms on common metrics and indicators. Stemming from a broad initial participatory approach, COSA's System now benefits from the ongoing and accumulated learning of its partners. The need to constantly re-design monitoring and evaluation protocols is virtually eliminated from each project and each project is held to the same standard of review.

2. Facilitating a common understanding and consistent measurement of sustainability

Sustainability is, almost by definition, complex; and this basic commitment to some level of common and transparent knowledge allows for effective learning from the many experiences and practices. Sharing common indicators and methods reduces confusion and costs while improving practical understanding. Producer communities and donors are also less fatigued from repetitive studies. Being able to replicate standardized work reduces the likelihood of research flaws and introduces a measure of transparency to the findings.

3. International Validity

In seeking a common system for good practice in sustainability assessment, COSA has drawn from internationally recognized multilateral instruments as an important foundation. Three accords in particular have contributed a strong, comprehensive, and balanced theoretical basis for the COSA indicator development process:

- The ten ***Bellagio Sustainability Assessment and Measurement Principles*** describe key steps to the development and implementation of a sustainability assessment process for ensuring transparency and credibility.
- ***The Winnipeg Principles*** offer one of the first and longest standing efforts to provide a comprehensive foundation for the guidance and assessment of sustainable development initiatives.
- ***The Rio Declaration (and Agenda 21)*** provides detailed and internationally agreed upon substance to the Winnipeg Principles and designate "meeting the needs of those most in need" and "participatory governance" as core components of sustainable development.

COSA by the numbers

34 partners and counting

17,800 surveys

12 countries

15 million data points

The substance of this process is deepened by not only having been broadly participatory but also by undergoing several years of real-life field testing.

Table 3.1 Multilateral Agreements

A SAMPLING OF INSTRUMENTS THAT INFORM COSA INDICATORS
Ilo Core 8 Conventions
FAO Rome Declaration on World Food Security
UN Framework Convention on Climate Change
Stockholm Convention on Persistent Organic Pollutants
International Plant Protection Convention
OECD Agri-Environmental Indicators
Ramsar Convention on Wetlands
Global Compact – UN
International Organization for Standardization (various)
Global Reporting Initiative
Convention On Biological Diversity
FAO GAP
IFC Social and Environmental Policies & Performance Standards
International Covenant on Economic, Social and Cultural Rights
Millennium Development Goals
OECD Economic Guidelines
Rio Declaration
UN Convention to Combat Desertification
Universal Declaration of Human Rights
WHO Guidelines for Water Quality

In addition to these foundational international accords, the COSA process has drawn from existing sustainability priorities as identified by more specialized, sustainability-related multi-lateral agreements and instruments (Table 3.1). These agreements provided the basis for the global themes that underlie the COSA indicator groups represented on subsequent pages and in Appendix I.

Because we have purposely drawn from a diverse range of well recognized foundational principles, the COSA approach can be used as a sustainable livelihood framework that is useful for comprehending the diverse assets, performance characteristics, and capabilities of producers and their farms.[34]

Brief Origins and Purpose

The Committee on Sustainability Assessment (COSA) formed through an affiliation of field experts and organizations coalesced around the need to improve how we address sustainability, in light of the absence of any practical and coherent agreement on what sustainability meant or how to measure it.[35]

Between 2005-2007, COSA members undertook a systematic review to determine what was known about the effects of various agricultural practices on sustainability - in other words, what was working and what was not. This work identified some key impediments to the understanding and management of sustainability:

- Most of the research on sustainability initiatives was limited to financial or economic analyses with much less dealing with environmental and social factors
- Most of the work was methodologically weak, with very little that qualified as impact assessment (see Glossary and Chapter 4) and nearly all of it lacked an adequate treatment of the counterfactual
- In most cases, the single snapshot view of a specific season or year failed to capture the expected longer-term manifestations of environmental and social changes.

Although leading development thinkers have long noted that it is critical "to take into account the multi-dimensionality of poverty"[36] there was little in the applied scientific literature that looked systemically at agricultural interventions taking into account that, if they are to be sustainable, they too must be understood multi-dimensionally. This is evident when, for example, efforts to maximize economic returns do not account for environmental effects such as degradation of water sources or loss of forests and biodiversity.

By 2008, COSA had polled hundreds of experts and stakeholders to determine what specific topic areas they believed were critical for sustainability. We then set about to see which of these aspects could readily be measured and how to best do so in a neutral manner and under the often challenging circumstances of rural areas in developing countries.

34 Scoones Ian. 1998. "Sustainable Rural Livelihoods: A Framework for Analysis." IDS Working Paper 72, Brighton, UK: Institute of Development Studies.
35 Credit for the name goes to IISD's Jason Potts who also co-founded The Finance Alliance for Sustainable Trade (FAST) and the Sustainable Commodity Assistance Network (SCAN).
36 See, for example: Bourguignon, François and Satya Chakravarty. 2003. "The Measurement of Multidimensional Poverty." Journal of Economic Inequality; Vol 1 p. 25-49

The COSA System

Expert input from a consortium of dozens of partner institutions and hundreds of experts has created the innovative features of the COSA System. The purpose is to facilitate a highly credible and yet very practical approach to understanding sustainability issues.

Figure 3.1 The COSA System

	**Scientific Methodology** A proven scientific methodology for assessing the multi-dimensional aspects of sustainability in agriculture
	**Local Capacity** Local capacity building in developing country institutions so they can partner in research
	**S.M.A.R.T. indicators** Commonly defined S.M.A.R.T. indicators for consistent measurement and credible data
	**Tools** A set of tools for gathering, comparing and sharing information

1. Scientific Methodology

To understand the intrinsic complexity of agricultural production systems and the wide range of variables that may affect their performance, COSA builds on the strength of its Systems to offer a harmonized framework of globally accepted indicators and tools that serve as an important basis for its assessments. In addition to establishing a common framework for the collection and analysis of comparable sustainability data, the COSA initiative is deeply committed to ensuring the methods necessary in order to have valid analyses and scientific credibility for its findings.

COSA's impact assessments use a mixed-method approach that better captures and assesses the diverse conditions found in the field. While basic scientific principles must underlie all sustainability analyses, needs and perspectives vary. The main component of the approach is the use of two standardized surveys: one administered to farmers, and another conducted with cooperatives or the community level organization that interacts with farmers. This process is informed and bolstered by the integration of useful data gathered from key stakeholders before and after the assessment.

COSA invites partnership in analysis and includes scientists and expert practitioners from the North and the South. It is committed to a neutral, multi-criteria approach and its data can be used for most forms of analysis, ranging from simple cost-benefit analysis and correlations between variables of interest, to supply chain analysis, lifecycle analysis, and regression analysis. COSA encourages such diversity as a vital source of shared learning.

COSA Scientific Committee
The COSA initiative is deeply committed to ensuring the methods necessary in order to have scientific credibility for its findings, particularly the attribution of observed differences to the interventions being monitored. COSA's extensive networks are clearly one of its primary strengths. In the realm of scientific or technical advice, COSA benefits from the input of a number of scientists from around the world. Among these is an esteemed group that includes:

Tanguy Bernard
International Food Policy Research Institute (IFPRI)
Lawrence Busch
Michigan State University
Alain de Janvry
University of California at Berkeley
Michael Hiscox
Harvard University
Jeremy Haggar
University of Greenwich Natural Resources Institute
Steven Jaffee
World Bank
Jaya Krishnakumar
University of Geneva
Dagmar Mithöfer
Rhein-Waal University
Bob Picciotto
Kings College & World Bank, Director General Evaluation (ret.)
Krislert Samphantharak
University of California at San Diego

2. Local Institutional Partners

One of the risks of a global framework for sustainability assessment is the potential to lose relevance to local conditions. Partnerships within many different networks are therefore an integral part of COSA at every level.

Knowing that sustainability cannot be successfully imposed from the outside, COSA engages leading institutions as Research Partners in each country to build local capacity rather than relying on outside experts. These investments are made possible by the support of key donors.[37]

With adequate initial COSA support, the Research Partners in a country become valuable advocates of sustainability and are ideally placed to ensure the contextual validity and relevance of the findings within their own agricultural sector. They also serve as a resource for anyone wishing to better measure or understand sustainability in that particular country, so that new efforts can benefit from, and build upon, the lessons already learned. It is expected that after 3-4 years, COSA's institutional Partners will be able to conduct this sort of research at a world-class level on their own, using COSA mostly in an advisory capacity. One of COSA's institutional Partners now conducts so many sustainability assessments for private firms, NGOs, producer groups, and even governments, that this type of work has become its primary source of research revenue.

COSA selects a Research Partner institution with the objective of developing permanent institutional capacity in a developing country and to ensure that its new expertise as a respected guide or advocate can be made available to help others better understand the particular local issues of sustainability.

For more information about partnering with COSA: www.thecosa.org/our-partnerships

COSA Research Partners

COSA believes that any path to sustainability must include the local institutions in each country. Following is a partial list of respected research collaborators with which COSA has worked.

CATIE (Central America)
The leading applied research institution in the region trains PhD researchers in applied methods, and offers a cross-country focus operating in Costa Rica, Nicaragua, Guatemala, Honduras, Mexico, El Salvador, and Panama.

CIRAD
The leading French institution for international agricultural research operates with local partners in dozens of countries.

37 For example, long-term core funding from SECO (Swiss Government) helps COSA to build permanent institutional capacity in a group of developing countries.

CRECE (Colombia)
Decades of advanced rural studies grant the Center for Regional Coffee and Center for Regional Entrepreneurial and Coffee Research a well-recognized advantage that is now being developed beyond its traditional areas into cocoa and other sectors.

ESRF (Tanzania)
The Economic and Social Research Foundation strengthens capabilities in policy analysis and decision making, and articulates and improves the understanding of policy options in the public and private sectors and in the donor community.

IAMB (North Africa & Mediterranean region)
The Mediterranean Agronomic Institute, with five decades of multi-country experience, is a leader in post-graduate training, applied scientific research and regional partnership activities.

ICCRI (Indonesia)
The Indonesian Coffee and Cocoa Research Institute, established in 1911, is under the auspices of Indonesian Agency for Agricultural Research and Development.

ICRAF
The World Agroforestry Centre is one of the most global of the Consortium of International Agricultural Research Centers (CGIAR) and has a broad mandate to understand the social and economic ecology of market-based agriculture and forestry systems.

IEP (Peru) – Five decades of experience and respected scholarship make the Institute of Peruvian Studies one of the country's leading centers for quality research.

INA (Papua New Guinea)
For more than 3 decades, the Institute of National Affairs has carried out research with world-class academic institutions to facilitate public-private dialogue.

University of Ghana ISSER
Since 1962, the Institute of Statistical, Social and Economic Research has been one of the country's most respected teaching institutions, generating solutions for national development.

WASI (Vietnam)
The Western Highlands Agroforestry Scientific and Technical Institute is one of Vietnam's leading research bodies.

COSA and select Research Partner institutions share state-of-the-art best practices to ensure a virtuous circle that benefits each of them for their participation. We maintain a global database of comparable indicators that further serves the escalation of mutual knowledge. COSA also links our Partners to a global network of research and development organizations, companies, and donors.

3. SMART Indicators

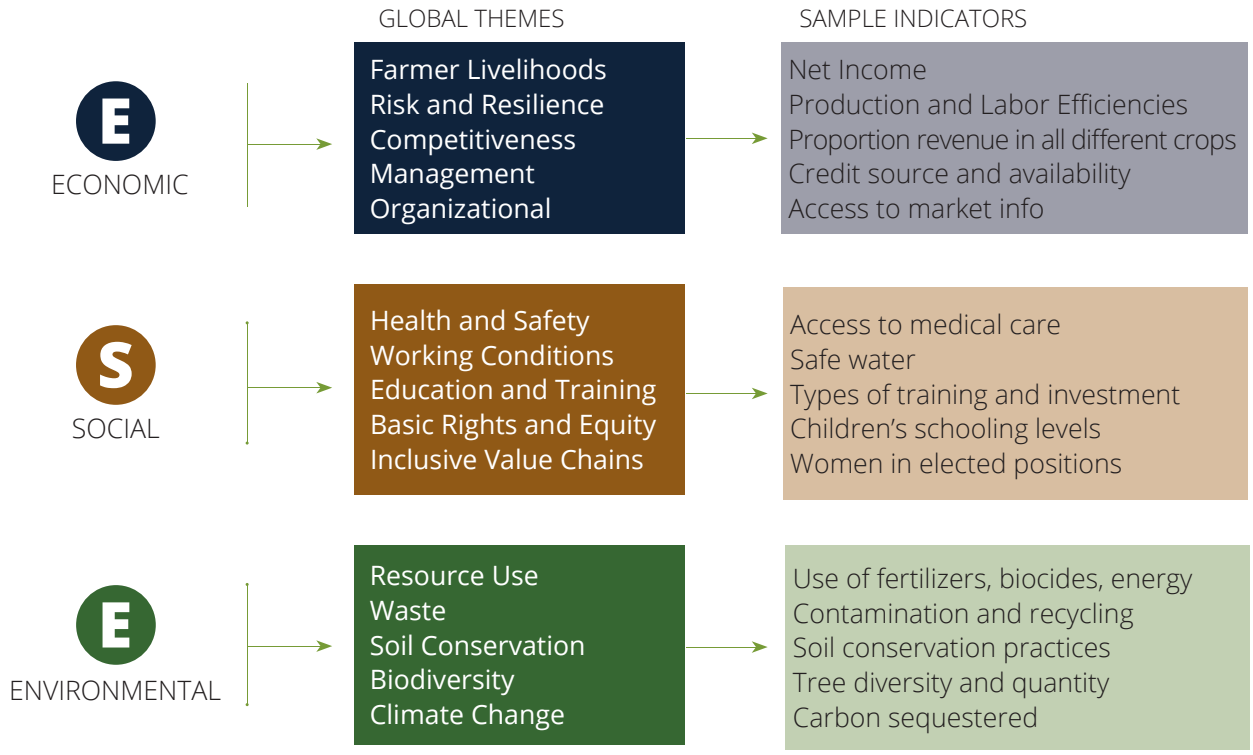
To understand the intrinsic complexity of agricultural production systems and the wide range of variables that may affect their performance, one of the hallmarks of the COSA System is its unique set of well over 100 globally accepted indicators and corresponding methodologies. These serve as the basis for its consistent and comparable measurements.

SMART CHARACTERISTICS
Specific
Measurable
Attainable
Relevant
Time-bound

These commonly defined SMART indicators cover 15 distinct Themes (Fig 3.2). They are part of a system that includes not only a clear theoretical vision for indicator development, but also the practical aspects of electronic data collection, database management, analysis, dissemination, and a lifecycle of continual improvement across a number of years and country experiences.[38]

38 This aligns well with the recommendations of: Russillo, Aimee and László Pintér. 2009. "Linking Farm-Level Measurement Systems to Environmental Sustainability Outcomes: Challenges and Ways Forward." Winnipeg, CA: International Institute for Sustainable Development; and Russillo, A. 2008. "State of the Art in Measuring the Impacts of Social and Environmental Standards: Issues." London: ISEAL

Figure 3.2 Sampling of Global Themes that Inform major COSA Indicators



The indicators that were developed from this process underwent a painstaking evaluation of whether or not they met SMART characteristics. In addition, COSA indicators are:

1. Aligned with dozens of international accords

2. Generally comparable across different conditions, crops, and situations

3. Oriented to measurably change over the short to mid-term

4. Sufficiently specific in definition to ensure clarity and comparability and ensure that the same thing is measured each time in the same way

5. Measurable with reasonable cost and effort

Equally important, every indicator was filtered for its potential to be actionable in the sense that the information from the indicator could reasonably function to stimulate a change of policy or investment.

4. COSA Tools

Having accurate information on the actual economic, social and environmental impacts of diverse agricultural processes is not a simple task, especially involving small-scale and poor farmers. From its inception, COSA has evolved to address the fundamental obstacles of doing this. We have invested heavily to reduce the costs of data gathering and to increase the accuracy of complex field research, and have worked to ensure the usefulness of the data and to address methodological challenges, such as bias and attribution. The COSA tools and approaches are continuously refined as we learn with our partners

COSA'S STANDARDS FOR MEASUREMENT TOOLS
To be truly ***effective***, they must be reliable and credible
To be ***credible***, they must be consistent, transparent, and based on sound science.
To be ***useful***, they must be comparable across countries and conditions.
To be ***used***, they must be simple enough to serve the day-to-day needs of the three stakeholders that most influence sustainability: producers, companies, and policymakers.

Figure 3.3 COSA Tools and Approaches

MEASURE	MONITOR	ASSESS AND EVALUATE	DATA	MANAGEMENT
COSA-Indicators Effectively measure key facets of sustainability in a relatively quick and cost-effective manner. **COSA-Survey** Standard or customized. For Farm, Village, Producer Organization. **COSA-Touch** Improves data accuracy by offering skip-logic, question helper, and data validation.	**COSA-Monitor** Practical ways for firms and projects to collect their own performance data and integrate it into their management.	**COSA-Analysis** World-class scientific process ensures that methods and data are reliable and accurate. **COSA-Evaluation Report** Interprets project results from a sustainability perspective. **COSA-Impact Assessment** Deepens strategic understanding & allows credible reporting	**COSA-Database** The largest set of comparable data on agricultural sustainability to enable consistent comparisons of multiple years' data and diverse locations.	**COSA-Dashboard** A simplified reporting process that allows for active sustainability management. **COSA-Mapping** Spatial understanding of key parameters facilitates strategic planning and targeting COSA-Impact. **COSA-Efficiency** Analyses of different kinds of efficiencies can improve outcomes with minimal external inputs. **COSA-Advisory** Strategic guidance on sustainability issues and information.

Integrating COSA with other Metrics and Indices

There are a number of global themes or categories in the below table that COSA can readily calculate and present in its work as indices and cross tabulations. COSA also integrates existing indices where these are valid. A prominent example is its testing and application of the Progress out of Poverty Index (PPI) - now used in more than 40 countries - in collaboration with the Grameen Foundation. COSA projects also test other approaches and will soon test components of the International Food Policy Research Institute (IFPRI) Women's Empowerment in Agriculture Index and other indices. Likewise, COSA is partnering with Root Capital, a noted financial innovator, to expand the available indicators on credit and finance.

Sharing Information

Along with our UN Partner agencies, COSA is developing a dissemination platform to assist those who want to have better access to the refined COSA indicators so as to make better decisions. The primary vehicle will be a searchable database that will be integrated into the UN-WTO International Trade Centre's global information systems. The indicators will provide the basic averages for different countries, crops, and types of VSS and all the information will be securely scrubbed of specific identifying characteristics.

Millions of data points offer a considerable wealth of data – the largest set of comparable data on agricultural sustainability in developing countries. COSA is dedicated to making this available for learning and decision-making.

Who Uses COSA Information?

In addition to the information it provides, COSA has distinct learning and management applications for at least four specific groups: for producers, industry, policy-makers, NGOs and standards bodies. We offer here some concrete examples of how we work with them.

1. For producers: COSA tools help producers make more sound and cost-effective sustainability choices by better understanding the expected investments in time and money, and the likely benefits of any initiative, investment or standard. It also helps them manage business by permitting benchmarking with other producers under similar conditions.

Case: One of the world's largest and most successful producer organizations, the National Federation of Coffee Growers of Colombia, has utilized COSA research methods for more than four years allowing it to collect and share information in a transparent and consistent manner across the regions of Colombia where it operates. Its managers note that having highly credible information permits them to better select from the many sustainability approaches that have been tested there and to help them to better meet their needs. As a simple indication of the perceived value of this information, the organization has invested hundreds of thousands of dollars of its own funds to gather and analyze COSA data on productivity, environmental impacts, social perceptions, and much more.

2. For traders, manufacturers, retailers, and investors: COSA provides realistic information for those that have an interest in maintaining the stability of their long-term supply and its quality. Especially for consumer-facing firms, the credibility of COSA's approaches can facilitate both reporting and compliance needs. Firms that are more advanced can use COSA to effectively integrate the appropriate sustainability principles (such as good farm management) into their operations or supply chain.

Case: One of the world's fastest-growing multinational coffee companies, Nestle's Nespresso, was an early adopter of COSA metrics. There was concern when it received the unpleasant evaluation that the producers applying its standards were achieving only average or below-average environmental results. To their credit, the firm used the information to improve and reconfigure their approach and within two years there was substantial measurable improvement of environmental practices among its farmer-suppliers.

> "Sustainability is indeed difficult to measure, but you cannot manage what you cannot measure.

3. For policy-makers and development agencies: COSA offers clear and objective information on how different sustainable practices affect producers and their communities. They can then make better-informed decisions on the appropriate mix of policy instruments that will be more likely to have the desired outcome.

Case: One of the world's largest development agencies, the International Finance Corporation, recognizes the need to hold its investments to a higher standard of overall sustainability. By commissioning COSA to design and pilot a Sustainability Measurement Tool Kit, it seeks to improve the consistency and relevance of the metrics applied across the many development projects that it funds. In addition, the transparency of such a system makes it easier to learn and to communicate lessons clearly. Having reliably comparable ways of measuring sustainability in agriculture opens the door to benchmarking outcomes in different regions. While still in its nascent stage, it is expected that this will help to refine and better design projects as well as to scale up the specific and diverse aspects that are working e.g., credit facilitation, training, or ecological practices.

4. For standards bodies and NGOs: COSA presents a credible and friendly way to better understand their effects under different conditions and to apply the learning in order to improve their standards, and therefore, help ensure the desired impacts of their sustainability systems.

Case: One of the world's fastest-growing VSS, UTZ Certified, has regularly worked with COSA to better understand the results of their efforts among coffee and cocoa farmers. It was stymied in one origin where its dedication to farmer productivity was not generating greater yields. Analysis showed that yields

were already at a high range of efficiency and would require an inordinate investment to generate even modest increases. However, the COSA Research Partner was able to identify that the sustainability training already being offered likely resulted in a more rational use of agrochemicals (primarily fertilizers) that reduced producer costs and potentially improved environmental conditions (nitrogen leaching is common in these production areas). The effect on net income was probably greater than what could reasonably be achieved with greater investments in yields. UTZ could therefore better understand how to target its work in the region in order to better allocate its resources and also optimize outcomes for participating producers.

Most clients and Partners engage COSA Advisory Services to focus on one or more of these objectives:

1. Develop a practical understanding of how to influence farmer sustainability
2. Understand how to leverage different aspects of sustainability (efficiency, better practices, risk management, etc.) to improve competitiveness
3. Facilitate the integration of more effective sustainability practices into a project or a business unit.

Working with COSA

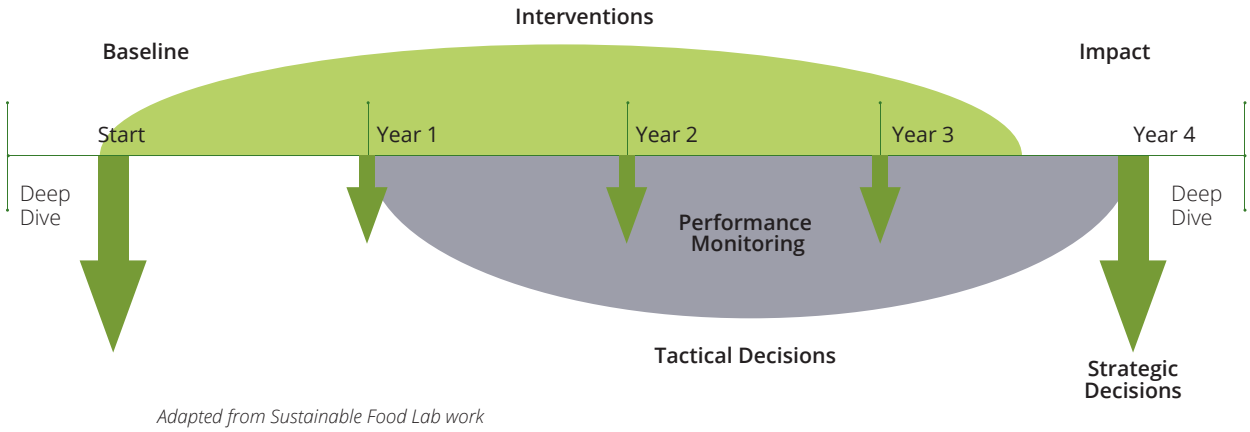
There are a number of options for working with, or even partnering with, COSA. Our Advisory Services take advantage of considerable experience with many companies, development agencies, and producer groups. Our understanding helps to frame the choices in a clear and coherent way and to facilitate the most effective decisions. Our aim is to understand the client's needs and then identify the best suite of options. These can range from simple diagnostics or indicator choices all the way to impact evaluation and interpretation for public reporting. This section explores some of the more important ways that we support our clients and partners in their efforts to understand and manage sustainability priorities.

Deciding the Right Approach

Both Impact Assessment and Performance Monitoring can be used in harmony to optimize the quality and cost of the information. Figure 3.4 illustrates how the professional measurement of a Baseline and Impact Assessment can be paired with day-to-day Performance Monitoring.

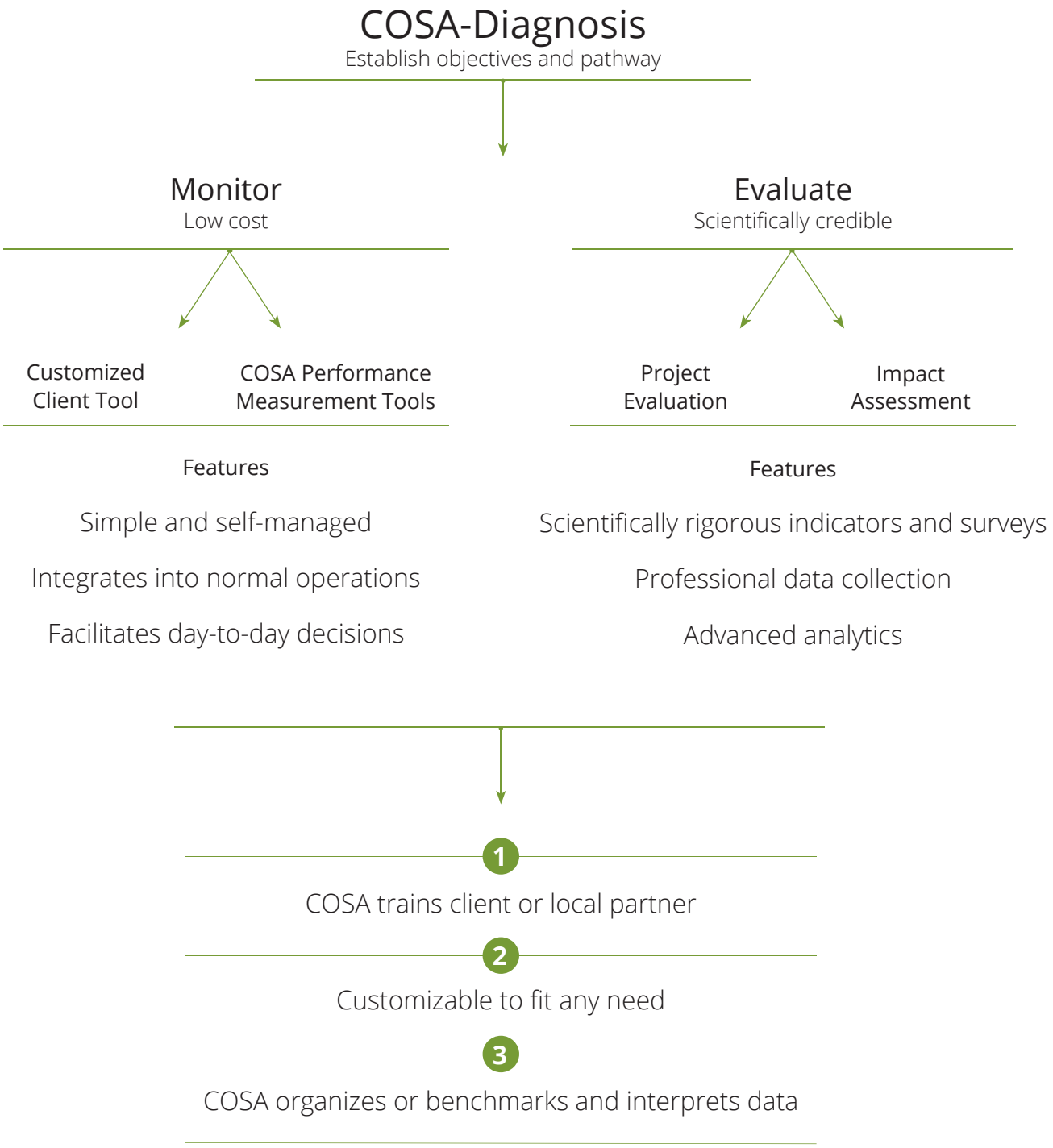
The baseline fieldwork performed prior to the intervention serves for establishing the initial condition. Then projects or companies can start Performance Monitoring from a more realistic basis and have the right data for an Impact Assessment that determines which of their sustainability investments make sense and whether their Performance Monitoring is accurate.

Figure 3.4 Baseline and Impact Assessment Paired with Performance Monitoring



Adapted from Sustainable Food Lab work

Figure 3.5 Deciding the Right Measurement Approach to Use



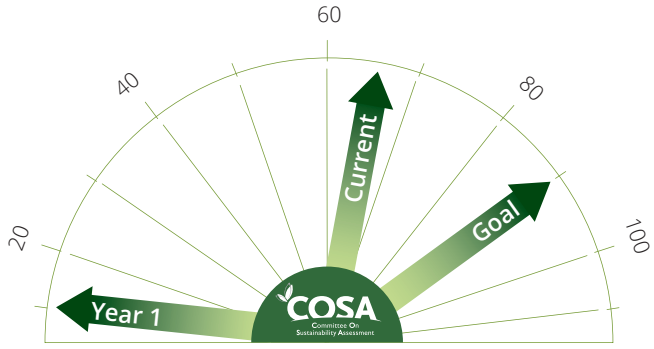
Sustainability Performance Monitoring for Managers

The COSA Performance Monitoring System offers affordable performance measurement that integrates vital information feedback loops to management. Given the complexity of supply chains and the conditions of farmers in developing countries, it is critical to have a consistent range of indicators that can reliably provide the right information.

The System gathers data that can be presented in real-time dashboard formats (Figure 3.6) to improve the tactical and day-to-day decisions that management must take. It can link directly to the more sophisticated COSA impact assessment tools for a deeper understanding and for more credible reporting. It is:

- **Customizable** with mission-critical questions that reflect key concerns and objectives
- **Low-cost and self-applied** during normal operations
- **Comparable** from country to country or project to project
- **Auditable** (if desired) to COSA and other data to improve accuracy and reliability

Figure 3.6 COSA Performance Monitoring Dashboard Scoring Productivity



Chapter 4

COSA Methodology

Since rural research often faces many different and difficult situations, we need to be prepared with a variety of research tools at our disposal. The COSA system has several primary guidelines that inform our methods:

- **Scientific process** matters a great deal as does integrating national partner institutions for the optimal adaptation of methods to achieve local relevance and a richer contextual understanding.
- Fostering a **consistent set of indicators** and measurement framework among many users, institutions, and leading firms facilitates the global learning about sustainability.
- **Assessing the overall picture** of the three dimensions of sustainability in balance is necessary in order to understand and manage the inevitable choices and trade-offs that occur.

Underlying Basis of COSA Methods

Neutral and Inclusive

The COSA method uses a diverse, neutral set of indicators and a targeted analytic strategy to tell the story of sustainability using measurable indicators. One of the main challenges of assessing sustainability in agriculture is accounting for its inherent complexity. To show the necessary facets of the story, the COSA methodology can employ over a hundred neutral indicators which were developed with input from hundreds of stakeholders including farmer groups, scientists, NGOs and standards bodies, private companies, and development agencies.

Similarly, to ensure neutrality and meaningfulness to the widest range of stakeholders possible, COSA has also avoided aligning itself with any particular analytic approach. In principle, researchers can use COSA data to feed into Life Cycle Analysis, cost-benefit analysis, Instrumental Variable Analysis, or nearly any other analytic framework in order to facilitate understanding.

Values and Limitations of Case Studies

From a methodological perspective, carefully designed case studies can offer useful in-depth insights into complex systems. Including qualitative analysis can have value for illuminating the context and the diversity that can certainly enrich learning and may not otherwise emerge.

It must be understood, however, that these types of evidence have intrinsic specificity to a place, time, or set of conditions, and their typically unique construction limits their application as learning tools because it is difficult to draw global comparisons or even conclusions beyond the localized context where a particular case study is applied.

Figure 4.1 COSA Methodology

1 **Project Design**	Articulate objectives and expected outcomes with client Identify where and what to measure Select appropriate Indicators and methods
2 **Getting the Right Data**	Train and prepare local institution staff Adapt with local partners and stakeholders Conduct fieldwork using surveys, focus groups, etc.
3 **Learning and Strategy**	Analyze and review opportunities Distill strategic learning Benchmark globally

COSA believes that a good impact assessment effectively combines tested quantitative methods with the insight of qualitative methods. COSA combines standardized indicators that provide easier comparability and faster cumulative learning about best practices with multi-stakeholder workshops to initially help focus research and then again to discuss findings at the end. These ensure that important contextual factors are understood and that the findings are validated by local experience.

> "In God we trust; all others must bring data.
>
> Cited in "The Elements of Statistical Learning" and often attributed to management icon
> W. Edwards Deming

The Importance of Local Presence and Relevance

One of the risks of a global framework for sustainability assessment is the potential to lose relevance to local conditions. COSA takes into consideration the essential local context and conditions and minimizes this risk with an intensive adaptation process. This includes converting data collection points to local units, translating to local languages, and rephrasing survey questions to achieve results that are not only accurate locally, but provide meaningful equivalents in the context of the global indicator set.

Simplicity vs. Complexity: A Holistic Understanding

There is a tendency to oversimplify sustainability, and its intrinsic complexity makes this understandable. Although it is tempting to just measure farm yields or biodiversity as the proxy for sustainability, the reality is that sustainability, by definition, necessitates balancing social, environmental, and economic needs. Any measurement that does not take this holistic view into account is simply not assessing sustainability. For example, if higher yields are achieved by clear-cutting forested areas, which then results in soil erosion, silted waterways, and the loss of timber and firewood for the surrounding communities, it can hardly be called a sustainable outcome. This presents quite a challenge for projects or investments whose focus is limited to only one or two desired outcomes.

Understanding the Theory of Change

Understanding the objectives and processes or the "theory of change" that is associated with an intervention is a fundamental step in measuring whether that approach resulted in the desired impact. However, it is often overlooked or inadequately established.[39] It is much more than a mission statement; it helps explore the assumptions and also determine the specific interventions or inputs that an investment or project will require and how they will combine to achieve the desired result. The theory of change thus creates a necessary basis for accurate assessment of the specific opportunities that are being created and their connections to the outcomes such as the practices or the behavior changes that were adopted.

While it is necessary to measure the stated objectives or the proposed theory of change, it is equally important to understand other elements that can affect the overall outcome. A hallmark of COSA is that it measures a range of diverse factors that affect sustainability in agriculture – not just those proposed by the theory of change.

Understanding Impact

The word "impact" and related terms carry specific meaning in the field of assessment and evaluation.[40] A brief discussion of the basic process and theory of change that motivates a sustainability-focused intervention is useful to understanding the terminology used in this field.

Impacts are best understood when measured over time because important factors, such as environmental and social indicators, can be slow to register significant change. COSA develops longitudinal data sets from repeated data collection efforts with its research Partners (Figure 4.2).

Project Interventions or ***Inputs*** are the resources and activities used to carry out or execute a project or intervention, and can include financing, know-how, and training. The ***Output*** or ***Outcome*** is the direct, immediate or short-term result. It is the result of the intervention and can include, for example, the adoption of different cultivation practices, new organizational practices, or the use of new post-harvest methods.

39 http://www.theoryofchange.org

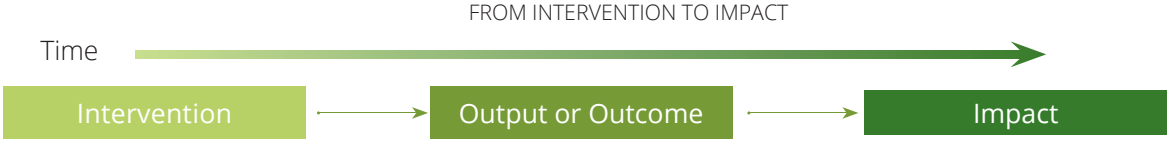
Impact is defined as the intended or unintended long-term effects (positive and negative) that can be attributed to a specific intervention or output, and can include improved aspects such as competitiveness, ecosystem health, or consistently higher income levels.

Impacts can be complex and far-reaching especially when capturing both the intended and unintended effects. It is often more correct to say that an impact is the result of multiple contributions rather than to identify it as the result of a single attribution.[41] To this end, COSA maintains that it is vital to conduct assessments from a more holistic perspective that integrates the economic, environmental, and social dimensions.

Impact Pathways

Many projects or investments simply measure the interventions (i.e., land certified or farmers trained), but these are only part of the pathway to a potential impact. Impacts can take many years to evolve and manifest, sometimes making them difficult to follow and measure. In the meantime, interventions and investments continue and require ongoing direction and decision making. Understanding the logical and likely pathways toward a desired sustainability impact is a basis for successful adaptive management. COSA strives to identify the Impact Pathways that are most likely to lead to a sustainable result, thus allowing managers and stakeholders to respond to emerging needs or opportunities in a timely manner.

Figure 4.2 Measuring Well: Interventions and Outcomes Differ from Impacts



40 The International Association for Impact Assessment, International Initiative for Impact Evaluation, World Bank, MIT's Jameel Poverty Action Lab, et al. define impact, generally, as COSA does: the intended or unintended longer-term effects (positive and negative) that can be attributed to a specific intervention or investment. See Glossary.

Means to Understanding Sustainability

There are different ways to understand sustainability, from self-assessments to independent impact assessments. Any choice essentially represents a compromise between, on one hand, the accuracy or credibility of the information and, on the other hand, the level of cost or effort that is required. The choices are by no means mutually exclusive and the optimal approach often integrates a mix of speedy and low-cost information gathering with more rigorous understanding of impacts and their pathways for action. The Table in Appendix V succinctly outlines the core differences between the most common approaches.

When selecting a strategy for understanding and managing sustainability it will be important to have a common classification or taxonomy for the indicators. This helps to ensure that they can not only be well-integrated and clear for the project or the investment but also so that they can be reported or discussed with stakeholders when necessary.

COSA and dozens of partner institutions are proposing the adoption of a harmonized framework of basic globally-accepted indicators that are already widely used. In addition to establishing a common framework for the collection and analysis of comparable sustainability data, the COSA initiative is deeply committed to ensuring the methods necessary in order to have scientific credibility for its findings, particularly the attribution of observed differences to the interventions being monitored.

Adaptation

An initial stakeholder workshop and a pre-research review are designed to collect information from different sources and a broad spectrum of participants and local experts. This information, gathered in a systematic way (using standard Country Conversion and Client Worksheets), enables adaptation to local conditions. In addition to the local context analysis, there is an opportunity to make the necessary adjustments after the initial pilot surveys. Modifications are made where needed to ensure consistency of survey meaning, and to allow for more accurate results that can be presented in a globally consistent manner.

Representative Samples of Producers and Communities

Sample design starts with selecting representative farms (such as those that undergo an intervention, adopt sustainability measures, or take part in a project). The next step is to select control farms that are similar in the key criteria to those that drove the selection of the target group and/or other factors that are likely to influence their outcomes or performance.[42] Within this basic with/without design, techniques such as stratification or clustering - particularly at village and organizational levels - can be used. COSA selects samples that balance statistical requirements while respecting the limitations (time and budget) on the number of farms and cooperatives that can be visited. The samples are selected to allow both descriptive analysis and econometric analysis that detect, with high levels of confidence, the differences in the performance means between target and control farms.[43]

Basic Diagnostics

COSA's impact assessments use a mixed-method approach that better captures and assesses the diverse conditions found in the field. While basic scientific principles must underlie all sustainability analyses, needs and perspectives vary. The main component of the approach is the use of two standardized surveys: one administered to farmers, and another conducted with cooperatives or the community level organization that interacts with farmers. This process is informed and bolstered by the integration of useful secondary data gathered from key stakeholders prior to the assessment.

COSA makes considerable use of demographic data to understand how factors such as *producer age, gender, education,* and *revenue and assets* could influence outcomes, as seen in Table 4.1. We take into account key institutional factors such as producer organizations and their membership, capacity, governance, assets, and services. Among other key variables are the type and quantity of training received, the Agro-Ecological Zone in which they operate (soils, slope, precipitation, etc.), information they have access to, recent shocks (civil or climactic disturbance) and the distance to markets. All of these can influence the outcomes and are important

41 White, Howard. 2010. "A Contribution to Current Debates in Impact Evaluation." Evaluation. 16 (2) 153–164
42 For example: asset levels, agro-ecological conditions, agri-business organization, infrastructure, etc.
43 Optimal levels of statistical confidence (e.g., 99%) are not always viable but COSA typically reports statistical differences at confidence levels of 90% or better when possible.

in order understand and account for differences that may exist between the households or farms independent of the project so that the results of an intervention can be tracked more accurately.

Table 4.1 COSA Indicators of Key Characteristics

HOUSEHOLD DEMOGRAPHICS
Producer age
Producer education
Producer experience
Membership in organization
Producer gender
Household revenue and assets
Household composition
FARM CHARACTERISTICS
Land tenure
Farm management
Farm size (Total farm and crop area)
Farm location
Crop or Tree variety and age
Number and type of current certifications
Distance to market

A number of these variables and other relevant information are collected during the project set-up stage through a questionnaire that has been refined over time. This guides the way the data collection is designed as well as how it is later analyzed and reported. We also focus on the context with local stakeholders in order to have much more refined and nuanced understanding of the realities that farmers face, and to help identify the likely pathways or approaches to best work with them.

Respecting the Counterfactual

In order to understand the counterfactual (or what would have happened in the absence of an intervention or investment), COSA will often simultaneously measure control groups as well. These control groups can only be considered valid to the extent that they are functionally similar to the target farmers and differing primarily by not having the same investment or intervention such as certification, credit, or training. Control farmers can be selected on the basis of their farm size, experience, Agro-Ecological Zone, membership in cooperatives or associations, distance to markets, level of assets, ethnicity, and more. There are considerable challenges to finding appropriate controls. Farmers may benefit from access to diverse types of infrastructure, they may have other training or certifications, and they may have diverse motives or entrepreneurial capacity. Nevertheless, we can identify good control groups and manage potential bias with active due diligence.

Managing Bias

COSA's field experience helps to design sampling and analytical techniques that minimize important biases. For example: Controlling for sampling bias through Propensity Score Matching (see Analysis section below); controlling for spill-over effects by selecting control groups from separate but similar communities; controlling some of the self-selection bias through the context assessments and random selection of target and control groups; and controlling for institutional differences between the two groups.

To date, COSA has focused on observational studies, but it plans to include other forms of investigation including randomized control trials, in the near future. Randomized control trials (RCTs), when well-constructed, allow somewhat more confidence in assuming the causality of observed outcomes to an intervention. While they can at times be narrowly focused, they can nonetheless serve as one of the complementary methods COSA uses for developing a rigorous and balanced understanding of the challenges and dynamics of agriculture systems.

Surveyor Selection and Training

Field surveyors (enumerators) are selected for a balance of local knowledge, interest in sustainability principles, and practical understanding of survey work. Considerable effort is devoted to proper training and supervision to improve data collection and to ensure that participating surveyors and local institutions continue to learn useful skills in assessment and evaluation. We also train enumerators in the most relevant surveying technology, such as using tablets with built in data validation to ensure reliable data entry.

Focus on Quality and Cost

COSA's advanced digital technology extends to all of its work and is field-tested. The pre-structured database architecture permits safe data storage and efficient analysis. Multiple language applications permit fast adaptation to local needs. COSATouch™ minimizes field time and increases accuracy. Features such as just-in-time quality controls promptly identify

data collection and entry errors so that they can be resolved quickly in the field.

Basic Survey Tools

Data is collected via structured digital surveys. On average, surveys take 1 to 1.5 hours and include both direct observations and structured questions. They are conducted by trained local professional surveyors. With this instrument we can record not only the direct changes associated with the specific objective or theory of change, but can also capture indirect or unplanned change that permits a much more complete picture of sustainability.[44]

Measuring Actual Field Outcomes

While a fair bit is known bit about supply chains or value chains beyond the farm gate,[45] much less is known about the effect of sustainability standards on farms and farmers.[46] Rather than solely assessing practice-based indicators or compliance with policy or requirements of specific standards or project, COSA assesses the functional reality of farmers and their farms and prefers performance-based approaches.[47] To fully understand sustainability, it is critical to observe the interdependent social, environmental, and economic dimensions of the effects at the farm-level.

Informed and Thoughtful Analysis

COSA invites partnership in analysis and includes scientists and expert practitioners from the North and the South. It is committed to a neutral, multi-criteria approach and its data can be used for most forms of analysis, ranging from simple cost-benefit analysis and correlations between variables of interest, to supply chain analysis, Life Cycle Analysis, and regression analysis. COSA encourages such diversity as a vital source of shared learning.

In its analytic work, COSA has utilized several approaches to better qualify and understand the available data. A sampling includes:

- *Difference in Differences (DID)* compares, using a simple linear model, the difference between the outcome indicator values 'before intervention or treatment' and 'after treatment' for the treated group with that of the non-treated group. Using this control group as a comparison at baseline helps control for differences between groups and helps mitigate the impact of how variability in conditions (independent of those caused by the intervention) may affect many of the observed changes. This is especially the case in agriculture, where yields (for example) can be significantly affected by local phenomena that can vary substantially from year to year.

- *Propensity Score Matching (PSM)* is a statistical matching technique used to more accurately compare groups by estimating the effect of a policy or intervention (treatment) by accounting for factors that may predict receiving it and could affect indicator performance. PSM helps address the issue of possible correlation between selection into treatment and other exogenous characteristics of the agents making the choice, by conditioning treatment on these characteristics. In other words it accounts for possible dissimilarities in these characteristics between the two groups. We implement PSM when possible and it is noted throughout locations are noted throughout this report using (†).

- *Instrumental Variables (IV)* analysis is used to estimate a relationship when there is simultaneity (when the "casual" direction of a treatment is not immediately obvious rendering the results of simple regression analysis biased and inconsistent). This method corrects for possible endogeneity of the treatment variable by using highly correlated but exogenous instruments. These instruments are given by exogenous variables that predict treatment but do not predict the outcome variables (our indicators).

- *Stochastic Frontier Analysis (SFA)* uses the measured yields and inputs to estimate the highest level of yield that can be achieved for that sample of producers given the inputs utilized. It estimates the level of inefficiency for producers who did not reach that level and can estimate the components that might have contributed to this level of inefficiency. Because not all input data is available or relevant in each area of study, each SFA has a slightly different specification for the stochastic production function,

44 This survey captures a diverse array of important indicators that provide a thorough and systemic view that incorporates the environmental, social and economic dimensions.
45 For example, the extensive work of Gereffi, Kaplinsky, Barrientos, and Reardon, among others.
46 Exceptions include: Bacon; de Janvry & Sadoulet; Hiscox; Jaffee, Henson, Diaz-Rios; Raynolds; and Ruben
47 For example, FAO SAFA findings suggest that while policy documentation such as "plans for a safe workplace" is easy to collect, it may not accurately represent the actual safety record or the safety impact of the entity.

though all the pertinent inputs are included. We follow the conventional specification for SFA and a simultaneous equation to explain the inefficiency term using components relevant to input use, such as producer demographics (sex, age, education), input technology (use of equipment) and locational fixed effects.

Stakeholder Consultations

COSA and its local Partner institution conduct a Final Workshop to review the findings with local stakeholders in a focus group format. This provides an opportunity to deepen the understanding of the data, of the local context, and to discover points that may have been missed during field work. Integrating the viewpoints of experts, local people and institutions contributes to new insights, lessons, and a useful validation of the findings. It is also a valuable chance to multiply the benefit of the information gathered by sharing it with those that are directly affected by it. In most cases, COSA data is not final until it is validated by this last step.

Chapter 5

COSA Findings

No single report could do justice to the richness of the data contained in nearly 18,000 field surveys that we have gathered on three continents. This chapter intends to share the scope of what COSA does in two ways: a) revealing a collection of its more interesting findings; and b) presenting a select number of in-depth observations demonstrating the versatility of these tools for decision-makers.

The chapter offers a sampling of the ongoing work in several ways:

1. Presentation of a variety of indicators of sustainability such as food security, income, producer organization services, and soil and water conservation measures.

2. Syntheses or groupings of the data such as economic and social indices across a collection of countries.

3. Cross tabulations that show relationships between indicators such as yields and environmental outcomes or education levels and yields.

4. Simple efficiency calculations such as the quantity produced per day of labor as well as more complex calculations of technical efficiency using Stochastic Frontier Analysis to understand how efficiently producers are converting different key resources such as land, fertilizers, biocides, and labor to crop yield.

5. Lessons are shared from the process of developing optimal indicators and neutral survey instruments.

We have made strides in measuring sustainability through the application of precise and practical indicators and a multi-dimensional approach to impact assessment. Yet, after seven years of development and testing a number of diverse approaches to measuring sustainability, we have also learned valuable lessons regarding ways not to measure. Unfortunately, the flaws of different approaches are often not evident until advanced analysis or a second year of measurement has been conducted. This report will highlight some of the lessons learned about how best to measure something as intrinsically complex as sustainability since these lessons may be valuable to many readers. As the increasing interest in understanding and demonstrating sustainability has led companies, producers, and institutions to each develop or adopt their own approaches, it would be unfortunate to not learn from these lessons and move forward together.

Figure 5.1 Countries Implementing COSA Tools

The primary research for this report comes from different COSA projects carried out between 2009 and 2013. This four year stage of COSA involved large-scale testing and development under the very different conditions of 12 countries following initial pilot work in 2007-08. A number of individual and extensive COSA reports have already been created for different countries, sectors, and certifications; those in-depth analyses have been shared with the agencies and firms that commissioned them.[48] The purpose of this report, in contrast, is to be illustrative of their scope rather than comprehensive.

COSA works in developing countries where sustainability issues in agriculture currently have the greatest impact. After our first small-scale piloting work in five countries, we expanded to projects in twelve countries (see Figure 5.1). Our experience began with the world's most economically important agricultural commodity and one that is particularly relevant for small-scale producers. Coffee is grown in over 60 developing countries and is a primary export for several of them; it provides a livelihood for about 20 million families.[49] We have expanded to cacao and will start on metrics applicable for food crops in 2014 due to client demand as well as our own strategic plan. We intend to soon address a number of other crops, acknowledging that it will take several years as well as interested partners in order to expand work into cotton, palm oil, tea, biofuel crops, soy, fruit and horticulture crops.

Caveats to the Data and Interpretation

As discussed earlier, COSA collects information on a variety of indicators covering the economic, environmental, and social realms and is capable of identifying and tracking a variety of project-related impacts and changes over time in the populations and regions of interest.

Impacts related to an investment, new training, or certification are expected to occur at different stages and not just within the span of one or two years. Measuring trends therefore takes time and in a number of cases we have the benefit of multi-year panel data and of a proper baseline assessment, while in other cases we have the information collected during the first year of the assessment that may not be a pure baseline (some interventions or training already occurred). Such short term views can increase the likelihood of inadequately controlling for self selection bias. Control groups can only capture a portion of this and, therefore, we employ methods such as PSM, DID, and context assessments over multiple years to help better control for this bias.

We report statistical significance levels when relevant to demonstrate differences between the target and control populations. It should be understood that icomparisons that are capturing a variety of factors but do not represent impact evaluations yet. At this stage, we are mainly discussing correlation rather than causation for the differences in the indicators that are presented in this section, with some exceptions that are noted.

The sample sizes, local contexts, and project objectives range greatly with farm samples ranging from sets of just over 100 to several thousand (see Appendix for details). Although there are many valid conclusions to draw from the data collected thus far, we acknowledge that it is not extensive enough to be representative of the overall conditions in any particular country or sector at a national level. Given these limitations, we therefore do not make many general claims other than for the situations where good data warrant them and we do not yet draw comparisons across countries. It should also be noted that there exist intrinsic challenges of addressing broader (landscape-level) impacts, especially to the environment, using only household-level and producer-group surveys.

The local capacity and conditions can play a significant role in determining the performance of farms or of a particular initiative. The variance in outcomes between the VSS, even for the same VSS applied in two different places, may often be explained by contextual differences or site-specific considerations.[50] We thus prefer in this report to present overall findings for the VSS rather than to specifically compare them or their individual results. In some cases, there is evidence that the VSS identify the more dynamic and capable producers to participate first. In such cases, it is challenging to identify well-matched control groups in order to effect a good assessment. Therefore, it is worth noting that

48 See for example: https://www.utzcertified.org/images/stories/site/pdf/downloads /cosa_baseline_report_on_utz_certified_coffee_farmers_in_vietnam.pdf
49 Lewin, Brian, Daniele Giovannucci and Panos Varangis. 2004. "Coffee Markets: New Paradigms in Global Supply and Demand." Washington DC: World Bank
50 This aligns with the findings of COSA Partner, the International Trade Centre. See: ITC. "When do Private Standards Work? Part IV." ITC: Geneva.

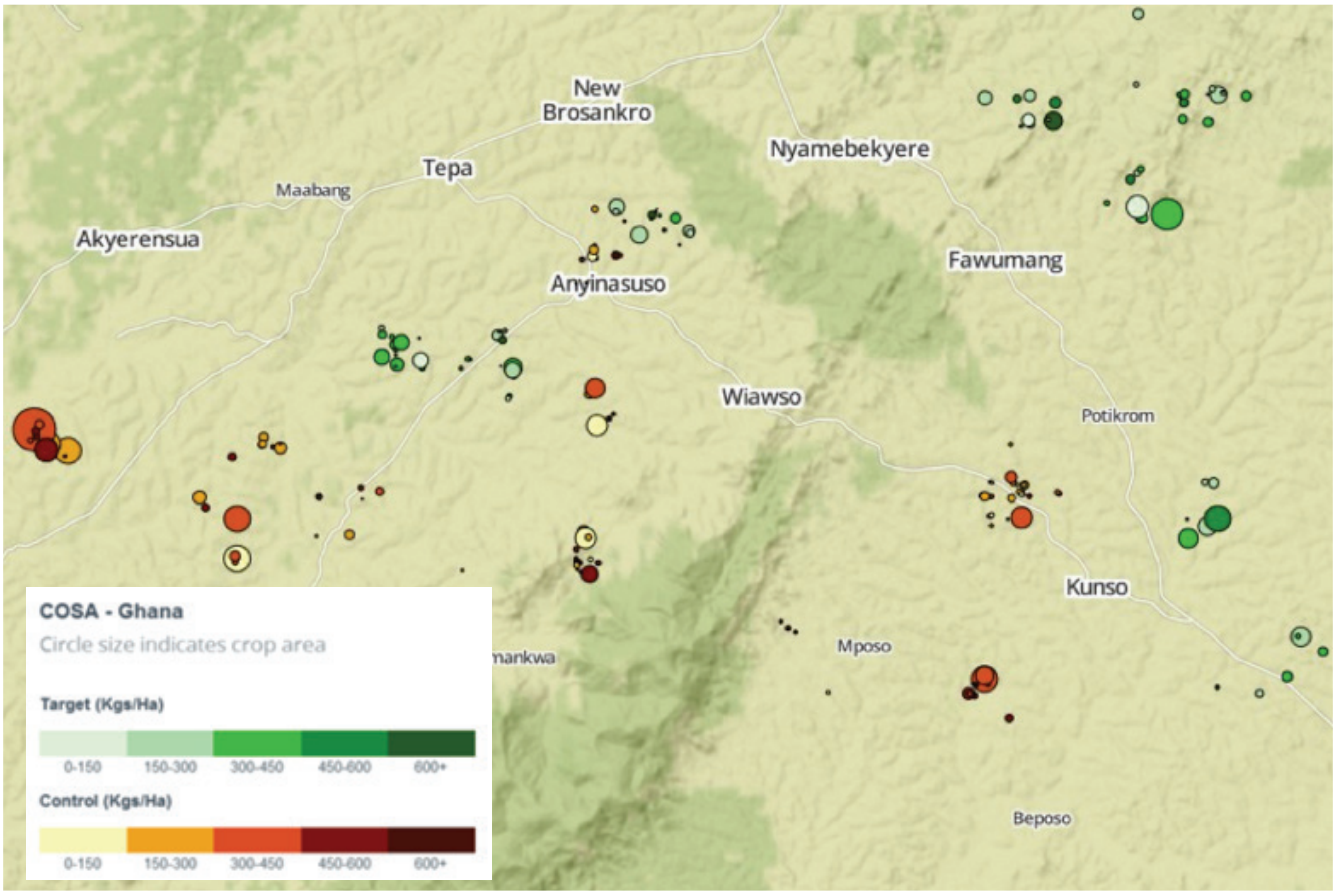
when this is the case, as less capable producers enter into these initiatives, they cannot be expected to have the same results.

Although there are a variety of ways to present the analysis, for simplicity we provide a representative group of figures typically using the averages (means) of the farms surveyed.[51] The findings represent an overview of the considerable data collected on farms that are certified or verified to a particular standard and in many cases, a similar group of uncertified farms that are used as controls. While no data is perfect, the diligent efforts to maintain best practices and the application of good methodologies give us confidence that these findings offer an exceptional view of the sustainability efforts underway and the challenges ahead.

5.1 Understanding Context

COSA makes considerable use of demographic data to understand how a number of factors, such as location, gender, institutional factors, and relative wealth could influence outcomes. Similarly, mapping geospatial data is one of the approaches we utilize to refine diagnostics and improve the targeting of interventions. This makes it easier to conceptualize the situation in a region. For example, using data collected about Ghanaian cocoa producers, we can map data on yields together with other variables such as farm size and determine change over time. In this way we can see if one region is doing better than another, and whether low-performing regions might benefit from a different type of intervention (see Figure 5.2). This helps to identify production relationships and interactions that are difficult to conceptualize when looking at the data more independently in tables or graphs. COSA continues to refine this type of analysis and plans to employ it more fully. Opportunities exist to integrate remote sensing with land-use changes and farm-level data to understand their relationships.

Figure 5.2 COSA Map of Farm Size and Yield, Ghana



51 In many cases the sample sizes and the distribution of results range substantially and where applicable, additional tests are reported to account for this.

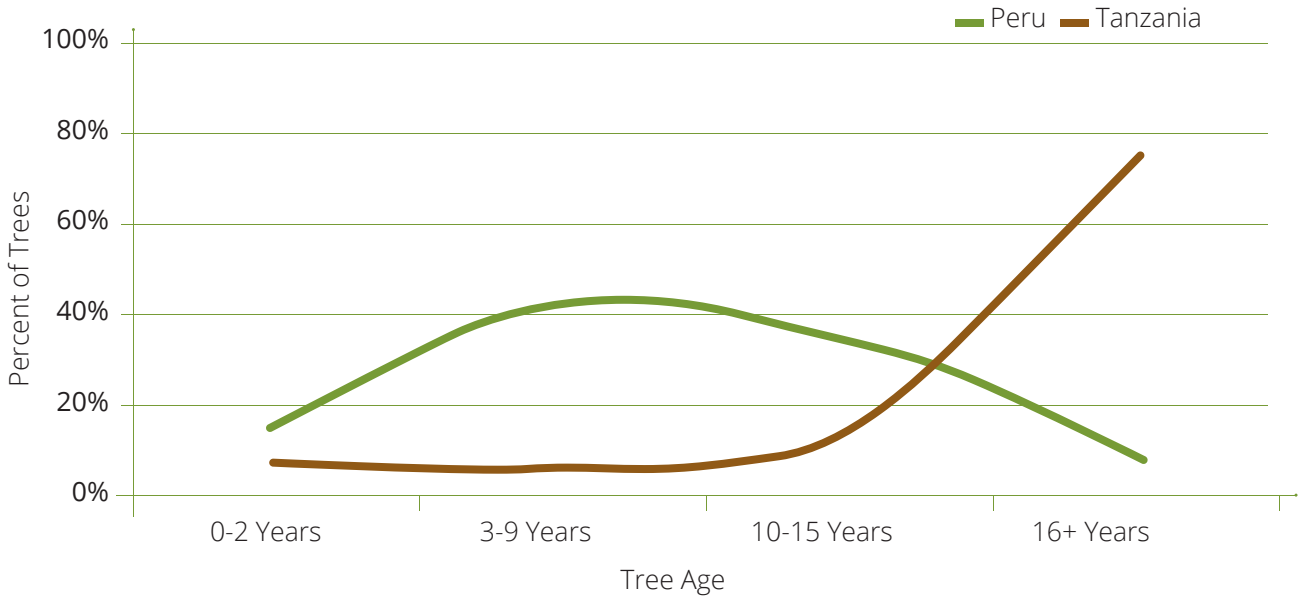
Information Variables that Affect Outcomes

Household and farm level variables are important in terms of refining or targeting project activities. They can provide important context to help understand the most effective ways to support project goals in each particular situation. Without this information, conclusions and recommendations could be strongly biased. For example, in Peru and Tanzania, we see a very different distribution of coffee tree ages (Figure 5.3).[52] Most of the Tanzanian trees are older and approaching senescence whereas the majority of trees on the Peruvian farms were at optimal production ages. This production constraint can help to explain persistent low yields and would be critical to know for any initiative that is considering replanting or rejuvenation as a project component.

While many surveys don't measure the age of tree crops, we include it because it is an important variable for several reasons. There are different ways to measure tree age. The most common measure (simply noting whether trees are producing or not) gives a very limited view of the farm situation. For example, trees that are "not producing" could signify that many trees are less than two years old and will soon be highly productive, or it could mean that trees are decades old and at the end of their production life. The point is that by not knowing tree age, it becomes almost impossible to design or employ a useful intervention that addresses productivity. Further, subsequent years would give the same general data on farm productivity and would obscure whether any efforts or advancements have been made (e.g., trees recently replanted). Replanting also provides a useful measure of confidence in the future of the crop. Thus, selecting the right indicator so that it complies with SMART principles (see Chapter 4) can make a substantial difference.

One of the best ways to understand context is to partner closely with resident institutions that are intimately familiar with the realities of local conditions and can interpret them accordingly even at the outset of planning a project. In Colombia, where it can be challenging to work in some rural areas, the value of a close institutional partnership is particularly evident. Not only does it provide access to places and types of information that outsiders might struggle to achieve, it also offers invaluable contextual understanding of the places and crops studied (see Box 1).

Figure 5.3 Tree Age Distribution in Tanzania and Peru



Source: Private survey using COSA Performance Management indicators

52 We also found tree age was associated with farmer ages as older farmers in Tanzania on average appear to be doing less replanting than the older farmers in Peru, perhaps because Peruvians have a longer life expectancy.

Box 1: Growers, COSA, and CRECE: The Value of a Partnership in Colombia

The COSA initiative in Colombia began to be deployed in 2008 through an alliance with The Centre for Regional Entrepreneurial and Coffee Research (CRECE) as a local partner, with the support of Colombian National Coffee Growers Federation and USAID - ACDI/VOCA.

The research has been conducted in annual phases for four years, gathering information directly from a sample of 3,000 small and medium coffee farmers in five coffee growing Departments, numerous farmer focus groups, and supply chain agents. The main purpose is to monitor and assess the results of the adoption of diverse sustainability certifications and initiatives by farmers. The collaborative research process between COSA & CRECE combines a qualified local team with a lobally experienced team for mutual benefit.

Some lessons learned:

1. For farmers, there has been significant measurable progress applying more sustainable agricultural practices over the last four years. The evidence of impacts has been utilized to inform decision-making at the farm level and at the policy level.

2. Results suggest that, in some cases, it is not the higher premiums from the sustainability programs that are the main driver of better economic outcomes.

3. The evolution of the VSS that are studied has been positive as several of the standards bodies have observed and applied the learning to improve their approaches.

4. The durability of impacts is less clear and some impacts, i.e., environmental are still developing. Investment in this knowledge is costly for a producer group to fund alone even if it is likely to offer a good return on investment.

5.2 Crosscutting Findings

The data collected in the surveys covers a range of economic, social, and environmental indicators. When viewed indicator by indicator, it can be challenging to understand project results on overall sustainability, so it is important to look at a range of indicators when evaluating project goals. Here, we present a few general themes.

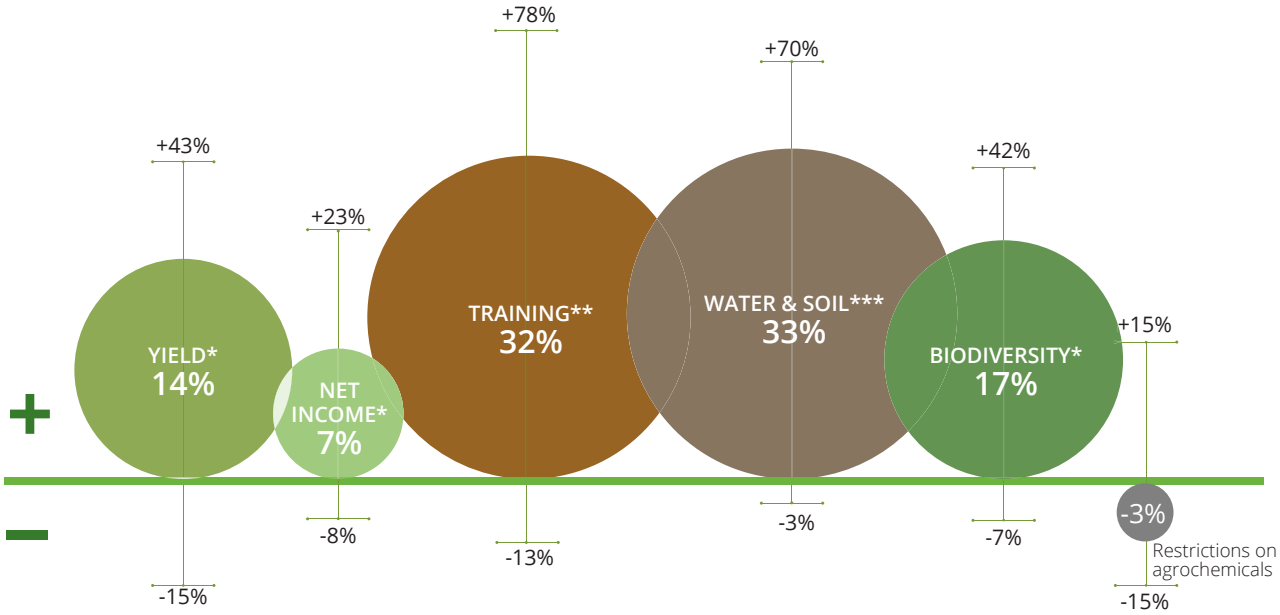
Figure 5.4 graphs the overall results for important COSA indicators among certified producers when these are compared to conventional (uncertified) control groups and showing the percentage difference. This includes seven types of sustainability initiatives in coffee and cocoa: Organic, Fair Trade, Rainforest Alliance, UTZ Certified, Starbucks C.A.F.E. Practices, Nespresso AAA, and 4C.[53] The figure illustrates data across multiple countries in Latin America, Africa, and Asia. Each data point comprises from 3,500 to 16,000 farm surveys.[54] While the detailed results differ from country to country (details follow later in the chapter), it is interesting to note the overall tendency of certified producers to have greater yields, higher net income, more training, a greater number of water and soil conservation practices, and greater levels of biodiversity. Nearly all are statistically significant as noted. The conventional control groups fared marginally better than the certified producers in having slightly more restrictions on the applications of agrochemicals by vulnerable populations (pregnant women, children, and elderly).

It should also be noted that this is indicative of tendencies observed and not a fixed or global conclusion for all VSS. In fact, we depict the variation, as indicated by the range lines in the graph (one standard deviation) to show that, in some cases, the indicator levels for certified farmers were lower than those for comparable control farmers even if the overall averages across countries were higher. Observing the various components in this manner for a number of countries simultaneously allows an overall view of sustainability efforts by VSS and the opportunity to discern patterns or trends.

53 Nearly all of the farms are certifications and a small number are verifications.

54 As noted earlier in the chapter, a portion of the data is not from longitudinal studies and so does not comprise a proper impact assessment; it should therefore be understood with caution since the subsequent results after multiple years could alter the findings. Some of this data represents an initial view of the differences for producers that have been part of an initiative compared to the control groups, and since some of these producers may have started at different levels of achievement on specific indicators than the controls, we can only observe the actual impacts by observing these groups over time and controlling for that starting point.

Figure 5.4 Certified Producers Outcomes compared to Uncertified Producers



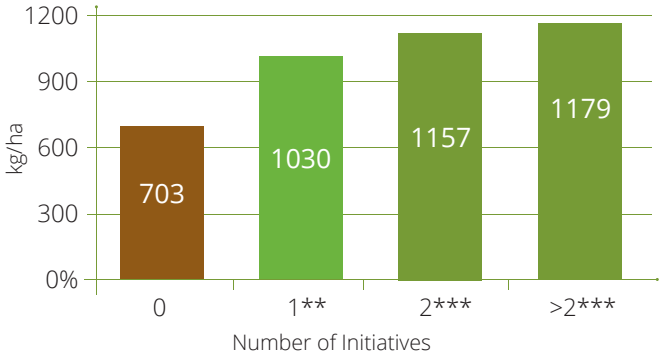
Multiple certifications

Based on our cross-cutting analysis, there is a trend toward better economic and environmental conditions when certified farms are compared to uncertified farms.

This result provides one explanation for the growing interest among producers to become certified. Producers hope to do better through certification, and those that are certified are on average doing better. Our data for most countries indicate a clear trend toward multiple certifications at the farm-level.[55] This is in part motivated by producers' expectations that having several will increase their marketing options and their income potential. Small producers often receive support for certification or audit processes and often do not directly pay the cash costs – they only bear the cost of compliance requirements – providing an incentive to have more than one certification.

There is evidence of a relationship between having multiple certifications and productivity (see Figure 5.5). It is not yet clear to what extent this links to increased sustainability in other dimensions, but we do see some evidence of correlation to improvements in incomes and both the environmental and social dimensions as well. Producers may also be motivated to attain multiple certifications as a risk mitigation strategy given that there is a considerable gap between the substantial volume of sustainable coffee that is produced as certified and the somewhat smaller amount that is actually purchased as certified. To look at the relationship between multiple certifications and farm-level productivity, we take a few examples from the data collected. In Figure 5.5 we see a positive relationship between the certifications or initiatives and average yields in Guatemala. The results exhibit decreasing marginal returns to the number of initiatives, with more than two initiatives not showing a substantial increase in yields. We see the same relationship in other datasets as well (e.g., Colombia). Of course, in these examples, we are not controlling for other factors that may play some role in this relationship.

Figure 5.5 Multiple Certification Initiatives and Yields in Guatemala



55 The approach used for identifying farmers who hold multiple certifications in a given survey is to classify each certification combination as its own group. For example, all farmers who hold both Fair Trade and Organic certifications would be considered as a single "FT-O" group, and compared to a control group of farmers who hold no certifications but are otherwise as similar as possible to the target farmers.

To further account for the possibility that the costs of multiple certifications could reduce a farmer's income benefits despite higher yields, we also calculated the net incomes for coffee producers across regions of not only Guatemala but also Colombia (accounting for total annual revenues less total costs at the farm level). We see that there is a positive and significant relationship (99% level of confidence) between the number of initiatives that a farmer has and the net income per hectare.[56]

Women and Productivity

COSA data can be parsed to look at how gender dynamics affect particular outcomes such as productivity. Women tend to have less access to financing, training, and lower rates of land ownership than men in the regions we have studied. They are also sometimes farming less productive terrains.

Consequently, one might expect to see lower yields, but we have not seen this in our sample populations. With a cursory review of results from four diverse sample groups (Indonesia, Vietnam, Tanzania, and Peu) we see that farms led by women decision-makers do not have significantly lower yields, despite the challenges women farmers often face. This is a multi-dimensional issue that we intend to pursue further in the near future.

5.3 Findings in the Economic Dimension

The surveys undertaken have collected a range of economic variables such as livelihood measures and competitiveness and those that relate to economic outcomes. Table 5.1 shows the general groups of economic indicators that are collected in a COSA survey. Economic findings ought not to be interpreted in a vacuum but rather in balance with other information that we collect that affects and is affected by the farm-level economic situation such as credit, price and yield volatility, diversification, and organizational governance. The Indicators and questions associated with these "Themes" and "Core Elements" below are similar across all countries to allow for comparison, but adapted to allow for local contexts.

Economic Indices

Before looking at indicators separately, we aggregated indices for the economic, environmental, and social data in order to provide a multi-dimensional overview of sustainability. Of course, with less detail we can over-simplify complex processes and miss valuable variability. Therefore, this is not intended as a replacement for evaluating a range of indicators.

The purpose is to supplement the more detailed indicators by condensing a number of related indicators into an index ranging from 0 to 100 (with 100 being associated with the highest possible scores for the overall grouping of indicators). Using Principal Component Analysis (PCA), we create weighted sums of the indicators according to their relative contribution to the variance of the overall index as well as the interrelationships between them.[57] Doing so, we account for as much of the variation in the dataset as possible.[58] The economic index is shown below, and the other indices (social and environmental) are included later in their corresponding sections. The indices are constructed to reflect the conditions and the available data sets in a particular country, as shown in Appendices. For this reason, and because these are general assessments, the indices are not always completely comparable to each other. Calculating these indices for a few countries allows us to see the general differences between our population of interest in the project (the target) and the control populations for diverse contexts.

In calculating the economic sustainability index, we consider a number of variables such as productivity, profitability, economic capabilities, and market orientation.[59] These variables help provide additional information on a household's ability to be economically viable and even to respond to some shocks (natural or market-related) - a feature that can be a critical component of economic sustainability, especially for small farmers. Variables such as the "price information available" or "access to credit" are also useful factors in a farm's economic competitiveness.

56 This finding is also supported by a recent assessment noting a positive relationship between certification and revenue among a sample of 160, 238, and 277 SME borrowers. See: Larrea, Cristina, Semida Minteuan and Jason Potts. 2013. "Investing for Change: An Analysis of the Impacts of Agricultural Investments from Select FAST Social Lenders." Montreal: FAST

57 We create dichotomous variables with all the indicators so that they are more comparable.

58 Trying to capture this variability in a succinct way, while useful for a broad perspective, faces issues as noted previously in terms of losing some of the complexity captured in each indicator and the relationships between them. For this reason, any comparative conclusions should be drawn with caution and with a similar range of particular indicators.

59 Exact specification in Appendix II.

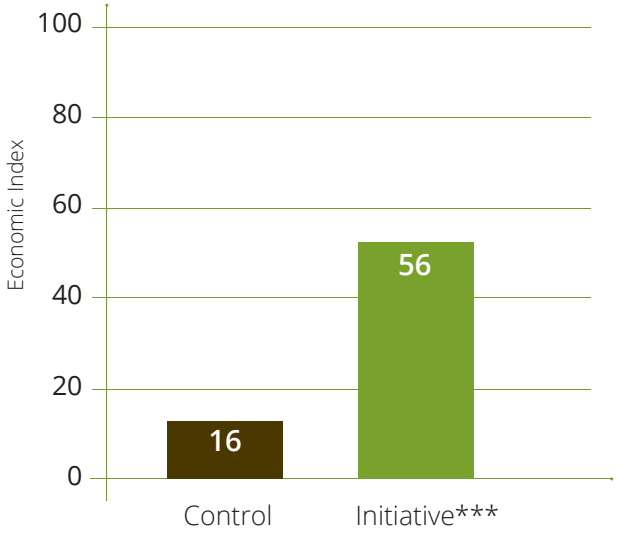
Table 5.1 COSA Indicators: Global Themes and Core Elements of COSA Economic Indicators

Economic

GLOBAL THEME	CORE ELEMENTS
Producer Livelihoods	Revenue
	Costs
	Income
Risk (Economic Resilience)	Diversification
	Information
	Access to Credit
	Volatility
	Vulnerability
Competitiveness	Business Development
	Differentiation
	Efficiency
Producer Organization	Governance
	Services
Perception	Economic situation

Figure 5.6 demonstrates a simple economic index for the sample of coffee producers in Costa Rica and Figure 5.7 shows the results (in a time series panel) for producers in Colombia. We see that producers that are part of an initiative have greater scores for the economic index in both. In Colombia, the two groups are significantly different over the span of three years but they do not change much.[60] So, it might indicate that this could simply be a correlation for the producers that are selected given the relative lack of change over time. More analysis would be needed to determine the causes for this and as mentioned, this type of time-series data should be concurrently used in more detailed analysis of project impacts.

Figure 5.6 Economic Index for Certified vs. Conventional Producers in Costa Rica



NB: This is a first-year analysis of differences that, although substantial, must be tracked over time to see if they alter over the longer term

60 Colombia data uses PSM matching.

The economic index that we are evolving for the future will also include risk management factors such as diversity of crops, volatility, and vulnerability because this is particularly important when understanding that in many poor countries vulnerability to climatic or socio-economic events (i.e. war or unrest) can be among the most important factors in economic resilience.

Figure 5.7 Economic Index: Comparing Certified to Control Group over Time in Colombia

Specific Economic Indicators

Looking at some of the economic indicators separately permits more focused conclusions, including a better understanding of the economic differences between producers that are part of a VSS or certified sustainability initiative and those that are not.

Opportunity Costs of Labor

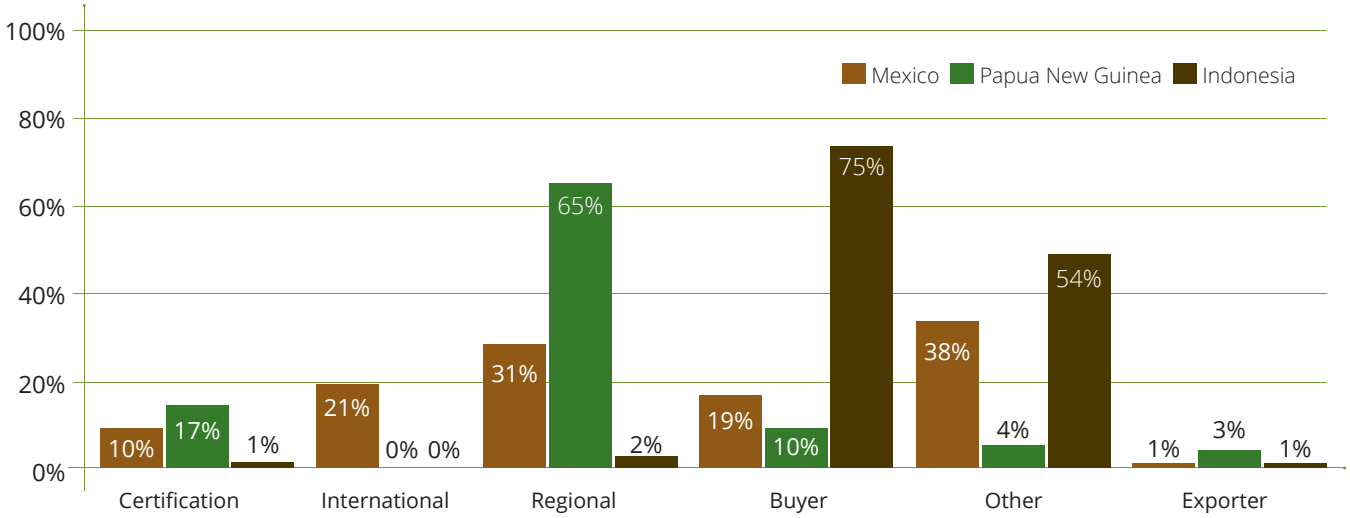
Overall, the largest farm-level costs for smallholder coffee and cocoa producers in all of our samples relate to the cost of labor. Most households employ a range of paid and unpaid labor. When estimating costs of production, it is thus important to consider unpaid labor costs (including unpaid labor provided by the household) as it is an essential part of the cultivation practices of any crop. Such opportunity costs should not be ignored, as the producers or their families could potentially use this time productively (if not used in the target crop) to invest in other crops, to participate in off-farm employment, or to get additional training or education.
To calculate these opportunity costs, we use the average salary of the village or region, and the number of days of labor that the producer reported. These "costs" can be substantial and give an indication of efficiency of labor use on the farm. In smallholder contexts, this can make a difference in understanding resource constraints. In one Guatemalan application of COSA (where the project targeted producers who were part of producer groups at various levels of development) we found that unpaid labor would account for 31% of total labor costs for producers who participate in lesser-developed organizations, while it only accounted for 9% of total labor costs for those in the more developed organizations. In general, more organized producers are using more hired labor rather than household labor. If we miss or ignore this large contribution of unpaid labor, we would (for example) overestimate the labor efficiency (and realized net "income") of the less-organized producers. This is a critical point for understanding most small-scale producers.

Markets and Prices

An important determinant of overall income levels for producers is the ability to get a good price for their products. To a significant extent this is related to having information regarding prices offered by different buyers. Using this information, producers can negotiate or make somewhat more informed choices about where and when to sell. More sophisticated and better-prepared farmers tend to know multiple prices and even the international or export prices. Fostering such market transparency improves competition, helps markets to function, and can improve price outcomes for producers. One could assume that certified producers have more information about market prices as they are often more organized and linked to higher-value supply chains. Interestingly, we did not see a tendency for certified producers to have better price information, indicating the possibility that they are either satisfied or perhaps captured (contractually or otherwise) by their relation with their VSS channel. While this may be the result of some of the datasets representing the beginning of the initiatives, wherein this may change over time, we also did not find much evidence of the expected negative relationship between the distance to markets and the knowledge of various prices for the countries observed.

We query producers about this and find that while

Figure 5.8 Producers Knowing Prices and Sources: Comparing Three Countries



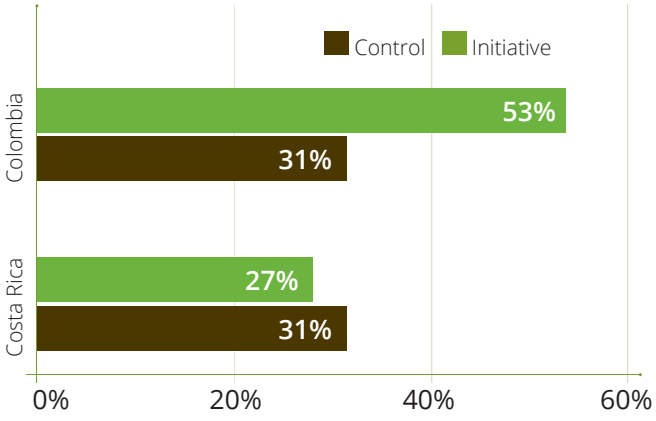
NB: In this graph, "other" is associated with informal or intermediary buyers

there is typically a broad range of price knowledge in general, there is a low level of price transparency, suggesting opportunities for improvement. Figure 5.8 shows, by country, the percent of farmers knowing the price offered at different levels and by different purchasers (both certified and uncertified controls are shown together). In the Figure the following definitions apply: Certification is the price paid by their buyer for certified product (if they are certified); International represents the international reference or commodity exchange price (this price indicates farmers' awareness of market factors in the value chain and how much of the international price their product commands); Regional represents the prices paid throughout the local region for the product; Buyer represents knowledge of the price received by their buyer for the product (an indication of transparency and awareness of the portion of the price they receive); Exporter is the price local exporters are paying; Other is any other relevant market price that the farmer knows. As noted, price knowledge ranges greatly between countries with Mexican producers knowing more types of prices, but there seems to be more transparency for the buyer price in Indonesia.

Credit Access

Credit is an important tool for a number of reasons because it allows producers to be more flexible with their production and marketing decisions. With credit they have the ability to purchase inputs when cash is limited and to buffer against unexpected shocks to income or production. We ask producers about the credit they requested, the credit they received, as well as the source. Figure 5.9 contrasts credit access in Costa Rica and Colombia noting the percent of producers that received credit in the past year. We see that in Costa Rica producers receive credit at a similar rate regardless of certification, whereas a higher percentage of certified producers in Colombia report having received credit than uncertified control farmers, although this was not statistically significant.[61]

Figure 5.9 Comparing Farmer Access to Credit in Costa Rica and Colombia



Yields

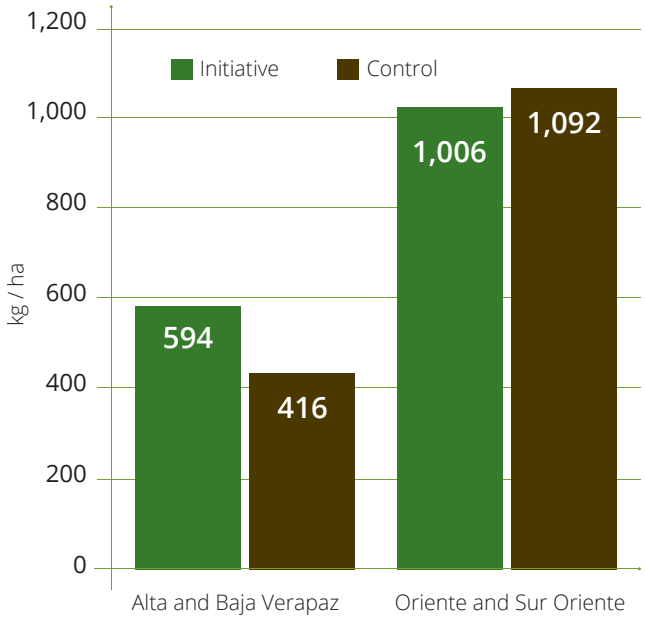
Increasing yield is a usually a major component of any agricultural initiative but can actually be difficult to measure accurately among small farmers who do not keep good records. With some crops there is a single harvest and a single sale. However, in order to confirm yields with actual sales in coffee and cocoa, we often face the challenge of having multiple

61 Results in Colombia come from a PSM analysis; results from Costa Rica do not.

harvests and sales to track, requiring the surveyor to account for sometimes more than a dozen different harvests/sales. To complicate matters further, harvests often come from different plots that are not contiguous. A strong survey structure and well-trained COSA surveyors can account for much of this variation.

This simple metric of yield (production weight of the crop per hectare), while informative, does not speak to the costs of achieving such yields nor to the potential trade-offs in other key environmental or social indicators such as agrochemical use and cost, water resources, biodiversity, and labor practices. These indicators are collected by the COSA surveys and should always be considered together. As seen in Figure 5.10, while initiatives can be associated with substantially higher yields, that is certainly not always the case. This example of producers in two regions of Guatemala shows how the results differed between more intensive producers (with access to more services and infrastructure) and less intensive producers.

Figure 5.10 Yields for Two types of Producers in Guatemala



Labor Productivity

In interpreting yields and productivity, it is important to understand and account for the inputs that were used for that level of production. These calculations of efficiency demonstrate the level of input use required for the measured level of crop output. One valuable measure of this efficiency is the relative productivity of farmers per day of labor. As shown in Figure 5.11, we see a difference in the range of labor productivity for target producers when compared to control producers. This difference is statistically significant (95 percent) in Peru but it is not significant for Guatemala. A higher level of labor productivity can make a difference not only in terms of income from increased production per day but also from the opportunity that such efficiency can present to use time to engage in other work, even off-farm.

Technical Efficiency

In addition to evaluating labor productivity, there are also important efficiency differences for other inputs that can influence the on-farm investment and production decisions. Technical Efficiency (TE) in farming can make a substantial livelihood difference especially for the majority of farmers who face financial constraints, as well as fixed resource constraints in land, water, and other inputs. TE is also an important part of competitiveness and can serve to reduce waste and environmental contamination from inefficient resource use. It is thus a prime COSA indicator to track when good input data is available.

Technical Efficiency analysis represents an opportunity to be more effective in targeting interventions toward the producers that are often at the low end of the efficiency and productivity scale where investment can result in the greatest change. It can also be an effective way of identifying the most productive farmers to help them to better utilize resources and reduce waste and environmental impact.[62] To calculate the predictions for technical inefficiency (or low TE) we specify a production function that relates various inputs (land, paid and unpaid labor, trees, fertilizers, biocides, etc.) to total output.[63]
In most cases the findings suggest a widespread inefficiency in input use and that most farmers have considerable room for improvement. We also see that the specific practices of some coffee farmers with the higher levels of TE could potentially serve as models

62 For example, the COSA assessment in Vietnam ranks them among the world's most productive coffee farmers and while one sustainability initiative could not improve their yields, they were able to influence their resource use. See https://www.utzcertified.org/images/stories/site/pdf/downloads/cosa_baseline_report_on_utz_certified_coffee_farmers_in_vietnam.pdf.

63 The findings include the variables used in the frontier analysis, average technical efficiency for certified and non-certified groups, and the regression of coffee land area on efficiency. While this model is simple, it is robust across different heteroskedastic and distributional assumptions for the inefficiency term. We find a significant negative relationship between land area and efficiency.

Figure 5.11 Labor Productivity (kg of GBE/day) in Perú and Guatemala

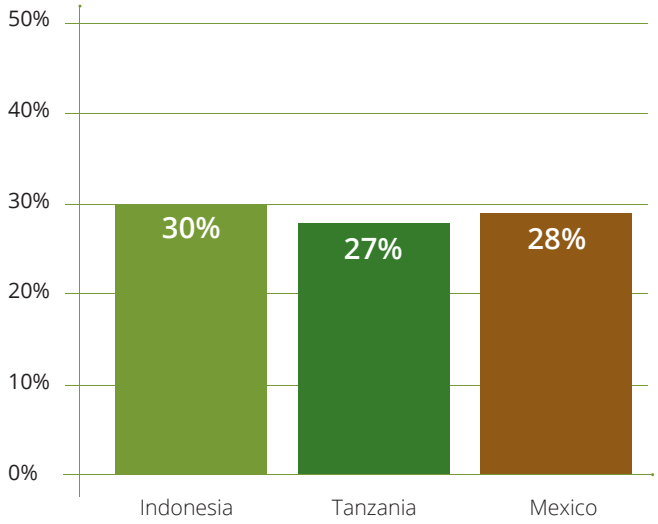
for the others or for specific technical assistance interventions. Producers participating in certification initiatives tend to have modestly higher levels of technical efficiency than their uncertified (control) counterparts in nearly all of the countries where we calculated this.

With better management, production could increase even without increasing inputs (or their costs) and this would likely increase net income as well. By examining technical efficiency in this way, we set up a framework to see how particular interventions (such as training) might impact farmers' efficiency over time.

Technical Efficiency Across Three Countries

We present the results of this analysis for three countries showing that the producers sampled in each one could make significant gains in yields. Figure 5.12 illustrates the substantially greater yields that producers could achieve if they were operating at full technical efficiency (i.e. using their inputs more efficiently compared with other similar producers in that country).

Figure 5.12 Projected Yield Gains at Full Technical Efficiency in Three Countries



To provide an example regarding what it means financially for producers to operate at full technical efficiency, Figure 5.13 shows the potential gains in income for producers in Mexico with low efficiency and those who are already highly efficient. Because these gains are the result of how inputs are used, they can potentially have little direct cost. In theory, low TE producers could attain 77 percent more net income solely by using their inputs more efficiently. This simple project intervention (recognizing ongoing inefficiencies) is likely preferable to the challenge of providing more inputs. As these producers are also associated with having low net income compared to high TE producers, the effects of improving input efficiency for those producers could directly target and provide valuable impacts for the poorest of the producers. For example, for the cocoa producers

sampled in Côte d'Ivoire, we see that target producers earn USD 290 more in net incomes per hectare than control producers.[64]

Perception of Economic Conditions

Of course, even with calculations of net income and efficiency, one can miss other aspects of the overall situation that are experienced by the producer and that may ultimately shape behavior and outcomes. Farmer decisions, in the absence of information, are usually made based on what the farmer perceives or feels regarding their current situation. The importance of perception, both as a reflection of behavior, but also overall well-being, should not be underestimated. For this reason, COSA relies upon a group of perception questions for a more qualitative analysis of the economic, environmental, and social situations. One example of this data collected in Vietnam is shown in Figure 5.14, in which producers were asked about their economic situation since certification.[65] A majority (55%) noted that it was better, 15% stated that it was the same, only four percent noted that the situation has become somewhat worse, and none considered their situation to have become "much worse." While this may be subject to response bias if the producers perceive any incentives to respond positively, given COSA's partners' neutral non-involvement in certification, it could be assumed that this is relatively accurate.

Figure 5.13 Potential Income Gains from Technical Efficiency in Mexico

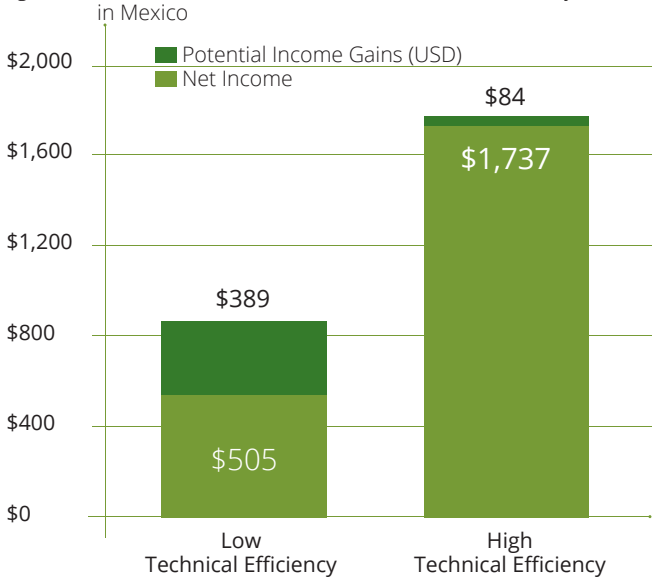
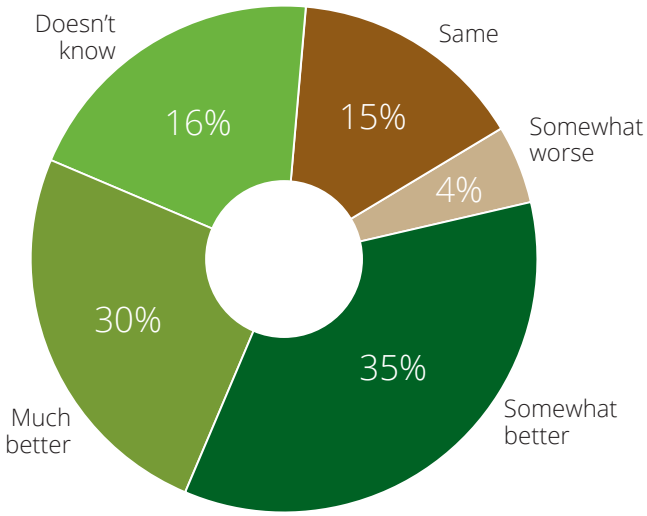


Figure 5.14 Farmer Perception of Economic Conditions Since Certification in Vietnam



PPI and Income

COSA successfully applied the PPI in four recent implementations during 2013: Guatemala (coffee), Peru (coffee), Mexico (coffee) and Colombia (cocoa). The initial results from these implementations are proving to be useful. From the client's perspective, using the PPI provides value in a number of ways. The PPI can help identify the extent to which the project has targeted the poor (if this was an objective of the project). For longer projects, using the PPI over time to track the status of a beneficiary can confirm if the project has made an impact on the beneficiary's poverty level.

COSA is beginning to use the PPI to not only provide context for the general regions where it is working but also to supplement and validate the results of its indicators such as net income. [67] As depicted in Figure 5.15, there is a clear correlation between our measures of greater net income and the PPI measures, showing reduced likelihood of poverty among cocoa producers in Colombia. When we estimate total producer incomes (which includes off-farm income) and arrange them by quintiles, we can see that the PPI, using a different calculation to determine the likelihood of those producers to be below the poverty line, comes up with a similar finding. While this correlation appears stronger for producers that are part of the initiative, the positive

64 Because we used a PSM technique, we are confident that we are comparing very similar target and control farmers and that this is a strong correlation between incomes and participation. Difference is significant with 95% confidence after PSM (Kernel) leaving 203 observations evenly split between target and control.
65 We utilize a standard 5 point Likert scale with an additional option for "Do not know."
66 Grosh, Margaret E.; Glewwe, Paul. 1995. "A guide to living standards measurement study surveys and their data sets". Living standards measurement study (LSMS) working paper; no. LSM 120. Washington, D.C.: The World Bank.
67 This comprehensive indicator for economic sustainability takes into account yield, prices, and cost of production.

Box 2: Progress Out of Poverty Index and COSA

Traditional measurements of poverty are conducted at the household level, asking detailed questions about assets, income, recent consumption, and expenditures. The best and most salient example would be the Livings Standards Measurement Surveys (LSMS),[66] which were established by the World Bank in the 1980s, to improve the methods used for targeting and monitoring progress of project beneficiaries in a consistent, rigorous, and comparable manner. Such surveys use an extensive, multi-hour questionnaire and tend to cover thousands of households. They are a considerable undertaking and are not often practical for smaller projects.

To reduce the cost and time needed to gather vital household data, a new suite of poverty assessment tools have been created that use reliable proxies for estimating poverty; they are not intended as substitutes for full household surveys or to get that level of detail. The most important and most widely used of these tools are the Grameen Foundation's Progress out of Poverty Index® (PPI), IRIS/USAID's Poverty Assessment Tools (PAT), CGAP's Microfinance Poverty Assessment Tool, IFAD's Multidimensional Poverty Assessment Tool, and Oxford' Multidimensional Poverty Index (MPI).

COSA tested some of these approaches and selected PPI for further work as part of its commitment to integrating and supporting useful tools wherever it finds them. In partnership with the Grameen Foundation, COSA seeks to pair the PPI functionality with COSA's more granular farm level assessments and indicators.

The PPI is a country-specific set of 10 questions that ask about a household's demographics and asset ownership and are easy to answer and verify. The questions are extracted from large-scale socioeconomic surveys such as the national census taken in each country and are selected and tested in order to correlate with known poverty levels for the respondents. The answers are then scored to compute the likelihood percentage that the household is living below the poverty line. The poverty likelihood percentage is based on any one of an array of national and international poverty lines (e.g., USAID's Extreme Poverty or the MDG's $1.25/day PPP) and helps to understand the likely level of poverty without the otherwise difficult tasks of capturing many factors of assets and non-farm income.

correlation is not always clearly evident across the samples and more work is underway to understand the influencing factors so as to better utilize the PPI. Still, this reinforces the validity of both tools to identify important components of economic sustainability.

Using the Mexican national food poverty line, the target farmers we surveyed there had a 14% poverty rate compared to 18 % of control farmers (significant at the 90% level). Additionally, one of the clearest (and perhaps least surprising) relationships was that between poverty and food security. While there were not many respondents in Mexico who were identified as having periods of food insecurity, those that did had a much higher poverty rate than those that did not have any periods of food insecurity. We see a similar situation for the Colombian cocoa producers as well.

To date, we do not have time series data that include the PPI and this is something we will be able to analyze after follow-up surveys. It may be that some of these PPI components do not change rapidly enough to see significant differences over the span of a few years. Analyzing this over the next several years will help provide perspective on the ways in which COSA can incorporate the poverty data provided by the PPI and use it for monitoring or other purposes.

5.4 Findings in the Social Dimension

COSA's social indicators are designed to measure key social sustainability targets as identified by major international agreements that cover a range of issues including labor conditions, household conditions, food security and education, as seen in Table 5.2.

For the social index, as with the economic index, we capture a range of relevant indicators together on a 100 point scale.[68] We include: the production conditions of the household (staple crop production,

68 The indicators are included in Appendix II and a further description of the nature and calculation is available in the Economic section.

Figure 5.15 Likelihood of Poverty (Measured by PPI) Compared to Income in Colombia

cash crop production, and food security); household and farm assets; school attendance; formal training in health and welfare issues; working conditions in the field; and literacy (See Appendix II for further details). We show this for Colombia across a range of years, as seen in Figure 5.16 We note that the differences at the 2008 baseline persist over time.

While the large-scale picture of the composite index allows an overview of trends, it is interesting to also consider some specific results so that the important details are not lost and that through targeting, sustainability goals can be more readily met. In Colombia, while the index shows persistent differences, we found mixed results when looking at particular indicators. In general, the level of food security decreased and there was also a decrease in the household members (under 18 years of age) that were in school (from 58% to 48%). The share of the time used for literacy training decreased from 15 percent to 4 percent. Meanwhile, the hours of training dedicated to issues related to health and welfare increased from 24 percent to 30 percent respectively. There were no changes in the overall level of wealth or in the accumulation of household and agricultural assets.

Figure 5.16 Colombia Social Index

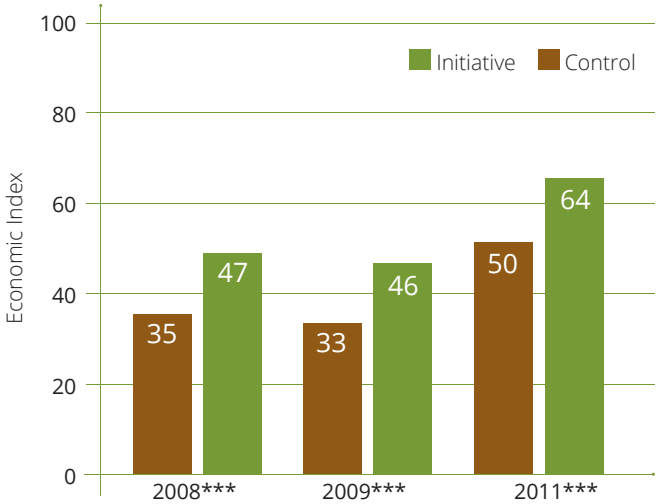


Table 5.2 COSA Indicators: Global Themes and Core Elements of COSA Social Indicators

S
Social

GLOBAL THEME	CORE ELEMENTS
Conditions	Health and Safety Living conditions
Basic Human Rights and Equity	Labor rights Education Gender Food Security
Community	Participation
Shared Value	Transparency Capacity and Finance
Perception	Social Situation

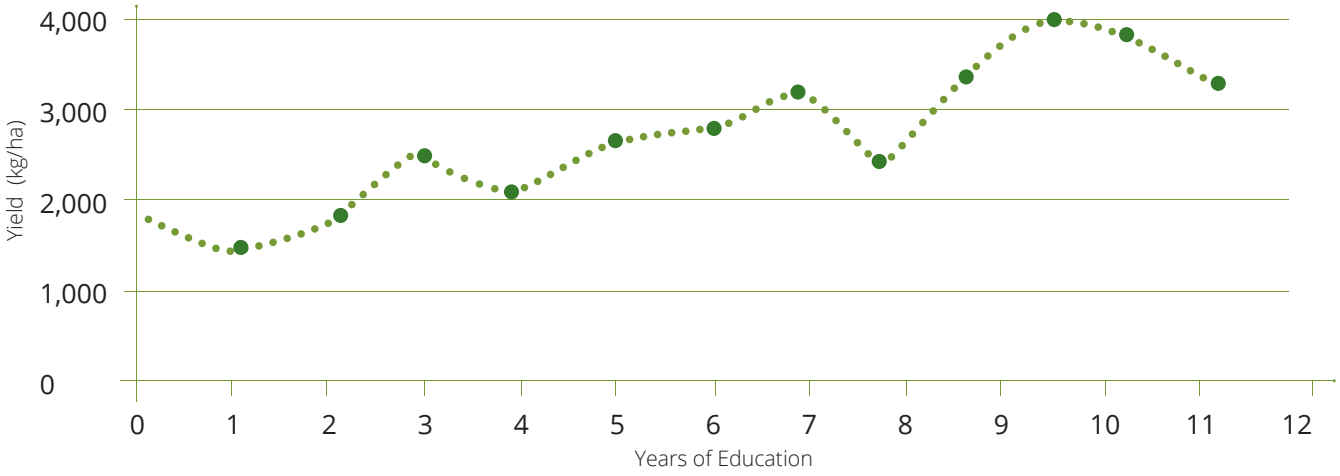
Specific Social Indicators

Education of the Household Head and Relation to Productivity

COSA assesses whether the education level of the head of the household is related to their production practices and results. This can be very useful in terms of tailoring interventions to match the actual capacity of a producer community (for example, literacy). A simple way to capture the relevance of education in production is to look at several indicators (certification, yield, training) across producers with formal schooling and those without schooling.

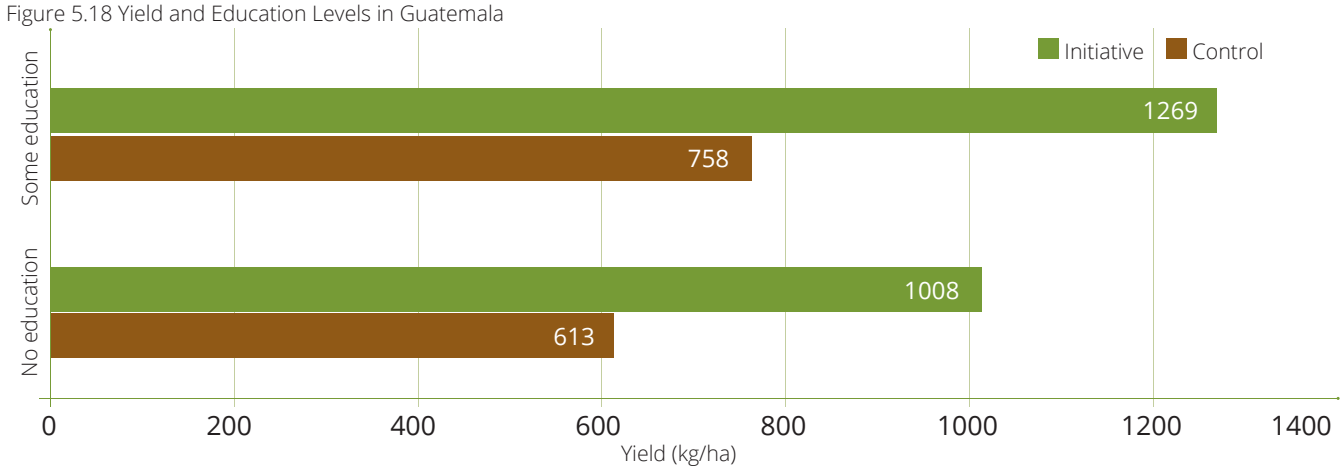
Of course, this indicator could have different relevance in different locations and could have a number of effects on productivity (e.g., literacy can help with access to information and technical training but may also foster leaving for off-farm employment). We, in fact, see that the evidence is mixed as illustrated with examples from two countries (Vietnam and Guatemala). In Vietnam, there seems to be a positive relationship between yield and education level as noted in Figure 5.17 (showing all farmers sampled) but no such relationship was evident in the Guatemala surveys.

Figure 5.17 Productivity and Education Levels in Vietnam



Looking further at how producers with particular education levels might be more likely to participate in a certification initiative (which might affect the outcome and the impact conclusions), we examined the differences between certified and uncertified producers.[69] Figure 5.18 shows that, while in general farmers with formal education have higher yields than those without education, certification is significantly (and positively) correlated with yields regardless of education. Of course, levels of education also correlate to other positive effects such as income and assets, so we cannot claim any causal relationship.

Figure 5.18 Yield and Education Levels in Guatemala



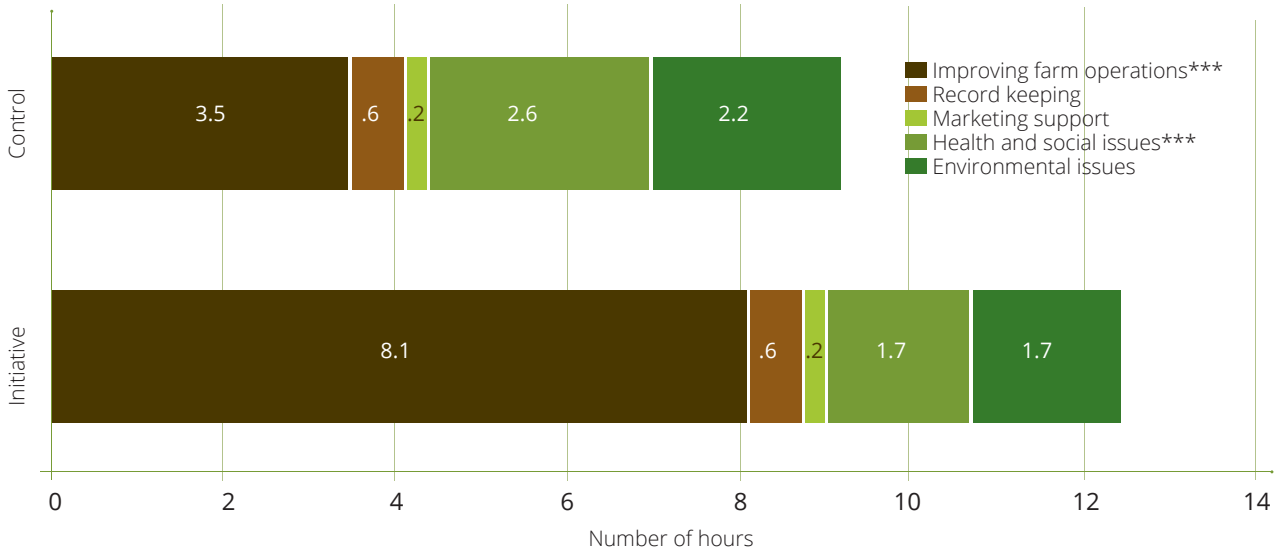
69 In Guatemala we split the sample into those with less than three years and those with three years or more.

Training Practices

Producers of commodity crops can receive a range of training from a variety of sources. Often training is associated with a project implementation but in many situations there is more than one group providing the training and for different purposes. The training might cover good agricultural practices, fertilization, environmental resource management, or even marketing and financial literacy skills. We see a range of training types and sources across sources across the countries we assessed. of countries.

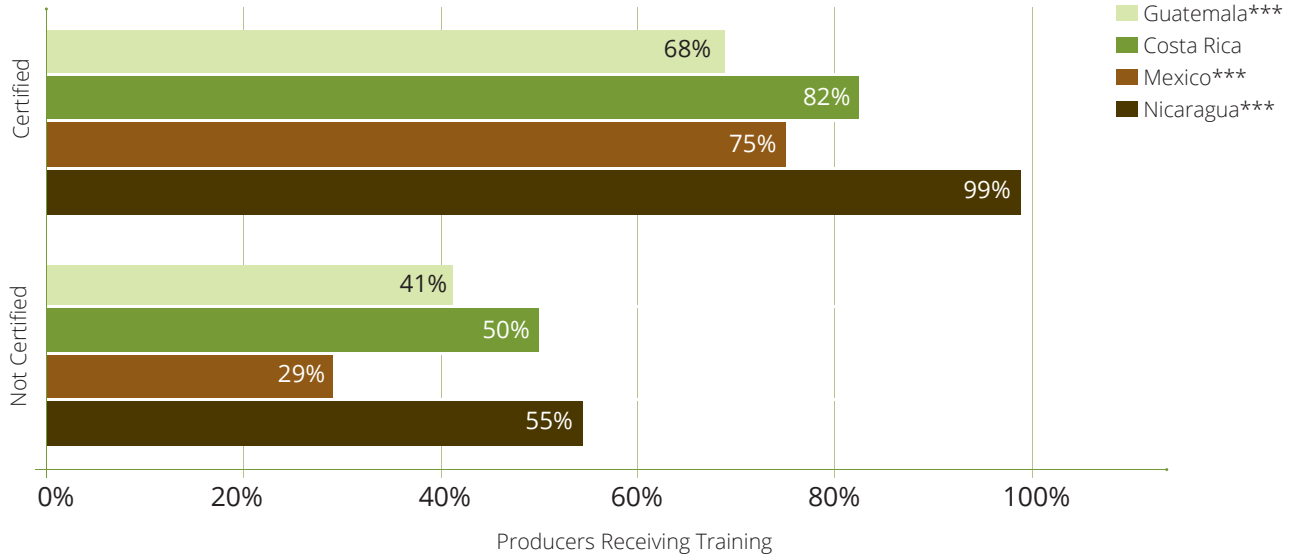
Using Vietnam as an example (Figure 5.19) we see that most training hours are spent in farm operations, followed by health and social issues and then, environmental issues. We see this in both the control and target group but the target group has significantly more training in farm operations. This may have impacted the activities of those producers. For example, the data provides evidence that the target certified farms reduced their use of agrochemicals (synthetic fertilizers and biocides and their costs of production) while not significantly sacrificing yields compared to non-certified (control) farms. This is no small accomplishment in a setting with some of the world's most productive coffee farms. Continued assessment, compared to controls, is necessary to better map the contribution of appropriate training to the impact pathways. These types of impacts may also contribute to a regional benefit of fewer toxic biocides released into the environment, and we know that less use of synthetic nitrogen also means decreased energy use and reduced greenhouse gases.

Figure 5.19 Types of Training Received, Comparing Certified and Uncertified in Vietnam



If we take this a step further for a range of countries and look at how certification may affect overall training, we see on average that more certified producers are receiving training than non-certified producers (Figure 5.20). This is what we would expect as many certification programs are associated with greater and more diverse training, but this is not always the case and the timing of this can vary so as to limit its effects.

Figure 5.20 Training Levels: Comparing Certified and Conventional in Four Countries



Box 3: Children's Education: A Lesson in Better Indicators

In small-farm households, labor used on the farm sometimes includes children, especially during the harvest season. This can sometimes cost the children in terms of reduced education. In an effort to evaluate how this might affect schooling, we ask producers questions about their children's education.

The results shown below are from two years of surveys conducted among coffee farmers in Tanzania. The groups asked in both years were farmers with two different certifications, and the corresponding controls for each group.

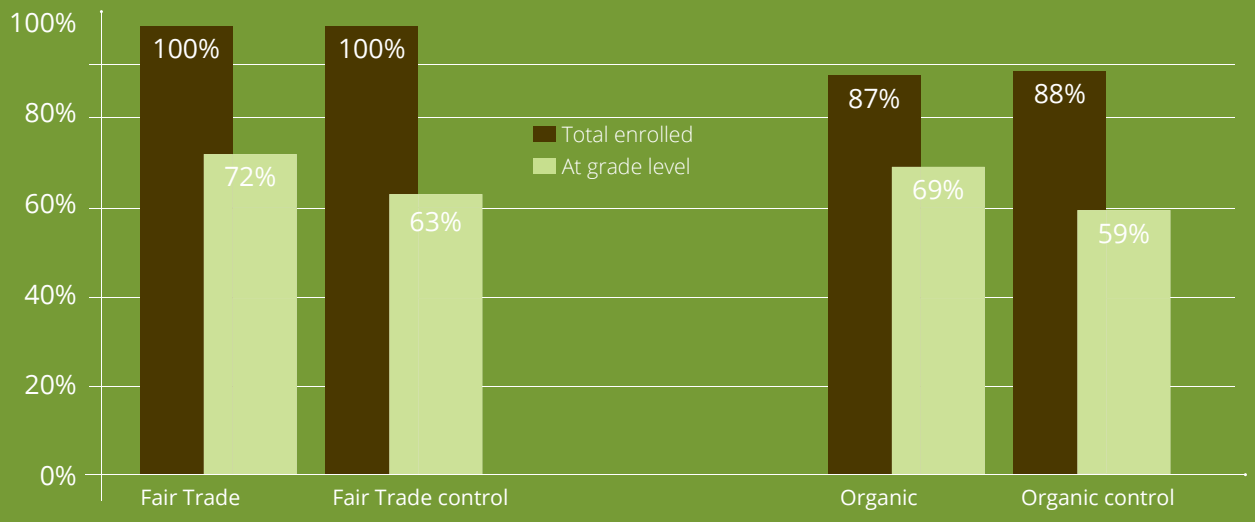
The graph below shows the difference in results from two ways to ask about children's schooling. In the first year of our survey (2009), we asked a well-accepted survey question about whether each child was enrolled in school and able to attend. The result was that the data showed a high proportion of children were indeed in school. During our review of the data, it was noted that this did not accurately reflect the educational realities observed in the field.

Accordingly, in the second survey we rephrased the question by asking about grade-level completion, in an endeavor to get closer to the intention of the indicator. We separately asked the ages of all household members and, in order to avoid possible bias in the answer, we asked what school grades each child had completed later in the survey.

In adapting our work to the local context, we noted that Tanzanian children begin primary school at age 7. We would therefore expect an 8 year old to have completed one grade of school, and a 19 year old to have completed 12 years of school. We altered the indicator to reflect whether or not a child had completed the grade levels expected for their age. This better reflected missing education due to challenging realities that include no money for school fees or books, the need to work, distance to classrooms, and the absence of teachers.

The second collection of results was substantially different from the first year, and presented a much bleaker picture of education in these rural communities. We learned an important lesson about how to structure an indicator because the simple and commonly used question, "Are each of the children enrolled in school?" had missed important details about the educational achievement of children.

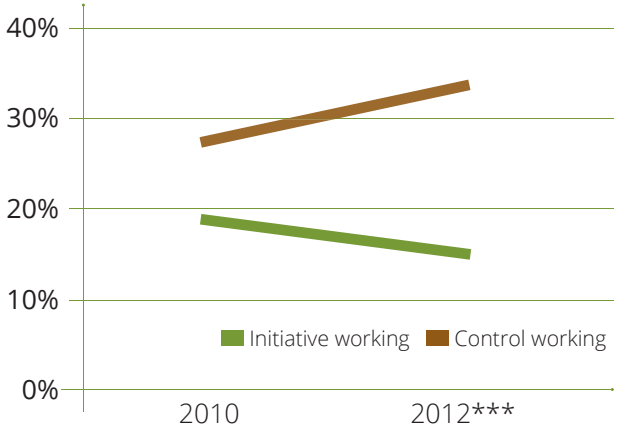
Understanding Education: The Question Can Drive the Result



Child Labor

Child labor persists in some farming regions and can be difficult for visiting researchers to detect and classify adequately. This thorny subject straddles the line between the natural progression of children learning farming from their families and those that are denied basic rights including safe conditions, indentured servitude, and access to education. In one study in Ghana (Figure 5.21), the percent of household children working in cocoa declined from 2010 to 2012 for the group participating in the certification initiative compared to the control group.

Figure 5.21 Child Labor Cacao in Ghana †

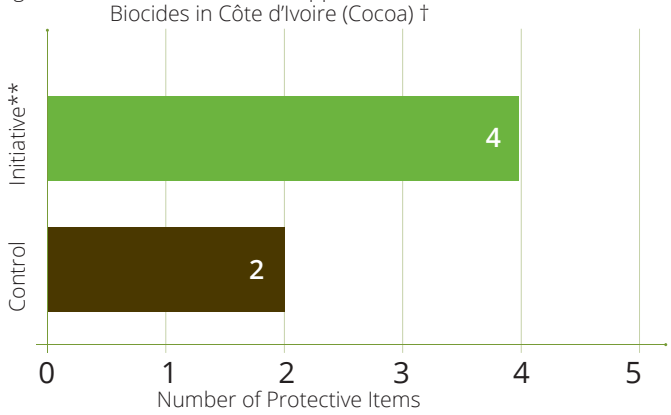


† Indicates use of Propensity Score Matching (PSM).

Protective Gear

Some certification schemes have explicit focus on worker health in an effort to address social sustainability components. In order to measure efforts to protect workers from exposure to hazardous materials, we collect information on protective gear used by the farmers and workers on the farm, and any limitations the producer imposes for application of chemicals by vulnerable people (pregnant women, children, and the elderly). Figure 5.22 shows the results of this analysis from cocoa farms in Côte d'Ivoire, where it is clear that target producers and their workers were using, on average, more protective items including, masks, eye goggles, gloves, boots, torso cover and pants to prevent skin contact.

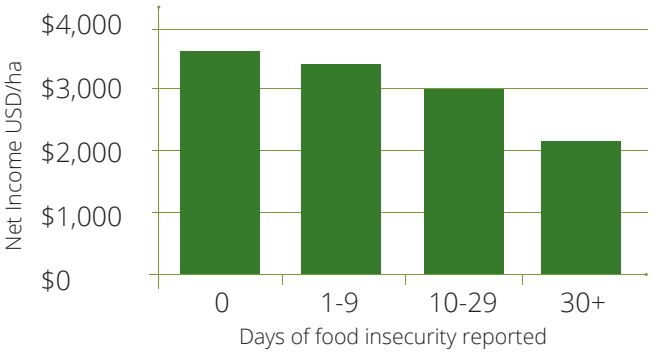
Figure 5.22 Protective Gear for Application of Biocides in Côte d'Ivoire (Cocoa) †



Food Security

We define Food Security as the ability of all members of a farm household to obtain adequate nutrition in a culturally appropriate and satisfying way each day. Increasing incomes - and thereby improving livelihoods - is the most common claim of sustainability initiatives, where "improving livelihoods" presumes improved or sustained food security. We looked at COSA data from several countries to evaluate the correlation between revenue or net income and the reported days of hunger. Not surprisingly, we see evidence that revenues and net incomes are higher on average for farmers reporting higher levels of food security. Figure 5.23 below is an example of this analysis from an assessment in Peru that includes the net income from coffee for the entire surveyed population (initiatives and controls).

Figure 5.23 Food Security and Income in Peru



However, this is an area where we anticipate that correlation is quite separate from causation. Prior research suggests that we should not expect that increased income will necessarily lead to greater food security. The World Bank has demonstrated that simply increasing agricultural production and household income by modest levels

does not necessarily reduce under-nourishment.[70] IFPRI and FAO concur with similar findings.[71]

We dedicate a substantial section of this report to Food Security for good reason. Most forms of sustainability are simply not possible where there is substantial hunger. The COSA approach aims to better assess overall well-being, not just survival (the calorie view). A further advantage of the nutritional assessment approach is that it can be queried relatively easily in the field. Yet there are challenges even with a simple food security indicator. Eliciting information about food security is not entirely straightforward as countries, regions, and cultures differ in their culinary traditions and expectations. If the head of household perceives that the answer to nutrition assessment questions could reflect negatively on them, they might be inclined to answer dishonestly that household nutrition is more secure than it is. In parallel is the scenario in which the head of household is motivated to pursue greater aid or assistance and answers in a way that makes the household nutrition conditions appear less secure than they are. Answers may also sometimes reflect that relatively low amounts of food have become the expected norm rather than a nutritionally balanced and adequate diet.

When we look at the relationship between food security and the diversity of crops cultivated, we often find that there is some correlation. The likely reasoning is that diversity, whether in income sources (different cash crops) or comestibles (food crops) may reduce the risk inherent in dependence. This would be particularly true where markets and crops may fail, which is the case in most rural areas and where focus on only cash crops or monocrops is risky due to farmers not having adequate fallback resources.

70 World Bank. 2007. "From Agriculture to Nutrition: Pathways, Synergies and Outcomes" Report No. 40196-GLB. Washington, D.C: World Bank
71 IFPRI. 2011. "Global Hunger Index". Washington D.C.: IFPRI; FAO. 2012. "State of Food Insecurity in the World" Rome: FAO

Box 4: Is Food Security The Single Most Important Sustainability Indicator?

Leading experts suggest that nutrition security is one of the most important metrics for understanding overall the socio-economic conditions of producers. Under-nutrition can be devastating to the short-term wellbeing and the long-term potential productivity of an individual. Lawrence Haddad, director of the Institute of Development Studies claims that childhood nutrition has a well-documented relationship to both health and economic productivity.[72] Adults who were undernourished as children have 15% less cognitive capacity, and a 1% loss in adult height as a result of childhood stunting (due to malnourishment) is associated with a 1.4 percent loss in productivity.[74] "When you lack regular access to good nutrition, you can be assured that you also have many other serious problems that will prevent normal functioning or achievement" notes COSA president Daniele Giovannucci. At a more macro level, Copenhagen Consensus research estimates that under-nutrition causes losses in GDP of 2-3% in regions where under-nutrition is significant.[75]

Research from the Global Alliance for Improved Nutrition (GAIN) has demonstrated the significant magnitude of malnutrition in the world's major cocoa production areas.[76] More than 70% of cocoa production is located in Ghana, Côte d'Ivoire, and Indonesia, in areas where more than 30% of children face hunger and suffer from stunting (reduced height compared to genetic potential is a key indicator for poor nutrition). The same trend can be seen in the coffee sector. In India, Vietnam, Indonesia, Kenya, and Ethiopia, where a substantial part of global coffee production takes place, stunting levels also exceed 30%.[77] This leads to major concerns from both a public health and business perspective, including:

1) Undernourished coffee and cocoa farmers suffer illness, fatigue and other health related problems, leading to reduced physical productivity and labor output.
2) Farmers' children don't develop to their full cognitive and physical potential, leaving the next generation underequipped to meet farming demands.[78]

There is general agreement that the quality of food is more important than the quantity and therefore estimating nutrition security is superior to estimating food security. Assessing nutrition security is inherently difficult due to dietary diversity, quality of nutrition, inconsistency of nutrient absorption, and seasonal variance in availability. Approaches range from a simplistic focus on calorie counts or protein fundamentalism to more sophisticated anthropometric measures or food inventories. IFPRI researchers recently reviewed various possible indicators and concluded that measuring the diversity of people's diets is the most promising. However, techniques for assessing such diversity are still complex and require frequent responses (often daily or weekly) in order to be accurate. IFPRI notes that "Diets vary quite a bit around the world and are more diverse in some regions than in others, so defining universal thresholds has failed so far." [79]

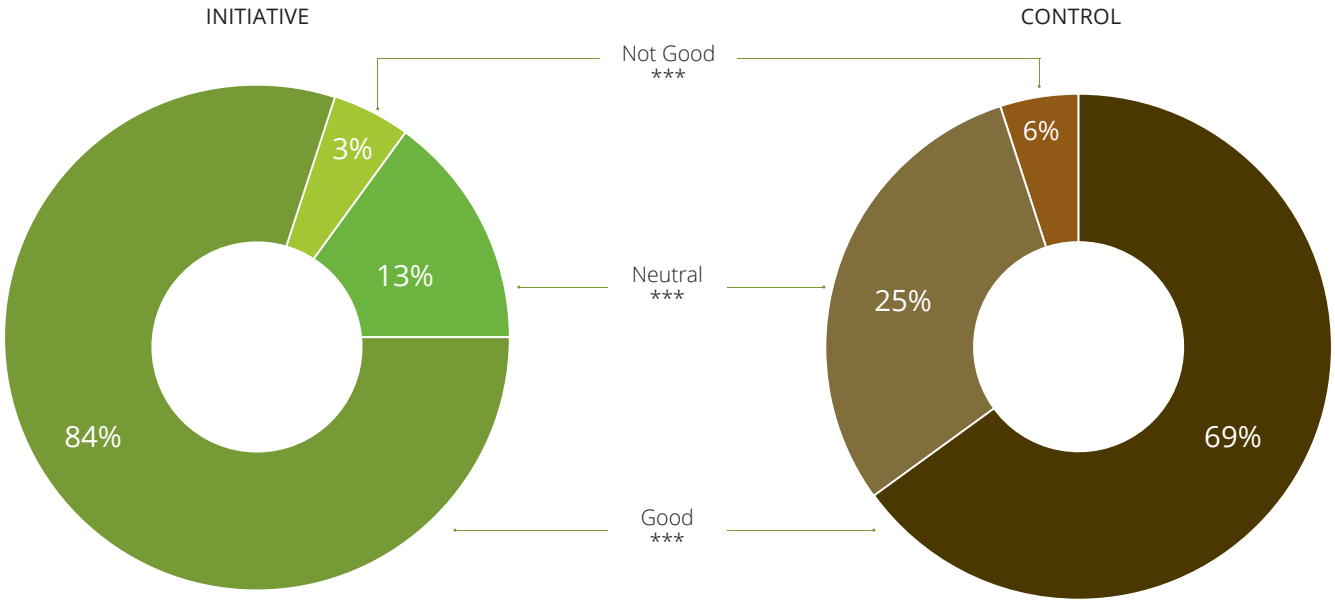
COSA has opted for the approach of inquiring into individual food security in ways that respect cultural and environmental differences rather than imposing normative guidelines. COSA's President cautions that there are trade-offs with every approach but that in many cases a simple universal approach is preferable to a more perfect approach that can be applied only rarely. He states that, "We cannot always wait for the necessary funding and interest to get an optimal nutrition assessment. Today, in millions of communities and thousands of supply chains around the world, we need to have a good idea if sustainability efforts are moving this important issue in the right direction."

72 Haddad, L. 2013. "Ending Undernutrition: Our Legacy to the Post 2015 Generation." IDS - CIFF
74 Behrman, Jere R. and Mark R. Rosenzweig. 2001. "The Returns to Increasing Body Weight." PIER Working Paper No. 01-052. Philadelphia, USA: Penn Institute for Economic Research
75 http://www.copenhagenconsensus.com/projects/copenhagen-consensus-2012/research/hunger-and-malnutrition
76 De Vries, K., B. McClafferty and M. Van Dorp. 2012. "Increasing Cocoa Productivity Through Improved Nutrition – A Call to Action" Concept Brief. Amsterdam: Global Alliance for Improved Nutrition (GAIN) and the Centre for Development Innovation Wageningen University & Research Centre
77 De Vries, K., B. McClafferty, M. Van Dorp and B. Weiligmann. 2013. "Increasing Coffee Productivity Through Improved Nutrition – A Call to Action" Concept Brief. Amsterdam: Global Alliance for Improved Nutrition (GAIN) and the Centre for Development Innovation Wageningen University & Research Centre
78 See, for example: Horton, S. and J. Ross (2003) "The Economics of Iron Deficiency." Food Policy; 28:51-75
Haddad, L. (2013) "Ending Undernutrition: Our Legacy to the Post 2015 Generation" Brighton, UK: Institute of Development Studies
Behrman, Jere, Harold Alderman and John Hoddinott (2004) "Hunger and Malnutrition." Copenhagen: Copenhagen Consensus Center
79 http://insights.ifpri.info/2013/04/measuring-hunger/#sthash.TIROLEvz.dpuf

Producer Perceptions of Social Issues

Gauging the overall perception of a farmer allows the opportunity for issues to emerge that may not have been reflected in the more structured questions. The survey question is purposely left open for a more qualitative interpretation by the producer, though responses are categorized with a five point Likert scale. If we look at overall perception of the social situation among Colombian coffee farmers in 2011, we see (Figure 5.24) that more of the target producers participating in various initiatives said they had a somewhat good or good social situation compared to control groups of conventional farmers not participating in any formal sustainability initiatives. In this case, most of the target producers had been certified for several years.

Figure 5.24 Producers' Perception of Their Social Conditions in Colombia



5.5 Findings in the Environmental Dimension

Environmental metrics are a key part of global sustainability discussions.[80] We know that human welfare is critically dependent on healthy ecological management, and by providing proper accounting we can identify the most effective options for lasting development. The environmental questions that we incorporate in our analysis cover a range of indicators including those in the categories of: water and soil conservation and protection measures, recycling, good agrochemical practices, environmental management and training, and biodiversity. We provide a sampling of these Themes and Core Elements in Table 5.3.

Our inputs, based largely upon farmer level surveys, provide unique insight into the ground-level realities of farms but not necessarily into some types of environmental impacts that are only evident and addressable at the scale of a regional landscape. Our mapping functions help to contextualize the area beyond the farm but, from a policy perspective, it is also useful to combine tools and ascertain environmental impacts on a broader basis.

As with the economic and social indicators, we constructed an index to capture a range of relevant environmental indicators together on a 100 point scale.[81] This offers a good overview and permits managers and policymakers to see the direction or trend of the category. For the environmental index, we include conservation practices for both soil and water, good agrochemical management practices, producer recycling practices, conservation areas and biodiversity (level of overstory coverage).

In the Colombia index below, our Research Partner (CRECE) also includes the metric of training in environmental issues and an evident plan for environmental protection since knowledge of these practices is critical to their implementation, if they are not already in place. Figure 5.25 shows the difference in the targets and controls for Colombia and it illustrates that the targets score consistently higher than the control groups.

Figure 5.25 Environmental Index in Colombia

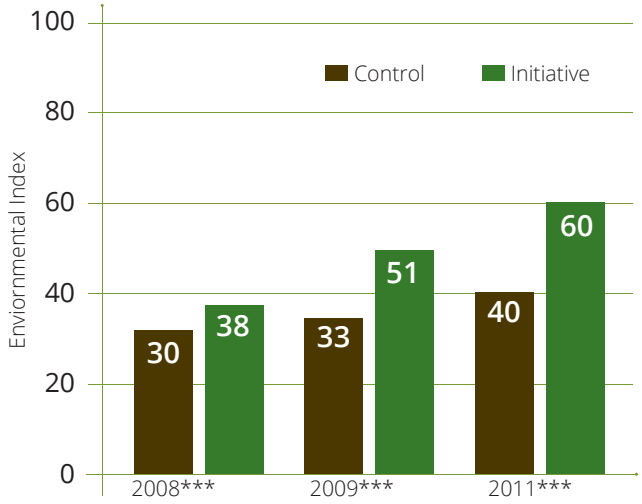


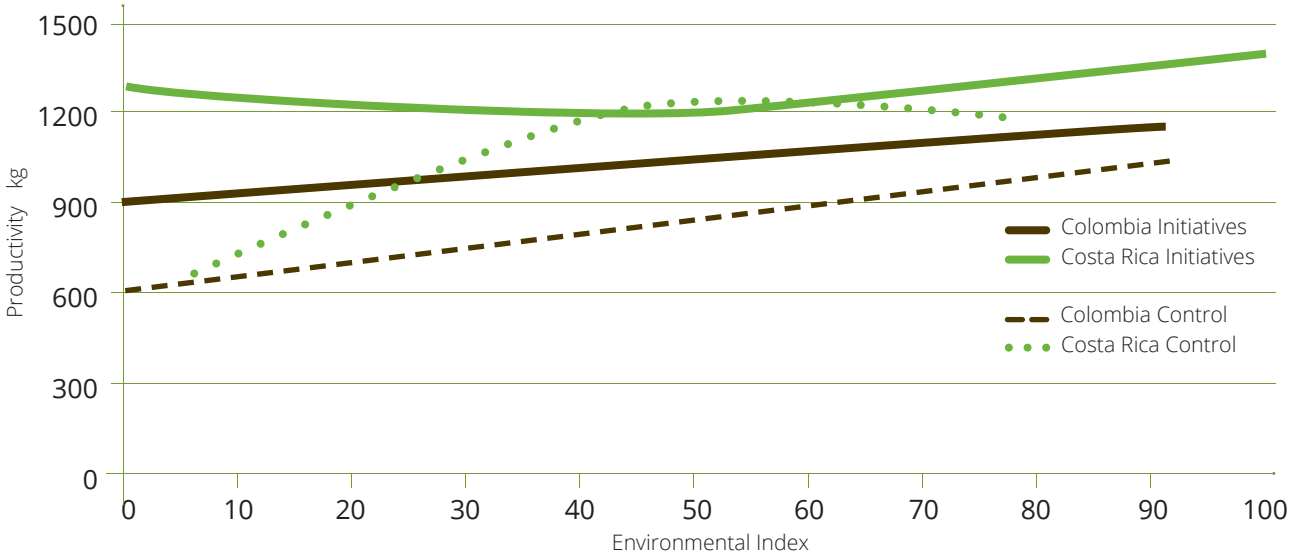
Table 5.3 COSA Indicators: Global Themes and Core Elements of COSA Environemtal Indicators

Environmental

GLOBAL THEME	CORE ELEMENTS
Water	Water Quality Water Quantity
Resource Management	Resource/input management Waste management
Soil	Conservation Soil Health
Biodiversity	Plant Diversity Tree Density
Climate Change	Sequestration & Mitigation
Perception	Environmental situation

80 The Ecological Footprint now being integrated within the Human Development Index is but one example
81 The indicators are included in Appendix II and a further description of the nature and calculation is available in the Economic section 5.3.

Figure 5.26 Environmental Index and Productivity, Colombia† and Costa Rica



A critical component of sustainability is the relationship between productivity and environmental results. This is especially useful to use over time to test a common hypothesis that good environmental stewardship will result in more stable long-term productivity. Figure 5.26 shows the relationship between the environmental index and yield productivity for both Colombia and Costa Rica. There does seem to be a positive relationship between the environmental index and productivity. When disaggregated, this does not always hold true for individual farmers or groups and can thus serve to help target those for more appropriate interventions. In the case of Colombia the certified producers have higher levels productivity and good environmental stewardship than the matching control groups that are not certified. In Costa Rica the situation is similar except that in some cases the control farmers have yields that match those for farmers certified in the initiative..

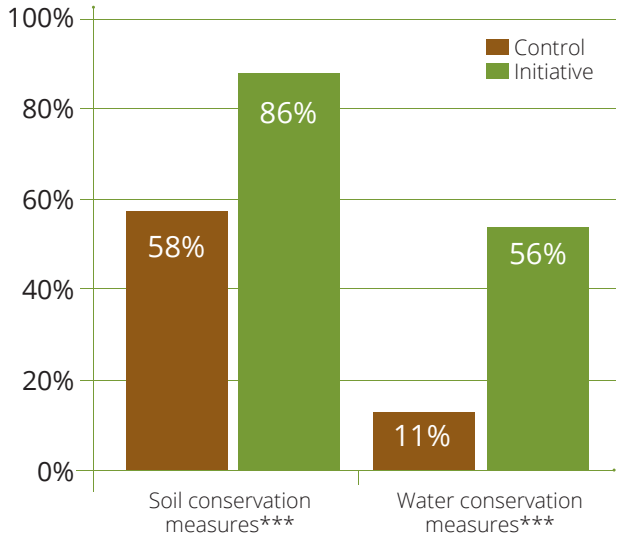
Specific Environmental Indicators

Water and Soil Conservation and Protection Measures

It is important to know the extent to which producers apply conservation and protection practices for water and soils. These are fundamental for long-term sustainability and tend to correlate with better productivity. COSA collected data on the average number of practices the producers use to increase water retention (which can improve water efficiency) and keep soil from eroding. Choices of conservation measures included mulch or planted soil cover, check dams, drainage channels or diversion ditches, soil ridges around plants, contour planting and terracing, and live fences (that is, trees and shrubs) as well as others, relevant to the area, that may be mentioned by the producer. In Côte d'Ivoire we observed that the producers who are part of an initiative are using a greater number of conservation and protection measures than the non-initiative (control) producers – at a 95% level of confidence. However, in both cases, the number of practices used by producers was very modest.

We see a similar relationship for Costa Rica where more initiative producers were using soil and water conservation measures (Figure 5.27) than their control counterparts.

Figure 5.27 Soil and Water Conservation Practices Used in Costa Rica



Better environmental stewardship in the form of conservation practices tends to correlate with yield. However, the relationship between specific practices and higher yields can vary, especially given the expected lag times of some of the impacts and is worth noting. Using similar methods of measurement we can compare data collected from four countries. As Figure 5.28 shows, in Tanzania and Vietnam we see a somewhat positive relationship with yield, but in Guatemala and Indonesia, we see the opposite. Clearly, there are a number of factors that influence these outcomes, and we are not controlling for those in this graphic. Nevertheless, the results suggest caution in making strong generalizations and make a case for the value of comparable measurements.

Tree Renovation and Replanting

Renovation on the farm is a critical component in understanding any tree crop that has a high initial establishment cost and a limited commercial life expectancy. It involves substantial levels of farmer investment and lost productivity during the establishment phase of a young tree. Renovation also has implications for long-term viability as aging trees become weaker and less productive. It is also an interesting indicator of confidence since producers will only make such substantial long-term investments if they have reasonable assurance of positive future outcomes.

Figure 5.29 shows that coffee tree renewal in Colombia has steadily increased over time. However, producers who are part of an initiative are doing less renovation than the controls. Producers who are part of an initiative tend to have younger trees, as substantially more producers in the control groups have trees that are more than nine years old.

Figure 5.29 Percentage of Coffee Tree Renewal per Year, Colombia†

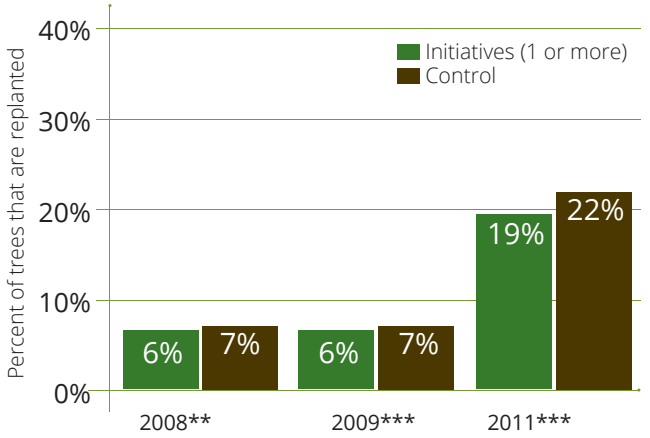
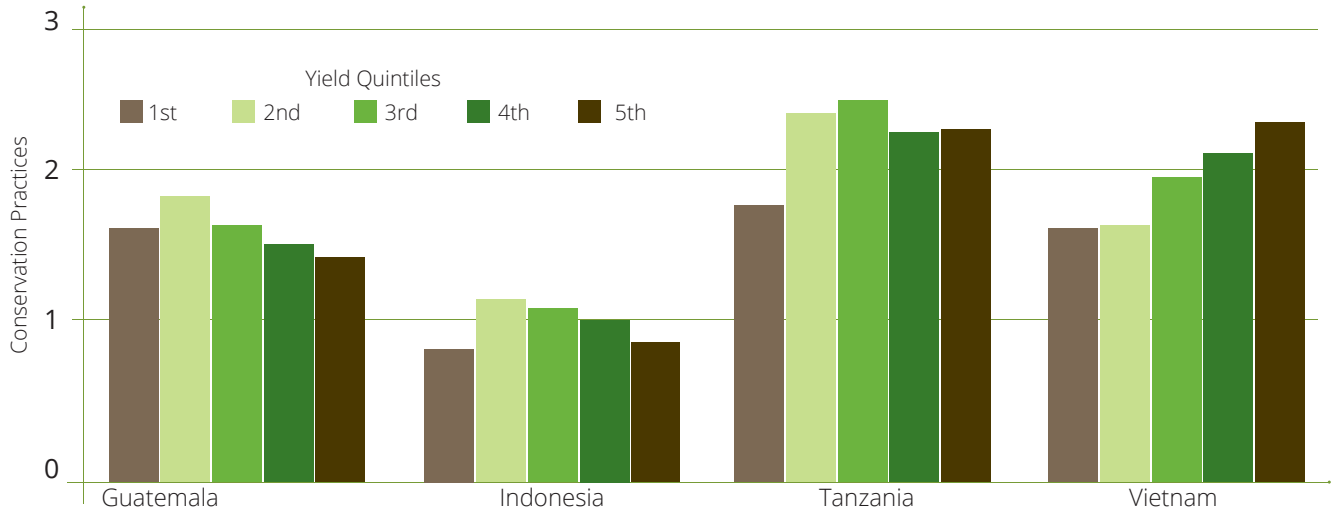
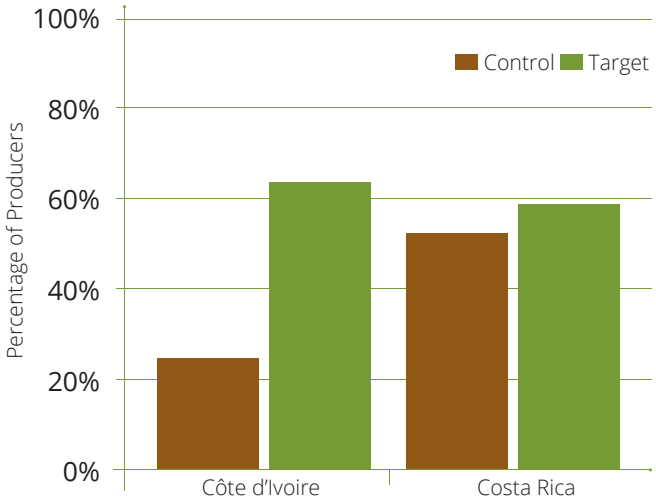


Figure 5.28 Conservation Practices and Yield by Quintile



From the data we have collected, the results are mixed between producers that are part of an initiative and those who are not. For example, we see the opposite relationship in Costa Rica than in Colombia, with approximately double the renewal rates for certified farmers when compared to non-certified farmers. In Mexico, we see similar replanting rates across certified and non-certified producers for both 2008 and 2010. We can see some differences between the target and control groups in terms of the decisions to replant for Côte d'Ivoire (cocoa) in Figure 5.30.

Figure 5.30 Producers Replanting, Côte d'Ivoire† (cocoa) and Costa Rica (coffee)



Environmental Training

In evaluating this indicator, we present data that has been analyzed using the combination of Propensity Score Matching (PSM) with a Difference in Differences (DID) analysis, in order to measure performance for both target and control groups before an initiative or intervention begins and then again after several years.

Using an example from México, producers were interviewed to determine whether they received training in good environmental practices, such as composting, soil conservation, and similar "organic-style" production methods. In 2008, only five percent of target producers had received any training in good environmental practices and none of the producers in the control group had received such training. By 2010, when producers were interviewed a second time, 37 percent of the target producers involved in the initiative had received training, compared with five percent of control producers.

Using the DID results, we would have expected that, in stasis, a similar difference would exist – in other words, that if five percent of control producers received training then 10 percent of target producers would also receive training, following in the same trajectory established by the control group (as seen in Figure 5.31). The DID analysis would assess the actual difference (37 percent versus 5 percent) as an increase in environmental training of 27 percent that could be attributed to the effect of the interventions since a number of other factors were controlled. Because these samples were already matched using PSM (and therefore controlling for observable differences), we have even greater confidence that the interventions, and not other factors or projects, induced a substantial increase in environmental training.

Figure 5.31 Projected and Realized Rates of Environmental Training in Mexico†

Biodiversity

For the sake of simplicity and to reduce the many hours/days necessary to directly ascertain the biodiversity level of a farm, this indicator classifies the percent of farm area in six levels of plant biodiversity: grassland, monoculture, production with sparse overstory, production with semi-dense overstory, production with dense overstory, and natural forest.

Biodiversity of habitats and species is an important component of sustainability especially in developing countries where natural resources make up 21-35 percent of total wealth, and environmental biodiversity is an important part of this wealth.[82] Its intrinsic complexity makes it difficult to measure

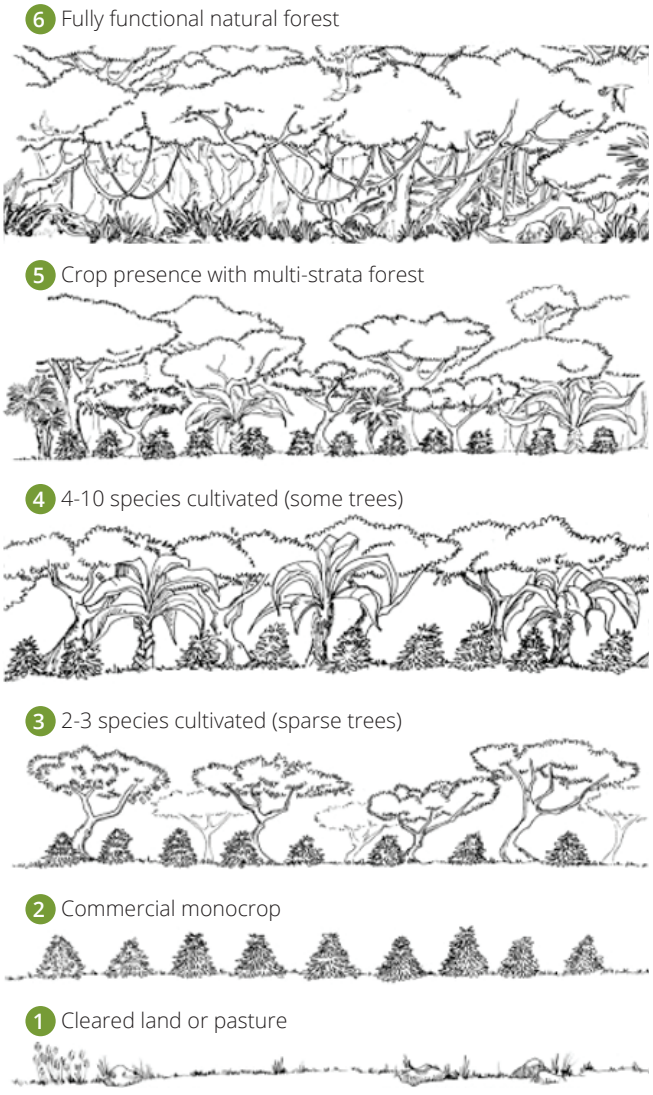
82 World Bank. 2013. "Biodiversity and National Accounting." World Bank Research Digest (7) 4. Washington, DC: World Bank

effectively without many types of bio-physical observations that include soils, water, flora and fauna. In fact, Milder et al. report on the lack of evidence on environmental and biodiversity impacts of certification in their review of available studies (no COSA results were included).[83] To account for biodiversity without requiring costly and complex efforts such as multiple days of expert observations and samples, COSA undertook several years of consultations and field testing to arrive at a well-accepted proxy of the above ground plants (flora) that is relatively simple, can be applied in most situations, and does not add substantial survey time.

Survey questions designed for multiyear comparisons or for cross-country comparisons are best when they are specific and not subject to a wide range of interpretation. This is critical since surveyors measure different places from year to year and it is easy to lose the consistency that permits comparability across years and countries. Assessing the landscape-level biodiversity on a farm presents exactly this sort of challenge.

In order to improve consistency of observation from year to year, surveyors are asked to observe the farm landscape and determine how much of the farm's area (as percent of total) is similar to a particular type of landscape that is described in a graphic provided. Figure 5.32 illustrates the six standard landscape options that range from minimal levels of biodiversity (Level 1 shows bare soil, pasture, or grassland) up through a complex and unmanaged forest (illustrated in Level 6). Of course, many farms are a mixture of different landscapes and so the calculation simply denotes the percentage or the actual acreage of the farm that compares to each category. This level of specificity allows the observation of even relatively modest changes from year to year and conversion of partial or entire areas to different forms of land use.

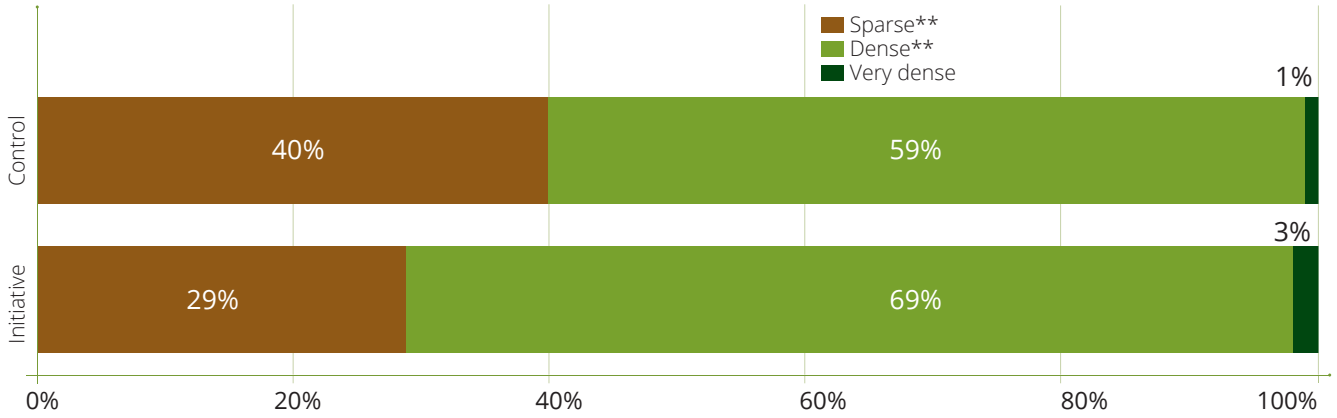
Figure 5.32 Farm Landscape Classification Graphic for Consistent Interpretation



An example of this in practice is illustrated in Figure 5.33 where producers in southern Mexico had some level of biodiversity coverage on their farms. Only a tiny proportion had "Very dense overstory" (Level 5) and none had Level 6. The largest proportion had a commercial poly crop system (Level 4) that is shown below as "Dense overstory". The second largest group classified as Level 3 which is mostly one or two species in addition to the coffee crop and is illustrated below as "Sparse overstory". None of the producers had Levels 1, 2, or 6.

83 Milder, J., L. Gross and A. Class. 2012. "Assessing the Ecological Impacts of Agricultural Eco- Certification and Standards: A Global Review Of The Science And Practice." Internal report. Washington, DC: EcoAgriculture Partners

Figure 5.33 Landscape Biodiversity of Producers in México†

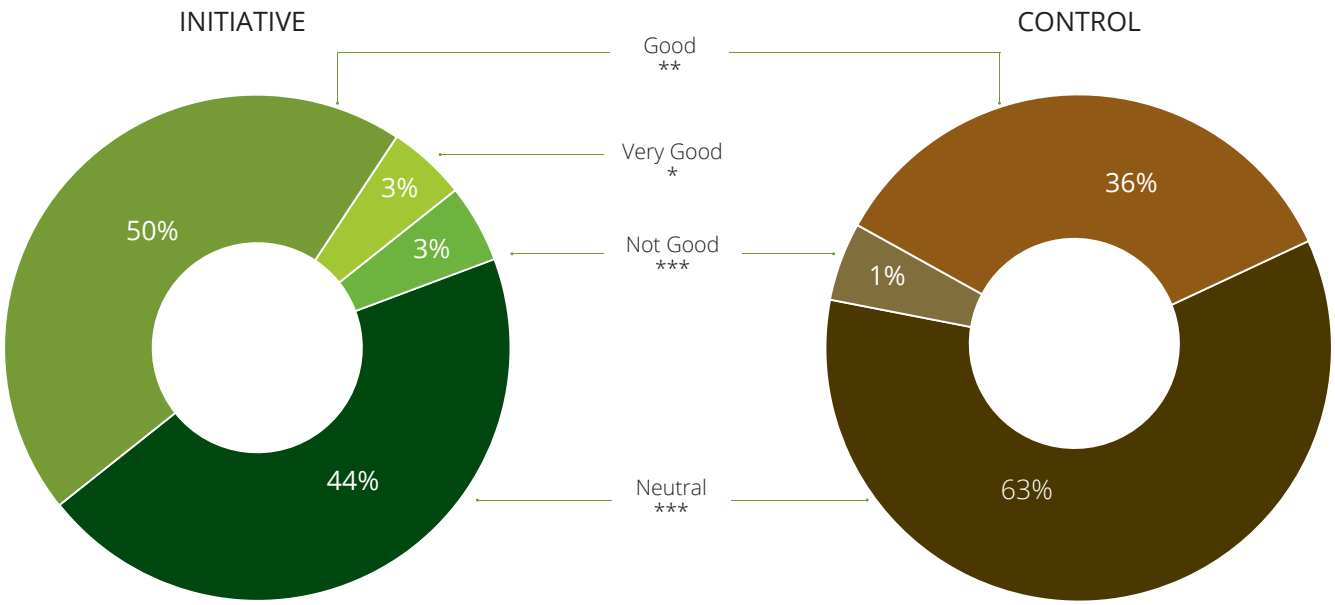


Environmental Perception of Producers

Gauging the overall perception of a farmer allows the opportunity for issues to emerge that may not have been reflected in the structured questions. In 2013, we asked Mexican coffee producers about their level of care of the environment. Measured on a five point Likert scale, the perception of environmental care on their farms between those participating in a certification initiative and the control farmers is significantly different as presented in Figure 5.34. While the majority of the control farmers (63%) thought their treatment of the environment was neutral or "Okay" – in the target group, the majority (53%) thought their treatment was "Good" or "Very Good".

This chapter has provided a selection of indicator results covering the economic, social, and environmental realms from a range of countries. While only a snapshot of the data collected, it provides insight into what is possible in terms of measuring sustainability, and the opportunities that exist moving forward.

Figure 5.34 Producer Perception of Environmental Conditions, Mexico



5.6 Producer Organizations

Producer organizations (POs) are often the most important institutional structure in rural communities. They serve as conduits of information, offer resources to their members, and connect producers to services (i.e. credit and technical assistance) and markets beyond their own community. In the case of smallholders, farmers with modest land and resources, these organizations can substantially improve a farmer's outcomes. It is therefore not surprising that nearly all of the coffee and cocoa producers that undertake a structured sustainability initiative or certification are organized in some form to do so.

This is especially important in remote areas where public services are limited or nonexistent. As such, POs can be powerful allies for a farmer's sustainability. Conversely, when poorly governed or managed, POs can be a drain on farmer resources, limit opportunities, and lower the prices a farmer receives. Accordingly, understanding the governance and services of a PO is an important part of understanding the pathways to sustainability for many farm communities.

Environmental Perception of Producers

Measurement of active participation and voice for producers in their PO seeks to express an aspect of more transparent governance that is important for the stability and longevity of representative organizations. COSA also uses this measurement as a proxy for community building – reasoning that as governance in local institutions becomes more transparent and responsive to farmers, communities are strengthened. For example, in Côte d'Ivoire, 44% of the certified cocoa producers in the initiative reported that they "always" or "sometimes" vote in meetings, compared to 17% of control farmers who said the same. The difference in participatory governance in POs is strongly related to participation in the initiative. Participation rates in meetings did not differ significantly between target and control farmers.

We estimate that the majority of sustainability initiatives such as certifications, direct trade and targeted projects are conducted through a PO. Producer organizations are formed for a wide variety of reasons including access to credit, technical assistance, gender support, and marketing. In evaluating the impacts of an initiative at the producer level, it is therefore important to also understand the PO structure. COSA collects information through a tailored survey that is specifically oriented to these POs (with some of the indicator themes shown in Table 5.4).

Table 5.4 Global Themes and Core Elements of COSA Survey for Producer Organizations

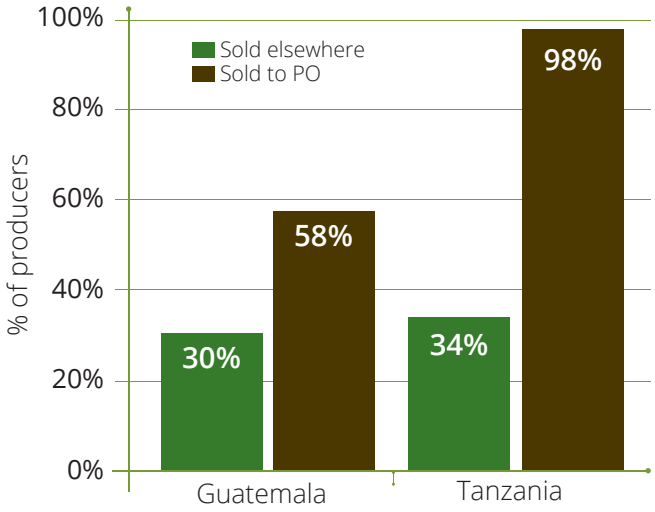
GLOBAL THEME	CORE ELEMENTS
General Information	Location and community characteristics PO basic profiles
Membership and Organizational Structure	Membership Organizational structure and governance
Financial Sustainability	Sources of finance Financial performance and management
Product	Type of products, productivity, product quality
Services and Facilities	Agricultural inputs supply Training and information Storage/Warehouse Value-addition/Processing Credit Marketing/Outputs commercialization
Certification or Standards	Certificates or Standards held Impacts on trade, production, labor conditions and business development.
Community services/ Externalities	Social externalities Economic externalities Environmental externalities
SWOT	Strength, Weakness, Opportunities, and Threats

Our Producer Organization Survey is designed to collect data on organizational and governance structure, marketing, reasons for establishment, certifications or standards it meets, services and facilities offered, community services, and challenges.

This information has proven to be a valuable supplement to the data collected at the producer level, both to confirm results and to provide context for the variety of challenges and opportunities that exist among the producers. Understanding the PO often explains what appear to be irrational farmer choices such as selling elsewhere for a lower price or participating in an initiative that a farmer does not understand. It can also offer valuable insights to the organization itself so that the PO can better manage its efforts.

One valuable indicator collected is the percent of their crop that producers sell to their PO. It can illuminate how effective and how valued the PO may be. For example, if producers only sell a modest proportion of their crop to their own PO, this could indicate a critical weakness of the PO. Producer Organizations do not always get to commercialize 100 percent of their members' production. Sometimes, a significant portion is sold to other buyers. This may be due to several reasons such as prior agreements or relationships, better price offers, urgent cash needs, rejection by the PO for quality or excess supply, or hedging against the risk of the PO not paying the farmer fully. Figure 5.35 shows the sales to the PO and the sales outside the group for two very diverse situations in Guatemala and Tanzania. The data show that all producers, regardless of initiative or control status, sell a portion to both types of buyers and we see similar results in other countries.

Figure 5.35 Sales to Producer Organization, Guatemala and Tanzania

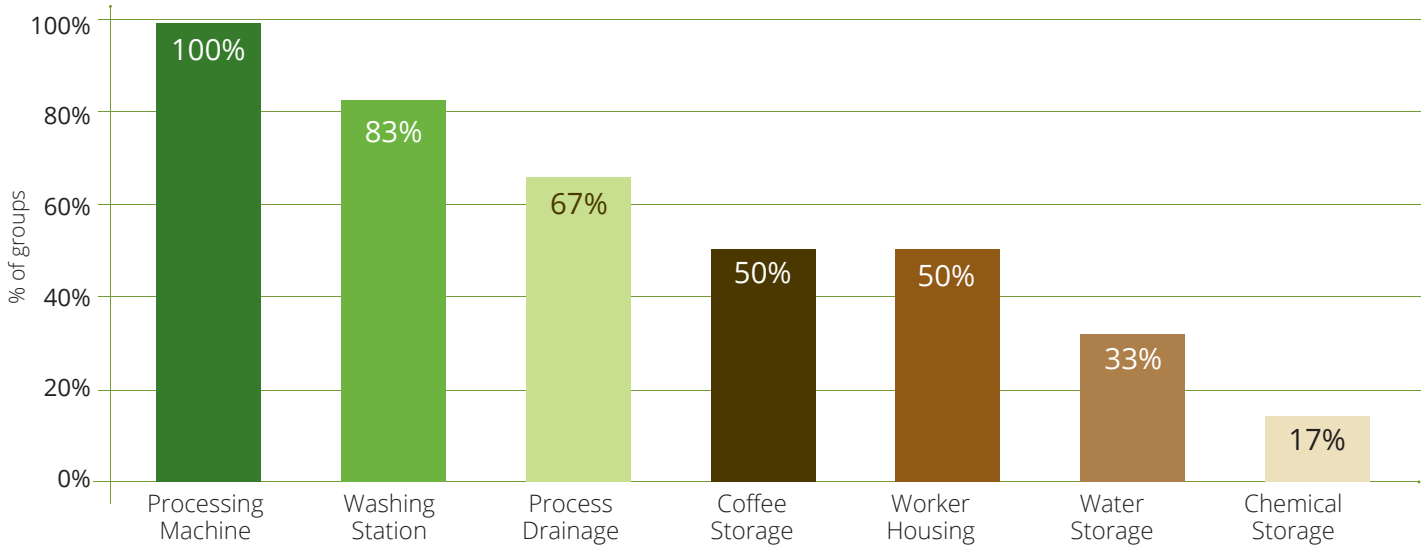


NB: totals do not equal 100 as some replied to both and some producers did not respond to the question

Investments by Producer Organizations

In Tanzania, the choice of investments made by POs signal that their objectives were primarily economic. Understanding the needs of farmers and the actual investments to satisfy those needs can offer clear opportunities for income-generating investments at the PO level. It is also important to understand the scale of investment required to participate in certifications or initiatives – Fair Trade is one notable example that requires a portion of the Fair Trade premium to be invested by the group or PO. Even in the absence of specific requirements within a standard, productive investments can be one of the pathways to sustainable development for farmers and so it is useful to understand the form and extent to which such investments contribute to producer sustainability. Farmer surveys alone cannot adequately capture the nature of the PO's influence on outcomes. In the example of one Tanzania survey, all POs made investments targeted to coffee quality in the form of large processing equipment and drying platforms. Over 80 percent provide a complete washing station (for pulping and fermentation) to their farmers; other investments are seen in Figure 5.36.

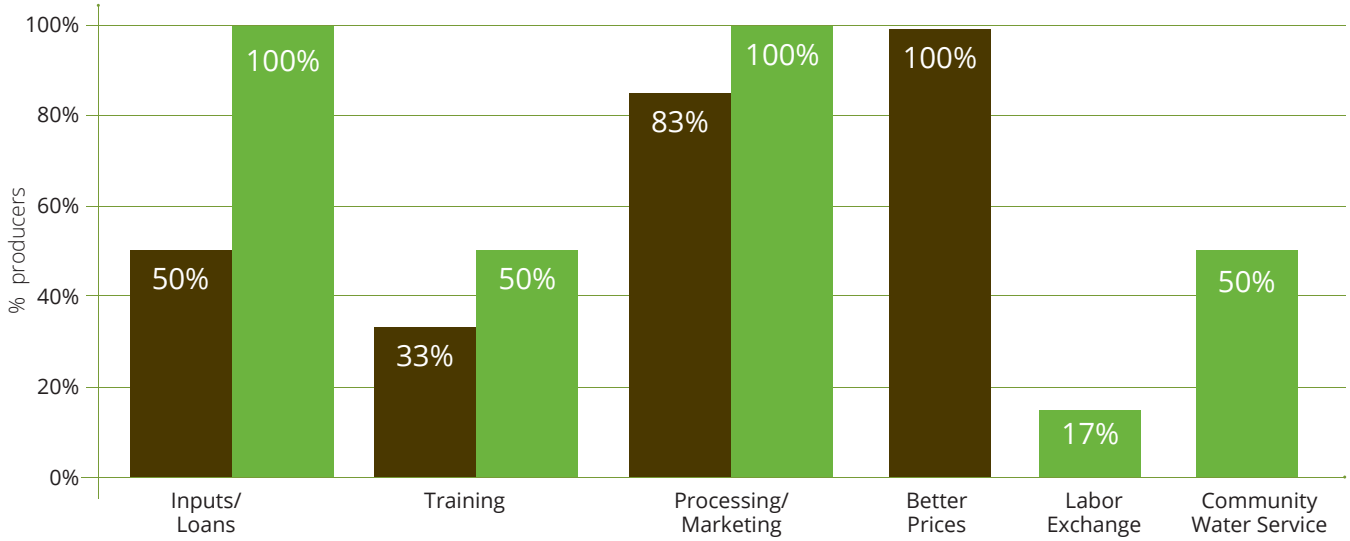
Figure 5.36 Investments by Producer Organizations, Tanzania



Producer Organization Services

Producers were polled about why they joined their PO, and Figure 5.37 matches their responses with the services provided by the PO. Since all producers in this particular Tanzania sample belong to a PO, it is vital to understand the motivation for this as well as the nature and effectiveness of the PO. Not surprisingly, most producers joined the group for inputs, loans, processing, and marketing. Interestingly, half of the POs have also come to provide a labor exchange function and community water services.

Figure 5.37 Original Reasons for Joining PO and Current Benefits of PO, Tanzania



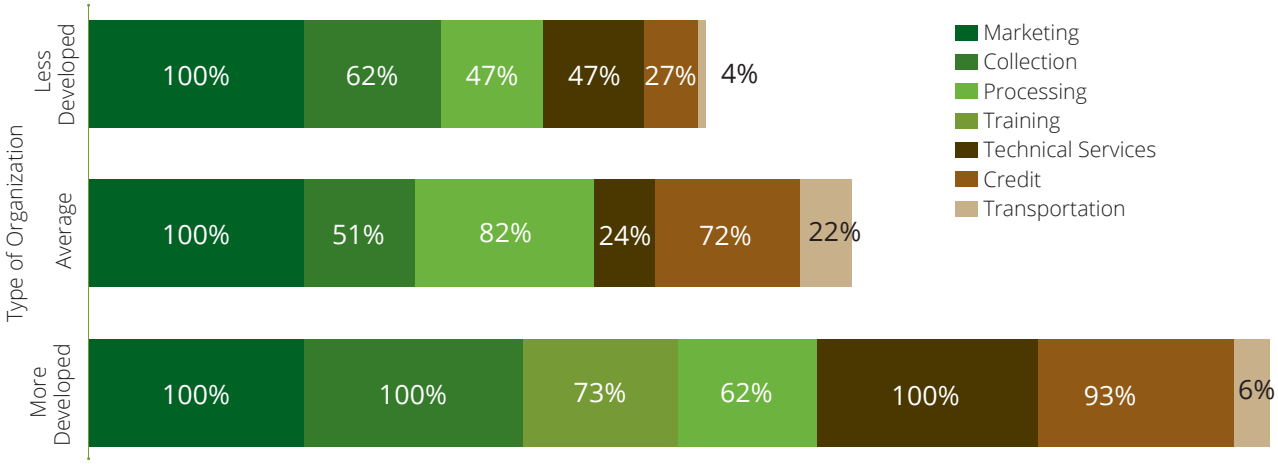
84 This has been demonstrated recently in Tanzania (Allen, S., M. Qaim, and A. Temu. 2013. "Household Water Constraints and Agricultural Labour Productivity in Tanzania" Water Policy 15 (5), 761-776)

These "extra" advantages, while not part of the original impetus to join a group, are vital to understand because they suggest benefits that can be enhanced or utilized to improve outcomes – for example, better water access. Such water resources can have a more important effect on overall agricultural productivity than more inputs.[84] Typical economic surveys that mostly cover prices or production-related infrastructure can easily overlook these factors. COSA's work instead supports a multi-dimensional perspective on sustainability that observes economic, social, environmental, and organizational aspects for a better understanding and partnership between producers and their organizations.

We cite another example from Guatemala where Producer Organizations participating in the project were classified into three types (more developed, average, and less developed) depending on their capacity (services), level of organizational development, and sustainable management practices. More developed POs had, on average, higher producing members, more certifications, and offered more services than the average organizations, and similarly the average organizations were superior to the less developed organizations in terms of services offered.

All of the POs offer marketing services. However, as Figure 5.38 illustrates, there are substantial differences in the types of services provided by the different POs. For example, technical assistance, usually considered a valuable and costly offering, was much less available from the average and less developed POs. This helps to identify opportunities to provide more appropriate types of support. For example, credit access can be a potential bottleneck to increasing productivity and/or incomes and is offered or facilitated by only a small portion of the less developed POs.

Figure 5.38 Services Offered by Organizations (% of orgs) in Guatemala

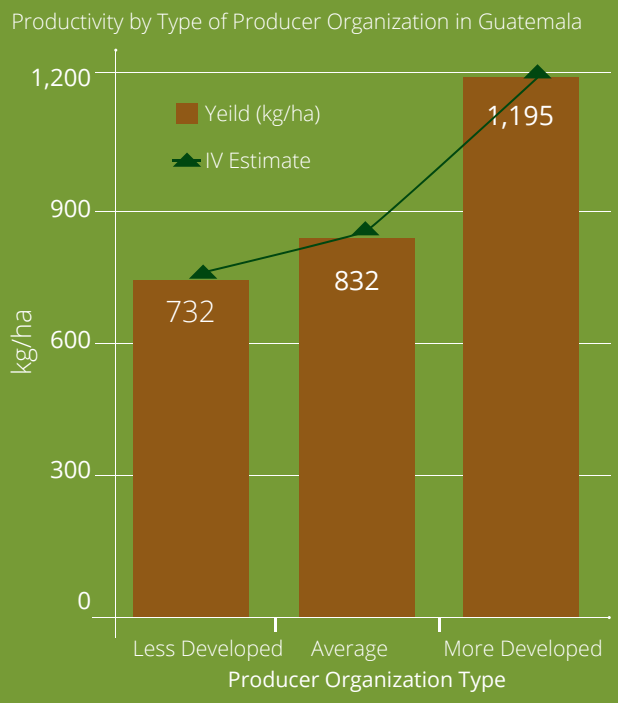


Box 5: Analyzing Impact by Instrumental Variables

In order to determine the effects (at the PO level) of initiatives or interventions on important sustainability indicators, we must address the analytical challenges that stem from interventions possibly targeted to particular types of farmers. Since there are unobservable characteristics that introduce bias and determine both an individual's participation in POs of different types and quality (e.g., entrepreneurial drive or interest in cooperatives) as well as project outcomes (e.g., yield) we employed an Instrumental Variable (IV) analysis to account for these.[85]

Using production in Guatemala as an example, the Figure shows there is a significant and positive relationship between PO type and each yield. There is an average difference of 187 kg/ha in productivity associated with being in the next higher PO level (from lesser developed to average and from average to more developed).

If we look at this graphically, the average yield increases with each PO type, and this increase is depicted by the orange "IV Estimate". Looking forward, we will compare this baseline data to results after the interventions to see if the interventions achieved improvements for the average and less developed organizations (indicated by a flatter "IV Estimate" line) or not.



85 Since we do not immediately know the causal direction of our treatments (for example, some POs are associated with higher production, but high production was one of the factors used to select producers) running such a regression would result in biased and inconsistent estimates of the marginal effect sizes of our treatments as discussed previously.

Chapter 6

Lessons Learned and Next Steps

There are high, and perhaps unreasonable, expectations for sustainability initiatives and standards. It is clear that they do not fulfill many expectations to be a complete solution for our planet's agricultural economic, social and environmental challenges. Sometimes the application or execution of their requirements results in only modest improvement. They can be costly for some farmers to apply both financially and in terms of altered practices in cultivation, management, and recordkeeping. The requirements can be especially challenging for the poorest farmers. In some cases, elevated standards without concomitant capacity building and financing will be likely to create barriers to entering markets. The VSS, like most initiatives, are not a magic formula and require a commitment to ongoing capacity-building and long-term investment if they are to improve the conditions of farmers and their communities.

Despite their imperfections, the VSS are among the best tools currently available in agriculture, in part because they serve as viable market mechanisms to transmit value (perhaps even to communicate ethics to some extent) and in part because they play diverse roles in the value chain.

Lessons for Policymakers and Companies

When well applied, VSS can smooth transactions, stimulate continuous improvement practices, reduce risk, and provide access to new markets. From a policy perspective, especially in a fast-changing agricultural landscape affected by diminishing resources, climate change, and population pressures, the dynamic qualities of VSS can provide a valuable advantage in the long-term. While the VSS can offer developmental value and public benefits, it is clear that only a small part of the financial value that they generate actually reaches producers thus debilitating their effects. Improving the measurement of costs and benefits can introduce the necessary transparency to improve the effectiveness of VSS and related initiatives.

Lessons for Producers and NGOs

At the ground level, it can be difficult to ascertain which approaches warrant the cost and effort required to adopt them. There is no simple answer. However, as our evidence grows, we can already discern several clear tendencies for producers and supporting organizations to consider. Sustainability initiatives such as the VSS can offer economic, social, and environmental benefits but at very different levels depending on existing conditions. In order to determine the probable outcomes, it will be important to understand the producers' starting point and the level of initial support that is available to cover the costs and compliance requirements.

Providing access to consistent guidance and local institutional support from NGOs, government, and Producer Organizations is invaluable when undertaking new approaches that may entail a level of risk and change. For producers to make the best choices they need to first be clear about their objectives and expected trade-offs. For example, a farmer in pursuit of higher yields will have to understand the possible associated requirements such as adopting new cultivation practices, using more labor, and making greater investment in agricultural inputs such as fertilizer. Most importantly, expectations need to be set at realistic levels; the promises that circulate of insatiable markets and high premiums are not certain.

Lessons for Standards Bodies

One of the recent developments worth further encouraging is the increasing focus of many VSS on understanding their own effectiveness by using thoughtful and balanced measurement. Few have the internal expertise to design and to implement robust monitoring and evaluation systems, but with modest levels of support and mutual cooperation, they have the potential to do so and probably improve their impacts and efficiencies. Making the results public and thus advancing transparency will be useful for this process of improvement.

Members of the ISEAL Alliance have made a commitment to implement an Impacts Code and several already collaborate with COSA to better align key indicators in order to advance knowledge and to benefit from mutual learning. Different stakeholders will have different priorities, information needs and interests; however, using a core set of common sustainability indicators and good scientific

methods is critical for numerous reasons. It enables information to be shared and validated, builds knowledge about what is working, and provides insights to the different users.

Next Steps

We are just at the beginning of our work and the need for the tools that COSA employs has never been more apparent. In 2012 and 2013 COSA indicators and methods have become widely used by development agencies, private companies, research institutions, and producer organizations. Current commitments within COSA networks suggest that this work is growing strongly, especially the work behind the scenes as an increasing number of private and public sector stakeholders are working with COSA to discuss how its tools might be used to standardize and fortify their own internal performance monitoring and evaluation procedures.

Efforts are already underway to further expand work in both coffee and cocoa and to start work with other crops and in more countries. Our experience with small and medium farmers suggests that there are opportunities for using COSA tools in other fields and also some challenges. As we develop these tools for other crops and livestock systems, we have the benefit of strategic learning from diverse global partners and nearly 20,000 surveys in 12 countries. We are currently considering cotton, tea, palm oil, staple crops, and sugar in addition to fruits and vegetables; the prospects depend on the interests of our partners and clients.

The application of COSA tools in coffee and cocoa throughout Africa, Asia, and Latin America is revealing a number of prospects for improving systems and for streamlining the data collection and analysis process. Our next stream of investments will focus on key areas:

1. COSA's new data gathering technologies, particularly COSATouch, present an enormous potential to reduce costs and improve quality of data for all COSA partners. However, such innovations require substantial testing in the diverse scenarios of developing country farming in order to achieve the necessary levels of reliability and stability that we seek.

   Current information gathering is outdated, costly and cumbersome. It needs to go beyond one-way data flow to a functional "multi-logue" between producers, buyers, and government or development agencies that can then leverage the developmental and commercial value of each. For this ongoing multilateral communication to function, we are exploring various new telephone technologies and testing approaches with diverse leaders including the World Bank, ADM, Swisscontact, and LaborLink) and want to expand this area with others.

   Another aspect of the current work that we are interested in expanding for a next-generation of COSA is coupling farm surveys with remote sensing and a more sophisticated spatial sampling of farms to better understand their overall relationship to land use in different landscapes.

2. Sustainability Measurement Modules will benefit companies and projects with their own simple internal system to measure sustainability in a low-cost way. The Module is a complete and ready-to-go tool that permits the integration of sustainability metrics into day-to-day decision-making and reporting. It will best serve organizations that do not have the technological ability to create consistent electronic surveys or manage multi-country data systems.

3. COSA is now evolving from its initial focus on methodological development and testing to an increased concentration on capacity building of local institutions. We plan to invest senior staff more substantially in improving training packages and more in-depth supervision periods for Partner institutions' staff in order to improve local capacity. Responding to the need to share and teach complex information multilaterally, we will be organizing database structures that permit access to different layers within large volumes of data, thus facilitating the transmission of lessons learned.

4. Communicating what are sometimes complex findings can be challenging and yet necessary for this data to serve many potential users. COSA continues to pursue the development of cloud-based modules, more accessible presentation graphics, and real-time "dashboards" that improve the speed and understanding of the information for managers at every level.

As an organization, COSA is functionally designed to collaborate and we enthusiastically invite you to or participate at any level.

COSA

Committee On Sustainability Assessment

Learning together globally

Appendices

Appendix I. COSA Indicators
See notes at the bottom

GLOBAL THEME	CORE ELEMENTS		INDICATOR
Key Characteristics	Household Demographics		Producer age Producer education Producer experience growing focus crop Producer gender Household revenue* Household composition
	Farm Characteristics		Land tenure Farm management Farm size Crop area Farm location Distance to market
	Adverse Events		Shocks
GLOBAL THEME	CORE ELEMENTS		INDICATOR
Water	**Water Quality**	E Environmental	Safe water for domestic use* Water contamination prevention measures*
	Water Quantity		Water conservation measures
Resource Management	**Resource/ input management**		Biocides used (synthetic & natural) Biocide use efficiency Toxicity class of biocides NPK use efficiency Integrated Pest Management Energy quality and use (gas, wood, and other sources)
	Waste management		Recycling Water contamination prevention measures*
Soil	**Conservation**		Erosion Soil conservation and measures to improve water utilization
	Soil Health		Intercropping Local nutrient cycle
Biodiversity	**Plant Diversity**		Plant and tree diversity
	Tree Density		Trees per hectare Forestation
Climate Change	**Sequestration & Mitigation**		Carbon Sequestration Conversion of natural areas to farm land
Perception	**Environmental situation**		Producer's opinions on environmental issues - Farm's care of environment - Community care of environment

GLOBAL THEME	CORE ELEMENTS		INDICATOR
Producer Livelihoods	**Revenue**	E Economic	**Focus crop revenue** - Yield - Price Farm revenue Household revenue
	Costs		**Direct costs for focus crop** - Labor days - Labor costs - Fertilizer costs - Biocide costs - Energy **Indirect costs for focus crop** - Capital assests - Cultivation practices - Traceability and record keeping - Deductions by buyer - Costs of standard or certification - Reforestation costs - Training*
	Income		Producer net income from focus crop
Risk (Economic Resilience)	**Diversification**		Revenue from other crops Area used for other crops Number of other crops or animal products Other revenue (not production related)
	Information		Access to market information* Price transparency*
	Access to Credit		Access to credit Credit history
	Vulnerability		Poverty status* Minimum wage* Insurance Days without sufficient food* Gender income differences
Competitiveness	**Business Development**		Access to market information* Price transparency* Relationship of farm price to global reference price Quality awareness Record keeping Training*
	Differentiation		Practices for product quality in harvesting & processing Product quality Control of certification or standard Current standards and certifications Price premium Crop sold with a standard or as certified
	Efficiency		Production/labor efficiency Cost efficiency
Producer Organization	**Governance**		Producer participation in groups* Democratic process in organization* Women's participation in producer groups*
	Services		Financial services* Production and post-harvest services* Community services*
Perception	**Economic situation**		Producer's opinion of their overall economic situation

GLOBAL THEME	CORE ELEMENTS		INDICATOR
Labor Conditions	**Health and Safety**	S Social	Restricted agrochemical use for vulnerable groups Protective gear for agrochemical application Farm injuries Access to Medical Services
	Living conditions		Smoke ventilation in cooking area Safe water for domestic use* Poverty status*
Basic Human Rights and Equity	**Labor rights**		Child labor Minimum wage* Safe water for laborers
	Education		Training* Children in school at appropriate grade level
	Gender		Women's participation in producer groups* Women managers Price received Education by gender
	Food Security		Days without sufficient food*
Community	**Participation**		Community services* Producer participation levels in groups* Democratic process in organization* Women's participation in producer groups*
Shared Value	**Transparency**		Access to market information* Price transparency*
	Capacity and Finance		Financial services* Production and post-harvest services* Community services*
Perception	**Social situation**		Producer's opinions on social issues - Community care of the environment - Quality of life

NOTES:
- "Producer" means the person on the farm who is designated the primary person responsible for decision making on focus crop production.
- All indicators refer to the most recent production year.
*Indicators marked with an asterisk are relevant to more than one theme or element.

Appendix II. Indices

Creating the Indices

The first step is to identify a set of variables that are associated with overall economic, environmental, and social well-being. We construct the indices from our wide-ranging set of COSA indicators (Appendix I), and select the most relevant and reliable indicators (see below for the components of the Economic, Environmental, and Social indices) taking into account data availability.

After selecting the indicators that make up the indices, we transform each indicator into a dummy variable (with one indicating a better outcome and zero indicating a worse outcome). For example, in the economic index, a farmer who has received training in marketing topics is given a value of one for that indicator, whereas a farmer who has not received such training is given a value of zero.

For continuous or categorical variables, a value of one is given when a threshold is reached. For instance, if the farmer knows more than one market price, they are assigned a value of one, but if they know only one or no prices, they are assigned a value of zero for that indicator. For variables such as net income or productivity, the dummy variable is defined using the median (above the median equates to one).

Using Principal Component Analysis (PCA) we can reduce the dimensionality of our data so that instead of looking at a number of indicators independently, we can consider all the indicators in one simple variable. We run the PCA using polychoric correlation, as described by Kolenikov and Angeles (2004), to accurately estimate the correlation among our transformed binary variables.[86] We find a polychoric correlation most appropriate due to its ability to handle ordinal variables that are non-normally distributed.

In short, the technique finds patterns between all the indicators (i.e., creates a covariance matrix), and then constructs new variables, or components, to explain portions of these patterns. The first component extracts the most information from each indicator by capturing as much of the variance in the data as possible. We use the First Principal Component to construct each index. As seen in the Table A.1, each index explains a proportion of the total variation of its indicators. Because we are using discrete data, we can expect the proportion explained to be far from 100 percent, as the categorization thresholds do not match exactly.

Table A.1: Proportion of total variation explained by each index

INDEX	COLOMBIA	COSTA RICA
Economic	25%	34%
Environmental	39%	43%
Social	26%	N/A

The final step is to re-scale the score, as it is given in a standardized distribution ranging from 0 to 100.

$$Index = 100 * \frac{((score_i - \min(score)))}{(\max(score) - \min(score))}$$

86 Kolenikov, S., & G. Angeles (2004) "The use of discrete data in PCA: theory, simulations, and applications to socioeconomic indices". Chapel Hill: University of North Carolina.

An illustrative elaboration of six COSA indicators

Net Income	Net income from focus crop is calculated as the difference between the total proceeds from the sale of the focus crop and the total costs of production. Costs of production include: • Main inputs (fertilizers, biocides, energy) • Purchasing seeds or seedlings and planting crop • Hired labor and unpaid family labor (opportunity cost = local daily wage for farm labor x days of unpaid labor)
Productivity	The crop quantity (or value) produced per unit of labor or inputs (fertilizer or biocide). Common descriptors are in the form of kilograms of crop produced per day of labor. Technical efficiency is a more complex calculation using multiple factors to determine the production that is possible under the same conditions (see section in Chapter 7 on Stochastic Frontier Analysis).
Training	One of the most important components of many sustainability interventions and is relatively easy to capture in project outcomes. While training can be an end in itself in terms of improved human skills and capacity, it is most often considered an output that can lead to an impact. If the expected impact, such as improved yields, occurs after productivity training, then the causal pathway is more clear and the results more likely attributable to the output, after productivity training, and similar untrained farmers did not have similar yield results. Thus training can certainly be a precursor or milestone in an impact pathway (see Chapter 6), but is, by itself, a relatively poor Key Performance Indicator (KPI) or project indicator of success. That is because it is easy to conduct cheap and probably ineffective training events simply to meet a project or investment objective (e.g., "2000 farmers trained"). It is the effect or impact of that training that ultimately matters.
Food Security	The ability of all members of a farm household to obtain adequate nutrition in a culturally appropriate and satisfying way each day. Chapter 7 outlines the distinction between food and nutrition security and why we use the former for practical purposes.
Biodiversity	Biodiversity of habitats and species is an important component of sustainability. Its intrinsic complexity makes it difficult to measure effectively without many types of bio-physical observations that include soils, water, flora and fauna. To account for biodiversity without requiring multiple days of expert observations and samples, COSA arrived at a well-accepted proxy of the above ground plants (flora) that is relatively simple, can be applied in most situations, and does not add too much survey time.
Perception	Perception questions offer a qualitative response that can capture aspects that other indicators may fail to observe. We ask producers to evaluate their economic outlook, their care of the environment, their community's environmental protection, and the overall quality of their lives.

Components of Economic Index

E

ECONOMIC INDEX	COLOMBIA	COSTA RICA
Strengthening economic capabilities	**Training in marketing topics** 1 = Farmer attended training in marketing topics 0 = Farmer did not attend training in marketing topics **Training in keeping records and traceability** 1 = Farmer attended training in keeping records and traceability 0 = Farmer did not attend training in keeping records and traceability **Access to short term credit** 1= Farmer had a short term loan 0= Farmer did not have a short term loan	**Training in marketing topics** 1 = Farmer attended training in marketing topics 0 = Farmer did not attend training in marketing topics **Training in keeping records and traceability** 1 = Farmer attended training in keeping records and traceability 0 = Farmer did not attend training in keeping records and traceability **Access to short term credit** 1= Farmer had a short term loan 0= Farmer did not have a short term loan
Quality of the coffee produced	**Coffee sold as low quality (undergraded beans)** 1 = Farmer sold less than 3% of less than 3% of total harvest as low quality coffee 0 = Farmer sold more 3% of total harvest as low quality coffee	
Market knowledge	**Prices known to farmer** 1 = Farmer knows two or more market prices 0 = Farmer knows one or zero market prices **Looked for new buyers on their own** 1 = Farmer looked for new buyers 0 = Farmer did not look for new buyers **Coffee sold as certified (More than 50%)** 1 = Farmer sold more than 50% as certified 0 = Farmer sold less than 50% as certified	**Prices known to farmer** 1 = Farmer knows two or more market prices 0 = Farmer knows one or zero market prices **Looked for new buyers on their own** 1 = Farmer looked for new buyers 0 = Farmer did not look for new buyers **Coffee sold as certified (Sells certified)** 1 = Farmer sold certified coffee 0 = Farmer did not sell certified coffee
Profitability	**Net Income (Above the median)** 1 = Farmer net income is above the median 0 = Farmer net income is below the median	**Net Income (Above the median)** 1 = Farmer net income is above the median 0 = Farmer net income is below the median
Productivity	**Coffee yield per hectare (Above the median)** 1 = Farmer coffee yield is above the median 0 = Farmer coffee yield is below the median **Keeps records of fertilizer application** 1 = Farmer keeps records of fertilizer application 0 = Farmer does not keep records of fertilizer application **Performs soil analysis** 1 = Farmer performs soil analysis 0 = Farmer does not perform soil analysis	**Coffee yield per hectare (Above the median)** 1 = Farmer coffee yield is above the median 0 = Farmer coffee yield is below the median **Keeps records of fertilizer application** 1 = Farmer keeps records of fertilizer application 0 = Farmer does not keep records of fertilizer application **Performs soil analysis** 1 = Farmer performs soil analysis 0 = Farmer does not perform soil analysis

Components of Social Index

SOCIAL INDEX	INDICATOR
Conditions of the household	**Production of food staples on farm (e.g., family consumption)** 1 = Farmer produces food staples 0 = Farmer does not produce food staples **Revenue from sales of other cash crops** 1 = Farmer receives revenue from other cash crops 0 = Farmer does not receive revenue from other cash crops **Food security** 1 = Household did not have any days of food insecurity in the past year 0 = Household did have one or more days of food insecurity in the past year
Wealth	**Household assets** 1 = Farmer has more household assets than the median 0 = Farmer has less household assets than the median **Farms assets** 1 = Farmer has more farm assets than the median 0 = Farmer has less farm assets than the median **Income dependence on focus crop less than 80%** 1 = Farmer's income dependence is less than 80% 0 = Farmer's income dependence is greater than 80%
Training & Education	**Formal training in health and welfare issues** 1 = Farmer received training in health and welfare issues 0 = Farmer did not receive training in health and welfare issues **Training in literacy** 1 = Farmer received training in literacy 0 = Farmer did not receive training in literacy **Children (under 18) % attending school at appropriate grade level** 1 = More of farmer's children attend school at appropriate grade than median 0 = Fewer of farmer's children attend school at appropriate grade than median
Living conditions of workers	**Household has vented cooking area or fireplace** 1 = Household has vented cooking area or fireplace 0 = Household does not have vented cooking area or fireplace **Water provided to workers is easily accessible** 1 = Water provided to workers is easily accessible 0 = Water provided to workers is not easily accessible **There is a functional first aid kit easily accessible at the farm** 1 = There is a functional first aid kit easily accessible at the farm 0 = There is not a functional first aid kit easily accessible at the farm **Restrictions on the application of agrochemicals by vulnerable groups (pregnant women, children, elderly)** 1 = Farmer has restrictions on the application of agrochemicals 0 = Farmer does not have restrictions on the application of agrochemicals **Protective equipment items that are functioning and available for application of agrochemicals** 1 = Farmer has equipment items that are functioning and available 0 = Farmer does not have equipment items that are functioning and available

Components of Environmental Index

E ENVIRONMENTAL INDEX	COLOMBIA	COSTA RICA
Water protection	**Protection and conservation practices for water sources** 1 = The farm employs water protection and conservation practices 0 = The farm does not employ water protection and conservation practices	**Protection and conservation practices for water sources** 1 = The farm employs water protection and conservation practices 0 = The farm does not employ protection and conservation practices
Recycling	**Recycling program** 1 = Farm has a recycling program 0 = Farm does not have a recycling program	**Recycling program** 1 = Farm has a recycling program 0 = Farm does not have a recycling program
Soil conservation	**Practices of soil conservation** 1 = Farmer employs more than two soil conservation practices 0 = Farmer employs two or fewer soil conservation practices	**Practices of soil conservation** 1 = Farmer employs more than two soil conservation practices 0 = Farmer employs two or fewer soil conservation practices
Agrochemical	**Good Agrochemical Practices (More than two practices, such as: keeps agrochemical records, restricts use by vulnerable people, properly handles wastewater, trains staff in proper handling of agrochemicals** 1 = Farmer employs more than two good agrochemical practices 0 = Farmer employs two or fewer good agrochemical practices	**Good Agrochemical Practices (More than two practices, such as: keeps agrochemical records, restricts use by vulnerable people,properly handles wastewater, trains staff in proper handling of agrochemicals** 1 = Farmer employs more than two good agrochemical practices 0 = Farmer employs two or fewer good agrochemical practices
Management	**Environmental plan or strategy** 1 = Farmer has a written environmental plan 0 = Farmer does not have a written environmental plan **Training in environmental issues** 1 = Farmer attended training on environmental topics 0 = Farmer did not attend training on environmental topics	**Environmental plan or strategy** 1 = Farmer has a written environmental plan 0 = Farmer does not have a written environmental plan **Training in environmental issues** 1 = Farmer attended training on environmental topics 0 = Farmer did not attend training on environmental topics
Biodiversity	**Maintenance** 1 = Farmer does overstory maintenance practices 0 = Farmer does not do overstory maintenance practices **Conservation and protection areas** 1 = Farmer does conservation and protection areas practices 0 = Farmer does not do conservation and protection areas practices	**Biodiversity (More than one species on farm)** 1 = Two or more species of plants on farm 0 = Fewer than two species of plants on farm

Appendix III. Projects

CONTINENT	COUNTRY	CROP	YEAR COMPLETED	NUMBER OF SURVEYS COMPLETED		COUNTRY PARTNER INSTITUTION	DATA COLLECTORS TRAINED
				Farms	Producer Orgs.	Name	
Africa	**Ghana**	Cocoa	2010	368	19	ISSER - University of Ghana	10
			2013	300	19	ISSER - University of Ghana	10
	Côte d'Ivoire	Cocoa	2010	387	46	COSA	4
			2011	253	30	COSA	6
	Tanzania	Coffee	2009	1050	43	COSA	15
			2010	1024	43	COSA	9
			2011	280	6	Economic and Social Research Foundation (ESRF)	8
Asia	**Vietnam**	Coffee	2010	327	22	Western Highlands Agroforestry Scientific and Technical Institute (WASI)	10
	Indonesia	Coffee	2012	327	4	Indonesian Coffee and Cocoa Research Institute (ICCRI)	9
	Papua New Guinea	Coffee	2012	202	0	Institute for National Affairs (INA)	8
Latin America	**Colombia**	Coffee	2008	2002	0	Centro de Estudios Regionales Cafeteros y Empresariales (CRECE)	19
			2009	3609	0	CRECE	26
			2011	3530	0	CRECE	25
			2013	1857	0	CRECE	21
	Colombia	Cocoa	2013	960	11	CRECE	14
	Peru	Coffee	2012	200	6	Instituto de Estudios Peruanos (IEP)	6
	Guatemala	Coffee	2009-2011	271	0	Centro Agronómico Tropical de Investigación y Enseñanza (CATIE)	6
			2012	442	39	CATIE & COSA	10
	Nicaragua	Coffee	2008-2009	294	0	CATIE	4
			2012	252	0	KK within IFC work	15
	Mexico	Coffee	2010-2011	61	0	CATIE	1
	Mexico	Coffee	2008-2013	300	0	COSA & CRECE CATIE	6
	Costa Rica	Coffee	2009-2010	237	0	CATIE	4

Appendix IV. Members of the Advisory Panel for COSA and Scientific Committee

INSTITUTION	PERSON	TITLE
4C Association	Melanie Rutten-Sülz	Executive Director
Coffee Quality Institute	Ted Lingle	Executive Director
Colombian National Federation of Coffee Growers	Luis Genaro Muñoz	General Manager
Columbia University, The Earth Institute	Pedro Sanchez	Dir. of Tropical Agriculture
Cornell University	David Pimentel	Professor & Chair National Academy of Sciences E.S.B.
East Africa Fine Coffees Association	Leslie Omari	Board chair (ex oficio)
Ecological Footprint Network	Mathis Wackernagel	President
EcoAgriculture Partners	Sara J. Scherr	President
ECOM Industrial Group	Teddy Esteve	CEO
EMBRAPA (Brazil)	Gabriel Bartholo	General Manager
Ethiopia Ministry of Agriculture & Rural Development	Yehasab Aschale	Dept Head
European Coffee Federation	Roel Vassen	Secretary General
Food and Agriculture Organization of the U.N.	David Hallam	Chief, Commodities and Trade Division
Fairtrade Labeling Organization International	Harriet Lamb	CEO
Green Mountain Coffee	Rick Peyser	Director of Social Advocacy
Guatemala Anacafe & Fedecocagua	Gerardo De León	Executive Board
Hay Coffee Consulting	Dub Hay	Sr. Vice President (ret.)
International Coffee Organization	Roberio Silva	Executive Director
Interamerican Development Bank	Vacant	
International Federation of Organic Agriculture Movements (IFOAM)	Markus Arbenz	Executive Director
India Coffee Board	G V Krishna Rau	Chairman (ex oficio)
Inter-African Coffee Organization	Frederick Kawuma	Secretary General
International Social and Environmental Accreditation and Labelling (ISEAL) Alliance	Karin Kreider	Executive Director
Peru National Coffee Council	Lorenzo Castillo	Executive Director
Mondelēz International	Neil la Croix	Dir. Sustainable Agriculture
Mexican Coffee Association	Rodofo Trampe	Executive Coordinator
National Coffee Association USA	Robert Nelson	CEO
Nestle	Hans Jöhr	Corporate Head of Agriculture
OXFAM	Vacant	
Specialty Coffee Association of Europe	Mick Wheeler	Executive Director
Rainforest Alliance	Chris Wille	Chief, Sustainable Agriculture
Sara Lee International	Stefanie Miltenburg	Manager Sustainable Business
Specialty Coffee Association of America	Ric Rhinehart	CEO
Sustainable Agriculture Initiative (SAI) Platform	Emeline Fellus	Manager
Swiss State Secretariat for Economic Affairs	Hans-Peter Egler	Head Trade Promotion
United Nations Conference on Trade and Development (UNCTAD)	Ulrich Hoffman	Chief, Trade and Sustainable Development Section
US Agency for International Development	Chris Kosnick	EGAT Team Leader

INSTITUTION	PERSON	TITLE
Utz Certified	Han de Groot	Executive Director
Additional advisors:		
Danish Institute for International Studies	Stefano Ponte	Head of Research
Rhine-Waal University of Applied Sciences	Dagmar Mithöfer	Professor of Agribusiness
University of Verona	Angelo Zago	Professor Economics
International Labor Organization	Ann Herbert	Researcher, Country Director
Colorado State University	Laura Raynolds	Professor
University of Berne	Udo Höggel	Professor
*Members serve as voluntary advisors, their participation does not imply endorsement of the findings or of the institutions.		

COSA SCIENTIFIC COMMITTEE

PERSON	INSTITUTION	TITLE
Tanguy Bernard	International Food Policy Research Institute	Research Fellow
Larry Busch	Michigan State University	Distinguished Professor Sociology and Director, Institute for Food - Ag. Standards
Alain de Janvry	University of California at Berkeley	Professor Agricultural & Resource Economics
Stephen Jaffee	World Bank	Lead Economist former Head Commodity Risk Management Group
Jeremy Haggar	University of Greenwich & The Natural Resources Institute	Head of Agriculture, Health, Environment
Michael Hiscox	Harvard University	Professor of International Affairs
Jaya Krishnakumar	University of Geneva	Professor of Econometrics
Dagmar Mithöfer	Rhein-Waal University	Professor of Agribusiness
Bob Picciotto	Kings College	Director-Gen'l Evaluation World Bank (ret.)
Krislert Samphantharak	University of California at San Diego	Professor of Economics
*Members serve as voluntary advisors, their participation does not imply endorsement of the findings or of the institutions		

Appendix V. Means to Understanding Sustainability

METHOD	COMMON TYPES	ACCURACY & CREDIBILITY	RELATIVE COST EFFORT	KEY ISSUES
Self-assessments	Reporting from supply chain or managers	Low	Low	- Inherent high risk of tunnel vision or bias - Likely to avoid negative or thorny issues - If measures are not fully consistent, they will not be comparable to others
Simple benchmarking to guidelines or standards	Following existing public guidelines for pollution control, GHGs labor practices, wages, child labor, etc.	Medium	Low	- Risk of avoiding negative issuesor using inappropriate guideline or standard - Tends to be static and thus limited as a management tool - Practices measured in different ways can create errors and confusion - Can change from country to country and limit comparison options - Can foster a checklist mentality to meet a proxy or measure and not the spirit of the topic
Data collected by interested parties	Certification audits or verification compliance reviews	Medium	Low	- Can miss important factors that are not part of the specific audit, especially after initial compliance - Inconsistent formats and data collection approaches - Can be subject to bias when there is incentive to get farmers approved - Can be only a compliance yes/no checklist without access to impact pathways
Data collected by others	Measure the number, type, and quality of interventions or practices undertaken	Low to Medium	Low to Medium	- Can be static and less adaptable to changing conditions - Unlikely to capture the actual results or outcomes of activities
The above can be Practice-based or Policy-based assessments while moving down the table the methods tend to use more reliable practice-based assessments.				
Performance monitoring	Supply chain monitoring practices assessing actual results or performance	Medium	Low to Medium	- Requires some capacity to establish metrics and execute in the field - If not consistent, can change from project to project and limit comparison - If only taken once, findings can be skewed - Important to get sampling right as well as how the data is collected and by whom
Impact assessments	Evaluations (ex ante and ex post) that take into account the counterfactual and establish some credible causality	High	High	- Requires neutral and transparent approach that often means an independent executing agency - More than a year of time is needed to see impacts - Requires some scientific capacity to conduct well