USAID | ETHIOPIA
FROM THE AMERICAN PEOPLE

AGRICULTURAL GROWTH PROJECT—AGRIBUSINESS AND MARKET DEVELOPMENT (AGP-AMDe) PROJECT

COFFEE VALUE CHAIN: COST BENEFIT ANALYSIS OF INTERVENTION

FINAL REPORT

This report was produced for review by the United States Agency for International Development (USAID). It was prepared by Optimal Solutions Group, LLC for USAID's "Learning, Analysis, and Evaluation Project (LEAP). Contract Number: AID-OAA-C-11-00169

UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT
LEARNING EVALUATION ANALYSIS PROJECT
(AID-OAA-C-11-0169)

AGRICULTURAL GROWTH PROJECT—AGRIBUSINESS AND MARKET DEVELOPMENT (AGP-AMDe) PROJECT COFFEE VALUE CHAIN: COST BENEFIT-ANALYSIS OF *INTERVENTIONS*

FINAL REPORT

Prepared for:

The United States Agency for International Development (USAID)/Ethiopia

Prepared by:

Optimal Solutions Group, LLC
University of Maryland Research Park, M Square
5825 University Research Court, Suite 2800
College Park, MD 20740 USA

Cambridge Resources International Inc.
60 Montgomery Street
Cambridge, MA 02141 USA

www.cri-world.com

Project Analysts:

Christopher Bennett, Senior Coffee Specialist
Richard Barichello, Senior Cost-Benefit Analyst
Leonard Leung, Cost-Benefit Analyst
Habtamu Fuje, Local Consultant
Dr. Glenn Jenkins, Cost-Benefit Manager
Christabel Dadzie, Evaluation Analyst

October 24, 2012

Disclaimer

Contents

ACKNOWLEDGMENTS

The LEAP team would like to thank the many individuals who have assisted the team in undertaking this study. The information for this study was obtained through the support of many stakeholders at all levels of the coffee value chain, and assistance from USAID/Ethiopia and ACDI-VOCA especially have greatly eased the data-collection efforts for the study team. Particularly, ACDI-VOCA's data on farm budget, physical and labor input requirement by farming technology, and its nursery budget provide the backbone of the farm and nursery models constructed for the financial and economic analyses in this report. The Coffee Research Agency also provided invaluable yield estimates and commentary.

A major data-collection effort was carried out during field visits in Jimma and follow-up interviews with industry stakeholders in Addis Ababa. Especially helpful are the data provided by the Ethiopian Coffee Producers and Exporters Association regarding the investment and operating costs as well as the physical and labor input requirements of cherry-processing stations (both dry and wet methods); farm-level data provided by three smallholder farmers in villages around Jimma; coffee purchase data by a *sebsabi* (a coffee collector who buys directly from farmers) and a *chaanyii* (a supplier who processes and aggregates coffee for sales on the trading floor at the Ethiopian Commodity Exchange [ECX]). The Jimma regional office of the ECX, Coffee Exporters Association, Cooperative Unions and Cooperatives, individual large-scale growers also provided useful background information.

Despite acknowledging all the assistance provided, the study team claims full responsibility for the results and opinions expressed in this report.

LIST OF ACRONYMS

AGP-AMDe	Agricultural Growth Program-Agribusiness and Market Development
CLU	Coffee Liquoring Unit
CBA	Cost-benefit analysis
CBD	Coffee-berry disease
CRI	Cambridge Resources International
ECX	Ethiopian Commodity Exchange
FEP	Foreign exchange premium
GBE	Green-bean equivalence
Ha	Hectare
HYV	High-yield variety
IP	Identity preservation
JARC	Jimma Agricultural Research Center
kg	Kilogram
NPV	Net present value
OSG	Optimal Solution Group
VAT	Value-added tax

EXECUTIVE SUMMARY REPORT—COFFEE

Project Description

The Agricultural Growth Program-Agribusiness and Market Development (AGP-AMDe) Project for Ethiopia is a component of the comprehensive Feed the Future (FtF) strategy developed by the USAID Mission for food-insecure developing countries. The main goals of AGP-AMDe include reducing poverty and hunger by improving the productivity and competitiveness of value chains that could give rural households greater opportunities for employment and increased income. For the duration of this project, USAID plans to target six specific commodity value chains: maize, wheat, coffee, sesame, chickpeas, and honey. *The* USAID Mission/Ethiopia will begin implementing the AGP-AMDe project in 83 woredas around Ethiopia in 2012. Of the 83 AGP-AMDe woredas, 16 are coffee-producing and are located in the regions of Oromiya and SNNP.

The total budget for the project spans a period of 5 years. At a 12 percent discount rate, it is equal to US$6.7 million in present value and will cover four components of the value chain: value chain competitiveness, access to financing, enabling environment, and innovation and investment. At the time of research, it was unclear how the budget would be divided between activities under each component.

Interventions Description

Although the AGP-AMDe work plan proposes multiple interventions for the coffee sector, not all are suitable for evaluation via a cost-benefit analysis (CBA), because their benefits cannot be identified with reasonable precision. The interventions selected for analysis in this study tackle two specific bottlenecks in the coffee value chain: the low productivity at the smallholder level and the general lack of coffee traceability, which suppresses coffee prices in the international market.

The production and marketing of high-yield variety seedlings to smallholder farmers is the first intervention to be analyzed in this report. At the present, demand for high-yield variety (HYV) seedlings outstrips supply, partly due to the insufficient number of seedling nurseries and partly due to the capacity constraint of the Jimma Agricultural Research Center (JARC), the government agency responsible for seed development and the production of improved seeds and seedlings. The study integrates the analysis of Activities 1.1–2.5 of Intervention III, Component 1, in the AGP-AMDe work plan. Activities 2.4–2.5 promote the merits of HYV coffee cultivation among smallholder farmers, while Activities 1.1–2.3 (and likely some undefined activities under Component 4) support improved variety development and the training of individuals in the production of seedlings to boasts the capacity of nurseries. Accordingly, in this analysis, the financial and economic benefits of cultivating HYV coffee are considered first, followed by a financial and economic analysis of the nurseries. Finally, the results of the financial and economic outcomes of the nurseries and the cultivation of coffee from conversion to HYVs are integrated for a more complete value chain analysis. This analysis includes an estimate of the net benefits received by the various stakeholders along the value chain.

The second intervention considered in this study is **improved traceability of export coffee**. The lack of traceability is a problem that currently plagues the coffee-export sector and deprives all value chain participants of an export premium that Ethiopian coffees really deserve, Ethiopia being the origin of Arabica coffee with its many distinctly different, high-quality coffee varieties. The intervention is not well defined but rather is mentioned in broad strokes in the AGP-AMDe work plan. It falls loosely under Activities 1.1–1.4 and 3.1–3.9 of Intervention I, Component 1. However, this intervention and related issues were raised in different contexts during the study team's interviews with many stakeholders in the industry. The study team finds lack of traceability to be the most pressing problem of the ones raised in the work plan and deserving of special attention.

Strategic Context and Rationale

The two interventions—namely, the production and marketing of HYV seedlings and improved coffee traceability—embody different strategies for raising coffee farmers' income. The former boosts coffee production at the farmstead and therefore the quantity available for sale. The higher throughput also generates downstream externalities for laborers who work at the farmstead and coffee-cherry processing stations as temporary employees and for many intermediary agents engaged in aggregating, processing, and trading coffee. As business transactions increase, the government then collects more direct and indirect tax revenues from the taxable parties in the value chain.

By contrast, the second intervention attempts to increase coffee prices by facilitating an information flow to exporters regarding the coffee's origins. During field visits to Jimma, Oromiya, it was evident that coffee farmers are well informed of the prevailing coffee prices at the Ethiopian Commodity Exchange (ECX). If this intervention succeeds in raising export coffee prices, it is likely that such an increase will be transmitted up the value chain and reflected in the coffee-cherry prices for smallholder farmers.

Data Source

Support from many stakeholders at all levels of the coffee value chain, and especially from USAID/Ethiopia and ACDI-VOCA, have greatly eased the study team's data-collection efforts. In particular, ACDI-VOCA's data on farm budgets, physical and labor input requirements by farming technology, and nursery budgets provide the backbone of the farm and nursery models constructed for these financial and economic analyses.

In areas where ACDI-VOCA data were missing or ambiguous, the study team relied on cross-checks of the data with information collected during field visits in Jimma and follow-up interviews with industry stakeholders in Addis Ababa. Especially helpful were the data provided by the Ethiopian Coffee Producers and Exporters Association on the investment and operating costs as well as the physical and labor input requirements of cherry-processing stations (dry and wet methods); farm-level data provided by three smallholder farmers in villages around Jimma; coffee purchase data from a *sebsabi* (a cofee collector who buys directly from farmers) and a *chaanyii* (a supplier who processes and aggregates coffee for sales on the trading floor at the ECX) of their dealings with coffee farmers. In addition, a number of additional data sources, such as macrolevel statistics, have been taken from the Central Statistical Agency (CSA) of Ethiopia.

Results for Financial and Economic Analysis on High-Yield Variety Coffee Cultivation

Part I of the analysis on the seedling production and marketing intervention estimates the incremental financial and economic impacts of HYV coffee cultivation for the existing traditional farming methods and the model farming technology recommended by the JARC. At the present, the JARC requires that the recipients of its seeds or seedlings adopt its recommended agronomic practices. Although the recommended practices do indeed yield a higher incremental financial net present value (NPV) for farmers, they impose a heavy cash outlay burden in the initial phase of the cultivation cycle when trees are unproductive and intercropping cannot be continued for as long because it requires more intensive utilization of physical and labor inputs to tend the trees. The greater total cash outlays required by the model farm program in the first 3 years amounts to 20 percent of the total income earned over the same duration by an average Oromiyan household with 5.2 members.

Results of the financial analysis are summarized in table A. On a per-farmer basis (each farm holding 1 hectare [Ha] of coffee), the model farming system yields the highest financial NPV of US$20,060 over the 20-year cultivation period, as compared to US$11,936 and US$5,857 for traditional agronomic practices using HYVs and local varieties, respectively. If traditional practices continue, each farmer earns an incremental benefit of US$6,079, but this amount increases to US$14,202 if the farmer adopts JCRA's recommendation.

Table A. Financial NPV of coffee cultivation by farming technology (12 percent discount rate, 20-year project life)

	Traditional practices		Model farm
	Local variety (1)	**HYV (2)**	**HYV (3)**
ETB			
Financial NPV per household	102,854	209,600	352,248
Incremental financial NPV			
Scenario (1) as the base case		106,746	249,394
US$			
Financial NPV per household	5,857	11,936	20,060
Incremental financial NPV			
Scenario (1) as the base case		6,079	14,202

Although the farm model with HYV cultivation yields the highest financial NPV, it requires substantially more labour and physical inputs. In monetary terms, the model farm imposes a significant cash outlay burden of around US$1,000, equivalent to 20 percent of the potential total income of a typical Oromiyan household. This perhaps explain for the low adoption or conversion rate to model farming. Ethiopia could reach more than twice as many farmers with financial and input support for the low input approach, while ensuring significant income distribution and export revenue gains in comparison with present prevailing traditional practices.

HYV coffee cultivation boosts coffee production and increases the demand for laborers during harvests and the throughputs for traders. The government collects additional tax revenues from the value chain participants liable to various forms of taxes. The government also collects more trade taxes, because the incremental coffee export generates foreign exchanges, allowing for more imports by the private sectors. The incremental benefits of HYV cultivation for various stakeholders are listed in table B. The total incremental economic benefit generated per farmer obtaining HYV seedlings is US$8,088 and US$19,742, depending on the type of farming methods that the farmer practices.

Results for Financial and Economic Analysis on a Single Nursery

Although the work plan mentions multiple possible partners in the establishment of nurseries, this analysis takes female household heads as the trainees in the production of seedlings. Upon the completion of their training, they will be employed by farmer cooperatives to produce seedlings that will be sold to farmers. At an output price of 1.25 ETB per seedling and an annual production level and turnover of 100,000 seedlings, the financial analysis indicates that a nursery makes a modest profit of US$14,541 in present value over a 10-year project life.

Table B. Incremental economic NPV generated by a household with 1 Ha of coffee holding by farming technology (12 percent discount rate, 20-year project life)

	Stakeholders (US$)				Economy (US$) (5)
	Coffee farmers (1)	**Laborers (2)**	**Traders (3)**	**Govt (4)**	
Traditional practices: HYV (1)	6,079	342	1,020	647	8,088
Model farm: HYV (2)	14,202	1,092	2,721	1,727	19,742
Difference (3) = (2) – (1)	8,123	750	1,701	1,079	11,654

The skill-enhancing training and the employment opportunity draw the female household heads out of their homesteads. They are likely to receive a surplus from their labor at nurseries, because their market opportunity is narrower. The nurseries are formal establishments, given the assumption of cooperative ownership. An implication of this intervention is that the nurseries and their female employees pay business and personal income taxes. In addition, member farmers of cooperatives periodically receive dividends from the nurseries. Table C reports the financial return of a nursery and externalities on a per-nursery basis. It has been estimated from the ACDI-VOCA nursery budget data that a nursery employs 3.84 females, who collectively earn a surplus of US$3,247 in present value. The government also collects US$4,654 of tax revenues from the nursery and its employees.

Table C. Present values of externalities per nursery (12 percent discount rate, 10-year project life)

	US$
Financial NPV of nursery	14,541
Present value of labor externalities	
Nursery laborers	2,162
Managerial/administrative staff	1,085
Present value of government tax revenues	4,654
Total economic NPV of nursery	22,443

The figures above are expressed on a per-nursery basis. The actual benefits that the interventions may bring depend on the nursery to be formed, itself a function of the intended coverage target. Of the 83 AGP-AMDe woredas, 16 produce coffee and have a collective total of 119,028 Ha of coffee holdings. A nursery can supply seedlings to 55.6 households, each with 1 Ha of coffee holding practicing traditional cultivation methods. If the coverage target is 1,000 Ha per year, then a total of 18 nurseries must be established. At the end of the 10-year project life, 100,000 Ha, or 8.4 percent of existing coffee holdings, will be converted to HYVs. The economic benefits of the HYV seedling production and marketing intervention generated at the nursery level for varying coverage target are reported in table D.

Table D. Present values of externality by the number of households covered (12 percent discount rate, 10-year project life)

	Seedlings required per year (million seedlings) (1)	Nursery required (2)	Female employees (3)	Externality at nursery (US$) (6)
Per nursery				22,443
Farm households covered per year				
1,000	1.8	18.0	69.1	403,975
1,500	2.7	27.0	103.7	605,962
2,000	3.6	36.0	138.3	807,949

The benefit of the intervention, however, extends beyond the nursery level, because coffee production increases, generating more coffee sales for farmers, more employment opportunities for casual laborers, more throughput and business for traders, and more tax revenues for the government. Combining the results from table B (the incremental benefit of traditional farming) and table D yields the total incremental economic NPVs of this intervention for varying coverage targets, which are reported in table E. Although economic NPVs from US$51.6 to US$103.2 million seem exaggerated, on average the 100,000 to 200,000 beneficiary farmers who obtain the HYV seedlings earn an incremental benefit of US$3,837 that is spread over 20 years of coffee cultivation. This table completes the analysis for the first intervention.

Table E. Stakeholder analysis of the production and marketing of HYV seedlings intervention by coverage target (12 percent discount rate, 10-year project life)

Coverage target (Ha/year)	Stakeholders (thousand US$)						ENPV (million US$) (7)
	Coffee farmers		Nursery female employees (3)	Farm laborers (4)	Traders (5)	Govt (6)	
	Nurseries (1)	Coffee cultivation (2)					
1,000	262	38,469	58	2,162	6,458	4,181	51.6
1,500	393	57,703	88	3,242	9,686	6,271	77.4
2,000	523	76,938	117	4,323	12,915	8,362	103.2

Analysis on the Increased Traceability Interventions

The proposed interventions for increasing coffee traceability focus on refining the grading precision of the ECX, through which most of the coffee must be traded and exported by law. However, during field visits and discussions with many stakeholders at different levels of the coffee value chain, the study team found that traceability erosion occurs not because of imprecise ECX coffee cupping and grading standards but rather because of ECX treatment of coffee as a bulk commodity. Many aspects of ECX operations, from the information-clouding design of the coffee contracts available on the ECX trading floor to the way coffee shipments to ECX warehouses are stored in bulk, exacerbate the problem. In light of this information, the study team determined that the proposed interventions would be misplaced and ineffectual in combating traceability erosion.

Conclusions and Recommendations

High-Yield Variety Coffee Cultivation

The main conclusion of this analysis is that converting the existing traditional varieties of coffee grown in Ethiopia to HYVs is entirely justified financially as well as economically. In addition, at the present level of seedling prices, it is financially rewarding to produce seedlings in nurseries that have annual production capacities of 100,000 seedlings.

One of the most important issues investigated in this analysis is why this process is moving so slowly in Ethiopia. A partial answer to this question can be found in the financial analysis of the model farm program. The cash-flow barrier of reducing the amount of intercropping during the first 3 years before coffee sales begin—a feature of the model farm approach—is likely a major factor, because the government will not issue the HYV seedlings to farmers unless they commit to utilizing the model farm design.

From this analysis, it appears that the best return to USAID investment in this area is a broad-based approach to marketing HYV seeds that informs farmers about estimated input-to-yield responses under various agro-ecologies. However, the farmers should not be required to use any single farm model. Similar instances of comparative economies of HYV tree crops in other countries (e.g., coffee, cocoa, rubber, oil palm, and coconuts) indicate that two to four times as many farmers can be reached (and more successfully) for a given investment budget when additional restrictions are not imposed than when the investment is contingent on the adoption of highest-yielding or highest-input scenarios.

Voluntary certification of companies producing genuine HYVs should be promoted. Informing end users of the difference between certified and noncertified HYV sellers encourages better performance through market competition. Mandatory licensing schemes, on the other hand, invite corruption as the inefficient producers seek to subvert the coercive system to stay in business.

Increased Traceability Interventions

The Ethiopia coffee export quality problem is not that the coffee is low-grade, *per se*, but rather that its quality is uncertain. This problem is exacerbated by the loss of spatial and business traceability at the

ECX. The ECX has apparently improved its performance over the 3 years of its existence, but its approach to traceability is out of step with the way that global coffee markets are moving.

The current interventions being proposed in the AGP-AMDe work plan have the objective of improving the traceability of the coffee sold at the ECX. Although they have the correct objective in mind, the interventions are likely to be ineffective. Any additional information regarding the improved quality of the coffee produced by a particular set of farmers is likely to be lost. The grading and storage methods of the ECX are not designed to provide a sufficiently refined quality- and source-classification system to allow prospective buyers to be able to offer quality premium prices due to uncertainty concerning the quality of shipment and the lack of knowledge of the sellers and their reputations.

During an interview, ECX officials mentioned plans to take on sesame, chickpeas, and other commodities. Currently, the regional ECX facilities are already undercapitalized. Without a corresponding increase in infrastructure investment, an ECX expansion will only further constrain its capacity to manage the coffee trade. Also, the idea of storing coffee in silos rather than bags could further exacerbate the loss of identity preservation and increase the risk of spoilage, together adding to the likelihood of price discounts. Both measures should be discouraged. Instead, management policies with respect to the bulking and first-in-first-out sales and delivery of coffee should be rethought to allow for traceability of the coffee supply by prospective buyers. For start, the ECX should consider allowing sellers' identities to be revealed in their ECX contracts on an optional basis. The shipments should also be stored separately to preserve the coffee's complete (spatial and business) identity, at extra storage or handling costs or an ECX commission fee. Sellers and buyers who find it advantageous to do so will subscribe to the services, because they will not only allow the sellers to earn premiums on high-quality coffee but also will help overcome information asymmetry between smallholder farmers and traders. The latter will acquire more bargaining power and thus can earn higher incomes from their coffee.

INTRODUCTION

USAID/Ethiopia's Agricultural Growth Program-Agribusiness and Market Development (AGP-AMDe) project focuses on strengthening market linkages in six agricultural value chains: coffee, honey, wheat, maize, chickpeas, and sesame. Cambridge Resources International (CRI) has been commissioned by Optimal Solution Group (OSG), the primary project contractor, to conduct cost-benefit analyses (CBA) on AGP-AMDe's interventions on the coffee and honey value chains. The purpose of this report is to present findings concerning interventions on components of the coffee value chain.

COFFEE-SECTOR INTERVENTIONS DESCRIPTION

For the AGP-AMDe project, USAID/Ethiopia has contracted ACDI-VOCA to design the interventions and to coordinate their implementations. ACDI-VOCA's proposal of interventions on the coffee sector is an umbrella approach that encompasses activities ranging from sponsoring a cupping competition to providing training to different coffee value chain participants. The interventions are broadly divided into four components: value chain competitiveness, access to finance, enabling environment, and innovation and investment. Table 1A presents the budget allocated to each component. Components 1 and 4 account for 48 percent and 30 percent of the total budget, respectively. Table 1B summarizes the total number of hectares (Ha) dedicated to coffee cultivation and annual coffee production in AGP-AMDe-targeted areas.

Table 1A. AGP-AMDe coffee-sector budget by project components (thousands US$)

	ACDI-VOCA work plan for the coffee sector						Total in PV
	Start up	Year 1	Year 2	Year 3	Year 4	Year 5	
Component 1							
Value chain competitiveness	72.2	760.5	885.9	967.1	957.9	519.7	3,334.6
Component 2							
Access to finance	16.5	173.8	202.5	221.1	218.9	118.8	762.2
Component 3							
Enabling environment	16.5	173.8	202.5	221.1	218.9	118.8	762.2
Component 4							
Innovation and investment	0.0	335.8	929.9	688.5	362.1	97.8	2,034.7
Total	105.1	1,443.9	2,220.8	2,097.7	1,757.9	855.1	6,893.7

Source: AGP-AMDe Project Work Plan (ACDI-VOCA 2012a).

Because the intervention design is currently at the formative stage, the cost breakdown for each intervention and activity under the first component is not finalized, and the specific interventions under the second to the fourth components are not yet defined.

Table 1B: Coffee area and production in AGP-AMDe-targeted regions

Region	Zone (1)	Number of *woredas* (2)	Coffee area (Ha) (3)	Coffee production (MT) (4)
Oromiya	Jimma	3	39,496	23,142
	Illubabor	3	19,434	8,899
Oromiya subtotal		6	58,930	32,041
SNNP	Gedeo	2	7,517	6,591
	Bench Maji	1	9,057	5,434
	Omo	2	6,021	4,785
	Kaffa	2	29,002	13,802
	Gurage	1	4,645	3,298
	Besketo	1	1,374	549
	Dawro	1	2,482	664
SNNP subtotal		10	60,098	35,123
Total		**16**	**119,028**	**67,164**

Source: AGP-AMDe Coffee Value Chain Intervention Woredas and FCUs (ACDI-VOCA 2012b).

Among the interventions that are defined in sufficient details in the work plan, not all are suitable candidates for cost-benefit analyses (CBA), because the benefits that ensue from the interventions are not identifiable or quantifiable with an acceptable degree of accuracy. This study focuses on two interventions for which CBA would be helpful to assist in decision making. The remainder of this section gives an overview of the selected interventions, as conveyed by ACDI-VOCA staff during in-person meetings and in the work plan submitted to USAID/Ethiopia. Table 2 illustrates how the two selected interventions relate to those in the ACDI-VOCA work plan. Interventions under components 2 to 4 are not analyzed, because the Cambridge Resources International (CRI) team has been unable to secure any information about the relevant interventions, aside from the budget allocated for the respective components, as shown in table 1.

Table 2. Classification of CBA interventions according to ACDI-VOCA work plan

	ACDI-VOCA work plan for the coffee sector		
	Component	Intervention	Activity
Intervention 1			
Part I: HYV seedlings cultivation	C1	III	2.4–2.5
Part II: Seedling nursery	C1 C4	III	1.1–2.3
Intervention 2: Increased coffee traceability	C1	I	1.1–1.4 3.1–3.9

Source: AGP-AMDe Project Work Plan (ACDI-VOCA 2012a).

Increasing coffee production through the production and marketing of HYV and disease-resistant seedlings to smallholder coffee farmers is the first intervention to be analyzed in this study. It falls under Intervention III, Component 1, in the ACDI-VOCA work plan. ACDI-VOCA plans to first identify and train local partners in targeted *woredas* (districts) in the production of HYV coffee seedlings. Secondly, using seeds acquired from local seed providers, the trained local partners cultivate and sell coffee seedlings to farmer cooperatives, who in turn sell the seedlings to smallholder coffee farmers. Many local partners will receive technical and financial aid and training under this plan, including existing seedling nurseries, farmer cooperatives, commercial farms, and individual female-headed households. Similarly, the work plan lists multiple sources of coffee-seed providers.

For the purpose of this study, the local partners are taken to be female household heads, and the seed provider is taken to be the Jimma Agricultural Research Center (JARC). Training an unknown number of female household heads is mentioned in the work plan (Activity 2.3 of Intervention III) and is likely to empower the trainees, who would otherwise have limited opportunities outside the home. ACDI-VOCA and the JARC have recently signed a memorandum of understanding; although the memorandum's specific content is not known, given the JARC's mission and area of expertise, it is likely to promote the provision or distribution of improved seeds or seedlings to coffee farmers.

For this intervention to succeed in the long run, the nurseries must be financially sustainable in the absence of external funding. Achieving financial sustainability, however, requires sufficient demand from farmers willing to incur extra expenses for the use and cultivation of the improved seedlings. Given these considerations, the CBA for this intervention is divided into two parts. Part I estimates the financial and economic incremental benefits that cultivation of HYV seedlings brings to smallholder farmers and other stakeholders in the economy. This part of the analysis can serve as a stand-alone CBA on yield-improving interventions, and the results from its financial module help determine whether coffee farmers find the financial incentive to acquire the JARC's coffee seeds or seedlings. In addition, results from the economic module help determine the net downstream economic externalities of seedling production.

Part II of the analysis focuses on the nursery level. Central to this analysis are the questions of whether the nurseries are financially sustainable and, if so, the magnitude of economic benefit generated by each nursery.

Increasing the traceability or branding of Ethiopian coffee is the second intervention evaluated in this report. The activities that fall under this intervention vary widely, including regional coffee quality profiling, providing training to cuppers, harmonizing cupping criteria with international standards, sponsoring a coffee-cupping competition, and organizing coffee-cupping trips to coffee-producing areas for female entrepreneurs. It is hoped that increased traceability and branding can increase coffee export prices and thus add value for all value chain participants. In terms of the methodology, the CBA for this intervention has been conducted using the farm model developed for the CBA for the nursery-sponsoring intervention. The success of the CBA hinges critically on whether the measures currently planned by ACDI-VOCA to improve traceability increase the price of coffee cherries at the farm gate.

INTERVENTION 1 — PRODUCTION AND MARKETING OF HYV SEEDLINGS

It is estimated that each year, the demand for coffee seedlings from Ethiopian coffee farmers reaches five million. The AGP-AMDe project incorporates a series of interrelated measures to facilitate their distribution to ensure that farmers acquire the improved high-yield variety (HYV) seedlings, including the development of improved coffee varieties, the multiplication of improved seeds and seedlings, and the distribution of these verities to coffee farmers.

The Jimma Coffee Research Agency (JARC) is a government agency in charge of coffee research and the development of improved coffee varieties. A component of the AGP-AMDe project is to support the JARC and related parties in their efforts to expand the development of improved coffee varieties and their adoption by coffee farmers.[1]

Overcoming the bottleneck in the supply and distribution of HYVs of coffee could significantly raise smallholder coffee productivity and Ethiopian coffee production. HYVs are inherently higher-yielding and resistant to the destructive coffee-berry disease (CBD). In areas seasonally afflicted by CBD, adopting HYVs has the additional advantage of preventing substantial yield losses.

At the present, the JARC requires that the recipients of its improved coffee seeds or seedlings adopt recommended, yield-maximizing farm-management practices, such as intensifying the use of chemical fertilizers, more aggressively pruning coffee trees, and spacing them closer, and so forth.

Maximizing coffee yield, however, does not necessarily imply optimizing the economic outcome. The JARC's recommended model farming system entails high labor and high physical input costs. The costs are incurred early in the production cycle, and months will lapse before revenues from the sale of coffee cherries are realized. Limited access to credit does little to finance the cultivation operation of many cash-strapped farmers. In addition, those who adopt the JARC's recommendations must forego part of the income generated from intercropping with cash and subsistence crops, as coffee trees are planted at higher densities. As a consequence, they have less time for intercropping before the coffee canopies shade out the intercrops.

The difference between yield maximization and optimization of economic returns is understood by large-scale and smallholder coffee growers. The majority smallholder Ethiopian coffee farmers who have managed to get access to HYVs use little to no chemical fertilizer and in general have adopted no other new cultivation practices. Even some large-scale growers with access to HYVs report using only a small amount of fertilizer, and then only during the initial planting of coffee seedlings.

The supply bottleneck for the propagation of HYVs thus seems to arise just as much from the conditions that restrict farmers from implementing the recommended farming practices as from the limited capacity of the JARC to produce HYV seeds or seedlings.

The financial module in Part I is conducted at the farm-household level to investigate the financial incentive for coffee farmers to acquire HYV seeds from the JARC or seedlings from its licensed seedling nurseries rather than to recycle or to use local seeds. Building upon the financial module, the economic module of the analysis estimates the incremental net economic benefit generated by a household that cultivates HYV coffee trees. Dividing the incremental net economic benefit by the number of HYV trees per hectare (Ha) of coffee holding gives the levelized net economic benefit of a HYV seedling. Part II of the analysis relies on the levelized benefit per seedling to examine the financial and economic merits of sponsoring the establishment of a HYV coffee-seedling nursery and the training of its producers.

[1] Recently a memorandum of understanding to this effect was signed. The CRI has not been able to acquire the details but believes the memorandum should relate to Component 4 (innovation and investment) of the work plan.

Part I — Financial Analysis of the Cultivation of High-Yield Variety Seedlings

Model Farm Description and Parameter Values

This analysis considers the cultivation of coffee trees in three separate scenarios: (1) the continuation of traditional agronomic practices using local variety seedlings; (2) the continuation of traditional practices using HYV seedlings; and (3) the adaptation of model farming practices using HYV seedlings. A separate farm model is constructed for each of the three scenarios. Based on the data collected from multiple sources, the farm model specifies the labor and physical input requirements and forecasts the revenue generated and costs incurred. The overall objective is to compute the net cash flow over the project life and the corresponding financial net present value (NPV) that a household may receive from coffee cultivation. Note that the first scenario describes the status quo. The differences in financial NPVs between scenarios 1 and 2, and between scenarios 1 and 3, represent the incremental financial benefit of the HYV seedling cultivated with traditional practices and model farming practices, respectively.

Although coffee trees can live as long as 30 years, this analysis considers a time frame of 20 years. For coffee or other commodities whose prices fluctuate widely from year to year, the analysis findings may lose precision as the time frame extends beyond a few years. However, given that 3 years will lapse before the newly planted coffee seedlings bear cherries, and that stumping (cutting the tree stem to knee height) is required 7 years after the trees become productive, a relatively short time frame would fail to capture the full financial return of coffee cultivation.

It is assumed that a household has a plot of coffee holding that measures 1 Ha. In addition, to facilitate a fair comparison between scenarios, it is assumed that the cultivation is on previously uncultivated land that requires land clearing and development, followed by the planting of coffee seedlings. Under the traditional farming system, fewer coffee trees are planted. Numerically, the average tree density in the traditional system is 1,800 seedlings per Ha, as opposed to 2,350 seedlings under the model farming technique.

Seedlings of both varieties take 3 years to grow. The wider spacing between trees in the traditional system allows for 2 years of intercropping, which generates some income to partially finance household consumption during the interim. Under the model farming system, however, intercropping is limited to the first year. In the fourth year, the young trees bear fruit. The harvest quantity varies by the seedling variety and farming technologies. For scenario 1, the annual yield is expected to be 4 quintal (400 kilograms [kg]) of green-bean equivalence (GBE) or 2.4 tons of fresh cherries per Ha; for scenario 2, the expected annual yield is 7 quintal (700 kg) of GBE or 4.2 tons of fresh cherries per Ha; for scenario 3, the expected annual yield is 12 quintal (1.2 tons) of GBE or 7.2 tons of fresh cherries per Ha. The trees remain productive from years 4 to 10. At the end of the 10th year, farmers cut the tree stems to knee height, a process known as stumping, so that new stems will develop from suckers to replace the original stems, whose productivity begins to fall past the 10th year. At the 14th year, the new stems bear fruit and thus begin the second productive phase. At the 20th year, the trees are stumped again, and the project is considered to end at this point. Table 1 summarizes the yield and production cycle of different farming technologies over the 20-year period.

Table 1. Yield estimate and coffee cultivation cycle over 20 years by farming technology

	Traditional practices		Model farm	
	Local variety (1)	High yield variety (2)	High yield variety (3)	
Coffee holding area and yield				
Coffee holding area per household	1	1	1	Ha
Tree density	1800	1800	2350	trees/Ha
Yield per coffee tree				
Green bean equivalence (GBE)	0.22	0.39	0.51	kg of GBE per tree
Red cherry	1.33	2.33	3.06	kg of red cherry per tree
Yield per hectare				
Green bean equivalence (GBE)	4.00	7.00	12.00	quintal/Ha per year
Red cherry	24.00	42.00	72.00	quintal/Ha per year
Production Cycle				
Length of coffee cultivation	20	20	20	year
Planting	1st	1st	1st	year
First harvest	4th	4th	4th	year
Stumping	10th	10th	10th	year

Source: Own derivation based on farm-budget data provided by ACDI-VOCA (2012c).

Besides seedling density, the two farming systems also vary by the intensity of labor and physical input utilization that is required. In both cases, a set of hand farm tools and drying materials are required. The model farming system uses 2 kg of organic compost/Ha for fertilizer, as compared to 1 kg for traditional methods. In addition, the model farming system requires 2,350 HYV seedlings, whereas the traditional method requires only 1,800 seedlings of either variety. Despite these quantitative differences, the monetary values of physical inputs are largely identical for the two farming systems.

However, the same cannot be said about labor inputs. To achieve an annual yield of 12.0 quintal GBE/Ha, the model farming system is substantially more labor intensive. For any phase of cultivation, the amount of labor input required is multiple times that required for the traditional system. During the harvest seasons, additional labor is required to selectively strip ripened red cherries off the branches. There is a general consensus that the average quantity of harvested cherries by an able-bodied adult is 30 kg/day. A breakdown of labor input by activity for each scenario is reported in table 2.

Over the 20-year coffee-cultivation period, the amount of required labor inputs fluctuates depending on the stages of tree development. For most of the time, a household that continues traditional farm practices has a sufficient labor supply to perform its own manual activities. Hired labor is only required intermittently to make up for the temporary labor shortfall during harvests or land clearing and development. However, the model farming system is so labor intensive that households adopting it are likely to recruit external laborers regularly. To estimate the extra costs this method entails, it is helpful to first consider a household's own labor supply, which is a function of the household size.

Table 2. Labor requirements for different farming technologies (person day/Ha/year)

	Traditional practices		Model farm
	Local variety (1)	HYV (2)	HYV (3)
One-off			
Land development	24.9	24.9	32.5
Holing, refilling, pegging	32.6	32.6	42.5
Planting seedlings	9.6	9.6	12.5
Subtotal	67.0	67.0	87.5
Unproductive (young or stumped) tree maintenance			
Weeding and cultivation	0.0	0.0	50.0
Hoeing and ridge maintenance	5.0	5.0	25.0
Mulching	12.5	12.5	25.0
Subtotal	17.5	17.5	100.0
Intercropping			
Intercropping operations	25.0	25.0	25.0
Duration*	2 years	2 years	1 year
Productive tree maintenance			
Shade-tree regulation	2.5	2.5	5.0
Weeding and removing lichen	2.5	2.5	16.0
Desuckering, pruning, stumping	7.5	7.5	32.0
Subtotal	12.5	12.5	53.0
Harvest preparation			
Drying bed construction	25.0	25.0	37.5
Small storage construction**	12.5	12.5	25.0
Subtotal	37.5	37.5	62.5
Harvest	30 kg daily	30 kg daily	30 kg daily

* Wider spacing allows for 1 more year of intercropping.
** This occurs once during the first harvest in the fourth year.
Source: Own derivation based on farm-budget data provided by ACDI-VOCA (2012c).

Statistics on the average household size for Jimma are not available, but the average household for the Oromiya region is estimated to be 5.2 persons. Table 3 reports the number of people in the average Oromiyan household along with their ages and gender composition.

For the same labor duration, the productivity and thus the amount of work completed by individual household members will vary owing to the difference in physical strength. To capture this difference, the labor of female adults, children, and seniors has been converted to male adult labor equivalence. By default, the labor equivalence of male adult labor is 1; those of female adults, children, and seniors are assumed to be 0.7, 0.3, and 0.3, respectively. Based on this information, it is estimated that a household can allocate up to 91 person days of labor to coffee farming each year (table 4, column 3).

Table 3. Average size, age, and gender composition of an Oromiyan household

	Oromiya
Average household size	5.2
Age composition	
15–64	46.8%
0–14	50.0%
65+	3.2%
Gender composition	
Male	50.3%
Female	49.7%

Source: 2007 Household Income, Consumption, and Expenditure Survey, Table 3.2 (CSA 2007).

Table 4. Own labour supply of an Oromiya Household

Household composition - Oromiya	Family member	Person day equivalence	Day on coffee farm per year	Person day equivalence per year
Adult male (15-64)	1.22	1.0	40.0	49.0
Adult female (15-64)	1.21	0.7	40.0	33.9
Children (0-14)	2.60	0.3	10.0	7.8
Senior (65+)	0.17	0.3	10.0	0.5
Total	5.20			91.1

Source: Own calculation based on 2007 Household Income, Consumption, and Expenditure Survey, Table 3.2 (CSA 2007).

In any year when the total labor requirement exceeds 91 days, the household hires external labor. During field-visit interviews, stakeholders reported that the daily wage rate for unskilled laborers is approximately 30 ETB. In addition, coffee farmers provide meals to laborers, which cost 10 ETB/laborer/day. The total daily cost of hired labor is thus approximately 40 ETB per person. While tending the coffee trees, coffee farmers must leave unattended other agricultural, income-generating activities, which means there is also an opportunity cost to their labor on the coffee farm. The imputed labor cost/day is assumed to be 24 ETB. The farm model accounts for both labor types (own household supply and hired) and assigns costs accordingly.

During a field visit to Jimma, the CRI team acquired from a *sebsabi* (collector) and a *chaanyii* (supplier) data about their purchases of coffee from farmers to study the output price of coffee cherries. The *sebsabi*'s data covers the past 2 years, while those of the *chaanyii* run from November 2011 to May 2012. The price of cherries ranges from 14 ETB/kg in late 2011 to 9 ETB/kg in recent months. In the model, the assumed cherry price is 14 ETB/kg.

Financial Analysis Findings

Using the aforementioned information, the farm model makes forecasts about labor and physical inputs required for the three scenarios, the associated costs incurred, and the revenue generated over the 20-year cultivation period. The financial NPVs summarize the overall profitability of the ventures. The results for each of these ventures include the revenues and expenditures for their coffee production as well as their intercropping activities.

At a 12 percent discount rate, traditional farming that uses local-variety seedlings yields a financial NPV of 102,854 ETB (US$5,857). If HYV seedlings are planted instead, traditional farming yields a financial NPV of 209,600 ETB (US$11,936). Lastly, the model farming system yields a financial NPV of 352,248 ETB (US$20,060). Even when farmers continue traditional farming practices, the incremental financial benefit of cultivating HYV seedlings is 106,746 ETB (US$6,079). The incremental financial benefit of switching from traditional practices using local-variety seedlings to the model farming system is even higher, at 249,394 ETB (US$14,202).

Table 5 summarizes the financial NPV of each coffee-producing system, inclusive of the benefits and costs of intercropping. Sensitivity analyses are conducted on several risk variables, including percentage deviation in yield estimate and annual percentage change in real daily wages of hired labor and coffee-cherry price. The presentation of these sensitivity analysis results occurs later in the economic module of this analysis so the incremental benefits of other stakeholders can be juxtaposed alongside farmers' financial benefit for comparison.

Table 5. Financial NPV of coffee cultivation by farming technology (12 percent discount rate, 20-year project life)

	Traditional practices		Model farm
	Local variety (1)	**HYV (2)**	**HYV (3)**
ETB			
Financial NPV per household	102,854	209,600	352,248
Incremental financial NPV			
Scenario (1) as the base case		106,746	249,394
Adopting model farming practices (3) – (2)			142,648
US$			
Financial NPV per household	5,857	11,936	20,060
Incremental financial NPV			
Scenario (1) as the base case		6,079	14,202
Adopting model farming practices (3) – (2)			8,123

Although the model farming system using HYV seedlings generates in present-value terms the greatest net financial benefit, many farmers may not find it appealing due to cash-flow constraints in the early years after introducing the system. Growing HYVs demands considerable labor and physical inputs and therefore cash outlays even at times when coffee trees are unproductive, either because they are not yet mature or are stumped. Specifically, during the first 3 years of cultivation, the model farming system requires a total of 412.5 person days, whereas traditional practices require only 169.5 person days for the same period of time. Traditional practices also have the advantage of allowing for another year of intercropping due to the wider spacing of coffee trees, which leaves more growing space for the intercrop. Table 6 presents the total farm labor and physical input requirements for different farming systems.

Table 6. Number of intercropping and total farm labor and physical input requirements in the first 3 years of coffee cultivation by farming technology

	Traditional practices		Model farm
	Local variety (1)	**HYV (2)**	**HYV (3)**
Number of years of intercropping possible	2	2	1
Farm input requirements			
Farm labor (person day)	169.5	169.5	412.5
Physical inputs			
Seedlings: local variety	1,800	1,800	2,350
Fertilizer (kg)	3.0	3.0	6.0

Source: Farm-budget data provided by ACDI-VOCA (2012c).

Table 7 reports the total net cash flow for the first 3 years of planting operation (the period before the coffee bushes start to produce) for different farming technologies. Traditional practices using the local variety of coffee trees generate as much intercropping revenue as do those using HYVs. The difference in the total cash flow is attributable to the difference of 0.5 ETB in the per-unit cost of the seedlings for the HYV. This cost notwithstanding, during the first 3 years, traditional practices yield positive earnings of US$424 and US$373 in present value. By contrast, model farming generates a net loss of US$605, largely because of its labor-intensive nature as well as the greater physical input costs of fertilizer and seedlings.

In short, not only does the model farm system entail higher operating cost, it also significantly reduces intercropping revenue during the first 3 years when the coffee trees are maturing. Both factors create greater short-term risks and higher cash outflows for the model farming system as compared to the traditional practices. The difference of some US$1,000 in the total cash flow over 3 years can be interpreted as the present value of an additional investment cost that must be financed for undertaking the model farming package. Considering that the annual per-capita income in Ethiopia is US$360, the total income earned by a household of 5.2 members over 3 years is approximately US$5,036 in present value. Therefore, the US$1,000 represents approximately 20 percent of the potential total income that must be forgone if the household adopts the model farming practices.

The current JARC policy that obliges the recipients of its improved seeds or seedlings to commit to the model farming system is well intended, as the financial analysis indicates that model farming does indeed maximize financial NPV. However, the same policy also acts as a major disincentive for HYV seedling cultivation; the majority of households simply lack the financial resources over the first 3 years to employ labor and physical inputs at the level of intensity recommended by the JARC.

The figures in table 7 are based on the assumed household size of 5.2 members and on the assumed coffee cultivation area of 1 hectare. Holding the age and gender composition constant, the larger the household size, the more of its own labor supply that a household can mobilize in coffee farming. Conversely, the smaller the coffee holding, the fewer hired labor inputs are required.

Table 7. Present values of revenues and expenditures in the first 3 years of coffee cultivation by farming technology

	Traditional practices		Model farm
	Local variety (1)	HYV (2)	HYV (3)
Intercropping gross revenue in ETB (IR)	15,143	15,143	8,000
Input costs in ETB			
Farm labor cost			
Hired labor cost	736	736	5,455
Imputed own labor cost	3,433	3,433	5,883
Physical input cost			
Seedlings	1,350	2,250	2,938
Fertilizer	2,172	2,172	4,344
Total input costs (TIC)	7,690	8,590	18,619
Net income in ETB (NI) = (IR) – (TIC)	7,453	6,553	-10,619
Net income in US$	424	373	-605

To gauge how the size of coffee-holding areas may influence household participation in adopting the model farming practices, a sensitivity analysis has been conducted to investigate its impact on the total cash flow for the first 3 years, interpreted as the investment cost of model farming. The results are reported in table 8. Column 4 indicates that the cash flow is sensitive to the coffee-holding size. Because the household size is held fixed, so is the amount of its own labor supply. Therefore, the household must hire extra laborers to tend larger coffee-holding areas. In general, an increase in coffee holding by 0.5 hectare increases the investment cost by about US$500.

Table 8. Sensitivity analysis of coffee holding on the present value of the net financial benefits for the first 3 years by farming technology (US$)

Coffee holding (Ha)	Traditional practices		Model farm	Difference (4) = (3) – (2)
	Local variety (1)	HYV (2)	HYV (3)	
1.0	**424**	**373**	**-605**	**978**
0.5	120	69	-461	530
1.0	424	373	-605	978
1.5	695	644	-811	1,456
2.0	966	915	-1,018	1,933
2.5	1,225	1,174	-1,225	2,399
3.0	1,479	1,427	-1,432	2,859
3.5	1,732	1,681	-1,638	3,320
4.0	1,986	1,935	-1,845	3,780

However, household size does not have a significant impact on the total cash flow for the first 3 years, because imputed labor cost is 70 percent of the hired labor cost; for every additional male adult household member, the household only saves 30 percent of the hired labor cost. Table 9 reports on the sensitivity of the present value of net cash flow over the first 3 years by household size. The cost differential becomes only slightly smaller as the size of the household increases (see table 9, column 4).

Table 9. Sensitivity analysis of household size on the present value of the net cash flow over the first 3 years by farming technology (US$)

Household size (no. members)	Traditional practices		Model farm	Difference
	Local variety (1)	HYV (2)	HYV (3)	(4) = (3) – (2)
5.2	**424**	**373**	**-605**	**978**
3.0	389	338	-699	1,037
3.2	392	341	-691	1,032
3.4	396	344	-682	1,026
3.6	399	348	-673	1,021
3.8	402	351	-665	1,016
4.0	405	354	-656	1,010
4.2	408	357	-648	1,005
4.4	412	360	-639	999
4.6	415	364	-631	994
4.8	418	367	-622	989
5.0	421	370	-613	983
5.2	424	373	-605	978
5.4	428	376	-596	973
5.6	431	380	-588	967
5.8	434	383	-582	964

As stressed, although model farming practices using HYV seedlings yield greater incremental financial NPV for farmers, they also require a substantially greater initial investment, which amounts to 20 percent of the total income earned over 3 years by a typical household in Oromiya. If the distribution of HYV seeds and seedlings is made contingent on adopting the JARC-prescribed model farming practices, it can be anticipated that many households will be denied access to the project, because they lack the financial resources to fully implement the JARC's recommendations. Furthermore, although the potential gain of access to improved seeds or seedlings is greatest for households with larger coffee holdings, they also face the tightest financial constraints as a consequence of the JARC's mandatory requirement to implement the model farming practices.

This concludes the financial module of the first part of the analysis on the production and marketing of HYV seedlings. Setting aside the investment-cost issue, coffee farmers reap direct financial benefit from cultivating HYV seedlings, regardless of the farming technologies used. The magnitude of incremental benefit for the economy is greater than farmers' private financial gain, because downstream value chain participants now acquire more coffee cherries for processing and trading. The government also collects more indirect tax revenues from the purchasing of inputs by the value chain participants. The economic impact of farmers' acquiring HYV seedlings is thus the subject of the next section of the analysis.

Part I — Economic Analysis of the Cultivation of High-Yield Variety Seedlings

Motivation

The objective of the economic module is to investigate the net incremental economic benefit that a coffee-farming household can generate if it adopts the high-yield variety (HYV) of seedlings. The incremental financial and economic benefits differ for two reasons. First, the financial prices of commodities include taxes and subsidies or other market distortions and are thus rarely identical to their true economic values. To capture these distortion-induced differences, financial values in the farm model are converted, item by item, to their economic values by means of commodity-specific conversion factors, which are computed using the methodology developed by Jenkins et al. (2012).

Secondly, even with zero net distortions at the farm-gate level, the adaptation of HYV seedlings by coffee farmers creates positive externalities for other coffee value chain participants. Higher coffee productivity at the farmstead boosts labor demand at times of harvest, at the farm level and in coffee-cherry processing plants. The intermediary agents who engage in coffee collecting, processing, and trading and exporting also receive more throughputs from coffee farmers. Additionally, throughout this process, the government collects indirect taxes from the purchases of inputs in various stages of coffee-bean production and marketing.

Downstream Externalities and Stakeholders

This analysis considers three classes of stakeholders: the laborers, the traders, and the government. The laborers include casual laborers working at coffee farms and processing plants and operating trucks. The Ethiopian countryside teems with migrant laborers who move around areas in search of temporary employment. Given the transient nature of their jobs, these casual laborers do not pay any personal income tax.[2] The conversion factor for this group of employees is estimated to be 0.8. An employee who receives a daily labor remuneration of 40 ETB (consisting of wages and meals) actually earns 8 ETB, or 20 percent, more than what she can otherwise receive if not employed. In other words, her outside opportunity is 32 ETB/day.

The second class of stakeholders includes the intermediary agents whose crucial services link the coffee farmers to the final buyers. These include the *sebsabis* (coffee collectors), the *chaanyiis* (suppliers), and the exporters. The *sebsabis* deal directly with coffee farmers. During harvest seasons, they drive vehicles to villages to collect fresh coffee cherries from farmers. During nonharvest seasons, they maintain small warehouses near *woredas* (districts) capitals, and coffee farmers in need of cash bring dry cherries to them. During the study team's field visit to Jimma, the *sebsabis* interviewed claimed that they largely act as agents for the *chaanyiis* (suppliers), who provide them with cash financing to pay the farmers. *Sebsabis* on average earn a modest margin of 5 to 10 ETB/kg of coffee cherries they pass on to the *chaanyiis*.

Chaanyiis play a very vital role in the coffee value chain, because they not only buy coffee cherries from *sebsabis* (and occasionally from individual farmers) but also process the cherries into washed or natural beans before transporting them for trade at the Ethiopian Commodity Exchange (ECX). It should be noted

[2] Anyone who does not work for more than a month for the same employer in a year is defined by law as a casual employee and is exempt from personal income tax (Ethiopian Chamber of Commerce 2005).

that farmer cooperatives and cooperative unions compete with *sebsabis* or *chaanyiis* for farmers' cherries and play the same role in the coffee value chain. Like *chaanyiis*, they also process cherries and trade beans at the ECX, but if they can find foreign buyers, they are also entitled to export directly. Positive downstream benefits also arise (and circulate back to farmers as dividends) if the incremental cherry production is sold to the cooperatives and if the cooperatives can sell the beans for a profit. Given that around 90 percent of coffee beans traded at the ECX originates from *chaanyiis*, this study does not consider downstream externality generated via the cooperative channel. Even if this additional channel is considered, the quantitative impact should not differ greatly, because the coffee-cherry market and the price offer by private agents and cooperatives are fairly competitive at this level. According to a study, the margin as a percentage of total operating costs is 6.6 percent for *chaanyiis* (ACDI-VOCA 2012d).

Although the coffee traded at the EXC can be targeted for export or domestic consumption, the ultimate destination of the incremental production is the export market. The incremental economic benefit created is measured by the monetary value of the export coffee. If a share of the incremental production is consumed domestically, then a share of the monetary value of export coffee is lost, and a share of the exporter's incremental earnings is simply reassigned to domestic coffee traders, who fall under the same category of intermediary agents as exporters. Previous research has found that the margin as a percentage of total operating costs is 5.2 percent for exporters (ACDI-VOCA 2012d).

The Ethiopian government is the third stakeholder that benefits from increased coffee yields. The government receives additional indirect taxes from multiple sources. First and foremost are excise duties collected from the purchase of inputs (such as fuel) that the intermediary agents employ for coffee processing and trading. Secondly, additional revenue from foreign exchange is created as a result of incremental coffee export. This encourages the expansion of imports and allows the government to collect more tariffs and excise duties from the incremental imports. For the same reason, the government loses tax revenue from the dampened export of items used as inputs in coffee cultivation. The net change in tax revenue is captured by the foreign exchange premium (FEP), which is expressed as a percentage of the market exchange rate. Kuo (2012) estimates the FEP for Ethiopia to be 6.5 percent.

In addition to indirect taxes, the government collects direct or income tax from taxable entities. For an Oromiyan farm household with land holding between 0.5 and 1 Ha, an annual rural land-use payment of 20 ETB/Ha and an annual agricultural income tax of 20 ETB/Ha are levied (Bureau of Revenues, the National Regional Government of Oromiya). The amount may vary slightly according to the size of the land holding, but these taxes are immaterial, because they are neglectable, at 40 ETB (US$2.30) each year. Furthermore, the taxes do not alter the incremental results of the economic analysis, because they are based on the size of the land holding and must be paid regardless of farming technologies and coffee productivity. Given the transient nature of their jobs, casual farm or processing-station laborers do not pay income taxes.

The only stakeholders that are effectively subject to taxes are the intermediary agents. In principle, as a result of the intervention, the intermediary agents earn higher income and thus perhaps pay more income taxes. However, it is difficult to estimate with any reasonable precision the incremental income tax liabilities at these levels without adequate background research. Therefore, it has been decided that the incremental income tax revenue should be omitted from this evaluation. This fact notwithstanding, incremental income tax only has a distributive impact and does not affect the overall economic analysis.

Economic Analysis Findings

Table 10 reports the total incremental economic benefit generated by a household that adopts HYV seedlings. The incremental economic benefit generated downstream depends on the type of farming technologies adopted. If traditional farming is practiced, each household that adopts HYV seedlings creates for downstream participants approximately US$8,088 in present-value terms over the 20-year period. Of the US$8,088, intermediary agents collectively earn US$1,020 of profit, while the government collects US$647 of incremental tax revenues, and the laborers earn a surplus of US$342. It should be recalled that part of the traders' profit is eventually redistributed to the government in the form of income tax.

If a farmer adopts model farming practices, the incremental downstream benefit becomes US$19,742. The incremental benefit for laborers, traders, and the government is US$1,092, US$2,721, and US$1,727, respectively.

Part II of the analysis on the production and marketing of HYV seedlings takes the figures in table 10 as the incremental net economic benefits of HYV coffee cultivation. The total economic benefit of coffee cultivation is determined by multiplying the per-household benefit by different levels of household coverage. If farmers are allowed to continue traditional farming practices, a high participation rate in the project is expected. On the other hands, if farmers must commit to the model farming system as a condition of obtaining the seedlings, many are going to be discouraged by the substantial investment cost, despite the fact that the economic value per seedling is greater.

Table 10. Incremental economic NPV generated by a household with 1 Ha of coffee holding (12 percent discount rate, 20-year project life)

	Stakeholders (US$)				Economy (US$) (5)
	Coffee farmers (1)	Laborers (2)	Traders (3)	Govt (4)	
Traditional practices: HYV (1)	6,079	342	1,020	647	8,088
Model farm: HYV (2)	14,202	1,092	2,721	1,727	19,742
Difference (3) = (2) – (1)	8,123	750	1,701	1,079	11,654

The overarching purpose of this exercise is to determine the merits of a HYV seedling nursery. For this purpose, it is helpful to compute the incremental economic benefit on a per-seedling basis, as shown in table 11. The figures are derived by dividing the net incremental benefit assigned to individual stakeholders (see table 10, columns 1–4) by the respective number of seedlings planted under the two farming systems. On average, a HYV seedling in a traditional farm generates an incremental economic benefit of US$4.49 in present value and US$8.40 in present value if it is cultivated using model farming practices. Table 11 also breaks down the incremental economic benefits by stakeholder for the inclusion in a stakeholder analysis later. It is comforting to find that coffee farmers retain at least 70 percent of the incremental benefit; this figure implies that, conditional on farmers' adoption, the incremental benefit of the intervention is greatest for the coffee farmers – the intended beneficiaries of the intervention – and not for other downstream participants.

Table 11. Incremental economic NPV generated per HYV seedling (12 percent discount rate, 20-year project life)

	Tree density (seedlings per Ha) (1)	Incremental benefit per HYV seedling (US$)				Economy (US$) (6)
		Farmers (2)	Farm laborers (3)	Traders (4)	Govt. (5)	
Traditional practices	1800	3.38	0.19	0.57	0.36	4.49
Percentage		75%	4%	13%	8%	100%
Model farm	2350	6.04	0.46	1.16	0.73	8.40
Percentage		72%	6%	14%	9%	100%

Sensitivity Analysis Findings

The findings reported in the previous section are sufficient for Part II of the analysis. As mentioned, Part I can serve as a stand-alone analytical piece on a yield-enhancing intervention. To complete the first part of the analysis, the set of tables that follow report results for a sensitivity analysis conducted with several variables: percentage deviation in actual yield of HYV seedlings (tables 12A–12B), annual changes in real daily wages (tables 13A–13B), and fresh coffee-cherry prices (tables 14A–14B).

Table 12A. Sensitivity analysis of the incremental economic benefit generated by households following traditional practices (12 percent discount rate, 20-year project life)

Percentage deviation in HYV estimate	Yield: traditional practices (quintal of GBE/Ha) (1)	Stakeholders (US$)				Economy (US$) (6)
		Coffee farmers (2)	Laborers (3)	Traders (4)	Govt. (5)	
0%	**7.0**	**6,079**	**342**	**1,020**	**647**	**8,088**
–30%	4.9	1,788	102	306	194	2,391
–20%	5.6	3,218	182	544	345	4,290
–10%	6.3	4,649	262	782	496	6,189
0%	7.0	6,079	342	1,020	647	8,088
10%	7.7	7,509	421	1,259	799	9,988
20%	8.4	8,940	501	1,497	950	11,887
30%	9.1	10,370	581	1,735	1,101	13,786

Table 12B. Sensitivity analysis of the percentage deviation in yield estimates of HYV seedlings (12 percent discount rate, 20-year project life)

Percentage deviation in HYV estimate	Yield: traditional practices (quintal of GBE/Ha) (1)	Stakeholders (US$)				Economy (US$) (6)
		Coffee farmers (2)	Laborers (3)	Traders (4)	Govt. (5)	
0%	**12.0**	**14,202**	**1,092**	**2,721**	**1,727**	**19,742**
–30%	8.4	6,846	682	1,497	950	9,974

–20%	9.6	9,298	819	1,905	1,209	13,230
–10%	10.8	11,750	955	2,313	1,468	16,486
0%	12.0	14,202	1,092	2,721	1,727	19,742
10%	13.2	16,654	1,229	3,129	1,985	22,998
20%	14.4	19,106	1,365	3,538	2,244	26,254
30%	15.6	21,559	1,502	3,946	2,503	29,510

Table 13A. Sensitivity analysis of yearly percentage change in real wages: traditional practices (12 percent discount rate, 20-year project life)

Annual change in real wages of daily labor	Stakeholders (US$)				Economy (US$) (5)
	Coffee farmers (1)	Laborers (2)	Traders (3)	Govt. (4)	
0%	**6,079**	**342**	**1,020**	**647**	**8,088**
-3%	6,185	316	1,017	646	8,164
-2%	6,153	324	1,018	646	8,141
-1%	6,118	332	1,019	647	8,116
0%	6,079	342	1,020	647	8,088
1%	6,036	352	1,021	648	8,057
2%	5,989	363	1,022	649	8,022
3%	5,936	375	1,023	649	7,984

Table 13B. Sensitivity analysis of yearly percentage change in real wages: model farming practices (12 percent discount rate, 20-year project life)

Annual change in real wages of daily labor	Stakeholders (US$)				Economy (US$) (5)
	Coffee farmers (1)	Laborers (2)	Traders (3)	Govt. (4)	
0%	**14,202**	**1,092**	**2,721**	**1,727**	**19,742**
-3%	14,605	1,003	2,713	1,722	20,043
-2%	14,483	1,030	2,716	1,723	19,953
-1%	14,350	1,060	2,719	1,725	19,853
0%	14,202	1,092	2,721	1,727	19,742
1%	14,040	1,127	2,724	1,728	19,619
2%	13,861	1,165	2,726	1,730	19,483
3%	13,664	1,207	2,729	1,731	19,332

Table 14A. Sensitivity analysis of price of fresh cherries: Traditional practices

Fresh-cherry price (ETB/kg) (1)	Stakeholders (US$)				Economy (US$) (6)
	Coffee farmers (2)	Laborers (3)	Traders (4)	Govt. (5)	
14.0	**6,079**	**342**	**1,020**	**647**	**8,088**
8.0	3,121	254	583	370	4,327
10.0	4,107	283	729	462	5,581

12.0	5,093	312	875	555	6,835
14.0	6,079	342	1,020	647	8,088
16.0	7,065	371	1,166	740	9,342
18.0	8,051	400	1,312	832	10,596
20.0	9,037	430	1,458	925	11,849
22.0	10,023	459	1,604	1,017	13,103

Table 14B. Sensitivity analysis of price of fresh cherries: Model farming

Fresh-cherry price (ETB/kg) (1)	**Stakeholders (US$)**				**Economy (US$) (6)**
	Coffee farmers (2)	**Laborers (3)**	**Traders (4)**	**Govt. (5)**	
14.0	**14,202**	**1,092**	**2,721**	**1,727**	**19,742**
8.0	6,314	857	1,555	987	9,713
10.0	8,944	935	1,944	1,233	13,056
12.0	11,573	1,014	2,332	1,480	16,399
14.0	14,202	1,092	2,721	1,727	19,742
16.0	16,832	1,170	3,110	1,973	23,085
18.0	19,461	1,248	3,499	2,220	26,428
20.0	22,091	1,327	3,887	2,466	29,771
22.0	24,720	1,405	4,276	2,713	33,114

Part II — Financial Analysis of a Seedling Nursery

Intervention Description

Multiple activities are planned relating to the production of high-yield variety (HYV) seedlings. One such activity is to help six existing nurseries expand their production of high-quality seedlings (Activity 1.1 of Intervention III). Other activities typically involve the identification and training of local partners in seedling production (Activity 1.2.2). The local trainees are drawn from among private commercial farmers, primary cooperatives, and smallholder farmers and are trained by experts who receive training themselves from the Jimma Coffee Research Agency (JARC). This organization is also responsible for the selection, multiplication, and distribution of improved seeds. Upon their completion of training, local partners establish or work in seedling nurseries that cater mostly to the demand for HYV seedlings from smallholder farmers. Large-scale commercial or state farms are potential clients, but their demand is likely to be limited given that many operate their own nurseries in their plantations.

The broad scope of the topic makes it difficult to model every aspect of the intervention. For the purpose of conducting a cost-benefit analysis (CBA), it is assumed that the local trainees are selected from among female household heads (Activity 2.3.1), although this assumption is not critical and modestly improves the economic outcome by reducing the economic or resource cost of labor. Female household heads are likely to benefit more from the training and the employment opportunities than their male counterparts who have a higher economic opportunity cost of labor. After the training, the female household heads work in local nurseries that are financially independent. The nurseries can be owned by any party, including cooperatives, private enterprises, or trained female household heads themselves. Ambiguity over the ownership of the nursery is immaterial for the purpose of this analysis: It is assumed that a farmer cooperative owns and operates the nursery. The nursery's after-tax earnings are redistributed to farmers as dividends, or the financial earnings of the nursery are reduced over time by lowering the price of seedlings. This is just another method to redistribute the earnings of the nursery to the farmers.

The fundamental purpose of performing a financial analysis of the nursery operations is to determine whether the price being paid for the seedlings provides sufficient financial incentive for this activity to be sustainable, given the seedlings' production costs. To study the economic value of a program for the conversion of farming the new HYVs of coffee, the nursery operations must be combined with a plan for the expansion of the use of these seeds in the cultivation of such varieties of coffee.

Nursery Model Description

According to the ACDI-VOCA work plan, the nursery sites should have the capacity to produce 100,000 seedlings per year. Although the AGP-AMDe project is intended to last 5 years, the analysis has been performed based on a project life of 10 years, because the goal is for the nursery sites to operate beyond the 5th year. Given its association with the JARC, the nurseries are treated in the model as formal establishments that are subject to value-added taxes (VAT), business income taxes, and other taxes. Similarly, their employees are permanent and are subject to personal income taxes.

The labor input requirements for different activities at the nursery are provided in table 15. The initial nursery-site clearing and fencing requires 375 person days of labor, and the annual production of 100,000 seedlings in subsequent years requires 750 person days per year. In additional, it is assumed the nursery hires one female employee to perform managerial or administrative duties. The manager works fulltime, estimated to be 264 days per year. The total labor requirement is thus 1,014 person days per year. Assuming female laborers on average work for 22 days each month, a nursery will thus employ 3.84 females per year. When the daily meal of 10 ETB is included, the total wage rate of unskilled female labor is estimated to be 34 ETB. After training, the females become skilled or semiskilled in producing seedlings. Their daily wages are assumed to increase by 5 ETB, to 39 ETB/day. Based on this information, a hired nursery laborer should earn about 748 ETB per month. The manager earns 1,320 ETB per month, or 60 ETB per day on average. For these monthly income levels, the average labor income-tax rate is 15 percent (Ethiopian Chamber of Commerce 2005).

ACDI-VOCA's nursery-budget data indicate that the nursery produces 100,000 seedlings per year. This scale is therefore the most efficient scale (lowest average cost) for operating a nursery. This cost also takes into consideration the convenience of the distance of the nursery from the farmers purchasing the seedlings. The initial assumption is that the price charged is 1.25 ETB/seedling. In view of the financial analysis findings from Part I, the overall demand in the country is likely to be substantially suppressed if the model farming system is contingent upon a farmer's acquiring HYV seedlings. If the requirement is removed, then a higher farmer participation rate is expected. This analysis considers the second scenario, in which farmers are allowed to continue existing farming practices. The number of nurseries is determined by the total demand for seedlings in a year. Each nursery is expected to operate at its long-run efficient level of introducing 100,000 seedlings per year.

Table 15. Annual seedling production and labor input requirements for a nursery

Seedling production	Seedlings per year	Seedling price (ETB/seedling)
Capacity	100,000	1.25
Nursery labor input	Person day/year	Daily wage rate (ETB/person day)
One-time		
Nursery-site clearing and fencing	375	39
Recurring		
Soil heaping and compost mixing	125	39
Cutting, filling, and arranging polythene tube	125	39
Presowing watering and sowing	50	39
Mulching and preparation	125	39
Preparing and constructing shade material	125	39
Watering and cleaning	100	39
Weeding and hoeing	50	39
Removing mulch	12.5	39
Thinning and removing shade	12.5	39
Sorting and counting seedlings	25	39
Subtotal (not including site clearing and fencing)	750	39
Administrative labor input	264	60
Total labor requirement	1,014	Person day/year
Number of working days/female laborer	22	days/month
Number of female laborers employed/year	3.84	female laborers/year

Source: Own derivation based on nursery-budget data provided by ACDI-VOCA (2012e).

Table 16 presents the nursery's physical input requirements and the associated costs. Although not explicitly specified in the data source, the nursery data should be inclusive of 15 percent of VAT.

Table 16. Physical input requirements for a nursery

	Input requirements	Cost (ETB/year)
Nursery physical inputs		
HYV seed	30 kg/year	3,600
Polythene bags	1 bundle/year	15,000
Farm tools	1 bundle/5 years	3,000
Mulch material	1 bundle/2 years	2,500
Shade material	1 bundle/2 years	2,500

Source: Nursery-budget data provided by ACDI-VOCA (2012e).

Financial Analysis Findings

Table 17 presents the financial NPV of a nursery. With these parameter values, the nursery is expected to yield a financial NPV of US$14,541 using a 12 percent real discount rate over the 10-year project life.

Table 17. Production, sales, and financial NPV of a coffee-seedling nursery (12 percent discount rate, 10-year project life)

Demand from smallholder coffee farmers	
Seedlings production per year	100,000
Farmers uptake	100%
Quantity of seedlings sold each year	100,000
Coffee Ha/farm supplied each year	55.56
Financial NPV per nursery (ETB)	255,342
Financial NPV per nursery (US$)	14,541

Because the nursery is owned by a farmer cooperative, the surplus is redistributed to member farmers as dividends. Alternatively, the nursery can lower the proposed seedling price from 1.25 ETB to increase the net benefits to the farmers employing the HYV seedlings. Table 18 presents the results of a sensitivity analysis conducted on the seedling prices, which indicates that the seedling price can be reduced by a maximum of 40 percent, or to 0.75 ETB per unit, without sustaining losses.

Table 18. Sensitivity analysis of seedling price on the financial NPV of a coffee-seedling nursery (12 percent discount rate, 10-year project life)

Seedling prices (ETB/seedling)	Financial NPV per nursery (US$)
1.25	**14,541**
1.25	14,541
1.13	11,475
1.00	7,400
0.88	4,980
0.75	1,160
0.63	–3,214
0.50	–7,719

A sensitivity analysis is conducted on nursery labor input requirement, which accounts for approximately 45 percent of total operating costs. Results in table 19 suggest that even if the nursery's actual labor requirement increases by 180 percent (either because of the project designer's underestimation of the efforts involved or because of unnecessary employment creation), the nursery is still financially viable.

Table 19. Sensitivity analysis of nursery labor requirement on the financial NPV of a coffee-seedling nursery (12 percent discount rate, 10-year project life)

Percentage change in nursery labor requirement	Annual labor requirement (person day/year)** (1)	Financial NPV per nursery (US$) (2)
0%	**750**	**14,541**
0%	750	14,541
20%	900	13,119
40%	1,050	11,675
60%	1,200	10,195
80%	1,350	7,774
100%	1,500	7,236
120%	1,650	5,652
140%	1,800	3,993
160%	1,950	2,196
180%	2,100	278
200%	2,250	–1,773
220%	2,400	–3,881

**Exclusive of site clearing and fencing in the first year.

The AGP-AMDe project targets 16 coffee-producing *woredas* in the Oromiya and SNNP regions, with a total area of 119,028 hectares under coffee cultivation (table 1B, column 3). With an average tree density of 1,800 trees/Ha under the traditional farming system, about 214 million coffee trees are planted, most of which are of local varieties. If the objective is to gradually phase out the local varieties and to replace them with HYVs over the next 20 years, the nurseries need to produce 107 million seedlings over the next 10 years, or 10.7 million seedlings each year. This requires setting up 107 nurseries, each with an annual capacity of 100,000 seedlings (see table 20).

Table 20. Coffee-cultivation hectarage in AGP-AMDe areas

Coffee area		
Oromiya	58930	Ha
SNNP	60,098	Ha
Total	119,028	Ha
Average tree density	1,800	tree/Ha
Total seedlings required over 20 years	214.3	million seedlings
Total seedlings required over 10 years	107.1	million seedlings
Total seedlings produced each year	10.7	million seedlings
Number of nurseries required	107	nurseries

Source: AGP-AMDe Coffee Value Chain Intervention Woredas and FCU (ACDI-VOCA 2012a).

The total number of new nurseries required is likely to be substantially less than 107, given the fact that some of the existing trees are improved varieties and do not requirement replacement and that the existing nurseries satisfy some of the demand for HYV seedlings. Table 21 reports the incremental financial NPVs and total seedling production over the 10-year project life by the number of new nurseries to be established.

Alternatively, table 21 can be interpreted as indicating the number of nurseries required when the demand for the HYV varies. For example, if the total seedling demand over 10 years is 10 million, or around 9.3 percent of the maximum potential demand of 107 million, then 10 nurseries are required. If the demand reaches 47 percent of the potential, then 50 nurseries are required. Of course, the actual number of new nurseries to be established depends as much on the number of existing nurseries as on the budget allocated to this intervention. The nurseries should be spatially dispersed to reduce transportation costs and travel time for farmers.

Table 21. Financial NPV of nurseries by the number of nurseries established

	Total seedlings produced (million seedlings) (1)	**Total production as % of maximum demand (107 million seedlings) (2)**	**Coffee hectarage supplied (Ha) (3)**	**Total nurseries financial NPV (US$) (4)**
Per nursery	1.0	0.93%	555.6	14,541
Number of new nurseries				
10	10.0	9%	5,556	145,411
20	20.0	19%	11,111	290,823
30	30.0	28%	16,667	436,234
40	40.0	37%	22,222	581,646
50	50.0	47%	27,778	727,057

Part II — Economic Analysis of an Integrated Program for the Conversion of Ethiopian Coffee Production to High-Yield Varieties

Introduction

The economic analysis of the high-yield variety (HYV) seedling nurseries is undertaken in conjunction with the implementation of a conversion program that would replace the existing varieties of coffee over time with the HYVs. This analysis begins by considering the net economic benefit of a single nursery operation. In Section 1, the assumption is made that the price received for the seedlings represents their economic value. In Section 2, this assumption is dropped.

In Section 1 of this analysis, the number of nurseries is determined by the size of the conversion program and integrated with the cultivation of the HYV for the production of coffee. After that point, the financial or economic value of the seedlings drops out of the analysis, because a financial or economic benefit to the nurseries is a financial or economic cost to the coffee cultivators. The economic value of the HYV seedlings is ultimately derived from the value of the coffee produced using these seedlings as an input of production.

Section 1: Economic Analysis of a High-Yield Variety Seedling Nursery

Three sources of economic benefit associated with the overall program are considered in this economic analysis of the production and marketing of HYV seedlings. The first part of the net economic value is the net present value (NPV) of the financial net benefit of the project. The second source relate to the difference between the financial and economic cost of the female laborers and the fact that they are required to pay taxes on their wages when they start working. The labor benefit for the female household heads arises from the skill-enhancing training they receive, combined with the employment opportunity. These women generally have a lower economic opportunity cost of labor than the wage rate they receive once trained. To capture the difference between the financial price and the true economic opportunity cost of hired female employees, a conversion factor of 0.74 for female employees has been computed to convert the financial costs to an economic resource cost. Out of every ETB earned in wages, the intervention generates a surplus of 0.26 ETB, of which 0.19 ETB is assigned to the female household heads and 0.07 ETB goes to the government in the form of personal income tax revenue.

In addition to personal income tax, the government also collects taxes from the activities of the nursery, which is treated here as a formal establishment that is subject to rural land-use payment, agricultural income tax, and value-added tax (VAT).

Table 22 reports the incremental economic NPV generated at the level of nursery, which amounts to US$22,443 per nursery over its 10-year existence. The financial NPV of the nursery (at a real discount rate of 12 percent) is US$14,541. Collectively, the female laborers earn a surplus of US$3,247 over 10 years. This amount is in excess of what they can otherwise earn elsewhere if they do not receive training and work in the nursery. Finally, the government collects US$4,654 of direct and indirect tax revenues, yielding a total economic NPV of US$22,443.

Table 22. PVs of externalities per nursery
(12 percent discount rate, 10-year project life)

	US$
Financial NPV of nursery	14,541
PV of labor externalities	
Nursery laborers	2,162
Managerial/administrative staff	1,085
PV of government tax revenues	4,654
Total economic NPV of nursery	22,443

Section 2: Economic Appraisal of the Conversion Program for Coffee Cultivation

The figures in table 22 are based on a single seedling nursery's supplying enough seedlings to cover 42.5 hectares (Ha) of coffee holding each year. An interesting question to consider is the total number and types of benefits generated at the nurseries if the intervention produces more seedlings. Table 23 presents results for such an analysis for different coverage targets. Recall from table 20 that Oromiya and SNNP have 119,028 Ha dedicated to coffee cultivation. A coverage target of 1,000 Ha/year can thus provide 8.4 percent of the existing coffee holdings with HYV seedlings by the end of the intervention. When the target is 2,000 Ha/year, 17.8 percent of existing holdings can be converted to HYV farms.

A nursery produces 100,000 seedlings each year, which is sufficient for 55.5 (100,000/1,800) Ha of coffee holding cultivated using the traditional method. Given a coverage target of 1,000 Ha each year, the intervention calls for the establishment of 18 nurseries, which collectively employ 69.1 female heads of household and generate an externality of US$403,975 at the nursery level during the 10 years they are in operation.

Table 23. PVs of externality by the number of households covered (12 percent discount rate, 10-year project life)

	Seedlings required per year (millions) (1)	Nurseries required (2)	Female employees (3)	Externality at nurseries (US$) (6)
Per nursery				22,443
Farm households covered per year				
1,000	1.8	18.0	69.1	403,975
1,500	2.7	27.0	103.7	605,962
2,000	3.6	36.0	138.3	807,949

As emphasized in Part I, converting farmers' coffee production from the local varieties to the improved HYVs generates net economic benefit along the value chain. The participants in the value chain that are affected by this conversion include the coffee farmers, the laborers (casual farm and processing-station laborers and truck operators), and the government. According to Part I of the analysis, a household that cultivates HYVs using traditional methods generates a total incremental economic benefit of US$8,088 over a 20-year period. Results for this part of the analysis are summarized in table 24. A coffee farmer with 1 Ha of coffee holding earns an incremental financial benefit of US$6,079. Laborers (temporary workers in farmsteads and processing stations and truck operators) earn an incremental income of US$342 on a per-farm basis. Traders collectively make incremental pretax profits of US$1,020. Lastly, the government collects an additional US$647 in taxes.

Table 24. Per-farm financial NPV and economic NPV of HYV coffee cultivation (12 percent discount rate, 20-year project life)

	Downstream stakeholders				Economy (5)
	Coffee farmers (1)	Laborers (2)	Traders (3)	Govt. (4)	
Traditional practices: HYV (1)	6,079	342	1,020	647	8,088

Note that the values in table 24 are discounted to the year that the seedlings are planted. The nursery produces seedlings throughout the project life, and each year a different group of farmers will acquire HYV seedlings for planting. Some may acquire the seedlings in the first year, while others must wait until the 10th year. Therefore, the benefits of this intervention are realized as a continuous stream for 10 years. This stream of benefit needs to be discounted again from the last 10 years to the first year when the nursery begins operation.

Table 25 computes the incremental financial NPV and economic NPV of HYV coffee cultivation for different coverage levels. The top panel presents the incremental financial benefit for coffee farmers. If the coverage target is 1,000 Ha/year, the farmers who receive the seedlings will collectively earn an incremental benefit of US$6 million in present value. This continues for 10 years, and the total discounted benefit for 10,000 farmers amounts to US$38.5 million. These seemingly exaggerated financial NPVs are reasonable, considering that the average discounted incremental income per farmer is US$3,846, which spans 20 years (from the first year when the farmer receives the seedlings to the 20th year when the trees are stumped). When downstream externalities are considered, the total economic NPV generated is US$51.2 million. For the coverage target of 1,500 and 2,000 Ha/year, the economic NPVs are US$76.8 and US$102.4 million, respectively.

Having presented the financial and economic impacts of HYV coffee cultivation at downstream of the value chain, beginning from the farmstead level (table 24), as well as the financial and economic impacts of the nurseries (table 22), the findings can be synthesized to estimate the overall impacts of the production and marketing of HVY seedlings intervention as a whole.

Table 25. Financial NPV and economic NPV of HYV coffee cultivation by coverage target (12 percent discount rate, 10-year project life)

		Year 1	Year 2	…	Year 9	Year 10
Financials for HYV cultivation						
Financial NPV of HYV cultivation per Ha*		6,079	6,079	…	6,079	6,079
Total financial NPV by coverage target (Ha/year)	Financial NPV**					
1,000	38,468,823	6,078,904	6,078,904	…	6,078,904	6,078,904
1,500	57,703,234	9,118,356	9,118,356	…	9,118,356	9,118,356
2,000	76,937,645	12,157,808	12,157,808	…	12,157,808	12,157,808
Economics of HYV cultivation						
Econmic NPV of HYV cultivation per Ha*		8,088	8,088	…	8,088	8,08
Total economic NPV by coverage target (Ha/year)	Economic NPV**					
1,000	51,185,110	8,088,352	8,088,352	…	8,088,352	8,088,352
1,500	76,777,665	12,132,528	12,132,528	…	12,132,528	12,132,528
2,000	102,370,220	16,176,703	16,176,703	…	16,176,703	16,176,703

* Discounted to the year of planting, when seedlings are acquired from nurseries.
** Discounted to the first year.

For the coverage target of 1,000 Ha/year, the intervention generates a nationwide economic NPV of US$38.7 million, which includes the net economic benefits arising from a total of 10,000 farmers' converting to HYVs at a rate of 1,000 seedings/year over 10 years, plus the net economic benefits of operating 18 nurseries for the entire 10 years. The amount increases to US$58.1 million and US$77.5 million, respectively, for coverage targets of 1,500 and 2,000 Ha/year (see table 26, column 5).

At the time this research was conducted, the budget allocated to this particular intervention had not yet been specified. It is hoped that this analysis can assist in determining the optimal coverage target range given the available budget.

Table 26. Financial NPV and economic NPV of the production and marketing of HVY seedlings by coverage target
(12 percent discount rate, 10-year project life)

	Seedlings required (millions) (1)	Nurseries required (2)	Nurseries (3)	HYV cultivation (4)	Total (5) = (3) + (4)
Financials of the intervention by coverage target (Ha/year)					
1,000	1.80	18.0	261,740	38,468,823	38,730,563
1,500	2.70	27.0	392,611	57,703,234	58,095,845
2,000	3.60	36.0	523,481	76,937,645	77,461,126
Economics of the intervention by coverage target (Ha/year)					
1,000	1.80	18.00	403,975	51,185,110	51,589,085
1,500	2.70	27.00	605,962	76,777,665	77,383,627
2,000	3.60	36.00	807,949	102,370,220	103,178,169

The differences between the economic and financial figures are the externalities that accrue to the female laborers at nurseries, the downstream laborers, the traders, and the government. These value chain participants benefit indirectly from the HYV seedling production and marketing intervention, which is intended to improve the incomes of smallholder coffee farmers.

Table 27 presents the results of the stakeholder analysis for this intervention. Coffee farmers benefit from two sources: HYV coffee cultivation and nursery dividends distribution. For a coverage target of 1,000 Ha/year, 100,000 farmers collectively receive an incremental profit of US$38.7 million (see table 27, columns 1 and 2). To meet the coverage target, the intervention calls for the establishment of 18 nurseries. The 69 female employees earn an incremental labor income of US$58,000 (see table 27, column 3). Increased coffee productivity generates more business for traders and boosts demand for truck operators and laborers at farmsteads and processing stations. Laborers earn an incremental surplus of US$2.2 million (see table 27, column 4). Traders' incremental earning is US$6.5 million (see table 27, column 5). Lastly, the government collects direct and indirect taxes from taxable entities throughout the coffee value chain, and these incremental tax revenues amount to US$4.2 million (see table 27, column 6).

Table 27. Stakeholder analysis of the production and marketing of HYV seedlings by coverage target (12 percent discount rate, 10-year project life)

Coverage target (Ha/year)	Stakeholders (thousands US$)						ENPV (millions US$) (7)
	Coffee farmers		Nursery female employees (3)	Farm laborers (4)	Traders (5)	Govt. (6)	
	Nurseries (1)	Coffee cultivation (2)					
1,000	262	38,469	58	2,162	6,458	4,181	51.6
1,500	393	57,703	88	3,242	9,686	6,271	77.4
2,000	523	76,938	117	4,323	12,915	8,362	103.2

Conclusions and Recommendations

The main conclusion of this analysis is that converting the traditional varieties of coffee grown in Ethiopia to HYVs is entirely justified financially as well as economically. In addition, at the present level of prices for seedlings, it is financially rewarding to produce seedlings in nurseries that each has an annual production capacity of 100,000 seedlings.

One of the most important issues investigated in this analysis is the question of why this process is moving so slowly in Ethiopia. A partial answer to this question is found in the financial analysis of the model farm program. The cash-flow barrier of reducing the amount of intercropping during the first 3 years before coffee sales begin – a main feature of the model farm approach – is likely a major factor, because the government will not issue the HYV seedlings to farmers unless they commit to adopting the model farm design.

From this analysis, it appears that the best return to USAID investment in this area is a broad-based approach to marketing HYV seeds, which informs farmers about estimated input-to-yield responses under various farming technologies. However, the farmers should not be required to use any single farm model. Similar instances of comparative economies of HYV tree crops in other countries (e.g., coffee, cocoa, rubber, oil palm, and coconut) indicate that two to four times as many farmers can be reached (and more successfully) with a given investment budget than when the intervention is only promoting the adoption of highest-yielding, highest-input scenarios with additional restrictions' being imposed.

Voluntary certification of planting material enterprises producing genuine HYVs should be promoted. Informing end users of the difference between certified and noncertified HYV sellers encourages better performance through market competition. Mandatory licensing schemes invite corruption, as the inefficient producers seek to subvert the coercive system to stay in business.

INTERVENTION 2 — IMPROVING COFFEE TRACEABILTIY

Contextual Background of the Intervention

Centuries of coffee farming and selective cultivation have endowed Ethiopia with many varieties of coffee, a number that is hardly paralleled by other coffee-producing countries. Grown in different areas that vary greatly in elevation and climate, many varieties have developed a distinct body and flavor, offering the potential to be marketed as speciality coffee. However, despite its reputation, Ethiopian coffee in general fetches relatively low prices in comparison to coffee of similar quality produced by other Eastern African countries, such as Rwanda or Kenya.

The low prices are attributable partly to inconsistency in the quality of coffee and partly to the lack of traceability of export coffee. The former arises largely because of improper cultivation or postharvest handling practices at the level of farmsteads or processing stations. The latter occurs because of lost information concerning the provenance, identity, and other characteristics of coffee as the commodity is aggregated and changes hands along the value chain, resulting in a less differentiable product in the export market.

Although the AGP-AMDe project proposal contains a plan to help farmers overcome the quality inconsistency by means of training, that specific class of interventions is not analyzed in this study, because the benefits are not quantifiable with reasonable precision and the interventions' success is contingent on a host of exogenous factors. Instead, this study focuses on an intervention that is oriented toward enhancing coffee traceability. During the study team's field visit to Jimma, it was evident that farmers are well informed of the coffee prices at Addis Ababa. Therefore, if the intervention succeeds, the concomitant increase in coffee prices is likely to be transmitted up the value chain to benefit smallholder farmers. Before analyzing the proposed intervention, it is helpful to identify the key weaknesses of the existing export regime as observed by the study team, to put matters into perspective.

Weaknesses of the Current Export Regime

Currently, green coffee beans can be legally exported through two channels. Coffee producers, including smallholder farmers or their representatives (farmer cooperatives and cooperative unions) and commercial or state plantations, are given the option to export directly. However, cooperatives may not have sufficient working capital to purchase enough coffee cherries from farmers for processing and exporting.[3] Acquiring an export license and the compliance cost can also be prohibitively expensive. Most importantly, it is difficult to find international buyers. As a consequence, direct export by coffee producers accounts for a relatively small fraction of total coffee exports.

The Ethiopian Commodity Exchange (ECX) thus provides the second and the primary channel for coffee export. Established in 2008, the ECX provides a trading floor for volume sellers and buyers of green coffee beans. In fact, the ECX is the sole legal trading platform for coffee traders who do not produce their own coffee, because it is stipulated that all coffee beans must pass through the ECX for grading, certification, and trading. Coffees of grades 1 to 9 are branded "export coffee" at the ECX, and those of grades above 9 are destined for domestic consumption.[4] Exporters are only licensed to export and are

[3] To combat this issue, Component 2 of the AMDe interventions provides corporate finance training to cooperative executives in the hope that familiarity with preparing business models and proposals would improve the chance of securing loans from commercial banks.

[4] A slight complication in the system is that another government agency, the Coffee Liquoring Unit (CLU), is charged with the responsibility of monitoring the quality of export coffee. The CLU has a similar grading scheme as the ECX, and only coffees deemed to be grade 5 or below by

therefore forbidden to sell coffee designated for export in domestic markets; likewise, traders who are licensed to supply the domestic consumption market are forbidden to sell their coffee abroad. Coffee producers may bypass the ECX system and sell directly to foreign buyers, but these direct exports are infrequent for the reasons aforementioned.

Coffee traders at the zonal level are obligated by law to transport coffee beans to a regional ECX warehouse, where the shipment are sampled and cupped. The ECX cupping staff members assign the coffee beans a grade based on the number of defective beans in a sample and the cupping characteristics of the brewed coffee. The coffee beans are then stored in bulk in ECX warehouses according to grades and broad categories of zonal origins. The owner may then offer the shipment for sale on the ECX headquarters' trading floor at Addis Ababa.

Information Clouding in ECX Coffee Contracts

The ECX coffee contract only informs potential buyers of the shipment's grade and a broad zonal label, which is shared by many *woredas* in the same zone. Vague as it may be, the latter gives the only clue about the shipment's precise spatial origin. Furthermore, the sellers' identities are hidden in the contract.
If two coffees produced in nearby *woredas* happen to receive the same grade, they become indistinguishable once they are shipped to ECX warehouses because both have identical labels.

Traceability has two fundamentally different dimensions in the coffee market: farm-area origin (spatial) and identity of the supplier (business). Both aspects contribute to the critical identity preservation (IP) in the open market and for certified coffees, such as organic and fair trade. The current arrangement (broad zonal label and hidden sellers' identities) in effect reduces coffee to the status of bulk commodities and makes no more economic sense than bulk trading of different wine *terroir* in France (e.g., only identifying Bordeaux or Burgundy origins). The arragment reduces accountability for quality and does not adequately accommodate the increasing global market demand for more traceability. At present, much of the information concerning provenance is concealed; there is a clear need for more market information regarding spatial and business traceability and for building the information and management capacity required to do so at the ECX. Whether the ECX has the will and sufficient capitalization to improve traceability for adequate identity preservation is unclear.

First-In-First-Out Warehouse Storage and Bulking

Other aspects of ECX operations further obscure coffee's identity. If a deal is made, the buyer receives a coffee shipment of the agreed-upon grade and quantity within a couple of days. However, the shipment is most certainly not the one originally bid for on the trading floor, because ECX warehouses operate a first-in-first-out delivery system: The coffee that is stored the earliest will be delivered first to the next immediate buyer of that particular coffee grade. Ethiopia's unique position in the world coffee market as a source of abundant, inherently fine coffee is not supported by a domestic trading regime that bulks its coffee rather than maintaining differentiation according to spatial and seller origin. This erosion of traceability runs counter to the global demand trend for adequate information regarding coffee origin. The lack of identity preservation results in lost opportunities for price premia and encourages price discounts to the detriment of all coffee value chain participants, including millions of smallholder farmers and the government that collects foreign exchange fees from exports.

CLU cuppers can be exported. In effect, exporters who purchase coffees of grade 6 to 9 at the ECX must screen and reprocess the purchased coffee to bring it to below-grade-5 standards.

Specification Mismatch at Delivery

During separate meetings with the Ethiopian Coffee Exporters Association and the Ethiopian Coffee Producers and Exporters Association, participating members mentioned incidences in which the coffee shipment actually received was of lower grade than that bought. This may result because of quality deterioration while in storage or because ECX coffee contracts indicate only broad grade classes instead of including the actual number of defects for the batch of coffee being purchased. The latter is likely to encourage sellers to bring the shipment close to the upper limits of defects allowable for any coffee grade. For instance, given a grade 3 defect range of 9 to 23 beans, it makes no difference to sellers whether the shipment contains 10 or 22 defects. This heightens the risk for buyers that a slight deterioration of quality in shipment might result in a lower grade of coffee, resulting in automatic discounts. Exporters are more likely to “ship close to specs” if they in turn have faced uncertainty when purchasing from the ECX because of the mismatch between the grade they thought they purchased and the actual grade delivered to them.

Banning the Export of Tradable Coffee

Finally, significant export revenue may be lost through the prohibition of exports of coffee above grade 5, for which there is a ready world market. To increase exportable volume, exporters may blend lower grades into grade 5 coffee, which lowers the coffee’s value, encourages the shipping of coffee too close to specification limits, and thus increases the risk of a mismatch between the documented export shipment and the quality of coffee actually received by the buyer because of even a minor deterioration in transit. Other major coffee-exporting countries that allow the export of lower grades earn additional revenue and do not necessarily experience a reduction in their export image, so long as lower-grade export shipments are labeled as such. Under a more efficient system, the ECX might expand its role without the current requirement that all coffee not exported by cooperatives and growers themselves be traded through the ECX. Note that major coffee-producing countries with less restrictive trading regimes are nonetheless able to earn global reputations for exporting high-quality coffee.

To summarize, ingrained in the ECX system is the objective to conceal the coffee quality and sellers’ identity from volume buyers. Although the system forestalls collusions, it prevents information flow and imposes unnecessary risks for buyers. As the proposed AGP-AMDe work plan correctly points out, a lack of buyer confidence in the coffee quality and export-grade certificates (the mismatch between the specifications and the characteristics of the actual coffee shipment) result in international discounts for Ethiopian coffee.

Interventions Description

Many interventions are designed to enhance coffee traceability. In terms of work-plan classification, these interventions fall under Activities 1.1 to 1.4 and Activities 3.1 to 3.9 of Intervention I, Component 1, in the work plan (see table 2). To give a few concrete examples, the interventions include hiring local and expat coffee experts to conduct regional coffee-quality profiling, providing Q cupping skills to ECX cuppers, hiring local and expat consultants to select 50 washed coffee samples for cupping competition, organizing coffee cupping trips to coffee-producing areas for female entrepreneurs, and facilitating or sponsoring workshops or conferences to promote Ethiopian coffee marketing.

Analysis Findings

One set of these measures, such as cupping competitions and organized cupping trips, works around the ECX system and relies on direct export. To a certain extent, the objective of enhancing traceability is achieved by linking a handful of coffee producers to exporters and by raising buyers' awareness and coffee publicity. Either approach can facilitate the flow of information between buyers and sellers. However, the impact of these measures on the overall traceability of Ethiopian coffee is expected to be limited, because their goal is to promote *individual* coffees.

The other set of measures, such as regional coffee profiling and Q cupping training, work within the ECX system. The strategy embodied in these measures is a refinement of the current cupping standards. In light of the previous section's discussion, the study team believes that many of the related interventions will be ineffectual in enhancing coffee traceability. AGP-AMDe interventions to improve coffee traceability will continue to fail so long as the fundamental problem is misunderstood as one of grading precision rather than its present leading causes, namely, the information-clouding design of ECX coffee contracts and the heightened risk of a mismatch between documented specifications of the coffee grade purchased and what buyers actually receive. No amount of increased grading refinement will help as long as this situation persists. AGP-AMDe interventions for quality and traceability tend to be solutions in search of problems that miss resolving the main structural constraints, particularly regulatory interference in information flows regarding the spatial and business origins of Ethiopian coffee.

Coffee is more like wine than staple commodities, such as wheat and maize, and therefore, to enjoy market-price premiums, it should as far as possible be traced to spatial origin (*terroir*) and specified businesses rather than bulked. Admittedly, ECX coffee contracts recognize some 250 different grades according to the processing methods (natural or washed beans), zonal origins, grades, and allowable destinations (export or domestically consumed coffees). But many more coffee grades of actual and potential interest to international buyers are not currently accommodated by the ECX system. Currently, it is unable to adequately track individual consignments of coffee to ensure that the graded coffee batch is the same batch actually delivered to the purchaser. A further refinement of cupping standards may improve the ECX cupper's ability to discern the subtleties of coffees, but this is irrelevant, because all distinctions are eliminated at the warehouses and relevant information is hidden from the potential buyers on the trading floor.

Lastly, it is unclear whether the increase in export coffee prices, if it ever occurs, transfers to smallholder farmers. During field visits, it was evident that coffee farmers are well-informed about coffee prices. However, given that coffee from nearby *woredas* is given the same zonal label and that sellers' identities are hidden in the coffee contracts, smallholder farmers cannot tell whether the *chaanyiis* whom they supply receive a higher price as a result of the intervention. On the other hand, if the seller's identity is revealed, then farmers can review the records of the trader's average historical margins and thus raise their bargaining power.

Given these circumstances, it is felt that the proposed interventions in the current work plan are largely ineffectual and their impact on smallholder farmers' income is minimal. Column 2 of table 22 reports the financial NPV for a coffee-cultivating household with 1 Ha of farming, practicing traditional farming. Column 1 of table 5 shows that traditional cultivation methods using local seed varieties yield a financial NPV of US$5,857. Overall, the various measures may increase the price for cherries by 0 percent to a maximum of 6 percent, but it is unlikely that the prices could realistically be increased by more than 6 percent. The incremental benefit is insubstantial. Even with a 6 percent increase in coffee prices, the household earns an incremental financial NPV of US$415 over a 20-year period. At a 12 percent discount rate, this is equivalent to an annuity of US$50/year. Alternatively, if the supplier of the product is clearly identified, the potential price premiums are likely multiples of the results shown in table 28.

Table 28. Incremental financial NPV per household with 1 Ha of coffee holding from increased traceability interventions (12 percent discount rate, 20-year project life)

Percentage change in coffee price	Cherry price (ETB/kg) (1)	FNPV per coffee farmer (US$) (2)	Incremental benefit (US$) (3)
0%	**14.00**	**5,857**	**0**
0%	14.00	5,857	0
1%	14.14	5,927	69
2%	14.28	5,996	138
3%	14.42	6,065	208
4%	14.56	6,134	277
5%	14.70	6,204	346
6%	14.84	6,273	415

Conclusions and Recommendations

In sum, the Ethiopia coffee export-quality problem is not low-grade coffee, *per se*, but uncertain quality. This problem is exacerbated by the loss of spatial and business traceability at the ECX. The ECX has improved its performance over the 3 years it has been operating, but its approach to traceability is out of step with the way that global coffee markets are moving.

The interventions proposed in the AGP-AMDe work plan have as their objective improved traceability of the coffee sold at the ECX, but they are likely to be ineffective. Any additional information regarding the improvement in the quality of coffee produced by a particular group of farmers is likely to be lost. The grading and storage systems of the ECX are not designed to provide a fine-enough quality and source classification to allow prospective buyers the opportunity to offer quality premium prices due to the uncertainty concerning the quality of shipment and the lack of knowledge of the sellers and their reputations.

During an interview, ECX officials mentioned plans to trade sesames, chickpeas, and other commodities. Currently, the regional ECX facilities are already undercapitalized. Without a corresponding increase in infrastructure investment, this planned ECX expansion will only further constrain its capacity to manage the coffee trade. Also, the idea of storing coffee in silos rather than bags could further exacerbate the loss of identity preservation and increase the risk of spoilage, thus adding to the likelihood of price discounts. Both measures should be discouraged. Instead, management policies with respect to the bulking and first-in-first-out sales and delivery of coffee should be rethought to allow for the traceability of the coffee supply by prospective buyers. The ECX should consider allowing sellers’ identities to be revealed in ECX contracts on an optional basis. Shipments should also be stored separately to preserve the coffee’s complete (spatial and business) identity, for an extra storage or handling cost or an ECX commission fee. Sellers and buyers who find it advantageous to do so will subscribe to these services, because they not only allow the sellers to earn a premium on high-quality coffee but also help overcome information asymmetry between smallholder farmers and traders. The latter acquires more bargaining power and thus earns higher income from their coffee.

APPENDIX 1 — GENERAL RECOMMENDATIONS ON THE COFFEE VALUE CHAIN

During the field visit, the study team engaged in discussions with many stakeholders in formal and informal settings about the situation of the coffee sector in Ethiopian. Recognizing that emotions can run high whenever any changes to Ethiopia's coffee production and trading system are discussed, especially if suggestions indicate that policy adjustments—let alone reforms—be required, the study team submits as an appendix the following suggestions for institutional support from USAID to encourage informed discourse regarding how best to enhance coffee traceability at ECX.

.

(1) **Stakeholder Collaboration and Coordination**

a. Encourage the establishment of a coffee agency under the prime minister modeled on the National Export Coordination Committee.

b. Support the establishment of an inclusive sustainable multistakeholder forum (MSF) for coffee value chain network players, including foreign buyers and coffee research institutes as well as donors. Useful lessons can be learned from a previous USAID agribusiness project, ATEP, which supported multistakeholder dialogue on the trade in skins and leather.

(2) **Active Engagement with Key Coffee Industry Stakeholders**

a. Inform large farmers about out-grower scheme modalities.

b. Establish an efficient and effective complaints arbitration system for ECX and coffee-exporter transactions.

c. Inform various associations about institutional strengthening, especially arguably the weakest and yet the most significant, the Coffee Traders Association.

d. Farmer associations with wider remits than cooperatives for coffee farming information.

(3) **Midterm Independent *Ex-post* Evaluation of AGP-AMDe**

a. Leave enough time for "course correction," including potential support for (1) and (2), above.

b. Draw on lessons learned from other present and past coffee-support projects in Ethiopia.

c. Conduct share-learning exercises with stakeholders.

d. Obtain insights for designers of follow-up USAID projects.

e. Explore ideas for the politically feasible development of greater enabling policy and institutional conditions for the sustainable growth of Ethiopia's coffee industry.

Particular attention should be paid to counterfactual locations—that is, those agro-ecologically and economically comparable areas that are not directly reached by AGP-AMDe interventions.

(4) **Analysis of the Transformative Removal of Coffee-Marketing Restrictions**

Examine with the Agricultural Transformation Agency (ATA) the social and economic pros and cons of

- allowing exporters to buy from traders and farmers;
- permitting the export of any marketable coffee grade;
- removing interregional restrictions on coffee trade; and
- Letting exportable-grade coffee be consumed domestically.

REFERENCES

ACDI-VOCA (2012a). *AGP-AMDe Project Work Plan*.

ACDI-VOCA (2012b). *AGP-AMDe Coffee Value Chain Intervention Woredas and FCU.*

ACDI-VOCA (2012c). *Farm Budget Data.*

ACDI-VOCA (2012d). *Coffee, Internal Data Marketing.*

ACDI-VOCA (2012e). *Nursery Budget Data.*

CSA (2007). *2007 Household Income, Consumption, and Expenditure Survey*.

Kuo, G. (2011). *Estimates of the Foreign Exchange Premium and the Premium for Non-Tradable Outlays for Countries in Africa.*

Bureau of Revenues, the National Regional Government of Oromiya. *Agricultural Tax.*

Ethiopian Chamber of Commerce. (2005). *Taxation in Ethiopia*.