The True Price of Tea from Kenya

Joint report by IDH and True Price

True Price™

the sustainable trade initiative

“By painting a picture of the major issues in the sector and their severity, IDH is able to quantify the impact of the issues now and over time, developing a targeted strategy that generates the most change.”

Dave Boselie

Senior Expert Learning & Innovation at IDH

About True Price

True Price is a social enterprise that aims to contribute to a circular and inclusive economy that creates value for all people by providing the information needed for such an economy. True Price helps organizations – multinationals, SMEs, NGOs, governments – quantify, value and improve their economic, environmental and social impacts. True Price works directly with organizations by providing research services. In addition, True Price enables organizations to measure their impact through a multi-stakeholder platform that develops open source methods for impact measurement that are relevant, sound and inclusive.

For more information visit:
www.trueprice.org

About IDH

IDH, the Sustainable Trade Initiative, accelerates and up-scales sustainable trade by building impact oriented coalitions of front running multinationals, civil society organizations, governments and other stakeholders. Through convening public and private interests, strengths and knowledge, IDH programs help create shared value for all partners. This will help make sustainability the new norm and will deliver impact on the Millennium Development goals.

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Preface IDH: Why this study?

The mission of IDH, the Sustainable Trade Initiative (IDH)

IDH, the Sustainable Trade Initiative (IDH), is a public private partnership facility, which co-invests into value chains with private sector companies. These investments address threats to environmental and social sustainability, such as; deforestation, water pollution, low income of farmers, underpayment of workers, lack of decent work practices, health & safety problems for producers and consumers. As continual improvement of the monitoring of our investments is a top priority for IDH, we are on the look-out for innovative methodologies, which provide meaningful measurements.

About the True Price Methodology

We feel the True Price methodology does just that, quantifying the externalities we strive to address and providing a tool for comparison across sectors. It provides the analytical tools to understand the key externalities in a sector and evaluate the severity of those externalities in simple, monetized terms. The methodology shows how external costs are divided over the supply chain, creating a uniform language and perspective for quantifying issues that are almost ethically impossible to significantly compare or aggregate. For example, how to compare the impact of child labor versus deforestation in the cocoa sector in West Africa (representing subsequently an estimated 11% and 13% as share of the total external costs of cultivation – see cocoa report)

Benefits of the Methodology

The True Price analysis also allows for cross-sector comparisons, for example, by expressing the gap between the price associated with the impact of the externality and end-market prices. In situations where the True Price gap is only 1 or 2% of the consumer facing price, a real price increase could be one of the feasible strategies to successfully address the externality. In the case a True Price gap is 30% of the consumer price, a more systemic change to the value chain may be required.

These types of insights can help us set the investment agenda and facilitate collaboration with the private sector. By painting a picture of the major issues in the sector and their severity, IDH is able to quantify the impact of the issues now and over time, developing a targeted strategy that generates the most change. The results are also highly relevant for the other stakeholders in our partnership, including public sector and civil society organizations, who play a role developing the enabling environment for sustainable commodity production.

Limitations and Next Steps

We are optimistic with the findings of these reports and the methodology used to develop them. Four analysis have been prepared for the sectors– cotton, cocoa, tea and coffee. As will be explained in the following sections, the first analyses have had many constraints in terms of data availability and data quality, and therefore did not allow for a robust statistical difference-in-difference (DID) analysis.

Nevertheless, the findings have shown us eye-opening details and dilemmas in our programs. Through publishing these first results, we invite our partners and key stakeholders to connect with us, and join the discussion.

Enjoy reading!
Dave Boselie
Senior Expert Learning & Innovation at IDH

Executive Summary

- In this study the external costs of the tea supply chain (smallholder cultivation in Kenya) were investigated to inform decision making for IDH's tea program. The external costs of conventional green leaf were compared to green leaf grown by smallholder farmers active in the Farmer Field School (FFS) program. Attribution of impact to the FFS training program was out of scope.

- External costs are costs caused by **economic activities which are not reflected in the prices** charged for the goods and services being provided. External costs can be classified as environmental costs if they have a direct effect on the environment and as social costs if they have a direct effect on the well-being of people.

- The cultivation of smallholder tea in Kenya has total **external costs of €0.70/kg green leaf**. By summing up the external costs with the farm gate price (€0.35/kg green leaf), a true price of €1.05/kg green leaf is obtained.

- 79% of the total external costs of cultivation on the conventional farm are social costs, **29% are due to underpayment** of hired and family workers. The other largest external cost drivers are lack of social security, water pollution, and child labour.

- Compared to other sectors (Ivorian cocoa, Vietnamese coffee, Indian cotton), the external costs of tea cultivation in Kenya are relatively low per kg of farm product.

- The total external costs of cultivation, transportation and processing are **€1.10/kg green leaf**.

- The **cultivation phase accounts for 65% of the total external costs** of the tea supply chain.

- 21% of total external costs of cultivation, transportation and processing result from **fuel wood burned at the tea factory** as energy supply for processing.

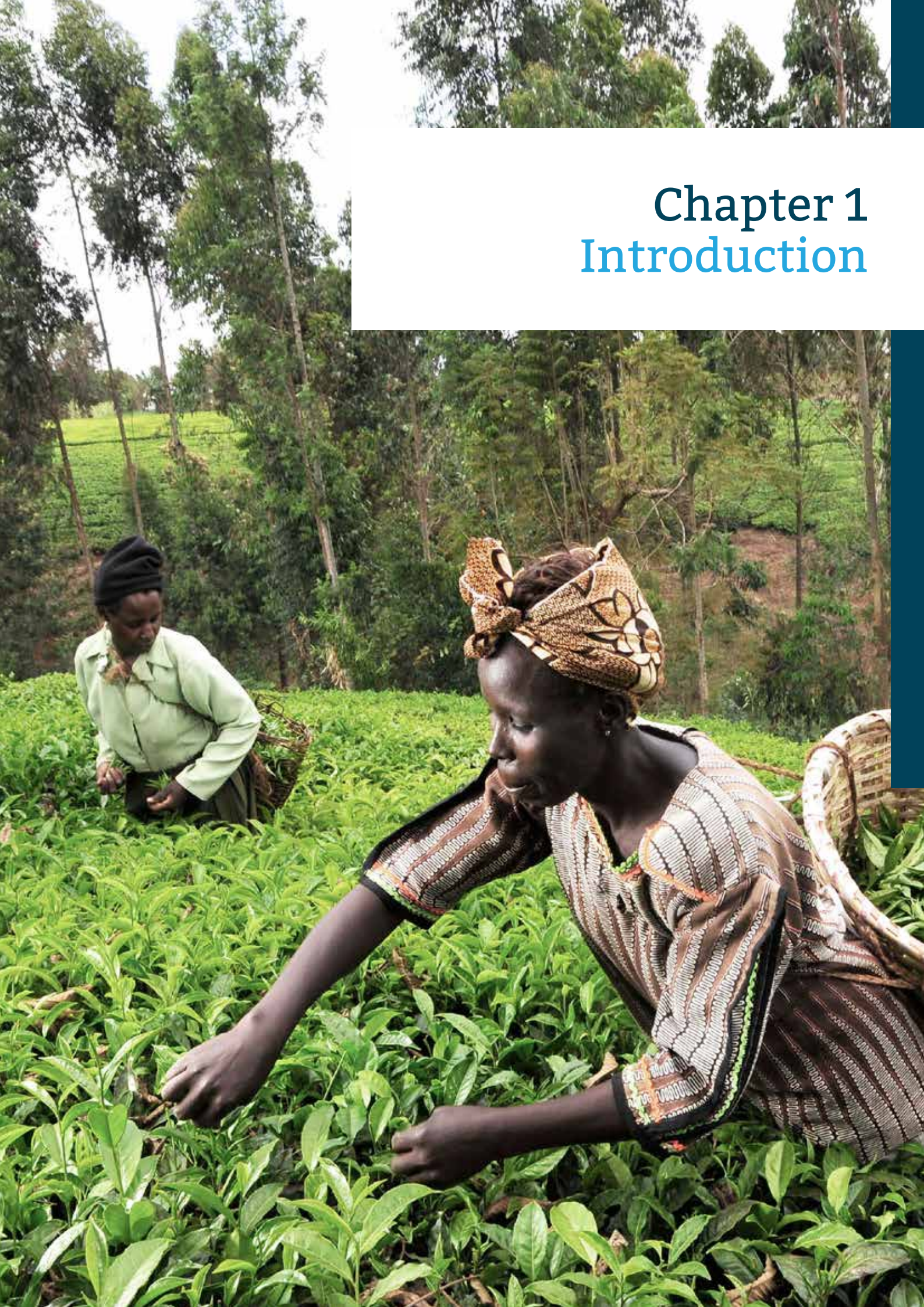
- Green leaf from a **FFS farm has 29% lower external costs** of cultivation than conventional green leaf. 40% of this difference is due to higher productivity of FFS smallholders, 10% by improved environmental conditions and 50% by improved social conditions. There are demonstrably higher wages, less accidents and lower fertilizer use on FFS farms.

- FFS farms are on average **24% more profitable than conventional farms**, with a yearly profit of €1,570/ha vs. €1,940/ha.

- Raising wages up to **living wage standards** has the potential to further decrease the external cost of FFS green leaf cultivation by 16%. Using a **net-zero deforestation** strategy in the forests west of the Rift Valley has the potential to further decrease external costs of FFS green leaf cultivation by 7%.

- **Future impact research is needed** for FFS and conventional farms, especially on wages, discrimination, child labour and social security. This would improve the robustness of the results of this study and enhance the quality of future decision making around interventions and investments.

Contents



Chapter 1
Introduction

1.1 Context and challenge

Following China and India, Kenya is the third largest tea producing country in the world, only selling 5% of production on its domestic market. About 10% of global tea production comes from Kenya (Monroy et al, 2012). To provide an idea of its magnitude, in 2014 the Kenyan national tea production reached nearly 445,000 tons of dry tea (TBK, 2014). Tea export accounts for 25% of Kenya's total agricultural export income (Monroy et al, 2012).

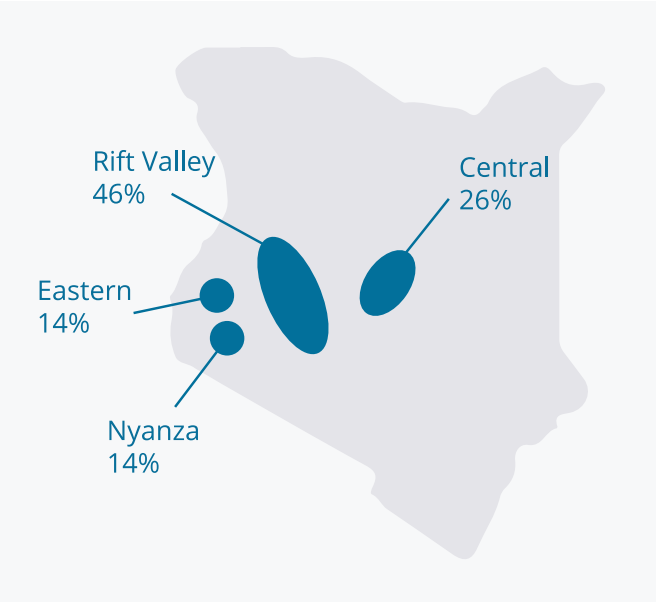


Figure 1 Main tea producing areas in Kenya (based on Monroy et al (2012)

While tea is also grown on large plantations, tea production in Kenya is predominantly in the ownership of smallholders. The smallholder sector accounts for 60% of the total tea production in Kenya and 65% of the area harvested (IDH, 2011). About 550,000 small scale tea farmers manage farms varying in sizes between less than 0.5 and 3.5 hectares (KTDA, 2014). These smallholders are both the suppliers and shareholders of the tea processing factories, which are owned by the Kenya Tea Development Agency Ltd. (KTDA), a private company that evolved from an initiative set up by the government. The Kenyan tea industry and all aspects of tea growing, research, manufacturing, trade and promotion are regulated by the Tea Board of Kenya (TBK). This governmental body was established in 1950 under the Tea Act (Cap 343) of the laws of Kenya (TBK, 2015).

Tea is an interesting crop for small-holders in Kenya due to a combination of factors (IDH, 2011; IFC, 2014). Kenya's favourable weather and soil conditions and the fact that tea is cultivated from an evergreen bush, makes it possible to harvest tea all year round. While it can take between 5 to 7 years after being planted for the tea bush to become productive for commercial purposes, the plant can remain productive for over 100 years. Large investments in machinery and irrigation are not necessary for small scale growing.

However, tea farmers are the most vulnerable in the supply chain with a few multinationals holding a large market share. Tea is exported following primary processing. This means that secondary processing such as blending and packaging as well as marketing are mainly carried out by large brands in consumer countries (Ethical Consumer, 2013). Those are the most profitable stages in the overall value chain with only about 10% of the value added captured by the producing country (Baffes, 2014). The market is characterized by a concentration of buyers, with 85% of the sales coming from four companies. This provides a degree of monopsony power to the buyers vis-à-vis local producers. (IDH, 2011).

Global issues in the tea sector are high fertilizer and pesticide application rates, energy intensive processing and decrease of biodiversity caused by mono-cropping. Fortunately, tea grown in Kenya requires low application of pesticides compared to other tea producing regions, due the particular tea breeds used in cultivation and the high altitude at which tea is grown (Agritrade, 2013). Aside from its environmental impact, cultivation of this crop has a large social impact. Social issues such as poor wages, lack of social and job security, long hours, and gender discrimination are high on the agenda of various NGOs and standard-setting

organisations operating in the Kenyan tea sector (War on want, 2011). Smallholder farms largely depend on family labour but also employ hired labour. These workers are often employed on a casual basis (Karanga, 2014).

Smallholders in the Kenyan tea sector face several challenges. First of all, power in the supply chain is highly concentrated on the buyer side. This puts pressure on the prices paid to the producers which remain low relative to the retail price (Ethical Consumer, 2013; IDH, 2011). Secondly, smallholder yields are currently lagging those of large estates, partly due to inefficient use of resources as a result of a lower knowledge level regarding optimal input use and good agricultural practices (Owuor, 2005). These suboptimal yields affect farmer income and thus absorption capacity at farm level to increase wages and invest capital in the farm.

Fortunately, efforts to improve the situation in the Kenyan tea sector are being made. Retailers and brands are strengthening their sustainable procurement criteria and a large part of the tea currently sold to the end consumer is certified (Ethical Consumer, 2013). Voluntary Standards Systems address social performance, environmental performance, or both, thus putting pressure on the sector to mitigate social and environmental issues. One example of an initiative following from the need to address social and environmental issues is the Farmer Field School (FFS) program. The goal of this program is to reach 17% of the farmers by 2015 in a public-private partnership between Unilever, KTDA, and IDH. This training program aims to professionalize farmers and at the same time mainstream certification (LEI Wageningen, 2014). On governmental level, action is taken by the Tea Board of Kenya (TBK) to influence activities during the primary processing stage. The TBK requires all tea processing factories to apply for a license before being allowed to process tea. This administrative barrier makes it easier for the TBK to monitor compliance with (sustainable) production standards and protocols. The TBK also facilitates research aimed at improving planting material, yields, quality and pest control and in addition provides advisory services to growers through field visits, demonstrations, and publication of research findings (TBK, 2015).

1.2 Goal and scope of research

One barrier to reducing social and environmental costs effectively is the lack of quantitative assessments of the size and materiality of the various environmental and social externalities of tea production in Kenya. Such information is needed to make well informed decisions and steer future interventions. Moreover, it is valuable to know to what extent FFS training reduces the externalities of tea cultivation, and how standard-setting and other organisations can allocate their resources most efficiently.

This study aims to contribute to these challenges by measuring and valuing the environmental and social externalities of the tea supply chain and by comparing conventional tea cultivation to FFS farm tea. “An FFS farm” refers to a smallholder plantation owned by a farmer enrolled in the FFS program. Central to this training is transfer of knowledge and tea management practices in order to increase green leaf productivity, diversify activities and optimize input use (LEI Wageningen, 2014). The sustainability of tea production is improved by increasing the adoption of Good Agricultural Practices (GAPs). FFS training is led by KTDA staff or already graduated FFS farmers assisted by the KTDA (LEI Wageningen, 2012). All FFS farms have as well achieved Rainforest Alliance certification. “A conventional farm” refers to a farm that is owned by a farmer who has not attended the Farmer Field School.

The goal of the present study is to provide the information needed with which IDH and other

supply chain actors in the tea sector (smallholder farmers, businesses, NGOs, standard-setting organisations, governments) can make informed decisions about sustainability. Identifying solutions or assessing the impact of providing farmers with FFS training are out of scope.

This report provides an answer to the following research questions:

1. What is the size of the external costs[1] of tea production in Kenya?
2. What are the most material externalities?
3. How are external costs divided over the tea supply chain?
4. Is there a difference between FFS farm vs. conventional tea?

The scope of this research is presented in Figure 1. It includes all environmental and social externalities that were considered material and for which data was available. For the cultivation phase, both conventional and FFS farm production are investigated. The study focuses on smallholders, as they account for 60% of tea production (IDH, 2011).

A highly in-depth research was executed for the cultivation phase, as this is the main focus of IDH's commodity programs and, as such, future interventions can be most easily realized. The transportation, processing and consumption phases have a less rigorous nature and were included in this study to place the external costs of the cultivation phase into perspective. Indirect players that also contribute to the external costs of the end product, such as financial institutions and suppliers of equipment, were excluded from the scope.

In this study, possible benefits of the tea supply chain – such as consumer pleasure, job creation and infrastructure – are not taken into account. Priority was given to provide a comprehensive

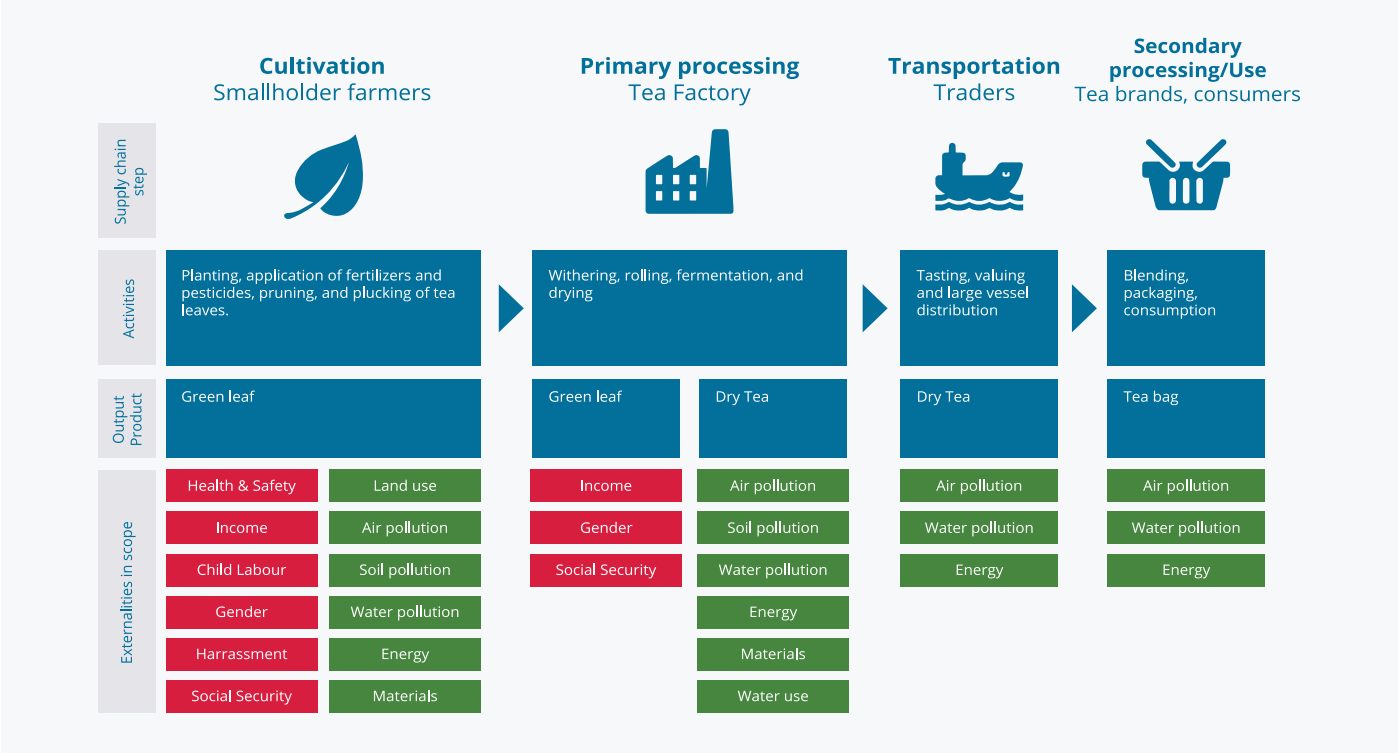


Figure 2 scope of the True Price study [2]

overview of the external costs instead of mapping costs and benefits on a more coarse level. The main reasons for this choice is that most challenges in the tea sector relate to external costs. Benefits (such as consumer satisfaction) are expected to be internalized in prices to a much higher degree than costs, as economic actors have an incentive to do so. In addition, the data requirements and assumptions necessary to measure external benefits are higher than for external costs.

It is important to note that this study does not attribute differences in external costs to the intervention. The difference in external costs between conventional tea and tea cultivated by FFS trained farmers in this report can be liable to selection effects. For example, farmers with better social conditions might choose to participate in training programs such as FFS more easily than farms with less favourable social conditions. This means that differences in external costs between FFS and conventional farms need not have a causal connection to receiving FFS training. Similarly, a lack of difference does not necessarily imply that FFS training has no impact.

This study is part of a series of four studies with a similar goal and scope, but focusing on different commodity groups: coffee from Vietnam, cocoa from Ivory Coast and cotton from India. The results of these studies are useful to place the tea supply chain into perspective.

1.3 Roadmap of the report

The aim of this report is to provide a condensed overview of the true pricing study conducted for tea from Kenya. Following this introduction, a brief explanation of the key concepts, such as externalities and true pricing, is provided. Afterwards, the main results and insights of the study are presented. These results are placed into a larger perspective by looking at the retail level ('What is the true price of a cup of tea?') and by comparing the results of tea to three other country-specific commodity supply chains: coffee from Vietnam, cocoa from Ivory Coast and cotton from India. In addition, this section presents the main limitations and assumptions of this study. The final section concludes with an overview of how these results can be used to improve social and environmental externalities of the tea supply chain.

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1 Results of external costs in this study are rounded off to €0.05

2 The externalities in scope refer to the entire supply chain step, of which there are four, and not to the activities.

Chapter 2
What is a true price?

2.1 What are externalities?

External costs are costs caused by economic activities which are not reflected in the prices charged for the goods and services being provided. External costs can be classified as environmental costs if they have a direct effect on the environment and as social costs if they have a direct effect on the well-being of people.

In this study, we define externalities as the effects of economic activities on others, expressed in an array of different units and footprints. When externalities are valued and monetized, they are called external costs.

An overview of externalities taken into account in this study are presented in Figure 3. Each externality (such as land use or health and safety) typically contains several indicators that are considered when monetizing the externality.

Category	Externalities	Specification
Resource use	Land use	Land conversion and land occupation
	Water use	Use of scarce water
	Energy	Use of non-renewable energy
	Materials	Use of scarce materials
Pollution	Water pollution	Eutrophication, acidification, marine ecotoxicity and freshwater ecotoxicity
	Air pollution	Greenhouse gas emissions and other hazardous air pollutants
	Soil pollution	Terrestrial ecotoxicity and human toxicity
	Waste	Waste and type of treatment
Workers	Health & Safety	Occupational accidents and breaches of H&S standards
	Income	Underpayment of hired labour (living wage) and family labour (living income)
	Child labour	Hazardous and non-hazardous child labour
	Forced labour	Forced adult and child labour
	Discrimination	Subdivided into gender and other types of discrimination (religion, race...)
	Harrassment	Sexual and non-sexual harrassment
	Social security	Social security provision, including annual, sick, maternity and paternity leave
	Freedom of association	Freedom for workers to form and/or join unions
	Overtime	Excessive working hours
Society	All social externalities that have an impact on society at large (dependant on scope)	

Figure 3 Overview of social and environmental externalities

2.2 What is a true price?

The true price of a product reflects the visible as well as the hidden costs of its production. It is defined as the sum of the retail price and the unpaid environmental and social costs.

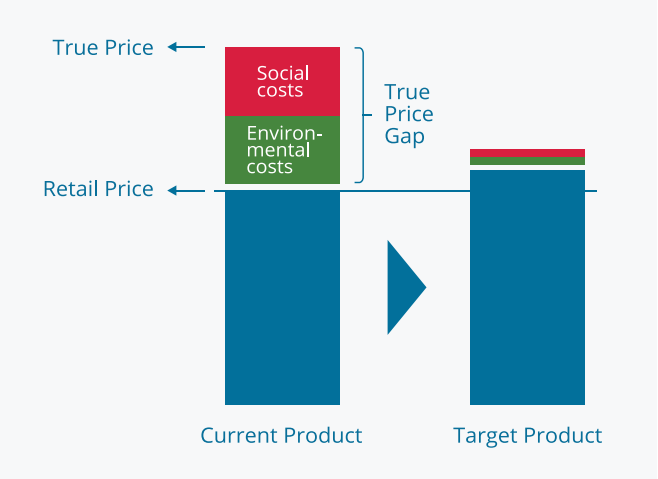

Figure 4 Reducing the true price of a product

These environmental and social costs are monetized in various ways. The main techniques can be separated into damage costs approaches (monetizing the welfare effects of an externality) and abatement costs approaches (monetizing the costs to prevent or restore a negative externality).

For environmental costs, one can mostly use existing approaches. For example, the impact of greenhouse gas emissions on society is often monetized by multiplying the kg of CO_2 equivalent emissions by a Social Cost of Carbon (SCC). The SCC is an estimate of the monetized damages associated with an incremental increase in carbon emissions in a given year. Recent SCC estimates can be found predominantly in a range from $43 to $220 per tonne of CO_2 equivalents (US IAWG 2013, Moore & Diaz 2015). This range can be explained by the variation in complexity of calculation models (and included effects on society) and the applied time frames and discount rates. This study uses a cost of $110 per tonne of CO_2 equivalents, which is around the average of the range.

Social costs are usually more challenging to monetize, although the techniques used to value social costs follow the same logic as those used to value environmental costs. For example, if occupational accidents occur, the damage costs of these accidents can be monetized by taking into account loss of life quality and lost time. Abatement costs would also include medical expenses needed to treat the person.

In this study, the true price method for monetizing external costs, which uses a combination of damage and abatement costs techniques, was employed.

In order to calculate a true price, three steps are needed:

1. Make an inventory of relevant environmental and social data
   - Examples of environmental data: energy use per ha, fertilizer application per ha, types of fertilizers used…
   - Examples of social data: hourly wage of workers, % of child workers…

2. Measure environmental and social externalities of production
   - Convert all gathered input data to actual environmental and social footprints

3. Calculate the costs of each externality to society
   - Multiply all environmental and social footprints with their corresponding costs to society

For an overview of the principles underlying the true price method, we refer to the Principles on Impact Measurement and Valuation (True Price, forthcoming).

2.3 Why calculate a true price?

The aim of calculating a true price is to manage risks, steer innovations and reduce social and environmental costs by improving transparency throughout the entire supply chain of a product.

By using information on external costs, businesses can improve the social and environmental impacts of their own operations and their supply chain. In addition, for businesses, externalities are becoming revenue and cost drivers as they are increasingly getting a price. The underlying driver of this trend is that externalities are being internalized at increasingly higher rates due to lower transaction costs[3], consumer demand for sustainable products and more effective regulation (True Price, Deloitte, EY, PwC, 2014).

There are various bottom-line benefits for producers from information that a true price provides:

1. **Risk management:** control and reduce risks in the supply chain due to future cost increase and regulation

2. **Cost reduction**: identify projects that are both sustainable and increase resource efficiency to reduce costs

3. **Innovation:** Identify alternative modes of production, that are more sustainable and cost-effective

4. **Branding:** communicate superior social and environmental performance of a product

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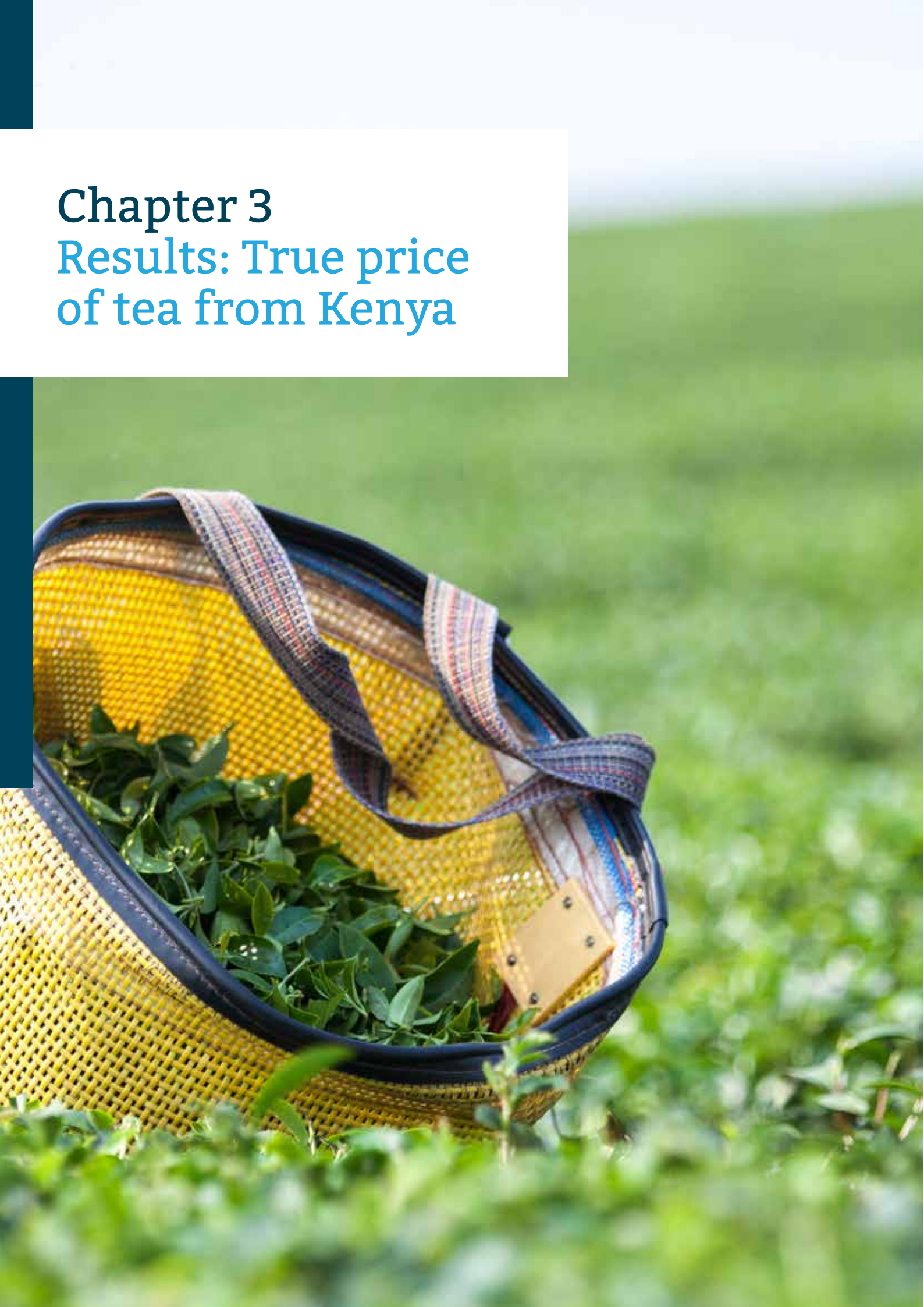
3 Transaction costs are the costs of providing for some good or service through the market rather than having it provided from within the firm.

Chapter 3
Results: True price of tea from Kenya



3.1 Size of external costs of tea cultivation

The calculated true price of conventional green leaf is €1.05/kg green leaf. This is the sum of the farm gate price (€0.35/kg green leaf) and the external costs of cultivation (€0.70/kg green leaf). The latter is also called the true price gap.

The true price gap is twice as large as the farm gate price of green leaf. This shows that at farm level there are substantial hidden costs relative to the market price. Social costs account for 79% of total external costs of cultivation. Environmental costs are relatively low, mainly due to low pesticide application rates and the fact that there is neither substantial water nor energy use at farm level.

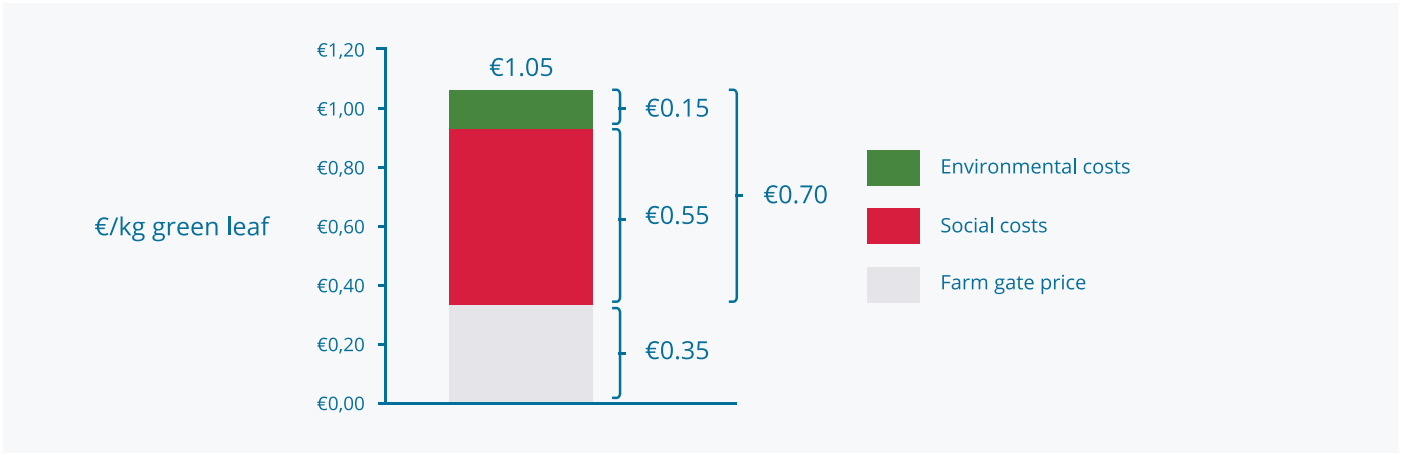


Figure 5 True price of 1 kg green leaf

3.2 Most material externalities of tea cultivation

The most material externalities during the cultivation of conventional tea in Kenya are income, child labour, social security, and water pollution.

- **Income (29%)**: the largest external cost during cultivation is caused by underpayment of hired workers as well as underearning of family workers.
- **Child labour (23%)**: the use of child labour is a concern during cultivation, with an estimated 15% of total farm labour being child workers.
- **Social security (14%)**: Lack of social security is a big issue throughout the tea supply chain. This is mostly due to the casualization of labour both on the farm and in the tea factory.
- **Water pollution (12%)**: the largest environmental cost is water pollution, mostly due to eutrophication caused by high fertilizer application rates.

3.2.1 Income

Underpayment of hired workers and underearning of smallholder farmers constitute the largest external cost in tea cultivation in Kenya. Hired workers receive an average annual wage of €1,080 (per FTE), which is 62% of the living wage. Family workers earn an average annual income of €1,340 per FTE, which is 77% of the living income[4]. The annual living wage for a Kenyan worker in a rural setting, as calculated by True Price, is €1,750/FTE. The fact that neither family nor hired labour earns sufficient money to provide decent living conditions for their household is problematic for the families themselves but also can trigger other social issues, such as child labour (Potts, et al., 2014).

It is challenging for farmers to pay their workers higher wages, as they themselves do not earn a living income. Raising legal minimum wages, adjusting tax and subsidy structures, increasing farm productivity (e.g. by adopting GAP's) and raising minimum green leaf prices are a few possible routes in decreasing the external cost of income.

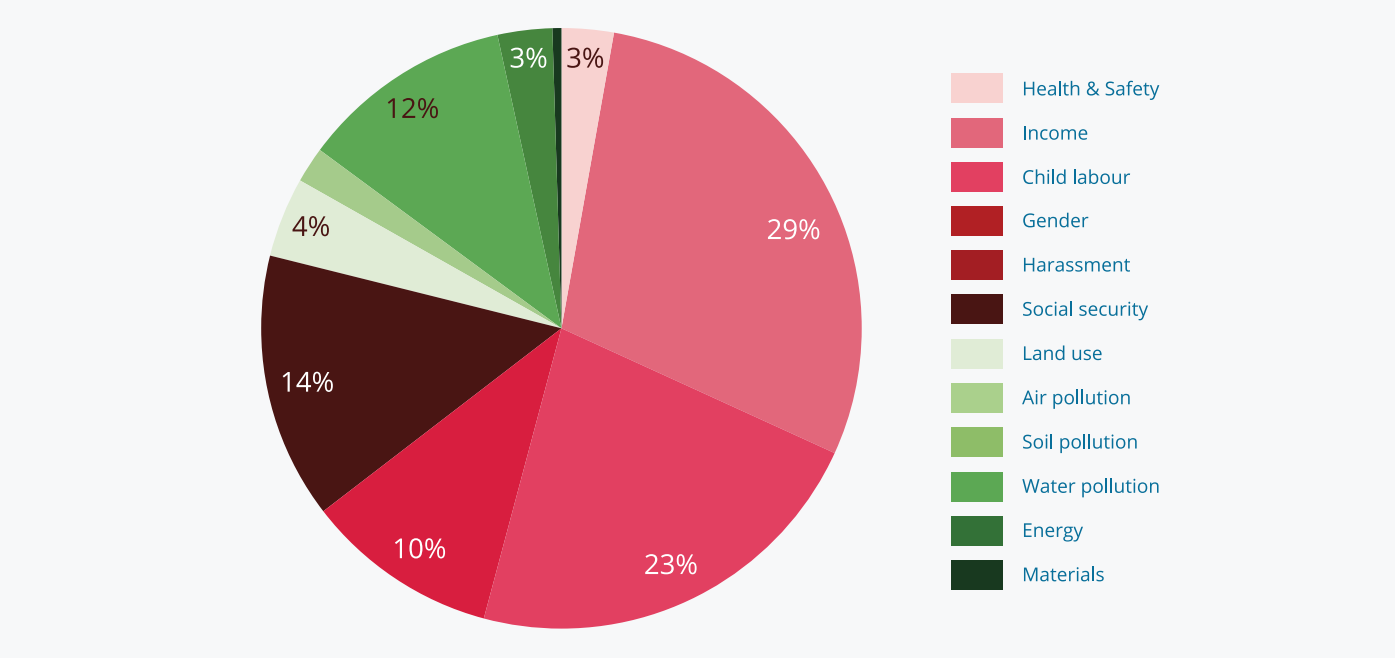


Figure 6 Share of each externality in the total external costs of cultivation

Currently the minimum agricultural wage for unskilled labour in Kenya is €675/FTE (Business Daily, 2015). This minimum wage is about 40% of the living wage. Raising this minimum wage further to better reflect the cost of living in Kenya would be an answer to underpayment of hired labour. Increasing yields and raising farm gate prices for green leaf are solutions effectively increasing farmer income and thus absorption capacity to invest in higher wages.

3.2.2 Child labour

Child labour is an issue in Kenyan agriculture with 15% of total farm labour being child workers. This number is an estimation based on tea sector specific, agricultural, and national statistics[5]. It is difficult to pin down the number of child labourers as the data available is often not sector specific and generally has a large range.

Recently the government increased its efforts and support for social protection programmes focussing on orphans and vulnerable children. In 2012 the Basic Education Bill passed, that strengthened compulsory basic education. There is some work to be done in terms of legislation for legal penalties for forced labour and committing resources to enforcement (Bureau of International Labor Affairs, 2013.

3.2.3 Social security

Lack of social security is an issue throughout the tea supply chain. This is mostly due to the casualisation of labour both on the plantation and in the tea factory. Smallholders rely on a combination of hired and family labour; in total 33% of the labour is hired labour (Van Der Wal, 2008). Casualisation is a concern because the workers are not guaranteed job security or other benefits permanent workers have a right to. Examples of such benefits are maternity leave, sick leave, and pension rights. Stricter legislation and control on casual and temporary workers by the government would be a big step forward in addressing this issue.

3.2.4 Water pollution

Cultivation of tea in Kenya requires significant fertilizer input (LEI Wageningen, 2014). Extensive use of fertilizers result in high concentrations of nutrients, especially nitrogen and phosphorus, in agricultural runoff. Nitrates are discharged to water bodies through leaching and surface run-off and are an important source of eutrophication.

The conventional farm applies on average about 355 kg NPK per hectare per year and 2,155 kg manure. Of the total amount of fertilizer applied on the tea farm, 86% is organic. On the FFS farm the average application rates of NPK are 320 kg per hectare per year complemented by 1,245 kg manure (LEI Wageningen, 2014). Organic fertilizer has a lower environmental impact compared to synthetic fertilizer in terms of materials use and energy required for production as it is an otherwise unused by-product of livestock. However, it is as well responsible for nitrogen and phosphorus in agricultural runoff.

3.3 Division of external costs over the tea supply chain

In the Kenyan tea supply chain, cultivation accounts for 65% of the total researched external costs. Transportation of tea – within Kenya from storage to tea factory to Mombasa and to Europe for consumption – accounts for 5% of total external costs. Processing green leaf to dry tea at the tea factories has a share of 24% of the total. Of this 24% about 85% (21% of total) results from fuel wood burned at the tea factory as energy supply for processing[6]. Packaging takes place in Europe and accounts for the remaining 6% of the total external costs.

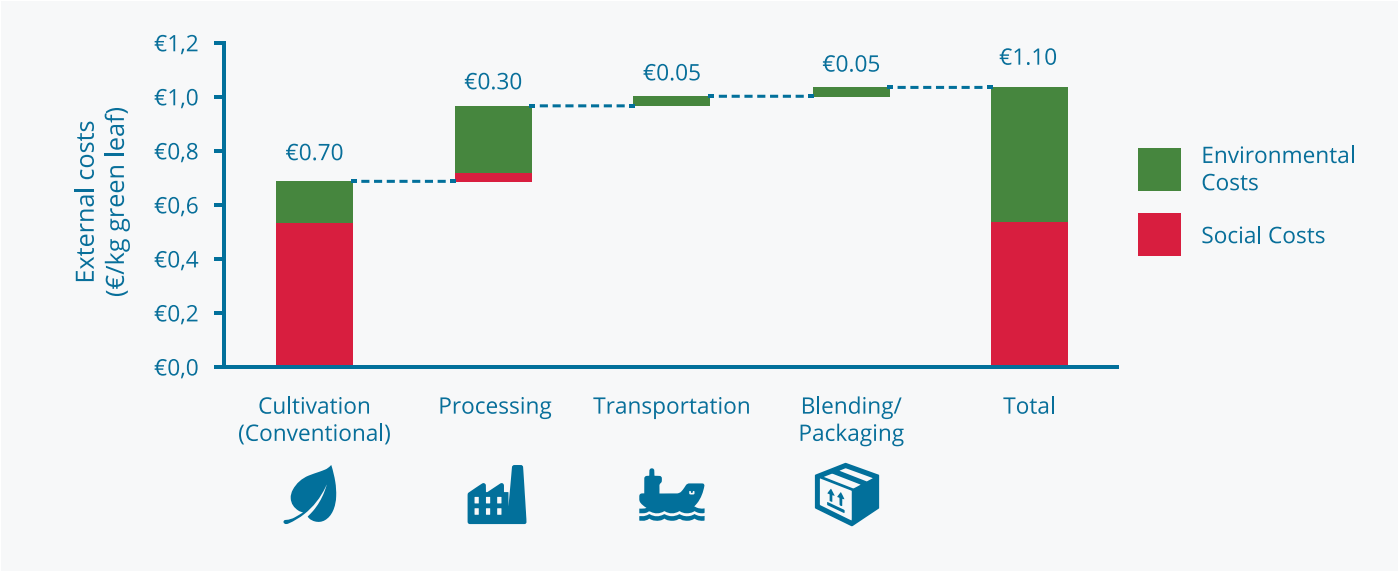


Figure 7 Division of external costs over the tea supply chain

3.4 Difference between FFS and conventional tea

In this research conventional tea was compared to tea from an FFS farm for those externalities for which data was available. For data points for which no distinctive data for FFS farms was available, it was assumed that they were the same as for conventional farms. As such, the outcomes of this comparison should be interpreted with care. It is plausible that tea from an FFS farm might have lower external costs than this research suggests. Also, it is important to realize that these results do not show the impact of farmer field schools, as they are not corrected for selection effects. For this an analysis is needed with a DID research design. This requires specific impact data for two groups of FFS and conventional (control) farms over multiple periods in time.

The external costs of cultivation of tea from an FFS farm are about 29% lower than conventional tea. 40% of this change is due to higher productivity of FFS farms, 10% due to improved environmental conditions and 50% due to improved social conditions. There are demonstrably higher wages, less accidents and reduced fertilizer use on FFS farms.

The largest issues on the conventional farm are income, child labour[7], and social security. On the FFS farm this picture is relatively similar. However, the size of these externalities relative to the total external cost, change: underpayment decreases from 29% to 16%, child labour increases from 23% to 27%, and social security increases from 14% to 17%. Raising both farmer income and wages of hired labour up to living wage standards has the potential to further decrease the external cost of FFS green leaf cultivation by 16% while on the conventional farm this potential is 29%. In chapter 7.1 this intervention is worked out in more detail.

FFS farms are on average more profitable than conventional tea farms. This can, for a large part, be attributed to higher yields, likely due to Good Agricultural Practices (GAP). The increased farmer income results in a decreased external cost of income (underearning) for family labour. It was found that on conventional farms a family worker has an annual income of €1,340 per FTE, whereas a family worker on a FFS farm earns €1,650 per year. Figure 9 represents the revenues, costs and net income for the average conventional and FFS farm.

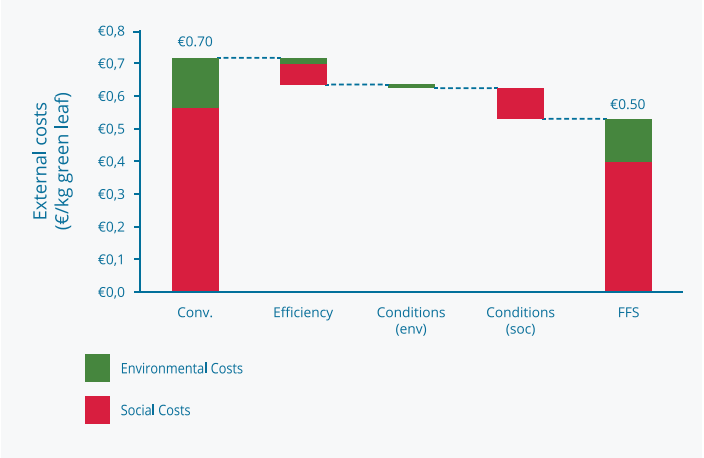


Figure 8 Difference in external costs for conventional and FFS tea

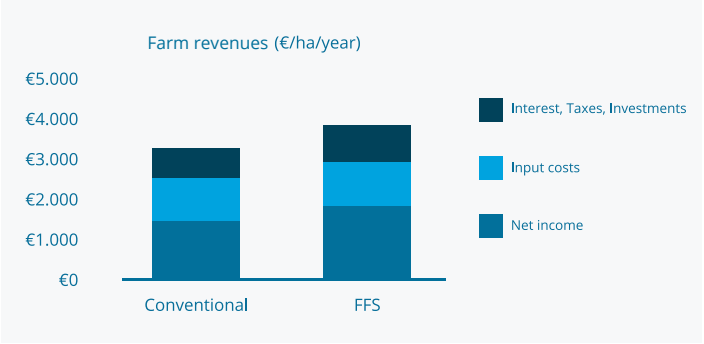


Figure 9 Revenues (split up in costs and net income) for the average conventional and FFS farm

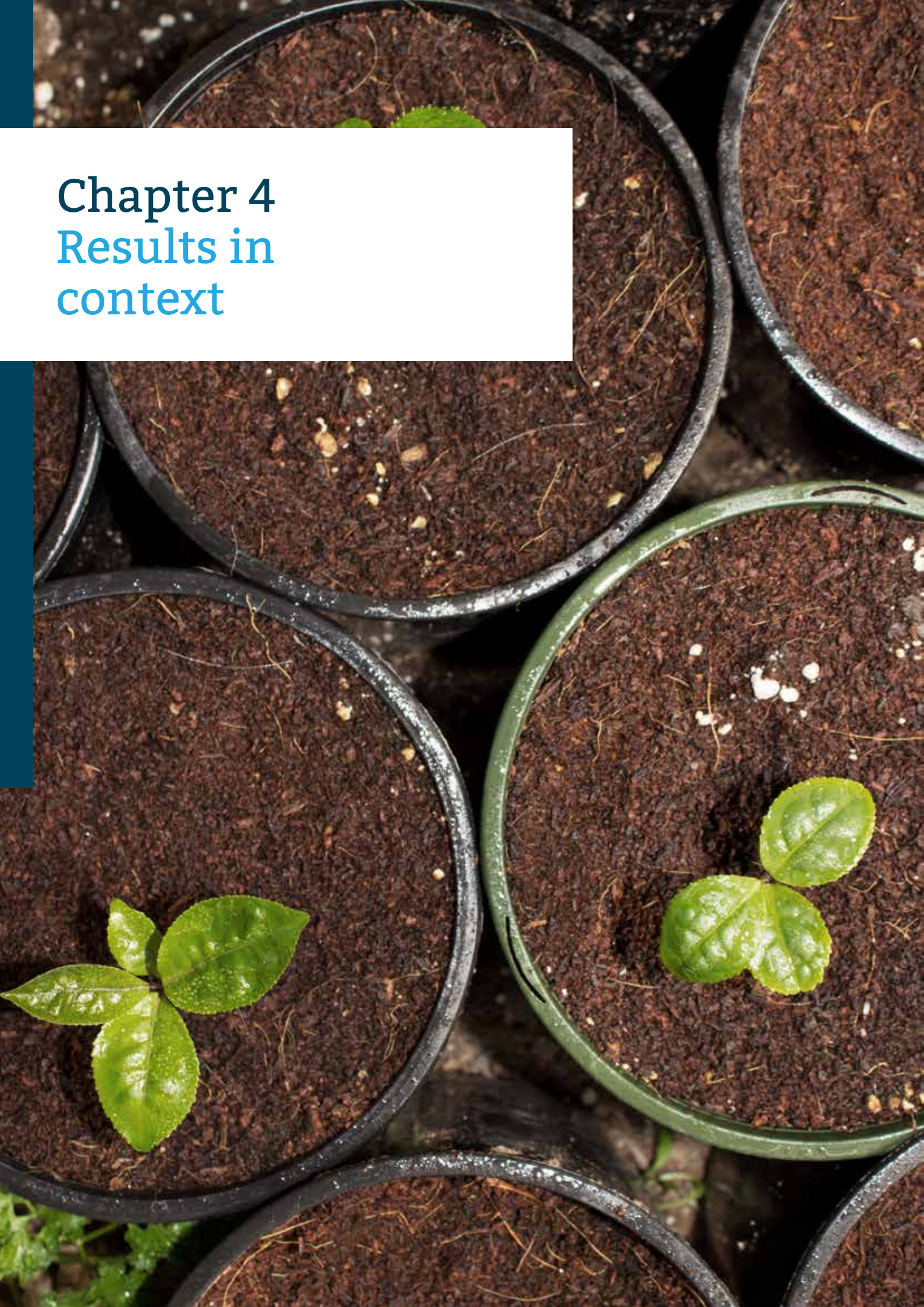
4 Both the living wage and the living income were calculated by True Price, based on a living wage basket, adjusted for taxes, insurance and other contributions. Household size is assumed to be 5 with 2 adults providing for 3 children.

5 Some estimates of the national levels are as high as 26% (Unicef, 2013) or even 30% (Van Der Wal, 2008) specifically for the tea sector.

6 In the Kenyan tea factories the main source of energy is biomass. While being a renewable energy source, 50% of the trees used for fuel wood is grown near a river thus depleting scarce water resources. It was found that certified tea factories use less wood per kg green leaf because of better storage facilities. However, as certification is not directly linked to the FFS program, the wood use in conventional tea factories was selected as a data source in this study.

7 Child labour rates for FFS farms are expected to be overestimated in this report, due to a lack of reliable and granular data

Chapter 4
Results in context



4.1 What is the true price of a cup of tea?

An interesting perspective arises, when considering the true price at retail level, in addition to farm level. The average retail price of a cup of tea (i.e. one tea bag of black tea) is estimated at €0.07[8]. The summed external costs of production (cultivation, transportation, processing, blending and packaging) of green leaf for a conventional cup of tea is €0.01. When including the external costs of consumption (scarce water use and energy use) the true price of €0.08 per cup of tea increases to €0.09 per cup. Packaging waste is assumed to have a negligible impact compared to the other externalities occurring throughout the supply chain. The largest contributor to the external costs of tea consumption is electricity use in order to boil water.

The true price per cup of tea as previously discussed and depicted in figure 10 is based on a cup of tea prepared and consumed at home. Taking a closer look at the relative size of the externalities compared to the retail price this comes down to about 25% of the retail price. When considering a cup of tea ordered in a restaurant or bar, the retail price will be around €2. Relatively to this retail price the external costs associated with the actual tea production are only 1%[9].

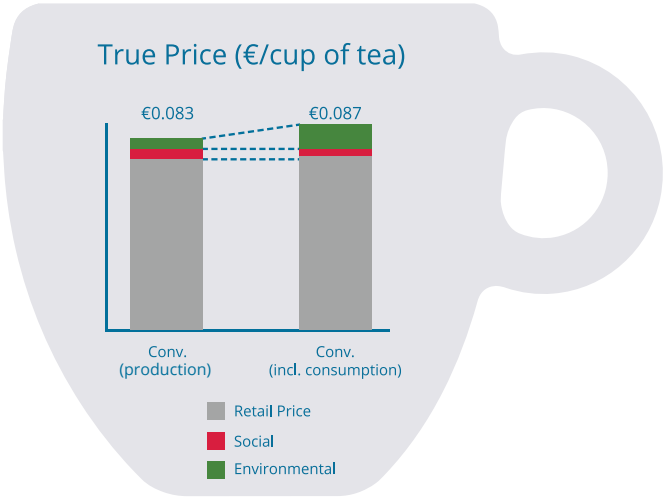


Figure 10 True price of a cup of tea

8 Retail price is based on tea from a multi-pack sold in a European supermarket (excl. cost of water and electricity required for the preparation). One tea bag of black tea contains 2 grams of dry tea.

9 Only externalities associated with tea cultivation, processing, and consumption are included. The externalities associated with the activities of the restaurant itself are not included.

4.2 How does tea compare to other sectors?

Simultaneously to this study, the true price of three other commodities were researched: coffee from Vietnam, cocoa from Ivory Coast and cotton from India. This allows for a comparison of external costs between sectors.

4.2.1 Farm level

Compared to other sectors, external costs of smallholder tea cultivation in Kenya are between 6.5 and 2.5 times lower than for Ivorian cocoa, Vietnamese coffee and Indian cotton cultivation respectively. Cocoa cultivation in Ivory Coast has the highest ratio of social to environmental costs. For cotton cultivation in India, but even more so for coffee cultivation in Vietnam, environmental issues predominate. In the Kenyan tea sector environmental costs are low compared to the social costs. This is mostly due to limited environmental externalities on farm level as no pesticides are applied, irrigation is not necessary, and no energy or machinery is used by the smallholders. This might change as climate and weather conditions change in the future.

Figure 11 also shows that cultivation of Kenyan tea leaves appears to be the most lucrative of the four commodities, with profits climbing up to €2,000 per hectare of FFS farm land. This is linked to the fact that tea from the Kenyan Rift Valley has high quality and relatively high yields, which are more than 20 times higher than for Ivorian cocoa beans.

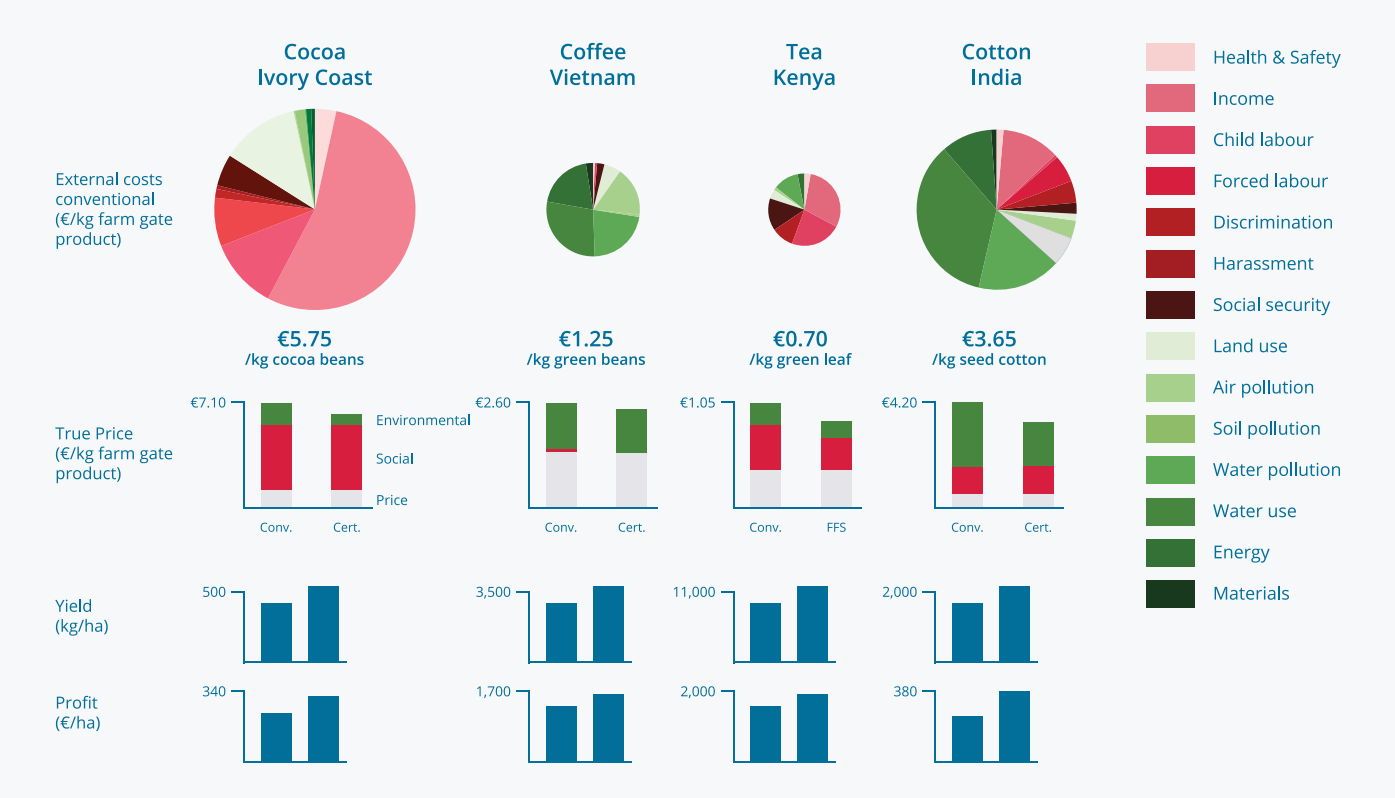


Figure 11 True farm gate prices of four country-specific commodities (conventional and certified) and their corresponding yields and profit values

4.2.2 End product level

The total external costs of cultivation, transportation and processing are €1.10/kg green leaf, which is about 10.5 times lower than for seed cotton (India), about 5.5 times lower than for cocoa (Ivory Coast), and about 1.8 times lower than for coffee (Vietnam).

Figure 12 shows how the retail prices of chocolate, roasted coffee, tea and cotton T-shirts relate to their corresponding true retail prices. It is important to note that the graphs only partially reflect the true price of chocolate as only the respective ingredient cocoa beans was taken into account. For example, the external costs of sugar and milk powder production and processing are not included in the true price gap of chocolate. However, it is clear that tea has a low true price gap compared to the other sectors, and chocolate has a relatively high true price gap.

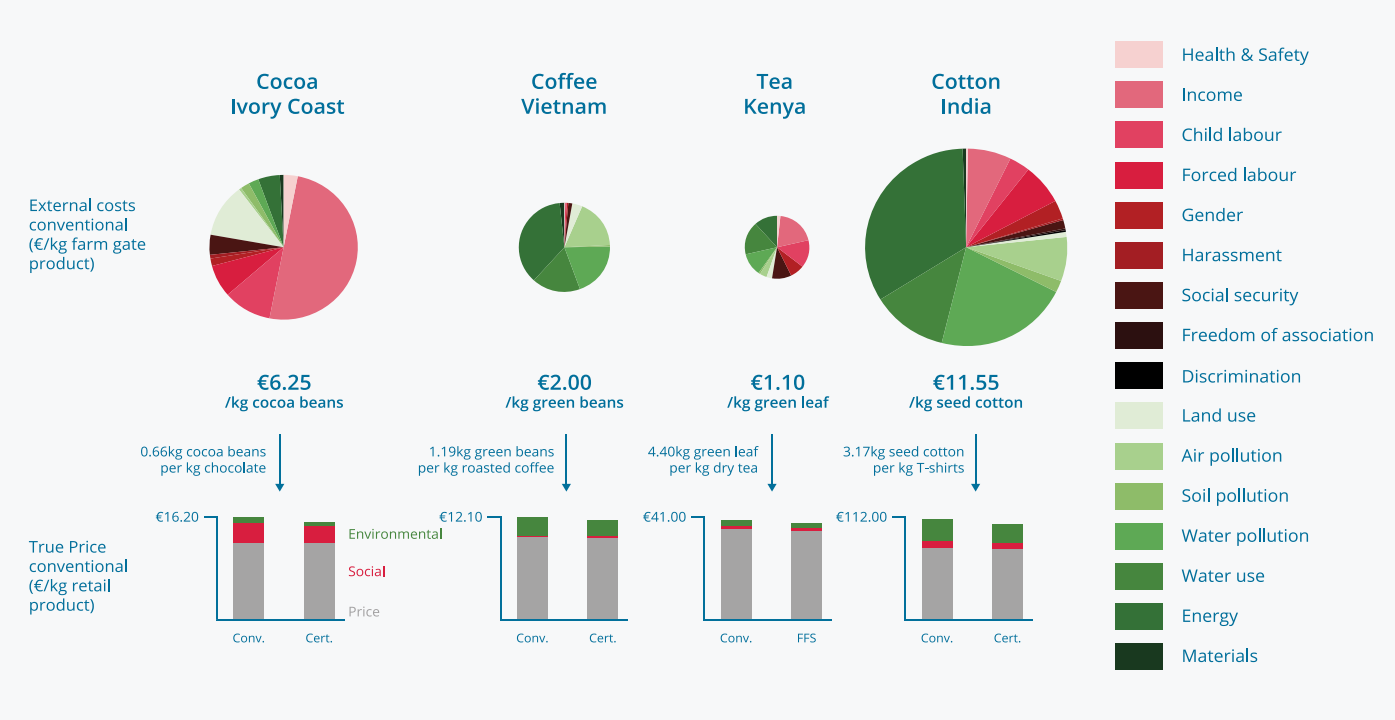


Figure 12 True retail prices of four country-specific commodities (conventional and certified). External costs on this slide include cultivation, transportation and processing, but exclude retail, consumption and end-of-life treatment.

4.3 Limitations of study

The results of this study are robust enough to be used in decision making. However, due to the data intensive and pioneering nature of this study, there are some limitations:

Limitations in scope

Due to data availability issues, some externalities were left out of scope. However, based on an initial materiality analysis, the size of the external costs linked to these externalities was expected to be relatively low compared to the externalities in scope (see Figure 2 for a detailed overview of the externalities in scope).

The cultivation phase was the main focus of this study and has been investigated in-depth. The analyses for the manufacturing and transportation phase had a less rigorous nature, but still provide a robust estimate. The retail phase was excluded from this study, due to its low materiality. Indirect players that also contribute to the external costs of coffee, such as financial institutions and suppliers of equipment, were as well excluded from this study.

Finally, it is important to realize that the results in this report only apply to tea produced by smallholders in Kenya, processed (primary) locally, transported to Europe, processed (secondary) in Europe and consumed in the UK.

Conventional versus FFS cultivation

As mentioned earlier, this study does not attribute external cost reduction to FFS training, as the analysis does not correct for selection effects. In order to do this, an analysis is needed with a DID research design, which requires specific impact data for two groups of FFS and conventional (control) farms over multiple periods in time.
Moreover, it is important to note that when no impact data for FFS farms was found, equal values as for conventional farms were used. This likely results in an overestimation of the external costs for green leaf from FFS farms.

Data availability and quality

Averages were used to represent the data. However, there often was a high variability across sources and regions for key indicators (i.e. yields). This causes uncertainty on the end results. In this study, a formal uncertainty analysis was out of scope.

Many specific assumptions were made throughout the analysis, in order to solve data quality constraints. To give an example, it was assumed that the same number of days per year were worked on both the FFS and the conventional farm.

Finally, it should be kept in mind that the results in this study are susceptible to the limitations of all studies from which data were extracted. These limitations can concern research design or unclear representation of results, amongst others.

Chapter 5
How can these results be used?

The results of this study can be used in various ways. First, they can be used to identify and assess interventions with the highest impact and return on investment. Second, they can be used to measure the effect of interventions over time.

5.1 Ex-ante: Identify and assess interventions with highest return on investment

The True Price analysis has uncovered the most material social and environmental external costs of tea production in Kenya. These are the areas where interventions are of highest need. With this knowledge in mind, the most promising interventions can be identified and assessed on impact as well as return on investment.

In this study it was found that 65% of all external costs throughout the tea supply chain occur during the cultivation phase. It is, as such, wise to focus future interventions on this phase. Furthermore, this study showed that in order to reduce the external costs of tea cultivation in Kenya, most impact can be created by focusing interventions on (i) increasing income and wages for farmers and workers, (ii) optimizing fertilizer application rates, (iii) increasing social security and (iv) reducing child labour.

Increasing the wages of hired labour on the farm has two distinct consequences on the cost of income. On the one hand it has a positive effect on the wages of hired labour. However, at the same time wage increases for hired labour result in increased labour costs for the farmers. This increase in labour costs has a negative effect on farmer income. There are several strategies to counterbalance this drop in farmer income and raise it to the living income:

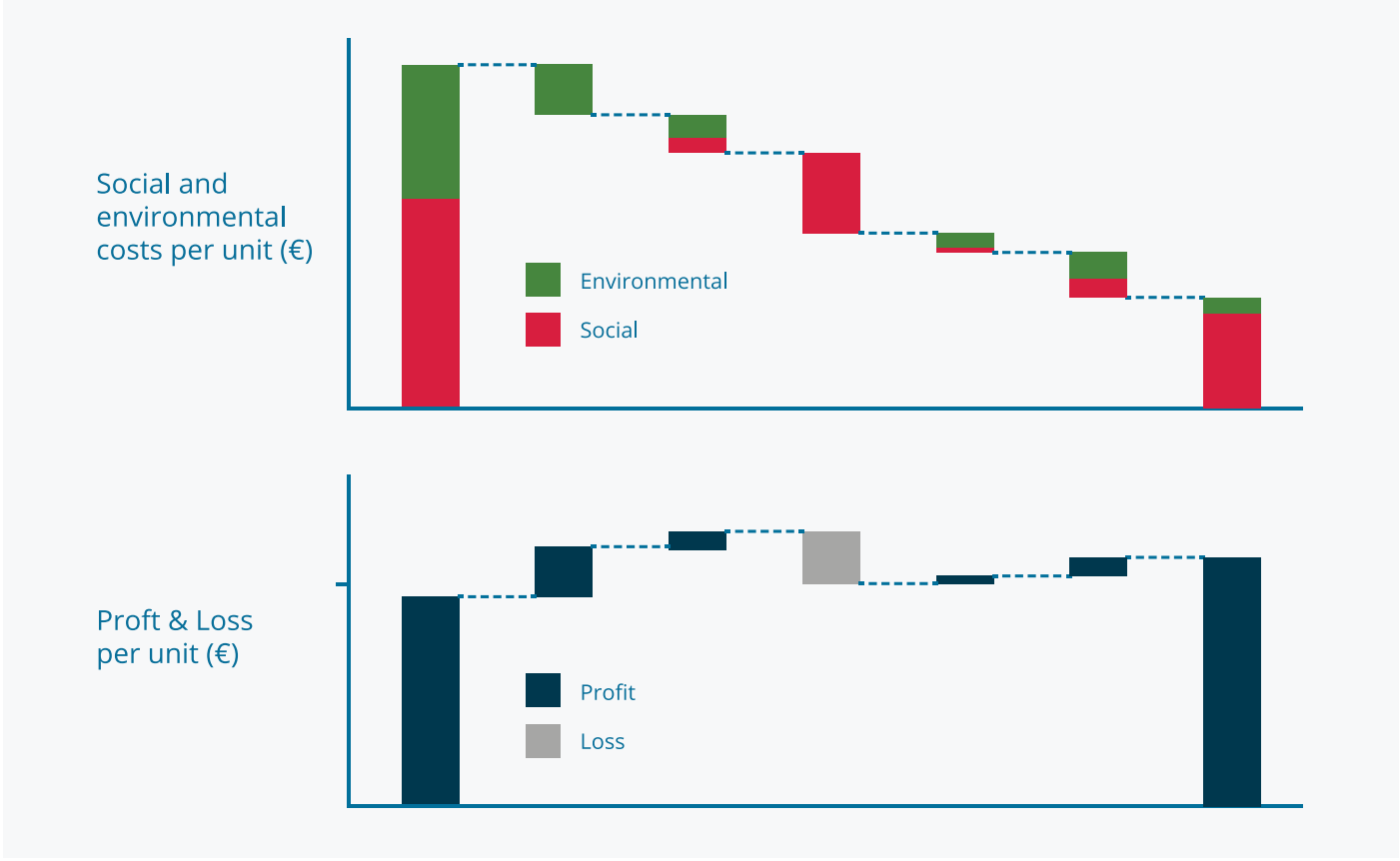


Figure 13 Hypothetical business case analysis of possible interventions

1. **Increasing yields** - Profits at the FFS farm are already higher compared to the conventional farm due to increased yields. Increasing production of green leaf per hectare, assuming all inputs remain the same, has a positive effect on farmer income and increases absorption capacity for higher labour costs.

2. **Optimizing input use** – Fertilizer application rates at the FFS farm are lower compared to the conventional farm while yields are higher. This indicates that conventional farmers might be over-fertilizing and thus be unnecessarily increasing their input costs.

3. **Increasing the farm gate price** – Farmers supply to the tea processing factories and receive a price per kg green leaf. In order for the farmer's income at the conventional farm to reach the level of the living income, the farm gate price has to increase by KES 15 (€0.15)/ kg green leaf, assuming yields and input costs remain the same. For the FFS farm, an increase by KES 5 (€0.05)/kg green leaf is required.

Note that reaching the goal of living wages is further away on the conventional farm compared to the FFS farm.

Interventions aimed at increasing both wages and farm profits are interesting throughout the Kenyan tea sector. Some other possible interventions are more localized in their targets. Deforestation and land use have a relatively small impact on the average farm. However, for specific regions it is a larger issue. Examples are the forest regions west of the Rift Valley and more specifically the Mau Forest. The latter is the largest montane forest in East Africa and one of the principal water catchment areas in Kenya. Deforestation with the purpose of creating a tea plantation in that area increases the environmental costs of land use significantly. Together with KTDA, IDH has already started the South West Mau landscape program to address the conservation challenges linked to this area.

For an FFS farm located in the forest west of the Rift Valley, the cost of land use accounts for 7% of the total external costs (€0.04/kg green leaf). Setting up a program to prevent deforestation

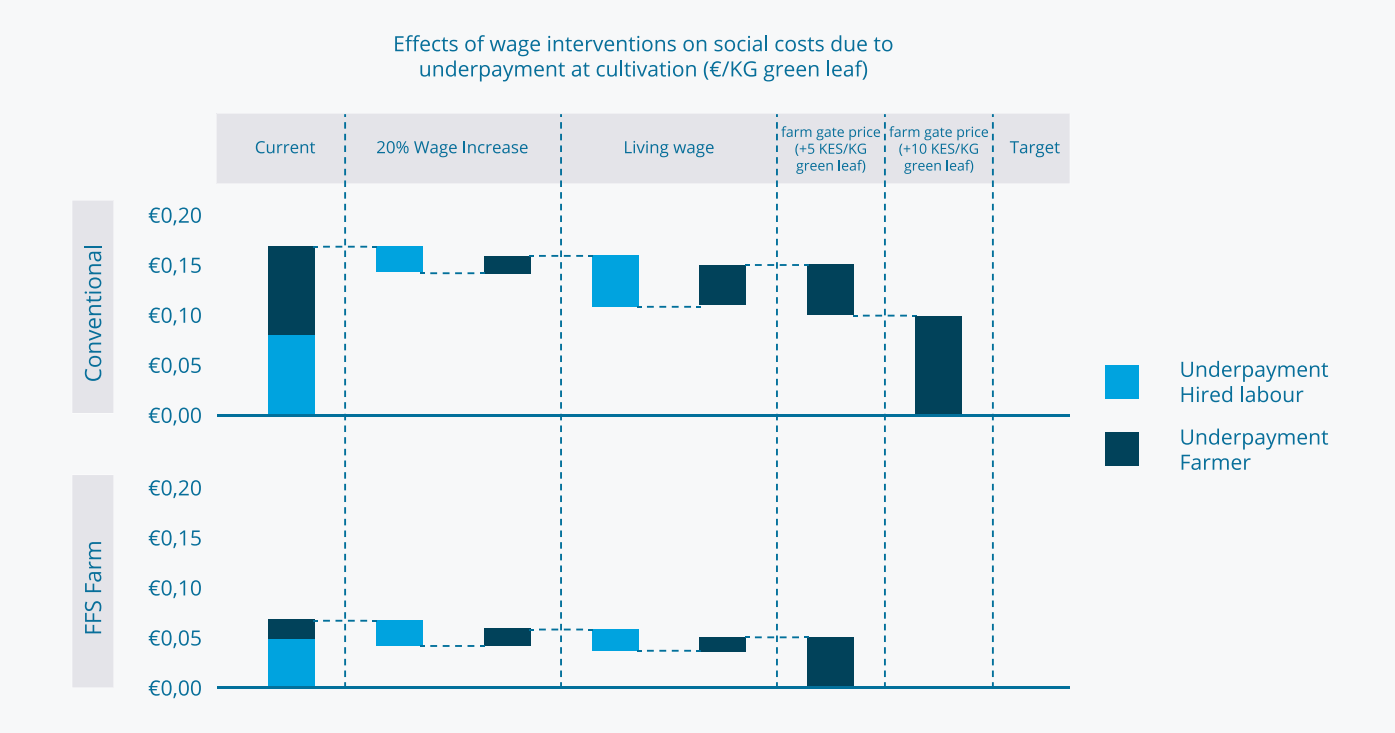


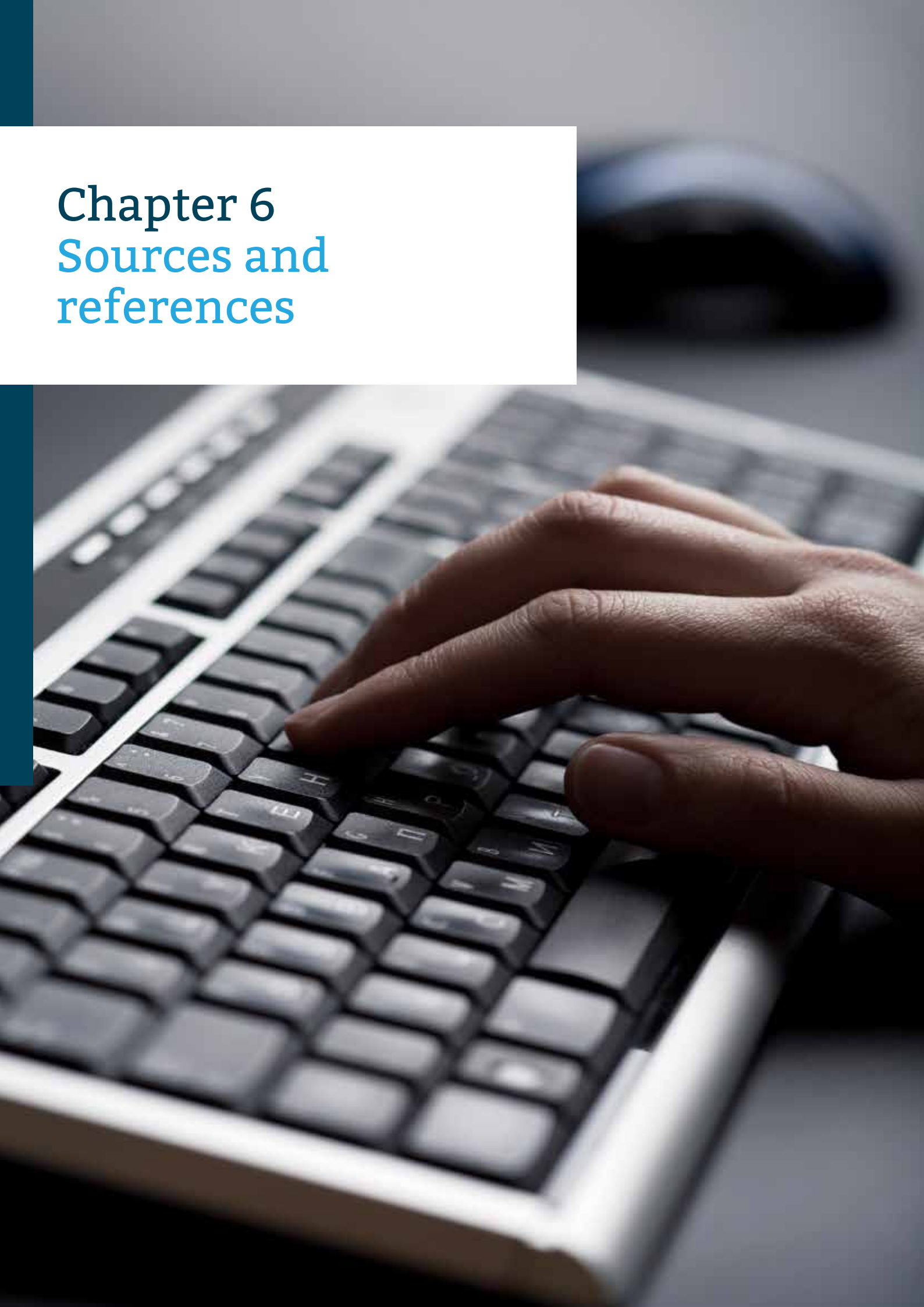
Figure 14 Business case analysis of paying a living wage to hired labour while guaranteeing a living income for the farmers

in that region based on the principles of a net-zero deforestation approach has the potential to decrease external costs of green leaf cultivation in the region by 7%.

5.2 Ex-post: measure impact interventions

True pricing can be used to measure the impact of an intervention by comparing the external costs of farmers with those of a real or a modelled control group (the option scenario vs the reference scenario). Depending on data quality, claims can be made as to whether and how the intervention creates value by increasing benefits or reducing costs. The total effect of the alternative scenario can be broken down into sub-effects. Based on this knowledge, the alternative scenario can be evaluated and improved. As mentioned before, measuring impact of interventions requires a specific data set to be available.

Chapter 6
Sources and references



Key data Sources

The calculations are based on a database of over 50 reports, articles and studies, including data from IDH. Figure 15 provides an overview of the key literature sources used in the study.

Key Literature - Cultivation	
General (Includes social & environmental	Kenya Tea Development Agency (KTDA) (2014). Tea Growers Payment: June 2014. LEI Wageningen (2011): Monitoring & Evaluation the Impact of Training Modalities for Sustainable Tea Production. Den Haag: LEI Wageningen UR. LEI Wageningen (2012). Sustainable tea production in Kenya: Impact assessment of Rainforest Alliance and Farmer Field School training. Den Haag: LEI Wageningen UR. LEI Wageningen (2014). For all the tea in Kenya: Impact assessment and baseline situationof Farmer Field Schools. Den Haag: LEI Wageningen UR. Monroy L., Mulinge W., Witwer M., (2012). Analysis of incentives and disincentives for tea in Kenya. Technical notes series, MAFAP, FAO, Rome. Owuor (2005): Assessment of Constraints in Technology Transfer System and Policies which Limit the Realisation of High Green Leaf Production in the Smallholder Tea Sector of the Kenya Tea Industry. *Africa Technology Policy Studies, Research Paper Networks No.3* , 1-69.
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Key literature - Processing	
General (Includes social & environmental	KHRC (2008). A comparative study of the tea sector in Kenya MIND (2013). Economic, social, and environmental impacts and overall sustainability of the tea manufacturing industry in Sri Lanka
Social	Kidusu, M. M., Memba, F. S., & Khayeka-Wandabwa, C. (2014). Effects of Factory Labour Costs on Annual Returns to Tea Growers: A Case Study of KTDA Managed Factories in Kenya. *British Journal of Science, Education and Culture*, 543. Joseph (2010). Risk rating in the tea planting industry. *Indian Journal of Occupational & Environmental Medicine, 14*(3), 97–99. Said-Allsopp (2013). Empowerment within global value chains: A Study of the Dynamics of Employment and its Impacts on the Lives of Women Employed in Kenyan Agricultural Export Industries
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Figure 15 Overview of key literature

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