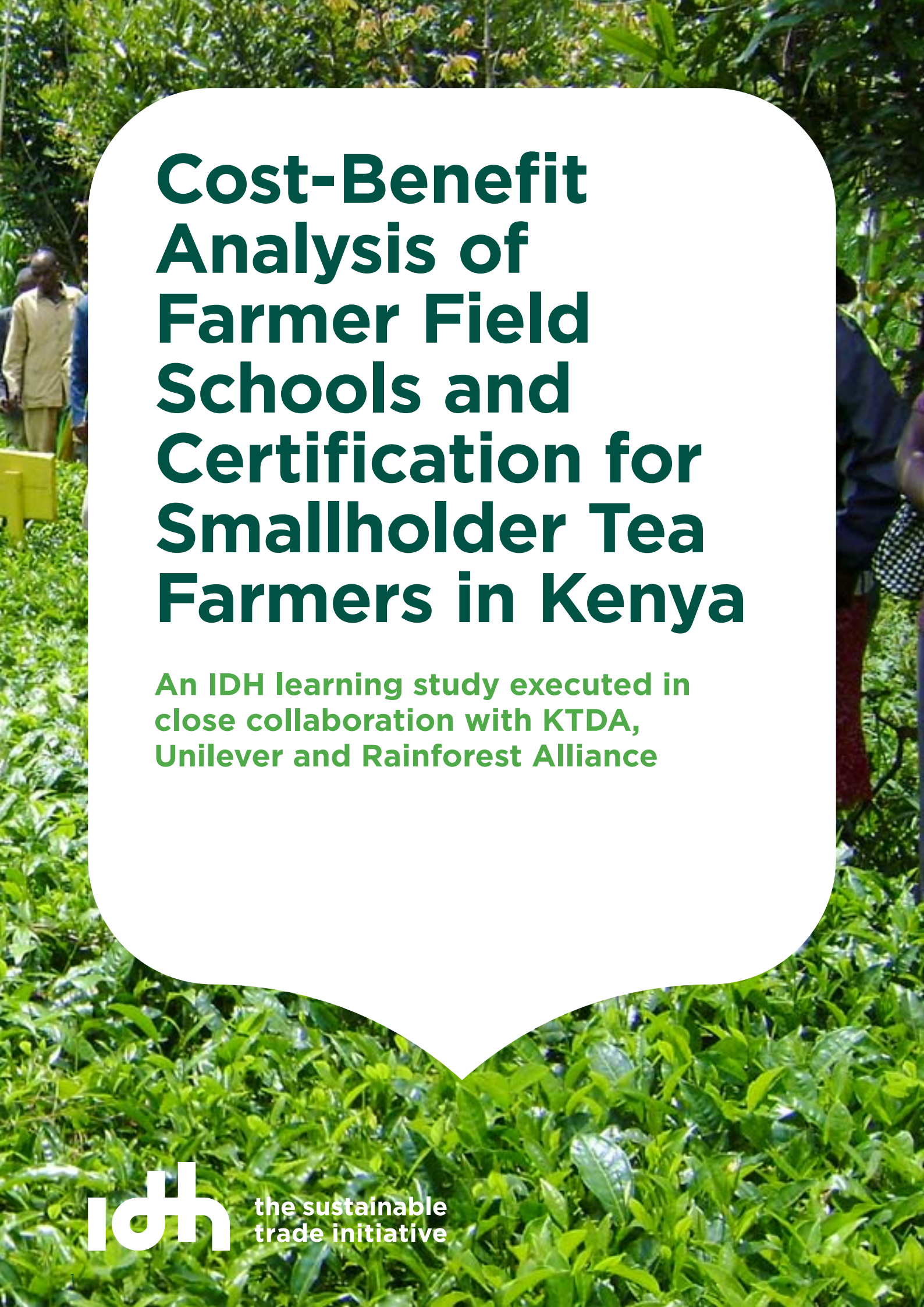


Cost-Benefit Analysis of Farmer Field Schools and Certification for Smallholder Tea Farmers in Kenya

An IDH learning study executed in close collaboration with KTDA, Unilever and Rainforest Alliance

the sustainable trade initiative

Contents

Preface

In contrast to the coffee and cocoa sectors, there have been no global governance initiatives such as multi-stakeholder round tables to improve the social, environmental and economic conditions of tea producers worldwide. Historically, the tea market has shown a persistent state of oversupply, which has kept a downward pressure on prices. Resulting low margins and under-investment have tended to jeopardize productivity and quality, and have acted as a barrier to the improvement of the working conditions and livelihoods of growers, creating a downward spiral that makes it hard for the sector to act in a more sustainable manner. An estimated eight million small-scale tea producers in Africa and Asia are working with outdated production methods, often in poor working conditions. Not only do these methods harm the environment, also they result in low yields and poor quality product. However, in western and Asian markets, there is a growing consumer demand for sustainable tea.

To address the most prominent sustainability issues in the tea sector IDH – The Sustainable Trade Initiative brought together a Public Private Partnership and, together with its partners, it started the Tea Improvement Program (TIP) in 2009. The program's main target was to roll-out sustainability certification schemes from estates to smallholders, building on ambitious commitments made by companies such as Unilever, DE Master Blenders 1753 and Twinings. TIP will end in 2013. IDH is developing a new Tea Program, which will run until 2015 with a focus upon the aim of achieving a tipping point to market transformation through up-scaling and embedding sustainable tea production.

This study focuses upon one of the most innovative projects under TIP, the KTDA Sustainable Agriculture Program. Key project partners are KTDA, Unilever, Rainforest Alliance and IDH. The main components of the project are Farmer Field Schools and Rainforest Alliance (RA) certification. By December 2012, 54 processing plants had achieved RA certification and 11 processing plants were in stages of preparation for certification. In addition, 798 Farmer Field Schools (FFS) have been formed, with schools in all 65 factory catchments. The supplier-buyer relationship between KTDA and Unilever has been key to this success with Unilever's buying commitment providing a clear incentive for factories and farmers to get involved.

Farmers have additionally been eager to participate because they could both define the FFS curriculum themselves and also capture the benefits from training (yields & diversification). Certification on its own did not lead to the most significant results. However, the combination of both certification and Farmer Field Schools delivered the highest impact. Key success factors in these circumstances are local ownership and embedding of new sustainable production practice.

This study was undertaken to provide the project partners with insights into the costs and benefits of up-scaling certification and FFS extension structures, with the wider objective of supporting the integration and expansion of sustainable processes in tea production. This represents the first in a series of IDH publications on the costs and benefits and business case analysis of sustainable tea production. Similar analyses will be conducted in Indonesia and India where IDH and its partners are designing and implementing programs for domestic voluntary standards.
This study was only made possible through the help and support of a large group of people within each participating organization. Specific reference to each one is made in the acknowledgements at the end of this document.

3

Executive Summary

IDH – The Sustainable Trade Initiative aims to improve the sustainability of international supply chains. To this end, IDH works towards tackling social, ecological and economical bottlenecks for first chain actors in developing countries. IDH convenes multi-stakeholder processes in which actors from both northern and southern (production) countries actively participate. The tea sector represents one of IDH's pillar programs.

Since 2009, the IDH tea program has involved multiple stakeholders, including; Unilever, DE Master Blenders 1753 (formerly Sara Lee), Twinings, Rainforest Alliance (RA), UTZ Certified, the Ethical Tea Partnership (ETP), Royal Dutch Coffee and Tea Association (Koninklijke Nederlandse Vereniging voor Koffie en Thee, KNVKT), Oxfam Novib and Solidaridad working together to drive worldwide sustainable tea production and consumption.

One of the projects under the tea program has involved two training models; Rainforest Alliance certification and Farmer Field Schools (FFS). These models are intended to enhance the sustainability of tea production by farmers connected to the Kenya Tea Development Agency (KTDA) through integration into KTDA's Sustainable Agriculture Program.

The partnership of IDH with KTDA and Unilever started in 2009, as an up-scaling of the pilot project (2006-2008). In less than 3 years more than 360,000 farmers have been trained for Rainforest Alliance certification through a train-the-trainer approach. KTDA, Unilever and IDH have therefore translated the prototypes into scalable models for capacity building and compliance with intended impact on MDG1 (poverty eradication) and MDG 7 (sustainable environment) and MDG 8 (global partnership).

In this study IDH analyzes the costs and benefits of further up-scaling the project, embedding sustainable production practices into the KTDA business model and assessing whether there is a business case for the project after IDH steps away as a public co-funder.

The study therefore serves as an input to the strategic design of next phase investment by KTDA, Unilever and IDH, which was agreed upon towards the end of 2012. The main ambitions of this next phase are to: fully embed sustainable agricultural practices in KTDA small scale tea production by having the management of certification programs institutionalized in KTDA; enhance KTDA's capacity to roll out the technical assistance program towards smallholder producers and factories and drive solid social issues work at both factory and farmer levels. As a result, it is intended that the Rainforest Alliance certification process will be fully integrated with Farmer Field School training to maximize sustainable impact. The cost benefit analysis is instrumental to achieving this overall goal as designed to determine how certification and farmer field schools should be integrated into KTDA's business model.

The cost-benefit analysis has produced the following conclusions:

- There is a business case for up-scaling RA certification to include all 65 factories and 560,000 smallholder farmers and also for the extension of the FFS program to cover KTDA's 3,700 green leaf buying centers.
- Rainforest Alliance certification has significantly increased the appetite of the Kenyan private sector (KTDA and its farmers) for co-investment to enhance the sustainability of its tea production. Private sector investments have by far exceeded the public co-funding budgets. On-farm investments represent up to 83% of the total conversion and 63% of the compliance costs for RA certification.
- There has been market recognition for sustainable certified tea via market uptake and a sustainability fee (price premium), although the actual premium reward has remained modest compared to the overall investment costs required. In 2012 the sustainability fee amounted to US$ 889,350. Currently this premium would only roughly cover audit costs.
- Yield improvements as a result of the training in good agricultural practices brought by the FFS have been the main value driver, covering upfront and recurring investment costs. A significant yield improvement of up to 36% provides farmers with a positive return on investment within a timeframe of 12 to 36 months, depending on the yield improvement scenario (36%; 18%; 9% improvement).

- FFS has appeared to be a relatively low-cost methodology for knowledge dissemination and capacity building, costing on average US$ 67 per farmer per 12-month cycle. The costs of RA training per farmer amounted to US$ 38 per farmer. In both cases cost per farmer is expected to come down due to scaling effects. FFS has contributed to the diversification of farming household economies into activities like dairy production, animal husbandry, horticulture and beekeeping. This diversification of the household economies is likely to become increasingly important as income from tea is relatively low.
  This research presents a population analysis which shows that the income from tea only[1], expressed in the equivalent of an urban minimum wage, would leave 56% of the KTDA farmers below this reference. Although it should be emphasized that the total household income is much more than the income from tea, this comparison reflects a number of important conclusions: a) diversification of the household economy is especially important for the smaller tea farms; b) the category of smaller farmers might consider shifting to other crops if higher yielding alternatives arise; and c) those smaller tea farmers might face serious challenges if new investments in their tea plantations are required e.g with regards to infilling, rejuvenation of the crop and compliance with new standards.
- The current costs of mobilizing extra external expertise for FFS training are about 10% of the total costs of FFS. This external expertise relates to non-tea agricultural activities for which KTDA could seek alignment with other government or donor programs.

The projections made by this study are sensitive to a number of elements that are outside the scope of control of the farmers, including climate (temperatures, precipitation), exchange rates and market price fluctuations (e.g. in 2012 market prices for tea increased from average $2.6 per kg in January 2012 to more than $3 per kg in December 2012[2]). Two types of sensitivity analyses have been conducted: a) against exchange rate fluctuations and b) a population analysis assessing the consequences for the required investments for the various farmer typologies (small versus bigger tea farmers). The conclusions of the sensitivity analyses are as follows:

- If Rainforest Alliance certification costs are evenly distributed among the 560,000 farmers of KTDA a significant number of farmers would see their income from tea[3] production being reduced to less than the daily minimum wage.
- One of the strongest assumptions in the study is a stable USD/KES exchange rate (at 85 KES per USD). Exchange rate history shows that, during the last 5 years, the rate was highly volatile, with a minimum of 61.25 KES per USD and maximum of 106.45 KES per USD. At an exchange rate of 61.25 and an average yield improvement of 18% a positive net cash flow would be achieved after 18 months, while at an exchange rate of 106.45 and an average yield improvement of 18% this period would be less than 5 months.

1 In most cases the tea crop is only one of the crops grown by small farmers. Maize, beans, potatoes, brassicas, dairy, fish, honey etc. can also be a source of additional income and at the very least provide nourishment for the whole family.

2 See http://www.atbltd.com/Docs/averageprices and the Annual Bulletin of Statistics 2012, International Tea Committee

3 This excludes household income from possibly other sources than tea.

1 Introduction

In the period from 2006 to 2008 the Kenya Tea Development Agency (KTDA), together with Unilever and with funding support from The UK Government's Department for International Development (DFID) started exploring ways to enhance the sustainable performance of tea farmers supplying leaf to KTDA. Two training models were tested: training for Rainforest Alliance (RA) certification and; Farmer Field Schools (FFS). Due to success of this initial pilot, KTDA and Unilever were keen to up scale the initiative as part of the Sustainable Agriculture Program of KTDA. IDH – The Sustainable Trade Initiative was now found as partner to co-fund the project and connect the project to the worldwide tea sustainability consortium. The new phase started in 2010 and has delivered training to more than 360,000 farmers. KTDA and IDH have translated the pilot approaches developed in the initial phases of the project into scalable models for capacity building and compliance. It is intended that these models will have impact upon on the following Millennium Development Goals (MDG): MDG1 (poverty eradication), MDG 7 (sustainable environment) and MDG 8 (global partnership). In this study IDH analyzes the cost and benefits of further up-scaling the project, assessing the business case for such investment and the potential future sustainability of the project after the involvement of IDH.

1.1 Focus and purpose of the analysis

This analysis examines the likely costs and benefits, which might follow the up-scaling of Rainforest Alliance certification to 100% coverage of KTDA's smallholders and an expansion of the Farmer Field School program from 583 to 3700 schools – to directly involve 117,000 smallholders[4].

These ambitions are designed to fully convert tea production within KTDA into sustainable practice and to improve the knowledge, income and health of smallholders. In the first phase, from 2010 until 2012, 57 factories (out of 65) were RA certified and 583 FFS were established. The next phase of the KTDA- Unilever – IDH project from 2012-2015 assumes several actions, including RA certification of the remaining 8 tea factories and establishing an additional 3,117 FFS over the next three years, fully merging the RA and FFS methodologies. This analysis examines the period from 2013 to 2017 and covers the business consequences of the proposed actions for up-scaling and embedding the project.

The analysis is designed to improve the knowledge of the project partners about potential outcomes of up-scaling and also to support subsequent decision making. Furthermore, it will help KTDA and IDH to embed the sustainability program fully into KTDA's business model. The proposed investment into up-scaling of extension services (FFS) and the certification project builds upon a number of opportunities that have surfaced in the context of Kenyan tea:

- During recent years the price of black tea has been relatively high and the exchange rate has been favorable, providing KTDA with an opportunity to invest in Farmer Field Schools and Rainforest Alliance certification.
- Combining FFS and RA methodologies would provide an opportunity to generate additional benefits (synergy effects) through the involvement of graduate farmers in FFS, RA and internal audit training.

4 **At the beginning of 2012 already 583 FFS had been established by KTDA. The model assumes that subsequently 1247, 1247 and 623 FFS need to be established in 2013, 2014 and 2015 of the second phase of the project**

- There is a significant gap between current and potential production yields, allowing scope for significant yield improvement. Farmers graduating from FFS are able to spread their obtained knowledge to their neighbors and, by doing so, indirectly influence the yields of non-FFS farmers. This positive spillover effect has a de-facto increase upon the impact of the capacity building efforts.

While the opportunities are evident, the project partners are also aware of the challenges that this ambitious intervention strategy faces. These can be summarized as follows:

- The project period for up-scaling and embedding sustainability in KTDA smallholder tea production is limited to 3 years (up to December 2015), which may not be sufficient to establish the desired number of FFS.
- The number of graduate farmers might not be sufficient to realize the synergy effect of the merged FFS and RA structure.
- Next to practical challenges to up-scale the training and extension services, it is challenging to fully develop the business model for sustainability in tea in terms of value creation and value capturing, e.g. developing the market uptake for certified tea while the supply of certified tea boosted so fast within the three year period.
- It may be difficult to identify and capture added value created by certification. Some benefits of RA certification (e.g. biodiversity and environment), which cannot currently be captured or monetized for adding to the revenue model.

Although this study has largely been based on primary data collection and modeling, a number of relevant existing studies have also been used as references. Several studies analyzed the benefits of RA certification and FFS based on smallholder surveys and found that both activities bring the farmers benefits which range from health improvements to yield improvements and improved community relationships (e.g. between factories and farmers)[5]. In order to obtain better metrics on the pros and cons of up-scaling investment, the current cost-benefit study has primarily been based on quantitative production, field trial and cost data obtained from KTDA factories and KTDA's head office.

The report is divided in five sections. Section 2 describes the research methodology, the scope of the study and assumptions made. Section 3 presents the business impact of the proposed investments for up-scaling Farmer Field Schools and RA certification. Section 4 presents two types of sensitivity analyses; the exchange rate sensitivity of the model and a population analysis. Section 5 presents overall conclusions and recommendations for future development.

5 For an overview of these studies see the list of references at the end of the report.

2 Methods, Costs, Value Drivers and Assumptions

2.1 Scope and boundary definitions

This cost-benefit analysis is based on historical data from 2006-2012. The projections have a scope of 5 financial years: 2013-2017. The analysis includes the costs of two streams of activities – Rainforest Alliance certification and Farmer Field Schools – within KTDA factories. For this analysis RA Certification costs estimates are calculated as costs encountered at all value chain levels (farmers, KTDA, IDH) when these are strictly associated with RA certification. Opportunity costs were not included into calculations. The cost of items which were associated with certification but were in place before the intervention have not been included. The cost of RA certification is calculated as the cost of certification of one KTDA tea factory. The cost of Farmer Field Schools is calculated as cost spent on establishing and running one FFS for the course of one full cycle (around 12 months). Only the costs strictly associated with establishing and running FFS are included, excluding the opportunity costs of farmers participating in FFS. Estimates of benefits cover potential benefits from the two streams of activities – RA certification and Farmer Field Schools – and relate to the benefits of tea growers within KTDA.

2.2 Financial metrics and other performance criteria

The main financial metric for the study is the break-even point; the moment in time when recurrent costs of both streams of activities, RA certification and FFS, will be equal to the benefits of these activities. This metric is chosen in line with the common objectives of the partners – for a financially sustainable system of FFS and RA certification. Other financial metrics include: the payback period, the average cost per farmer and the average costs per farmer typology (large versus small), total production increase, and yield increase. Based on secondary data, reference is made to other non-financial indicators such as the improved health of farmers and improved relationships between farmers and factory.

2.3 Assumptions

A range of assumptions have formed the design of the cost-benefit model and the scenarios as follows:

- The total number of factories is 65
- The total number of KTDA farmers is 560,000
- The average number of farmers per factory is 8,615[6]
- The average number of buying centers per factory is 60
- The average number of farmers in one FFS is 30
- The average number of lead farmers per factory is 29
- The remaining factories will be RA certified during 2013
- The planned number of FFS will be established during the next 3 years (2013, 2014 and 2015)
- The total investment period is 3 years
- The market for black will remain the same size for the next 5 years
- The average made-tea production of KTDA is 200,000,000 per year (according to KTDA)
- 4 kg of green leaf is needed to produce 1 kg of black tea[7]
- The average market price of black tea is $3 per kg
- The average return to the farmer is 70% of KTDA's revenue
- The main quantifiable benefit of yield increase is assumed to be the result of FFS training, particularly from plucking trials and improved agricultural practices
- The baseline yield of KTDA green leaf production is 1 kg per bush
- The average price of PPE (Personal Protective Equipment) is 2400 KES, equivalent to $ 28.24
- The sustainability fee price premium as a main quantifiable benefit is assumed to arise as a result of RA certification
- The sustainability fee is $ 0.1 per kg of RA certified tea sold through direct sales
- The US dollar/KES exchange rate will remain stable for the next five years at 85 KES per USD.

2.4 Data Sources

The cost of establishing and running one FFS was estimated based on interviews with factory managers, field services coordinators, factory accountants and Tea Extension Service Agents (TESA's, extension workers of KTDA). Four pilot factories were selected for the analysis (Ngere, Mungania, Nyansiongo and Momul)[8]. These four factories were the first to experiment and implement FFS, starting with pilots already in 2008 and therefore able to provide time series data on yield e.g. comparing FFS trained farmers with non-FFS farmers. The cost of certification for one KTDA factory was based on interviews with factory management, factory accountants and TESAs as well as information provided by Rainforest Alliance and interviews with KTDA management.

Yield increase, a financial benefit of FFS, was estimated based on field trial results data provided by KTDA and confirmed by multi-year production statistics obtained from the four pilot factories.

The sustainability fee, a quantifiable financial benefit of RA certification, was estimated based on sales and price information provided by KTDA's marketing department and the Rainforest Alliance representative in the region. For the population analysis, KTDA provided the researchers with a random sample of 25,481 observations from three factories, Ngere, Kanyenyani and Weru after a check on data availability and data quality.

6 **The number of farmers per factory varies greatly. 8,615 is taken as the average number of farmers.**

7 **Although the researchers are aware that conversion rates of 4.4 seem more realistic according to some expert opinions, a conversion rate of 4 has been chosen for the sake of simplicity in combination with a fixed green leaf price of 35 shilling over a multi year period. The slight overestimate on the first is compensated for by an underestimate for the later.**

8 **For general information on the pilot factories see Appendix 7.**

2.5 Scenario Design

The analyzed scenarios include several variations of yield improvement (36%; 18%; and 9%) as yield improvement has appeared to be the key driver of value creation – bringing return on investment for conversion and compliance costs and up-scaling of the FFS extension system.

Costs per farmer for RA certification go down from $38 to $27.

2.6 Data structure

The study is based on incremental time series data, meaning cash inflow and cash outflow from the proposed actions (full scale RA certification – 65 factories and establishing a total of 3700 FFS) by the end of 2017.

2.7 The cost model

The estimated costs for Rainforest Alliance certification and FFS are based on information from the four pilot factories and additional information from KTDA factory management. All data was collected during a field trip to Kenya in August 2012. Detailed information is presented in Tables I and II in the following sections.

Table I. Cost Items of Rainforest Alliance certification of one factory (unit cost US$)

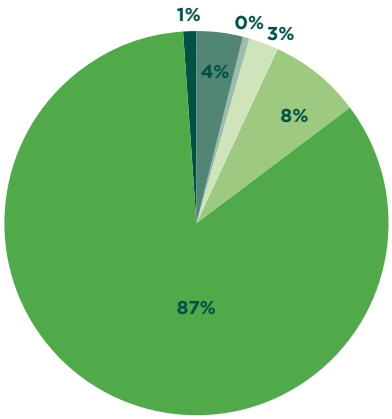
RA	One-time cost	Expected	Recurrent Cost	Expected	Financing
Training RA level	13,329	9,330	-	-	IDH
Training factory level	1,412	1,412	353	353	Factory
Internal audit	8,824	8,824	7,991	7,991	Factory*
External audit	25,853	17,850	25,853	17,850	Factory
Farmer compliance	275,692	196,633	62,842	54,153	Farmers
Factory compliance	2,965	2,965	2,831	2,831	Factory
Total	**328,074**	**237,014**	**99,870**	**83,178**	

One-time costs are the cost needed to certify one factory. Expected costs are the costs of certification with the assumption that some of the cost items will decrease in the future. It is expected that external audit cost will be lower in the future and therefore the assumption is made that these will be 30% lower, as a basis for the calculation. Calculations are based on the exchange rate of 85 KES per USD and average number farmers per factory of 8,615. Farmer compliance costs are calculated based on the assumption that 70% of the farmers needed to purchase PPE; that percentage is assumed to decrease to 50% in future. See Appendix 3 for a detailed overview of the cost items of RA certification.

* paid by IDH in first year of certification.

Figure 1a. Cost of RA Certification of one factory

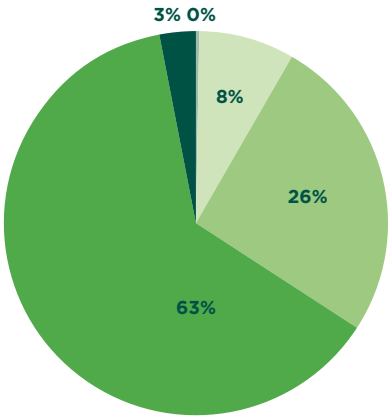
$328,074



- Factory Compliance **1%**
- Training RA level **4%**
- Training factory level **0%**
- Internal Audit **3%**
- External Audit **8%**
- Farmer Compliance **84%**

Figure 1b. Recurrent Cost of RA Certification

$99,870



- Factory Compliance **3%**
- Training RA level **0%**
- Training factory level **0%**
- Internal Audit **8%**
- External Audit **26%**
- Farmer Compliance **63%**

The Distribution shown in the figures is related to current one-time and recurrent costs of RA certification without taking into account future dynamics.

The total one-time cost of Rainforest Alliance certification of one tea factory is $328,074. The recurrent cost of Rainforest Alliance certification of one factory is $99,870 per year. Due to efficiency increases, experience and a decrease in the external audit price[9],the one-time and recurrent costs of certification are expected to go down to the level of $237,190 and $83,426 respectively. Based on these cost estimates, the total financial requirement to certify the 8 remaining factories is $1,898,085, of which $1,573,068 (83%) is expected to be paid by farmers as a compliance cost.

The total recurrent cost of RA certification for 65 KTDA factories is $6,491,554 and is expected to go down to $5,422,716 in the future, with 75% of the cost covered by farmers as a compliance cost. The total recurrent cost of RA certification per farmer is $9.68 per year.

Recurrent farmer compliance costs are $4,084,706, $7.3 per farmer per year based on the assumption that the average number of farmers per KTDA factory is 8,615.

To fully cover the recurrent costs of RA certification the average sales price of KTDA black tea should increase by $0.027 (2.7 USD cents). Figure 1 provides the following information:

- an illustration of cost items included in the one-time cost of RA certification of one KTDA factory;
- an illustration of cost items included in the recurrent cost of RA certification of one KTDA factory.

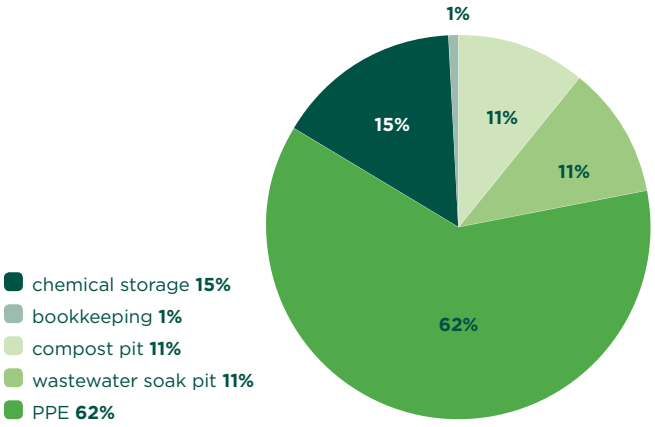
The “farmer compliance cost” covers the most significant part of the one-time and recurrent cost of RA certification, 84% and 63% respectively. The separate components of farmer compliance costs for the one-time cost of RA certification are illustrated in Figure 2.

IDH investments of €1.1 million account for less then 4% of the total investment.

9 **Under the new policy of RA external audits will be linked to previous certification scores. It is likely that under good compliance the costs for the external audit and extra spending related to the external audit will decrease significantly.**

Costs per farmer for FFS go down from $67 to $52.

Figure 2. Components of Farmers Compliance Cost



The distribution shown in the figure related to current one-time and recurrent costs of RA certification without taking into account future dynamics. The cost of PPE is based on the assumption that 70% of the total number of farmers purchased PPE. The costs of water and compost pits are based on hired labor cost. The cost of chemical storage is calculated based on the assumption that 70% of the farmers needed to purchase or build it.

Based on information collected during interviews at the four pilot KTDA factories the total costs and cost items of one FFS were estimated. A Farmer Field School runs a 12-month cycle, and continues as a self-learning activity after graduation of the farmers. Therefore the recurrent cost of FFS is assumed to be zero. Table II illustrates cost items of establishing and running one FFS and how those cost items are expected to change in the future.

The total financial requirement to establish 3,700 FFS is $6,020,732, including $1,006,426 for the already active number of FFS and $5,014,306 to establish the remaining 3,200. Based on the up-scaling plan $2,005,722 is to be invested in 2013 and 2014 to establish a total of 2,560 FFS and $1,002,861 to be invested in 2015 to establish the remaining 640.

The cost of FFS per farmer is $52, based on the assumption that the average number of farmers in each FFS is 30. The findings of Egerton University[10] confirm our findings if methodological differences in cost recognition are accounted for. In this cost-benefit analysis only cost items of FFS were included if these were strictly related to the FFS and did not occur prior to the FFS. For example, the hiring of a venue has not been taken into account as an FFS cost as FFS usually take place in the buying center or in the field. Also, the cost of fertilizer has been excluded from calculations because all fertilizers used in field trials are used on a plot that belongs to one of the FFS farmers and therefore no additional fertilizing occurred. If these differences between the Egerton study and the cost-benefit analysis are accounted for, the results of $71 per farmer (found by Egerton) comes close to $52 per farmer found in this cost-benefit analysis.

Based on the RA and FFS cost models the total cost of the project, including investment and recurrent cost, by the year 2012 is $45,580,337 (total cost spent on 540 FFS and certification of 57 tea factories).

Table II. Cost Items of establishing and running one Farmer Field School

FFS	One-time cost	Expected	Recurrent Cost	Expected
Materials for FFS	210	167	-	-
Training cost	1,380	1,105	-	-
Graduation cost	422	294	-	-
Total	**2,012**	**1,566**	**-**	**-**

The assumption is made that a FFS lasts for 12 months and does not continue training delivery after graduation and therefore recurrent costs do not occur. The calculations are based on the exchange rate of 85 KES per USD. See Appendix 2 for a detailed overview of the cost items for establishing and running an FFS.

10 **Cost and benefits of running a tea-based Farmer Field School in Kenya, 2012**

Potential difference between production of FFS and non-FFS farmers could be as high as 36% depending on the plucking frequency.

2.8 Benefit rational

Estimated future yield increase and estimated future sustainability fee charged by KTDA for RA certified tea sold through direct sales to customers, surpassing the Mombasa tea auction, are taken as direct financial impacts.[11]

2.8.1 Yield increase

The potential yield increase in green leaf production is estimated based upon trial data. Field trials were designed to identify the difference in green leaf production on 3 plots: a plot with a plucking interval of 21 days, one with a plucking interval of 14 days and one with an optimal plucking interval of 7 days. The measured yield increase "from worst to best practice" was 93%. If a farmer moves from a 21 to 7 days plucking interval the amount of plucked tea will almost double. If a farmer changes the plucking frequency from 14 to 7 days, this will be followed by a 36% yield increase. If a farmer has a plucking frequency between 21 and 14 days the yield will increase by 56% if the plucking frequency changes to 7 days. Table III illustrates the yield increase achieved by changing the plucking frequency from 14 to 7 days (see Appendix 4 for detailed information on plucking intervals).

To summarize, potential yield increase might vary from 36 to 93% depending on baseline plucking frequency. In order to confirm the validity of potential yield increase, production data from the four pilot factories (Ngere, Nyansiongo, Momul, Mungania) was obtained. The production data used presents data on the quantity of green leaf accepted at factory level over the last six years of 24 different FFS and of a farmer control group in the same geographical area. The farmer control group was not participating in a FFS.

Table III. Yield increase in percentages from plucking trials at KTDA East and West of Rift Valley

East of rift valley	Average yield increase
Gachege FFS	31%
Kanyenyini FFS	34%
Kathangariri FFS	35%
Kiegoi FFS	31%
Kinoro FFS	29%
Ragati FFS	48%
Total average yield increase east of rift valley	**36%**

West of rift valley	Average yield increase
Kebirigo FFS	53%
Nyansiongo FFS	52%
Kapsara FFS	45%
Litein FFS	19%
Momul FFS	42%
Total average yield increase west of rift valley	**42%**

KTDA (overall)	2010/2011	2011/2012	Average yield increase
KG green leaf	837,989,220	907,664,958	**7,68%**

Calculations are based on plucking trial data provided by KTDA. Percentages are calculated as the percentage difference between base-line green leaf production (which is assumed to come from 14 days plucking interval) and green leaf production resulting from the optimal plucking interval of 7 days. Table figures represent mathematical rounding. The result is free from selection and climate biases. See Appendix 5 for an overview of yield growth at different plucking intervals.

11 **Other financial benefits could be: short-term higher bidding by buyers at the auction leading to higher auction prices, longer-term contract with buyers and new buyers paying higher prices.**

Figure 3a. FFS vs non-FFS yields Ngere tea factory

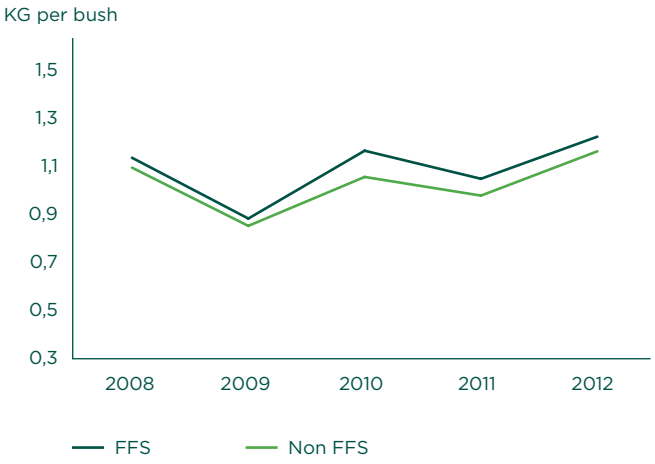
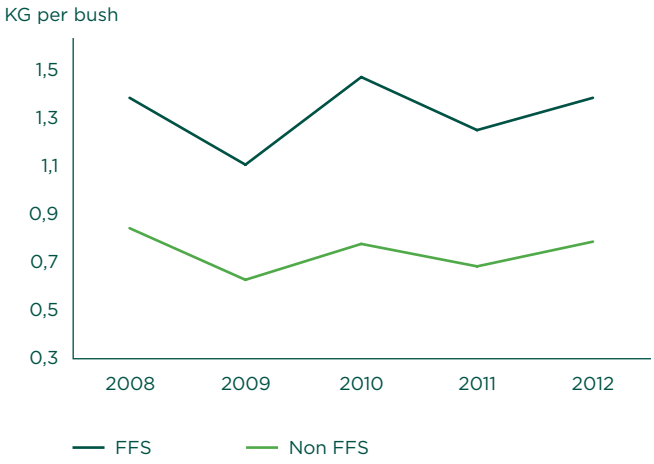


Figure 3b. FFS vs non-FFS yields Mungania tea factory



Calculations (%) are based on trial data provided by KTDA.

Following figures illustrate the difference found between production levels of FFS and non-FFS farmers for the factories of Ngere and Mungania.

The figures show that the difference between FFS and non-FFS production levels has been consistent in time and among the factories. Tea production depends heavily on climate factors such as rainfall, therefore within a 5-year time horizon no conclusions can be drawn on the total production increase/decrease yet it is obvious that FFS farmers perform better in given climate conditions. An average gap between FFS and non-FFS farmers production for the four pilot factories is 34%.

The cost-benefit analysis approach clearly faces some constraints. First, because farmers voluntarily attended FFS selection bias cannot be eliminated and therefore the difference in production cannot be fully attributed to FFS training. Second, production data obtained from the factories reflects the amount of green leaf delivered to the factory and accepted by the factory, but does not necessarily represent actual on-farm production levels. In addition, side selling is a common practice among farmers which means that certain amount of grown green leaf might be sold to a tea collector other than the KTDA tea factory. Nevertheless, based on a combination of the two approaches it can be concluded that FFS is generating a significant yield increase of at least 36%. To avoid overestimation and to account for possible biases the low end of yield increase estimates will be used. In retrospect, the yield increases of 36%, and especially 93%, seem unrealistically high.

FFS farmers perform better in given climate conditions compared to non-FFS farmers. The average gap between FFS and non-FFS farmer's production for these 2 pilot factories is 52%.

However, taking into account the existing gap between the current production yield of 1 kg per bush and potential maximum yield of 3 kg per bush we can conclude that 36% and even 93% yield increases still leave significant opportunity for further improvement.

2.8.2 Sustainability fee / price premium for certified tea

Based on historical sales information provided by KTDA management, the total sustainability fee (price premium) paid by buyers for RA certified tea was calculated at $558,385 for the financial year of 2011-2012 and $889,350 for the financial year 2012-2013 (based on extrapolation of second half-year results). Future sustainability fees have been estimated based on the assumption that direct sales will increase in proportion to the number of (increased) certified factories.

2.8.3 Other sources of income

LEI Wageningen UR has been asked to track progress to assess whether the FFS approach and training for RA certification makes a difference to the income of smallholder tea producers. In July 2010 a baseline assessment was conducted and in February 2012 a mid-term impact study was carried out. The LEI impact study (2012) did not draw conclusions as to whether participation in training impacted upon or added to other sources of income, because no historical data was available for comparison. However, it was indicated by the trained groups that their income from other sources is higher than two years ago, while the non-trained groups indicated that they earned less. This highlights that trained farmers have increased their income from sources other than tea knowledge of Good Agricultural Practices (GAPs) could have a spin-off effect on farmers' other agricultural activities. The importance of this diversification for the long-term economic sustainability of smallholder producers is also indicated by other studies e.g. Braun & Duveskog (2010).

2.8.4 Impact of training activities on farmers' livelihoods

For other indicators of livelihood, significant overall improvements have been observed. The indicators "your relations with your neighbors" and "access to self-help activities[12]" both scored high in the surveys of 2010 and 2012. Perceived livelihood improvements were highest in the groups which received training for both FFS as well as RA, followed by a group trained only in FFS and then by a group trained only in RA.

All trained groups demonstrated more improvement in livelihoods than the comparison group. A point of further improvement could be for further development of commercial activities within FFS. However, overall, farmers were very satisfied with the FFS training and most indicated that they benefitted from FFS training. Benefits range from improved income to higher productivity, leading to fewer household disputes over money as well as the development of activities other than tea, leading to more self-sufficiency in food and empowerment for women. Farmers also said that their relations with the factory improved. Challenges mentioned were the age of the members (it was noted that younger farmers seemed less likely to become members as it was perceived that they felt they did not have more to learn on such issues), illiteracy and the slow pace of rolling out the FFS methodology. Such a roll-out could be facilitated through graduate farmers acting as mentors by teaching other farmers. FFS groups indicated to LEI researchers that the sustainability of their groups was facilitated through their registration as a self-help group. In conclusion, FFS developments were evaluated as highly positive by the farmers, providing scope for development and expansion in the future.

2.8.5 Farmers' evaluation of RA training

Almost all of the farmers who participated in RA training activities evaluated these as very positive and indicated that the training had provided them with benefits. These were mainly social and environmental improvements, as well improvements in productivity and enhanced green leaf quality. In addition, it was noted that relations with the factory improved. KTDA factory staff argued that the two factories considered in the LEI study had already embedded RA certification in the factory system (e.g. audit costs, lead farmer costs and a program on continuous improvement). Issues mentioned by farmers for the future related to the continuation of training activities (also on other topics), training of the right people (both spouses) and how to motivate farmers to participate (through communication, certificates and offering tokens/refreshments). According to the factory staff, challenges lie in the up-front investment costs related to PPE, and the lack of (immediate) reward for participating farmers. Premium prices and credit facilities would be helpful in overcoming this.

12 Self-help activities can be defined as group activities intended to help fellow group members with contributions from fellow group members.

3 Business Impact

3.1 The farmer business model

A cost benefit model was built in order to assess the financial outlook of investments into FFS and RA certification. Financial modeling requires building cash flow projections, which in turn require the transformation of quantifiable benefits into cash inflow. In this case, yield increases at farm level have been converted into farmer income. Income at KTDA level has not been taken into account. KTDA belongs to the farmers and distributes all revenues (except management fees) between them in the form of base payments, benefits and dividends.

Farmer income from tea production comes from revenue received for green leaf sold to the factory minus costs accrued in the process of green leaf production. In the KTDA system, payment for green leaf is made in two steps – a base payment received upon delivery at the factory gate, and an "end of year" bonus. For the purpose of calculations in this analysis the total price a farmer receives per kg of green leaf from the factory is used. The total price KTDA uses for internal calculations is 35 KES per kg of green leaf (as a 5 year average). Currently (spring 2013), the total payment received by the farmer is 50 KES per kg (according to KTDA's public announcement).

To illustrate the tea growers' business model used in further calculations, it is assumed that the total amount of tea sold to the factory in a given year is on average 1000 kg. The following table shows how farmer income from tea production has been calculated.

Before proceeding with the cash flow projections it is critical to provide insight into how the market price of black tea received by KTDA is converted into the green leaf price received by KTDA farmers (Table IV shows how the actual price of green leaf is converted into farmer's income). KTDA sells its tea through either the Mombasa Tea auction or through direct sales. Currently, the auction price of black tea is 3.2 USD per kg. A proportion of RA certified tea is sold directly, bypassing the auction and achieves a sustainability fee premium of an extra 10 cents per kg of green leaf. For the calculations, the auction price of KTDA tea has been used as the closest estimation of price received by KTDA for black tea. To date, the total quantity of the sustainability fee premium received by KTDA has been modest compared to total KTDA revenue.

Table IV. Farmer income calculation for 1000 kg of green leaf sold

Green leaf sold	1,000 kg in KES
Revenue	35,700
Cost of plucking	7,000
Cost of pruning	1,000
Cost of tipping	377
Cost of weeding	1,161
Cost of fertilizers	3,409
Tea cess (tax)	357
Overhead cost	998
Income	**21,398**

The model is built on the following key data: the 5 year average price per kg of green leaf is 35 KES; cost of hired labor is 250 KES per day; cost of plucking per kilo of green leaf is 7 KES; cost of pruning is based on the assumption that 1/3 of the tea bushes need to be pruned in a given year and cost of pruning is 3 KES per kg of green leaf; cost of fertilizer is ,446 KES; 12 bags of fertilizer are needed per ha per year; average number of bushes per ha is 8,611.

$$\text{Price of Green Leaf} = \frac{\text{Price of Black Tea x Exchange Rate}}{\text{Conversion Ratio}} \times \text{Return to the Farmer}$$

The price of black tea is currently 3.2 USD, at an exchange rate of 85 KES per USD. The conversion rate from black to green tea is 4:1 (4 kg of green leaf is needed to produce 1 kg of black tea). The percentage return to farmers stated on the KTDA website is 75%. According to the formula shown above, the price of green leaf is 51 KES per kg.

Farmer income from tea production accounts for 60% of the revenue received to green leaf sold to the factory ($251 per 1,000 kg tea).

3.2 Cash flow projections

In order to build cash flow projections estimated benefits were transformed into cash inflows. Increase in green leaf production was transformed into cash inflow or income using information on KTDA and tea grower business models. The following table gives an illustration of the cash inflow calculation for a proposed yield increase of 36% for farmers directly involved in FFS.

The sustainability fee premium charged by KTDA for RA certified tea was calculated on the basis of 10 US$ cents per kg of black tea and can be directly transformed into the cash inflow associated with RA certification.

Table V. Calculation of cash inflow from 36% yield increase for the period 2012-2015.

	2012	2013	2014	2015
№ of FFS	500	1,780	3,060	3,700
№ of farmers	15,00 0	53,400	91,800	111,000
% of farmers	3%	10%	16%	20%
Total GL output	21,428,571	76,285,714	131,142,857	158,571,429
Δ In GL output	7,710,799	27,450,444	47,190,089	57,059,912
Revenue in KES	**269,877,962**	**960,765,546**	**1,651,653,130**	**1,997,096,922**
Cost of plucking	(53,975,592)	(192,153,109)	(330,330,626)	(399,419,384)
Cost of pruning	(7,710,799)	(27,450,444)	(94,380,178)	(57,059,912)
Cost of tipping	(2,910,242)	(10,360,463)	(17,810,683)	(21,535,793)
Cost of weeding	(8,954,592)	(31,878,347)	(54,802,101)	(66,263,979)
Cost of fertilizers	(26,283,518)	(93,569,323)	(160,855,128)	(194,498,030)
Tea cess (tax)	(2,698,780)	(9,607,655)	(16,516,531)	(19,970,969)
Overhead cost	(7,690,014)	(27,376,451)	(50,602,144)	(56,906,105)
Income in KES	159,654,426	568,369,755	926,355,739	1,181,442,749
Income in USD	**1,878,287**	**6,686,703**	**10,898,303**	**13,899,326**

The number of established FFS reflects a 3-year KTDA projection. The model depends on the following: average number of bushes per ha is 8,611; conversion ratio for green leaf (GL) to black tea is 4:1; the 5 year average price per kg of green leaf is 35 KES; average number of farmers in FFS is 30; total production of made black tea is 200,000,000 kg per year; cost of hired labor is 250 KES per day; cost of plucking per kilo green leaf is 7 KES; cost of pruning is based on the assumption that 1/3 of the tea bushes need to be pruned in a given year and cost of pruning is 3 KES per kg of green leaf; cost of fertilizer is 2,446 KES; 12 bags of fertilizer are needed per ha per year. The revenue in KES is the delta in GL output multiplied by 35 KES (price per kg of green leaf). The calculations for 2016 and 2017 will be similar to the income calculation of 2015. All calculations are based on a USD/KES exchange rate of 85 KES per USD.

Table VI. Cash flow projections for 2013-2017, 36% yield increase scenario (in USD).

			2013	2014	2015	2016	2017
Benefits	Yield	direct indirect	7,045,850 3,522,925	11,251,623 5,923,396	14,247,264 5,923,396	14,247,264 5,923,396	14,247,264 5,923,396
	Fee		889,350	1,014,172	1,014,172	1,014,172	1,014,172
Cost	FFS	2013 2014 2015	(1,953,699) - -	- (1,953,699) -	- - (976,849)	- - -	- - -
	RA	one-time	(1,898,085)	-	-	-	-
		recurrent	(5,692,593)	(5,422,716)	(5,422,716)	(5,422,716)	(5,422,716)
Sum			**1,913,747**	**10,812,776**	**14,785,267**	**15,762,116**	**15,762,116**

The direct benefits from yield increase for the FFS farmers are calculated based on the model shown in Table V. The indirect benefits from yield increase for the non-FFS farmers are calculated based on the same model with the assumption that each FFS farmer is sharing the knowledge obtained during the FFS training with one non-FFS farmer, which leads to a yield increase of 18% for non-FFS farmers. The cash inflow from the Sustainability Fee is calculated based on KTDA sales data, assuming that the fee will increase proportionally with the increasing number of certified factories. The costs for establishing and running the targeted number of FFS are calculated based on costs indicated in Table II and reflects KTDA's expectations of project development. The one-time cost of RA certification reflects the cost of certifying the remaining 8 factories under the assumption that all factories will be certified in 2013. The recurrent costs of RA certification reflect the costs shown in Table I including all the costs, which will be incurred on an annual basis to maintain RA certified. All calculations presented are in USD. The direct increase in yields represented is achieved by the farmers participating in FFS. The indirect yield increase represented is realized by farmers indirectly involved in FFS training by means of knowledge spillover. The sustainability fee represents the amount of funds KTDA will potentially receive as a price premium for RA certified tea.

Table VI presents the cash flow projection based on the assumption that a 36% yield increase was realized by FFS farmers and, in addition, that each FFS farmer shared their knowledge with one non-FFS farmer, generating an indirect yield increase for non- FFS farmers of 18%. Knowledge sharing is a predicted spillover effect of neighboring farmers learning from each other (a common phenomenon in the global agricultural sector).

3.3 Scenario analysis

The figures in Table VII demonstrate that, even by the beginning of 2013, the costs of the project will be covered by financial benefits brought by RA certification and FFS due the achievement of predicted yield increases. Similar calculations have been made for different scenarios of yield increases (18% and 9%). The results of which are shown in Table VII.

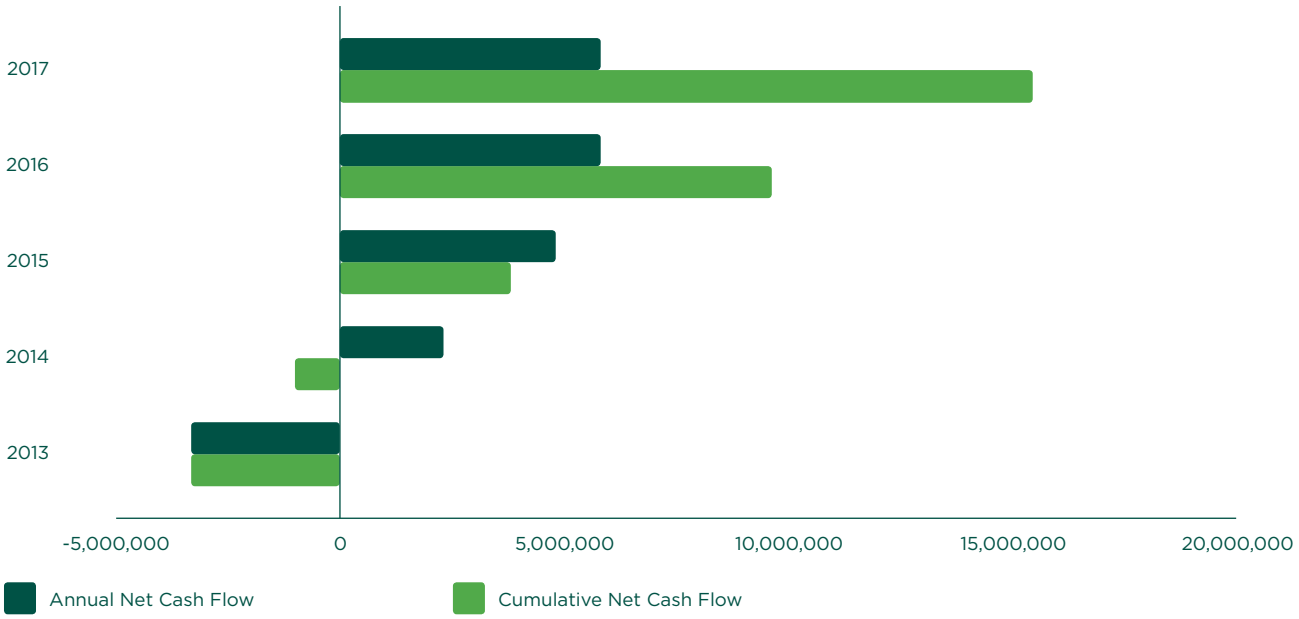
Based upon trial results of potential yield increase, it is felt that our estimations of yield increase in the scenarios are realistic. The following figures illustrate annual net cash flow and cumulative cash flow for the yield increase scenarios of 18% and 9% for farmers directly involved in FFS, and 9% and 4.5% respectively for indirectly involved farmers.

Table VII. Financial results and break-even points for the different yield increase scenarios (in USD).

Scenario	2013	2014	2015	2016	2017
36%	1,913,747	10,812,776	14,785,267	15,762,116	15,762,116
18%	(3,368,663)	2,225,267	4,699,937	5,676,786	5,676,786
9%	(6,010,857)	(2,068,488)	(342,729)	634,121	634,121

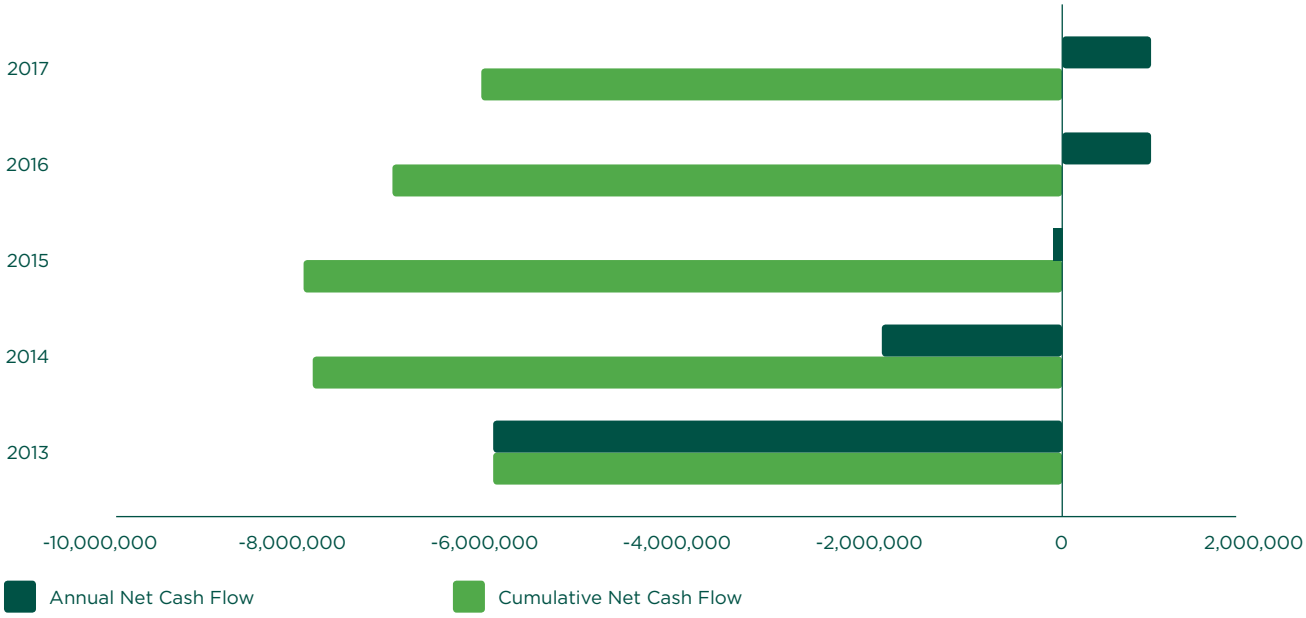
All calculations are in USD, based on the assumption that the USD/KES exchange rate will remain stable. Recurrent costs are calculated based on the cost model presented in Table I and II. The numbers highlighted in red indicate the break-even point or point in time when the recurrent costs of the project will be fully covered by project benefits.

Figure 4. Annual net cash flow and cumulative cash flow for yield increase scenario: 18% direct and 9% indirect.



All calculations are in USD, based on the assumption that the USD/KES exchange rate will remain stable at 85 KES per USD.
The scenario assumes 18% yield increase for FFS farmers and 9% yield increase for indirectly involved farmers.

Figure 5. Annual net cash flow and cumulative cash flow for yield increase scenario: 9% direct and 4.5% indirect.



All calculations are in USD, based on the assumption that the USD/KES exchange rate will remain stable at 85 KES per USD.
The scenario assumes 9% yield increase for FFS farmers and 4.5% yield increase for indirectly involved farmers.

Figure 4 shows that, with a sustainability fee of at least $889,350 (extrapolating the Q1 result to a full year) and yield increase for FFS farmers of at least 18%, the system will become sustainable in the year 2014 and no additional financial support will be required to maintain the project. In addition, the yield increase of 18% for FFS farmers and 9% yield increase for indirectly involved farmers, will result in an increase in KTDAs total output by 5.4% (if the yield increase reaches the potential level of 36% total KTDA output will increase by 10.8%).

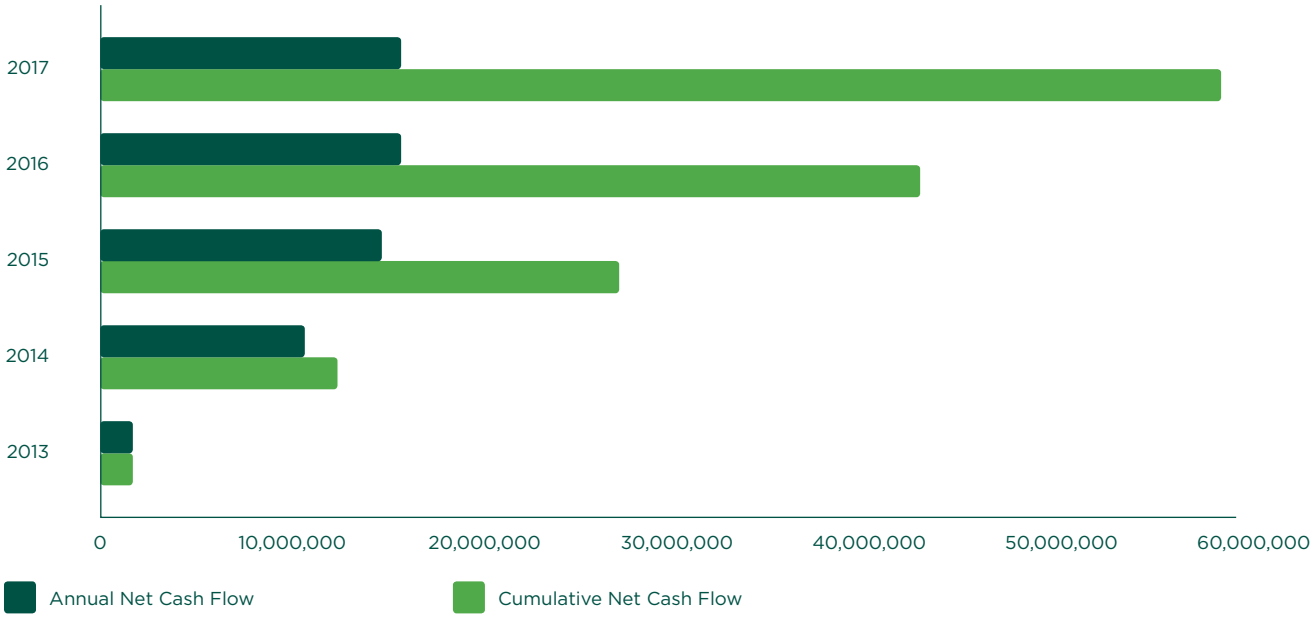
Figure 5 illustrates the "worst-case scenario" of a yield increase of 9% for FFS farmers and 4.5% for indirectly involved farmers.

Figure 5 demonstrates that a 9% yield increase for FFS farmers and 4.5% yield increase for indirect farmers would generate positive net cash flow by 2016, meaning that the project becomes financially sustainable. Under this scenario no additional funds would be needed to cover the project's recurrent costs from 2016 onwards.

Figure 6 illustrates the "best-case scenario" of a yield increase of 36% for FFS farmers (117,000 of which are intended to become involved during the period 2013-2015) and 18% for farmers indirectly involved in FFS training (assuming that each FFS farmer will share the obtained knowledge with one neighbor, resulting in 18% yield increase).

Figure 6 demonstrates that a 36% yield increase for FFS farmers and a 18% yield increase for indirect farmers, would generate positive Net Cash Flow by 2013. A payback period in the foreseeable future is achievable for the scenarios of 36% and 18% yield increase if initial investments (made before 2013 to establish 500 FFS and certify 56 factories) are excluded from the calculations.

Figure 6. Annual net cash flow and cumulative cash flow for yield increase scenario: 36% direct and 18% indirect.



All calculations are in USD, based on the assumption that the USD/KES exchange rate will remain stable at 85 KES per USD.
The scenario assumes 36% yield increase for FFS farmers and 18% yield increase for indirectly involved farmers.

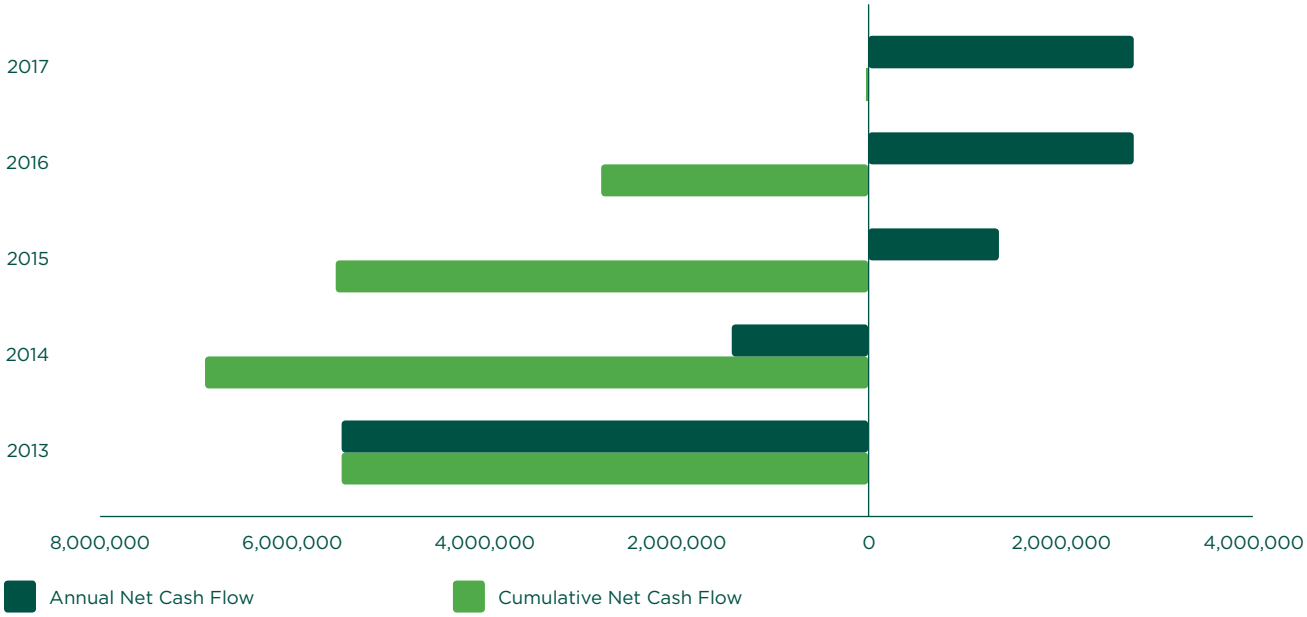
4 Sensitivity Analysis

Tea farmers are facing multiple risks which are outside the scope of control of their business but which can seriously impact the financial results and sustainability of the business: tea prices, exchange rates, and climate change effects. Furthermore the typology of the farmer in terms of size and capitalization of the farm strongly influences the handling perspective of the farmer – entrepreneur. For the purpose of this study two types of sensitivity analyses have been conducted. The first analysis focuses on the exchange rate and the second analysis is a population analysis.
The researchers strongly advise KTDA to conduct similar sensitivity analyses on the volatility of tea prices and on climate change effects.

4.1 Exchange rate analysis

One of the essential assumptions in this study is a stable KES/USD exchange rate. Exchange rate history shows that during the past 5 years the rate was highly volatile with a minimum of 61.25 KES per USD and maximum of 106.45 KES per USD (see Appendix 1).
In order to confirm the robustness of the study, results were run against two extreme historical scenarios – exchange rates of KES/USD of 62 and 106 KES per USD. For these calculations the scenario of 18% yield increase for FFS farmers was used.

Figure 7. Annual net cash flow and Cumulative net cash flow for the 18% yield increase scenario at an USD/KES exchange rate of 62 KES per USD.

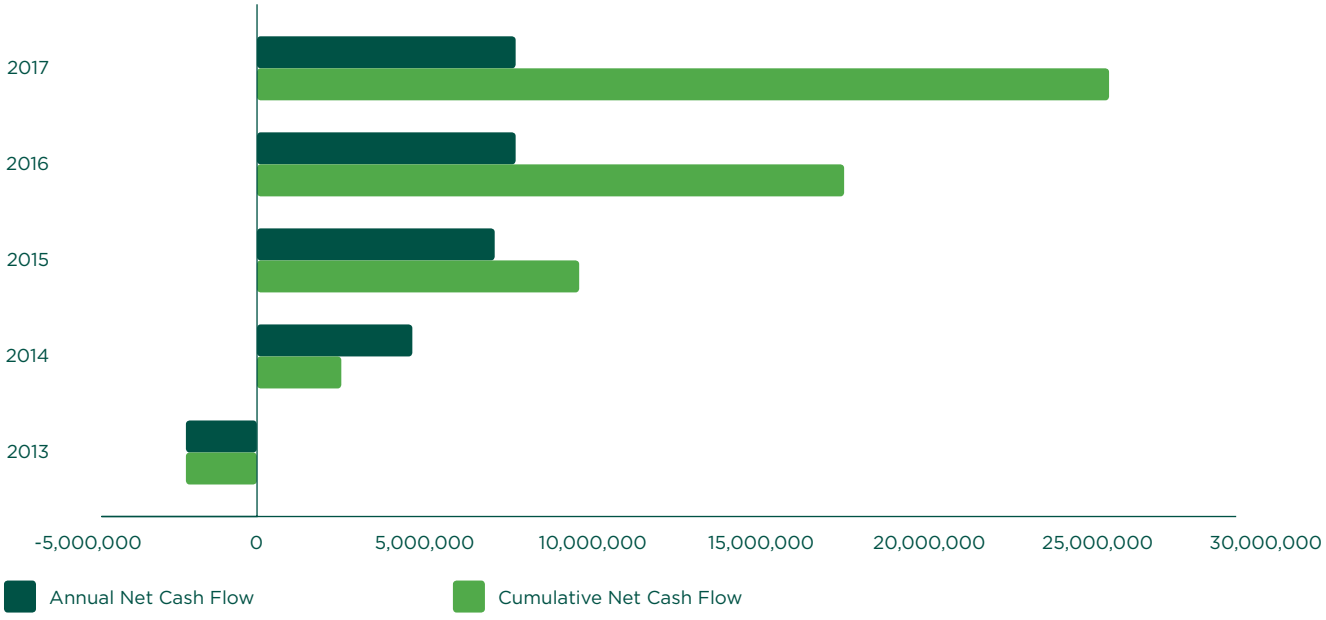


All calculations are in USD, based on the assumption that the USD/KES exchange rate will remain stable to 62 KES per USD.
The scenario assumes 18% yield increase for FFS farmers and 9% yield increase for indirectly involved farmers.

Figure 7 shows that even with a modest yield increase of 18% the “worst-case” exchange rate scenario leaves the project financially sustainable by 2015. Figure 8 illustrates the net and cumulative cash flow for the “best case” exchange rate of 106 KES per USD.

The sensitivity analysis demonstrates that project results depend strongly on the KES/USD exchange rate. A low exchange rate significantly reduces profitability, however such a rate still results a in self-sustaining project within a foreseeable (around 3 year) time horizon. High exchange rates drastically improve the return on investment of the project and make it possible to cover total investments through addition financial benefits received.

Figure 8. Annual net cash flow and Cumulative net cash flow for the 18% yield increase scenario at an USD/KES exchange rate of 106 KES per USD.



All calculations are in USD, assumed that the USD/KES exchange rate will be stable and equal to 106 KES per USD. The scenario assumes 18% yield increase for FFS farmers and 9% yield increase for indirectly involved farmers. Calculations are made under the assumption that the price of green leaf as a main component of cash inflow depends on the exchange rate in the following way: price of green leaf = (price of black tea*exchange rate)/ conversion ratio *return to farmer.

4.2 Population analysis: Socio-economic impact of RA certification and FFS

In the preceding sections the smallholders of KTDA have been treated as if they consist of a homogenous population of farmers. In reality, the size of land, number of bushes and levels of professionalism between farmers' households can differ substantially. In order to get a better understanding of the impact of training and certification interventions for various typologies of farmers, additional information has been collected. The sample was chosen on basis of data availability and (quick) access.

For the population analysis, statistics were obtained on number of bushes per farmer and green leaf production delivered to 3 KTDA factories (Ngere, Kanyenyani, Weru) for the financial year 2011-2012. In total 25,481 observations have been gathered. This set of observations seems to be representative for the entire population of 560,000 KTDA farmers. However, with the assistance of KTDA, the number of observations could be increased in future analyses.

A range of characteristics for the population have been analyzed, these include number of bushes, total production, production per bush and total income from tea production. Such analysis helps to further improve our understanding of the current conditions of KTDA farmers and the influence of RA and FFS on farmer's income and production.

It is assumed that farmers rely significantly if not completely upon income from tea. Such a dependency was required in order to establish an important assumption for the analysis: that farmers are interested in increasing income from tea production and are willing to implement knowledge obtained directly from FFS or spread by FFS farmers.
In order to make sure that only motivated farmers are part of our selection, farmers with a lower than the number of bushes required to provide a significant portion of a farmer's income have been removed from the selection.

Farmer income from green leaf production was calculated based on the model described in the first part of the analysis (Table IV). Income depends on the number of kilograms delivered to the factory in a given year, the average yearly price of green leaf received by the farmers, the cost of plucking, pruning, tipping, weeding, the cost of fertilizers and taxes. Based on the model, one kilogram of green leaf delivered to the factory brings 20.7 KES of income to the farmer.

The analysis is based on a minimum annual wage, which should be sufficient to support one household for one year. There is an ongoing debate about wages in the tea industry. The minimum required income differs between regions, countries and sizes of households. Therefore some uncertainty and possible estimation bias should be acknowledged. Finally, the following estimations of the minimum wage were used: an estimation of the minimum wage provided by KTDA, that was reported by the Kenyan Ministry of Labor and an estimation included in the Human Rights Report of the U.S. Department of State (2008).

The following assumptions are used in the population analysis, that:

- Tea production is the primary source of income for KTDA farmers
- The official minimum wage in Kenya is 70,550 KES (the legal minimum for urban workers) or 60,000 KES (KTDA reference for 250 KES per day for an agricultural worker) or 30,432 KES (the Kenyan legal minimum wage for an agricultural worker), see appendix 6 for more details
- The minimum wage is assumed to be sufficient to support the livelihood requirements of households
- The recurrent cost of RA certification is $9.68 per year or 882 KES
- The exchange rate USD/KES is stable at 85 KES per USD
- The cost of obtaining an RA certificate is $328,074 per factory or $38 per farmer (3,236 KES) if it is assumed that the cost of certification will be covered by farmers through direct compliance cost or decreased payment from the factory
- The benefits of certification in terms of a sustainability fee will account for $2.0 per year per farmer
- The total cost of establishing one FFS is $2,013 with a cost per farmer of $67
- The potential yield increase from FFS is 36% for 20% of all farmers (representing the 117,000 FFS trained farmers) and 18% for another 20% of farmers due to the expected spillover effect (one-to-one). This translates to a potential yield increase of 10.8% for the total KTDA farmer population.

Figure 9. Income distribution for the normalized farmer population (in KES).

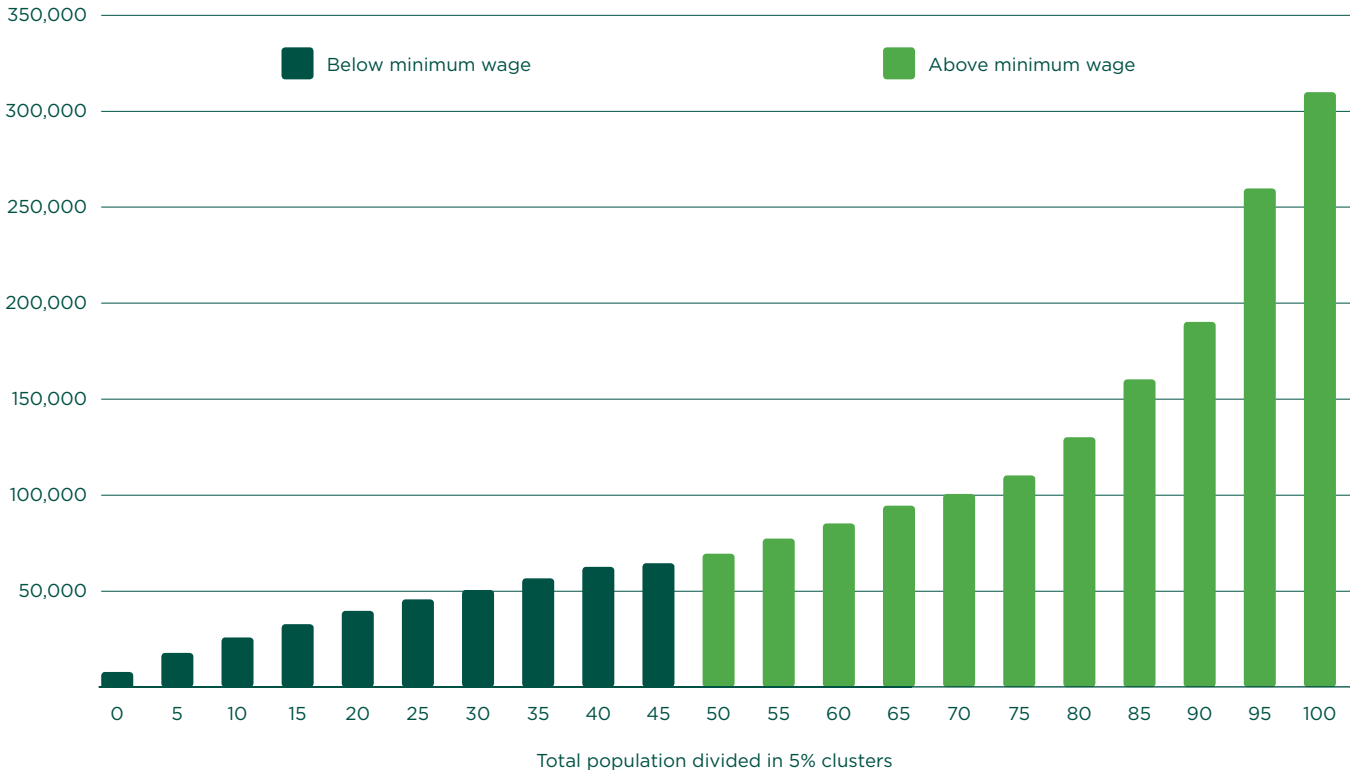
To build the distribution an average income is calculated in every 5% group from the lowest to the highest income for all farmers. The official Kenyan minimum wage of 70,550 has been taken as a baseline to illustrate the percentage of farmers with an income below the minimum. The red bars highlight the percentage of farmers with an income below the official minimum wage. The GIni index for the population is 0.53.

Preliminary analysis shows that:

- Out of 25,481 farmers 3,825 (15%) have less than 700 bushes. In order to further proceed with the analysis these were removed from the study population. Given the high number of such farmers, KTDA should pay attention to their condition and number, although measures to improve their livelihood will need to vary from the tools provided through RA and FFS. 340 incomplete observations were found, which have been excluded from the population for further analysis.
- Out of 21,456 farmers, 269 farmers (1.25%) with an average number of 1,964 bushes produce an average of 18.63 kg of green leaf per year (a yield of less than 0.03 kg per bush, and an average income from tea production of 683 KES). This extremely low yield might be explained by side-selling, farmers leaving the field or by them lending the land to other farmers.
- Out of the total population, 647 (3%) farmers have yields higher than 2.5 kg per bush (with an average income of 154,369 KES per year, an average number of bushes of 1,310, and average production of 4,205 kg). This high yield (3.26 kg per bush on average) might be explained by borrowing the land or collecting green leaf from other farmers. Farmer groups with both extremely low and extremely high yields have characteristics which make them very different to the farmers targeted by RA and FFS activities. Therefore it seems reasonable to remove both groups from the population. The population remaining after the removal of extremes and farmers less than 700 bushes will be referred to as the “normalized population”.
- In order to have an income equal to the minimum wage for an urban worker (70,550 KES) a farmer requires 1900 bushes with a production yield of 1 kg per bush and would require 1,660 bushes to reach an income of 60,000 KES per year.
- The normalized population consists of 20,740 observations (80.1% of the total population) with an average income of 73,786 KES, slightly above the official minimum wage. This group has an average number of 1,917 bushes, with an average yield of 1.05 kg per bush and an average production of 2,010 kg per year.
- Taking the official Kenyan annual minimum wage for urban workers of $830 (70,550 KES) as a reference, the following is found: 13,157 farmers (63%) have an income of less than 70,550 KES per year. Figure 9 illustrates the income distribution for the normalized population; the Gini coefficient (an internationally recognized measure of income inequality) for the population is 0.53.

Figure 10a. Income distribution for normalized farmer population

Figure 10b. Income distribution for normalized farmer population after 36% yield increase



All calculations are in KES, assumed that the exchange rate will be stable at 85 KES per USD. The red bars illustrate the percentage of farmers with an income from tea production below the minimum wage of 70,550 KES per year.

Taking a different estimation of the minimum wage, 250 KES per day or 60,000 KES per year, which KTDA management indicates is a reasonable estimation, it is found that 56% of the normalized population (11,522 farmers) has an income from tea production lower than the minimum wage. Another point of reference is that the official Kenyan minimum wage for unskilled agricultural workers of 30,432 KES per year is known to be insufficient to support the worker (see Appendix 6 for more details). Based on this minimum wage 5,058 farmers (24% of the normalized population) have an income from tea production which is lower than the annual minimum wage.

Initial analyses based on these minimum wages show that:

- 143 farmers will be pushed below the official minimum wage of 70,550 KES by recurrent cost of RA certification (820 KES per year per farmer). A price increase due to sustainability (certification) would amount to 135 KES per year per farmer (calculated as the estimated yearly sustainability fee multiplied by percentage return to the farmers and divided by the total number of certified farmers). This price increase would not be enough to cover recurrent costs.
- 491 farmers (2.4%) will be pushed below the official minimum wage of 70,550 by paying the cost of obtaining the certificate (estimated at 3,230 KES per farmer).
- If the yield increases by 10.8% (one of the scenarios developed in the first part of the analysis[13]) for the normalized population, average income will increase up to 80,711 KES per year. The number of farmers with an income below the official minimum wage will decrease to 12,124, lifting an extra 1,033 farmers (5% of the population) up to the minimum income of 70,550 KES.
- Further up-scaling of the FFS project can potentially increase yields among the total population of up to 36%. This would decrease the number of farmers with an income from tea below the minimum wage to 10,007 (48% of the normalized population). In other words, this would potentially lift 15% of the population out of poverty. Average income would increase to 99,068 KES.
- A potential yield increase of 36% generates an average additional income of 26,224 KES per year for farmers. Comparing the additional income with the total cost of up-scaling the FFS methodology shows that the extra income fully covers the costs of up-scaling the FFS even under the assumption that all the costs occur in one year. Based on the FFS cost model, the total costs of up-scaling the FFS project to cover all KTDA farmers (assuming that the direct involvement of 70% of the farmers is needed to cover the entire population) is $20,462,400: $36 or 3,060 KES per farmer.

Figure 10 illustrates the difference in income distribution between the current situation and the scenario of 36% yield increase for the total population.

13 **If the yield increase reaches the potential level of 36% the total KTDA output will increase by 10.8%.**

5 Conclusions and Recommendations

The first phase (2009-2012) of the Sustainable Agriculture Program in Kenya has achieved tremendous success due to the collaboration between KTDA, Unilever, IDH – The Sustainable Trade Initiative and Rainforest Alliance (RA). By December 2012, 54 processing plants had achieved RA certification and 11 processing plants were at stages of preparation for certification. 798 Farmer Field Schools (FFS) have been formed in all factories, of which 241 FFS have graduated and 557 FFS are currently running, representing a total of 16,710 farmers in schools (30 farmers per school). The supplier-buyer relationship between KTDA and Unilever has been key to this success with Unilever's buying commitment providing a clear incentive for factories and farmers to get involved.

Farmers have additionally been eager to participate because they could both define the FFS curriculum themselves and also capture the benefits from training (yields & diversification). Certification on its own did not lead to the most significant results. However, the combination of both certification and Farmer Field Schools delivered the highest impact. Key success factors in these circumstances are local ownership and embedding of new sustainable production practice. This study was undertaken to provide the project partners with insights into the costs and benefits of up-scaling certification and FFS extension structures, with the wider objective of supporting the integration and expansion of sustainable processes in tea production.

Core elements for the next phase of 2013-2015 are that:

- KTDA will extend the FFS approach to all the coded buying centers (3,700 in total)
- KTDA will use the best graduate FFS farmers to coordinate the additional schools under supervision of TESAs and FSCs
- There will be full integration of RA lead farmers and FFS and vice versa
- Factories will use FFS as an extension vehicle to reach out to ALL their farmers

5.1 Conclusions of the Cost Benefit Analysis

- There is a business case for up-scaling both RA certification and FFS. Based on the demonstrated yield improvements reaching up to 36% and a sustainability premium of direct sales of $0.10 per kg of made-black tea the required investments can be covered and positive net annual returns on investment can be realized between 2013 and 2015 (depending on the yield scenario, these were modeled on 36%, 18% and 9% yield improvements);
- Yield improvement is the key value driver for enhancing sustainability and up-scaling the current RA-FFS model. In our analysis, the most conservative estimations of yield improvements and knowledge spillover effects have been considered in order to avoid selection bias and create a robust business case. Even with modest estimated improvement of 9% yield increase there is a clear business case. Given the enormous gap between current production yield and maximum possible yield (1 kg per bush compared with 3 kg per bush per year) and successful experience of FFS plucking trials it must be concluded that significant yield increase can be reached by most of the KTDA farmers who rely on tea production as on one of the main sources of income.
- The population analysis, which was conducted on a sample of 25,000 farmers, revealed that yield improvement provides a significant pro-poor development potential. Further up-scaling of the FFS project can potentially increase yields among the total population of up to 36%. This would decrease the number of farmers with an income from tea below the minimum wage to 10,007 (48% of the normalized population). In other words, this would potentially lift 15% of the population out of poverty. Average income would increase to 99,068 KES.
- Diversification of farmer household economies is strategically important to strengthen the long-term resilience of their business and can be addressed via the FFS curriculum. KTDA needs to further develop a strategy for this element in terms of costs, funding and external alliances.

5.2 Recommendations for the future

- **Duplication and trans-modeling of the cost-model for integrating FFS curricula with (RA) certification to other countries.** One of the key success factors of the sustainable tea project in Kenya has been the unique organizational structure of KTDA itself, integrating over half a million smallholder farmers in a co-ownership model for production, processing and export sales. One of the constraints on the way of enrolling different countries and sectors into similar practices – the absence of highly organized structures such as KTDA – might be mitigated by working at factory level, involving factory management by showing the business case demonstrated by KTDA.
- **Monitor changes in the KES/USD exchange rate because of its significant influence on the business case.** It will be strategically important to monitor the exchange rate over time. The sensitivity analysis shows the robustness of the case (where the favorable exchange rate significantly improves the payback period and the non-favorable exchange rate still leaves the project self-sustainable in a foreseeable time horizon) yet volatility has been high in the past few years and could impact upon the ability to sustain the project financially and upon its speed of implementation.
- In order to assess a broader set of risks for the future of tea farming the researchers would strongly advise KTDA to **conduct similar sensitivity analyses on the volatility of tea prices and on climate change effects.**
- **Address new questions.** In addition to the fact that the study has shown an insight into the costs and benefits of RA certification and the up-scaling of FFS, the analysis also generates a **number of strategic questions** that need to be discussed with the management of KTDA such as:
  - How to up-scale FFS without losing quality of implementation? How to create the maximum motivation and incentives for TESAs, Lead Farmers and FFS Graduates when integrating compliance based curricula with a focus upon craftsmanship for continuous improvement of quality and yields?
  - How to sustain certification after the first year of compliance?
  - How does yield improvement relate to factory processing and market uptake capacities?
  - How to improve market uptake rates for certified tea? How to capture a larger sustainability fee from certified tea?
  - What are the value creation and value capturing opportunities of certified tea that currently cannot be quantified and monetized (such as biodiversity, improved water quality and water management, social cohesion of local communities)?
  - How to monitor and manage real-time data on yield improvements?
  - In the current analysis, the focus has been on improving land productivity; what is the scope for increasing labor productivity (and/or mechanization)?
  - Can KTDA further develop alliances with external expertise centers to further support the diversification components of the FFS?

References

Braun, A. and Duveskog, D. (2010),
The Farmer Field School approach – History, Global Assessment and Success Stories, Background Paper for the IFAD Rural Poverty Report

Buses, B.C. (2012),
The Role of Scaling Up Farmer Field Schools and Rainforest Alliance Certification on Sustainable Tea Production among Small-scale Tea Producers West of Rift Valley, Master thesis, Egerton University

Hiller, S., Onduru, D. and de Jager, A. (2009),
Sustainable tea production – an assessment of Farmer Field Schools in Kenya, LEI Wageningen UR, 2009

Hiller, S., Brusselaars, J., and Ton, G. (2010),
KTDA certification for tea in Kenya, M&E Baseline report, Report 15 April 2011, LEI Wageningen UR

Maina, W. S., Mwangi, J. G., Boselie, D., Onduru, D., & Buses, B. C. (2012a),
Up-scaling Farmer Field Schools and Rainforest Alliance certification among smallholder tea producers in Kenya: Options, opportunities and emerging lessons, PEC 2012; 43(43):141-158, ICID: 1002406, IC™ Value: 3.00

Maina, W.S., Buses, B. C., Mwangi, J. G., Boselie, D., Onduru, D., & Waarts, Y. (2012b),
System Design and Scalability of Farmer Field Schools and Rainforest Alliance Certification of Smallholder Tea Producers East and West of Rift Valley – A Research Report on the Scalability of Sustainable Tea Value Chain project in Kenya

Waarts, Y.,Ge, L., Ton, G., Jansen, D. (2012),
Sustainable tea production in Kenya – Impact assessment of Rainforest Alliance and Farmer Field School training, LEI Wageningen UR

Acknowledgements

This report is prepared by IDH – The Sustainable Trade Initiative with support of the Kenya Tea Development Agency (KTDA), Unilever and Rainforest Alliance.

Authors
Svetlana Maytak, MSc *junior manager learning and innovation* was the principal researcher and author of the study under supervision of Dave Boselie, PhD *senior manager learning and innovation* at IDH – The Sustainable Trade Initiative.

With assistance of:
Peter Mbadi, KTDA
Judith Fraats, IDH
Zakaria Mitei, Unilever Kenya
Marc Monsarrat, Rainforest Alliance
Management of KTDA factories Ngere, Nyansiongo, Mungania and Momul

Publisher
IDH – The Sustainable Trade Initiative

Editing
Joss Tantram, Terrafiniti LLP

Design
Dietwee merk, ontwerp en communicatie

Disclaimer
This report provides approximations of important financial costs and benefits that should be considered in decisions involving up-scaling of RA certification and Farmer field Schools. The analysis is based on soft and hard information provided by IDH, KTDA, KTDA factory management, Rainforest Alliance, and Unilever and believed to be accurate. The cut-off date for data collection was 31 December 2012. Estimation of past and future financial results always includes some uncertainty and might depend on factors beyond authors control and unknown to the authors.

Appendices

Appendix 1
USD/KES exchange rate

The following figure illustrates dynamics of the KES/USD exchange rate for the period of 2008-2012.

Appendix 2
Cost Items of FFS

The following table illustrates the cost items of running one FFS for the full cycle of 12 months. The costs in USD are based on the assumption that the exchange rate is stable at 85 KES per USD. Projected costs illustrate how cost items will change in future.

Cost item	Cost KES	Cost USD	Projected cost KES	Projected cost USD
Materials for FFS:	**17,864**	**210**	**14,264**	**168**
Flip chart	1,188	14	1,188	14
Text book	300	4	100	1
Spring scale	1,500	18	1,500	18
Folder	300	4	300	4
Record keeping	400	5	400	5
Notebook	1,500	18	1,500	18
Foolscap	327	4	327	4
Spring files	500	6	500	6
Sisal twine, yellow tape	750	9	750	9
Masking tape	300	4	300	4
Manila paper	1,500	18	1,500	18
Pen	1,000	12	1,000	12
Pencil, eraser	1,000	12	1,000	12
Felt pen	1,000	12	1,000	12
Sign for the demonstration plots	1,500	18	500	6
Rulers	1,200	14	1,200	14
Tape measure	600	7	200	2
Calculator	1,200	14	400	5
Paper punch	700	8	233	3
Stapler	500	6	167	2
Flipchart stand	600	7	200	2
Training costs:	**117,328**	**1,380**	**93,928**	**1,105**
TESA time	46,080	542	22,680	267
TESA educational purposes	11,208	132	11,208	132
Trips and visits by farmers	30,000	353	30,000	353
TESA travel costs	17,640	208	17,640	208
External facilitator	10,000	118	10,000	118
Communication cost	2,400	28	2,400	28
Graduation costs:	**35,900**	**422**	**25,000**	**294**
TESA time	6,400	75	6,400	75
Polo shirts, caps	21,000	247	21,000	247
Certificates	1,500	18	1,500	18
Hospitality	7,000	82	7,000	82
Total	**171,093**	**2,013**	**133,193**	**1,567**

Appendix 3
Cost Items of RA certification

The following table illustrates the cost items of RA certification and further compliance with the standard in Kenyan Shillings.

Cost item	Cost in KES	Recurrent cost in KES
Training cost RA level:	**1,132,937**	-
Training cost factory level:	**120,000**	**30,000**
Training of LF and factory staff	40,000	-
Follow-up training	20,000	20,000
Materials for follow-ups	10,000	10,000
Training of farmers by LF	50,000	-
Internal audit of farmers:	**744,000**	**679,250**
LF allowance	550,000	550,000
Follow-ups after inspection	60,000	60,000
Box file	10,000	5,000
Check list	75,000	25,000
Folder	3,000	3,000
Transport cost	25,000	25,000
Communication	5,000	5,000
cost	2,000	1,000
Clip board	2,000	2,000
Flip chart	1,500	750
Eraser, pencil, sharpener	10,000	2,000
Camera	500	500
Spring files		
Internal audit of factory:	**6,000**	**6,000**
External audit:	**2,197,500**	**2,197,500**
External Audit fee	2,167,500	2,167,500
Extra spending on external audit	30,000	30,000
Farmer compliance cost (total):	**23,433,846**	**5,341,5381**
Compost pit (per farmer)	300	300
Wastewater soak pit (per farmer)	300	300
PPE (per farmer)	2,400	2,400
Chemical storage (per farmer)	600	600
Bookkeeping (per farmer)	20	20
Factory compliance cost:	**252,000**	**240,667**
Signs	15,000	5,000
Waste shield	20,000	20,000
Waste pit	2,000	667
Water testing	15,000	15,000
reporting and administration	200,000	200,000
Total	**27,886,283**	**8,488,955**

Appendix 4
Field trial data

The following field trial information is obtained from 6 KTDA factories for 30 field trials. The numbers represent trial results in kg of green leaf for different plucking intervals – 21, 14 and the optimal plucking interval of 7 days.
The third column represents the average plucking result for the 21 and 14-day plucking interval.

№	21 day	14 day	21-14 day	7 day
1	30	35	33	54
2	34	41	38	46
3	16	31	23	39
4	21	33	27	42
5	23	34	29	45
6	24	31	27	40
7	20	34	27	45
8	23	34	29	43
9	20	30	25	48
10	31	45	38	66
11	34	42	38	62
12	34	43	39	65
13	33	50	42	67
14	32	44	38	59
15	33	52	43	60
16	35	52	44	62
17	21	30	26	46
18	27	30	29	33
19	26	28	27	31
20	19	41	30	66
21	28	38	33	41
22	26	31	28	37
23	34	43	38	66
24	21	33	27	42
25	24	34	29	45
26	24	31	27	40
27	20	34	27	45
28	23	34	29	43
29	20	30	25	38
30	19	29	24	42
Average	**26**	**37**	**31**	**49**

Appendix 5
Yield growth for different plucking intervals

Yield increase from 14 days plucking interval to the optimal 7 days plucking interval

Factory	FFS 1	FFS 2	FFS 3	FFS 4	FFS 5	FFS 6	FFS 7	Average
Gachege	54%	12%	28%	-	-	-	-	**31%**
Kanyenyini	26%	32%	29%	32%	26%	60%	-	**34%**
Kathangariri	47%	48%	51%	34%	34%	15%	19%	**35%**
Kiegoi	53%	10%	11%	61%	9%	21%	55%	**31%**
Kinoro	26%	32%	29%	32%	26%	27%	-	**29%**
Ragati	48%	-	-	-	-	-	-	**48%**
Total								**36%**

Note: Table figures represent mathematical rounding

Yield increase from an average of 21 and 14 days plucking interval to 7 days plucking interval

Factory	FFS 1	FFS 2	FFS 3	FFS 4	FFS 5	FFS 6	FFS 7	Average
Gachege	65%	23%	70%	-	-	-	-	**52%**
Kanyenyini	54%	58%	47%	67%	51%	92%	-	**61%**
Kathangariri	74%	63%	69%	61%	55%	41%	43%	**58%**
Kiegoi	80%	16%	15%	120%	25%	30%	73%	**51%**
Kinoro	54%	57%	47%	67%	51%	52%	-	**54%**
Ragati	78%	-	-	-	-	-	-	**78%**
Total								**56%**

Note: Table figures represent mathematical rounding

Yield increase from 21 days plucking interval to the optimal 7 days plucking interval

Factory	FFS 1	FFS 2	FFS 3	FFS 4	FFS 5	FFS 6	FFS 7	Average
Gachege	78%	35%	152%	-	-	-	-	**88%**
Kanyenyini	98%	96%	70%	125%	87%	140%	-	**103%**
Kathangariri	113%	82%	91%	103%	84%	82%	77%	**90%**
Kiegoi	119%	22%	19%	247%	48%	42%	94%	**85%**
Kinoro	98%	91%	70%	125%	87%	90%	-	**94%**
Ragati	123%	-	-	-	-	-	-	**123%**
Total								**93%**

Note: Table figures represent mathematical rounding

Appendix 6
Kenyan minimum wage

The minimum wages for different group of workers established by the Kenyan government can be found in the Labor Institutions Act (Special Issue, Kenya Gazette Supplement № 68, 2 July, 2012, http://www.labour.go.ke/index.php?option=com_docman&task=doc_download&gid=21).

The following the quotation is from the 2008 Country Reports on Human Rights Practices/Kenya, U.S. Department of State (http://www.state.gov/j/drl/rls/hrrpt/2008/af/119007.htm):

"There is no national minimum wage. However, the government established minimum wages by location, age, and skill level. In many industries the legal minimum wage equaled the maximum wage. The lowest urban minimum wage was approximately 7,578 shillings ($105) per month, and the lowest agricultural minimum wage for unskilled employees was 2,536 shillings ($35) per month, excluding housing allowance. In 2007 the Productivity Center of Kenya, a tripartite institution including the Ministry of Labor, the Federation of Kenyan Employers, and COTU, set wage guidelines for various sectors based on productivity, inflation, and cost of living indices. The minimum wage did not provide a decent standard of living for a worker and his or her family. Most workers relied on second jobs, subsistence farming, other informal work, or the extended family for additional support. A large percent of the labor force worked in the informal sector and were not covered by these provisions".

Appendix 7
Pilot factories

General information on the four pilot factories, Ngere, Mungania, Momul and Nyansiongo:

General Information	Ngere	Mungania	Momul	Nyansiongo
Production (2011 kg)	23,705,517	21,464,885	20,064,000	13,478,028
# of farmers	7,583	9,186	12,542	12,630
# of buying centers	78	58	65	68
Year of beginning of FFS	2006	2006	2006	2006
# of TESA	3	5	6	4
# of bushes	21,464,885	14,000,000	30,000,000	22,811,506
Duration of school (month)	18	12	12	12
Average number of farmers per school	30	21	30	30
# of subgroups	3	3	5	5
Compensation of LF for internal audit	450	500	400	400
# of FFS per TESA	2	2	2	2
Total # of FFS	17	26	13	14
Graduated FFS	11	16	6	6
# of lead farmers	25	30	31	15
average # of factory staff	140	120	150	155
# farmers audited LF (per day)	8	8	10	10
Year of obtaining RA certificate	2009	2009	2009	2009
TESA compensation per hour	168	160	125	216

Appendix 8
Acronyms

DFID	The UK Government's Department for International Development (DFID)
ETP	Ethical Tea Partnership
FFS	Farmer Field School
FSC	Field Service Coordinator
LF	Lead Farmer
GAP	Good Agricultural Practices
GL	Green Leaf
IDH	The Sustainable Trade Initiative
KNVKT	Koninklijke Nederlandse Vereniging voor Koffie en Thee (Royal Dutch Coffee and Tea Association)
KTDA	Kenya Tea Development Agency
MDG	Millennium Development Goal
PPE	Personal Protective Equipment
RA	Rainforest Alliance
TESA	Tea Extension Service Agent
TIP	Tea Improvement Program

Contact

The Sustainable Trade Initiative (IDH)
Utrecht, The Netherlands
www.idhsustainabletrade.com
office@idhsustainabletrade.com

powered by idh