

A close-up photograph of several cocoa pods hanging from a tree branch. The pods are yellowish-orange and have a bumpy, textured surface. The background is a soft-focus green, suggesting a lush environment.

# The True Price of Cocoa from Ivory Coast

Joint report by IDH and True Price





## 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](http://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.

For more information visit:

[www.idhsustainabletrade.com](http://www.idhsustainabletrade.com)

# 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.

## 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 analyzes have had many constraints in terms of data availability and data quality, and therefore did not allow for a robust statistical difference-in-difference 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 Manager Learning & Innovation at IDH*

# Executive Summary

- In this study the external costs of the cocoa supply chain (with smallholder cultivation in Ivory Coast) were investigated to inform decision making for IDH's cocoa program. The external costs of conventional cocoa beans were compared to certified cocoa beans. Attribution of impacts to the standard-setting organisations 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 cocoa in Ivory Coast has total **external costs of €5.75/kg cocoa beans**. By summing up the external costs with the farm gate price (€1.35/kg cocoa beans), a true price of €7.10/kg cocoa beans is obtained.
- 84% of the total external costs of cultivation are social costs, **54% are due to underpayment** of hired and family workers. The other largest external cost drivers are land use, child labour, forced labour and lack of social security.
- Compared to other sectors (Vietnamese coffee, Kenyan tea, Indian cotton), the external costs of cocoa cultivation in Ivory Coast are relatively high.
- The total external costs of cultivation, transportation and processing are **€6.25/kg cocoa beans**.
- The **cultivation phase accounts for 92% of the total external costs** of the cocoa supply chain.
- **Certified cocoa has 16% lower external costs** of cultivation than conventional cocoa. 60% of this change is caused by higher productivity of certified farms, 10% by better environmental conditions and 30% by better social conditions. There are demonstrably lower rates of child labour, accidents and deforestation on certified farms. Application rates of herbicides and fertilizers are demonstrably higher on certified farms, yet this causes lower external costs per kg of cocoa beans, as yield increases.
- Certified farms are on average **49% more profitable than conventional farms**, with a yearly profit of € 341/ha vs. €229/ha.
- Working towards **zero deforestation** has the potential to further reduce the external costs of certified cocoa cultivation by around 6% (€0.30/kg cocoa beans). Another 32% of external cost reduction (€1.55/kg cocoa beans) can be obtained by **improving yields**, via optimizing fertilizer application rates.
- **Future impact research is needed** for certified and conventional farms, especially on wages, discrimination and fertilizer and pesticide application rates. This would improve the robustness of the results of this study and enhance future decision making around interventions and investment

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# Chapter 1

## Introduction



## 1.1 Context and challenge

The global demand for cocoa has been growing with an annual rate of 2 to 3% since 2008 (IDH, 2015; World Cocoa Foundation, 2014). One of the primary drivers of this increase is the growing middle class in China, India, and Brazil (World Cocoa Foundation, 2014). Around 36% of global cocoa production comes from Ivory Coast (International Cocoa Organization, 2013). Moreover, Ivory Coast is the largest exporter of cocoa beans, holding a market share of 29%<sup>1</sup>, which is equal to an export value of 2 to 3 billion euros (Hausmann, et al., 2011).

This large scale cultivation of cocoa in Ivory Coast creates a risk for the environment, more specifically by its impact on land, biodiversity and pollution. As cocoa in Ivory Coast is grown by around 600,000 to 900,000 farmers – predominantly smallholders – with up to 6 million dependents, the cultivation of this crop also has a large social impact, both negative as positive (Ingram, et al., 2013). Social issues, such as underpayment, child labour, forced labour and health & safety are high on the agenda of various NGOs and standard-setting organisations operating in the Ivorian cocoa sector, and with good reason. Daily farmer incomes commonly fall under the World Bank's \$2/day poverty line and a recent report from Tulane University showed that the percentage of children working in cocoa production in Ivory Coast has even increased from 23.1% to 34.9% over the past 5 years (Tulane University, 2015; Fountain & Hütz-Adams, 2015). Moreover, farms in Ivory Coast generally have low and decreasing productivity rates compared to other cocoa producing countries, which can further increase the negative impact on the livelihoods of farmers (Ingram, et al., 2013).

The global cocoa supply chain is subject to an increasing market concentration. Two processors will produce about 70-80% of the world's couverture, while only eight traders and grinders

control approximately three quarters of the worldwide cocoa trade (Fountain & Hütz-Adams, 2015). This concentration lowers the selling power of farmers. In an attempt to improve pre-competitive collaboration, the World Cocoa Foundation (WCF) has launched CocoaAction, a collaborative strategy of eleven of the largest chocolate and cocoa companies in the world. CocoaAction's target is to train approximately 300.000 farmers by the end of the decade on two core elements; increasing productivity of cocoa farms, and improving the situation of women and children in cocoa (Fountain & Hütz-Adams, 2015).

More efforts to improve the situation of farmers in Ivory Coast were made by the Ivorian government in 2011, with a reorganization of the cocoa sector. This included the establishment of a national Coffee and Cocoa Council (CCC) with multi-stakeholder representatives, responsible for the management, regulation, development and price stabilisation of cocoa. As a direct result, the minimum price for cocoa beans was raised from 750 CFA francs to 850 CFA francs per kilo or \$1.487 per tonne at the end of 2014 (Fountain & Hütz-Adams, 2015). The Ivorian government also changed their auction and forward selling system in 2012 and set up a reserve fund at the Central Bank of West-African States as a protection against the possibility of a future major drop in world cocoa prices (Technical Centre for Agricultural and Rural Cooperation, 2012). These reforms combined with higher world market prices have led to an increase of 40% of the farm gate prices, according to the Cocoa Barometer 2015 (Fountain & Hütz-Adams, 2015).

Apart from institutional reforms, voluntary sustainability standards are making progress as well. According to The State of Sustainability Initiatives Review 2014, 39% of the cocoa beans produced in Ivory Coast in 2012 were certified, either by UTZ (20%), Rainforest Alliance (17%), Fairtrade (3%) and/or Organic (<1%) (Potts, et al., 2014). Research shows that certification



seems to influence farmers' knowledge and implementation of good agricultural practices (Ingram, et al., 2013). Farmers note numerous benefits such as marketing their beans at a good price, access to information and training, providing a forum for exchange and building social capital (Ingram, et al., 2013).

Many reports have been written about the cocoa sector in general and the Ivorian cocoa sector specifically. However, most studies to date do not quantitatively measure the social and environmental externalities throughout the value chain and make the comparison between conventional cocoa cultivation and alternatives.

## 1.2 Goal and scope of research

One barrier to reducing social and environmental costs effectively in the cocoa market system, like any other market system, is the lack of quantitative assessments of the size and materiality of the various environmental and social externalities of cocoa production. Such information is needed to make well informed decisions and steer future interventions. Moreover, it is valuable to know to what extent certification improves the externalities of cocoa cultivation, and how standard-setting 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 cocoa supply chain and by comparing conventional to certified cocoa. Certified cocoa is produced on a farm that holds one or more certifications from a voluntary standard system. Conventional cocoa is produced on a farm that does not hold any certification from a voluntary standard system.

The goal of the present study is to provide the information needed with which IDH and other supply chain actors in the cocoa sector (smallholder farmers, businesses, NGOs, standard-setting organisations, governments) can make informed decisions about sustainability. Identifying solutions or assessing the impact of certification are out of scope in this study.

This report will provide an answer to the following research questions:

1. What is the size of the external costs<sup>2</sup> of cocoa production in Ivory Coast?
2. What are the most material externalities?
3. How are external costs divided over the cocoa supply chain?
4. Is there a difference between certified vs. non-certified cocoa?

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 certified<sup>3</sup> cocoa production was investigated. The study focuses on smallholders, as they account for 80 to 90% of cocoa production (World Cocoa Foundation, 2014).

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 analyses for the transportation, processing and consumption phases were of 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 cocoa supply chain – such as consumer pleasure, job creation and infrastructure – were not taken into account. Priority was given to provide a comprehensive 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 cocoa 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, such as the standard-setting

organisations. The difference in external costs between conventional and certified cocoa presented in this report can be liable to selection effects. For example, farms with better social conditions might chose to become certified more easily than farms with less favourable social conditions. This means that differences in external costs between certified and non-certified farms need not be caused by the actions of the standard-setting organisation. Similarly, a lack of difference does not necessarily imply that a standard-setting organisation 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, tea from Kenya and cotton from India. The results of these studies are useful to place the cocoa supply chain into perspective.

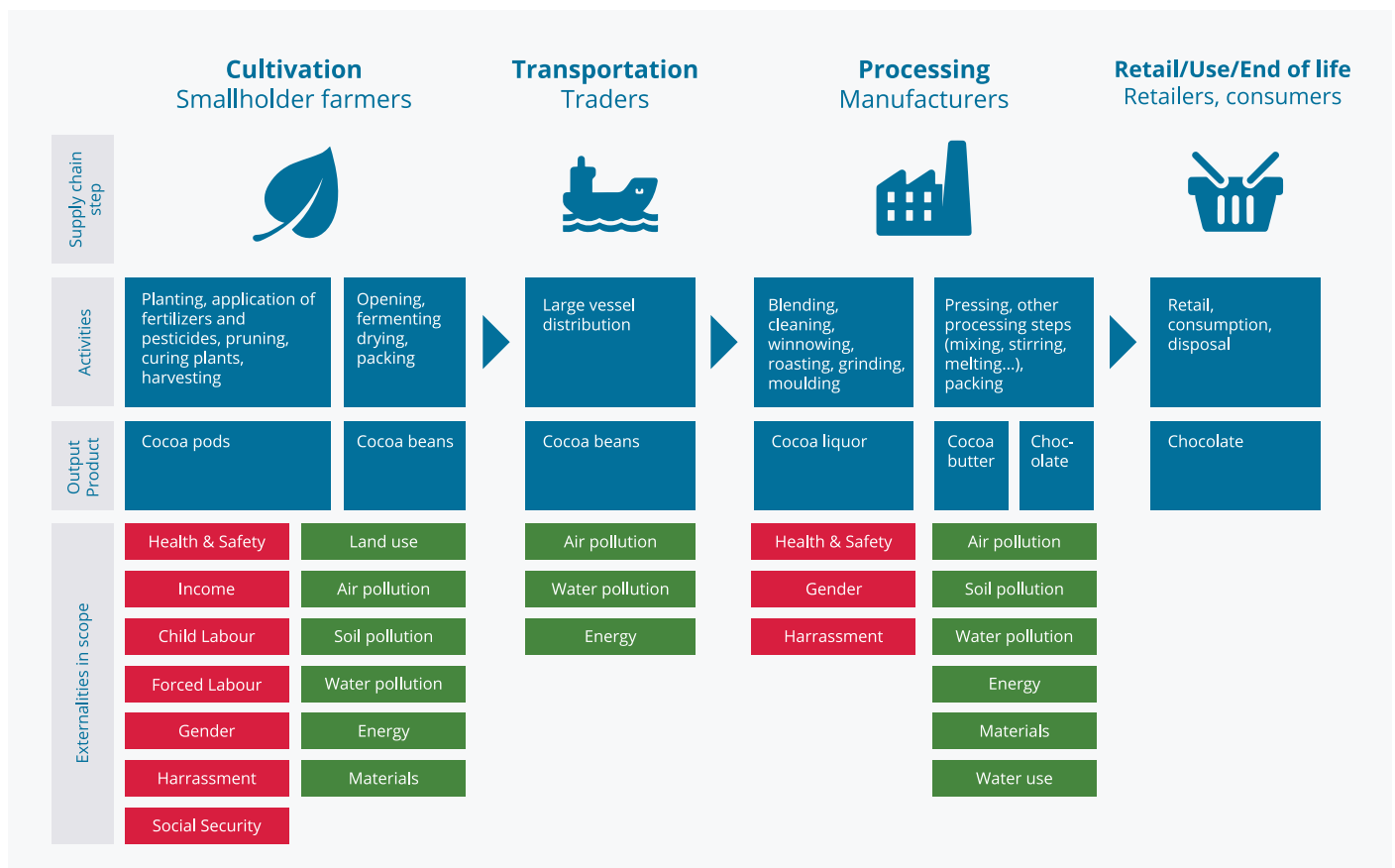


Figure 1 scope of the True Price study<sup>4</sup>

## 1.3 Roadmap of the report

The aim of this report is to provide a condensed overview of the true pricing study conducted for cocoa from Ivory Coast. Following this introduction, a brief explanation of key concepts, such as externalities and true pricing, is provided. Afterwards, the main results and insights of the study will be presented. These results will be placed into a larger perspective by looking at the retail level ('What is the true price of a chocolate bar?') and by comparing the results of cocoa to three other country-specific commodity supply chains: coffee from Vietnam, tea from Kenya 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 cocoa supply chain.

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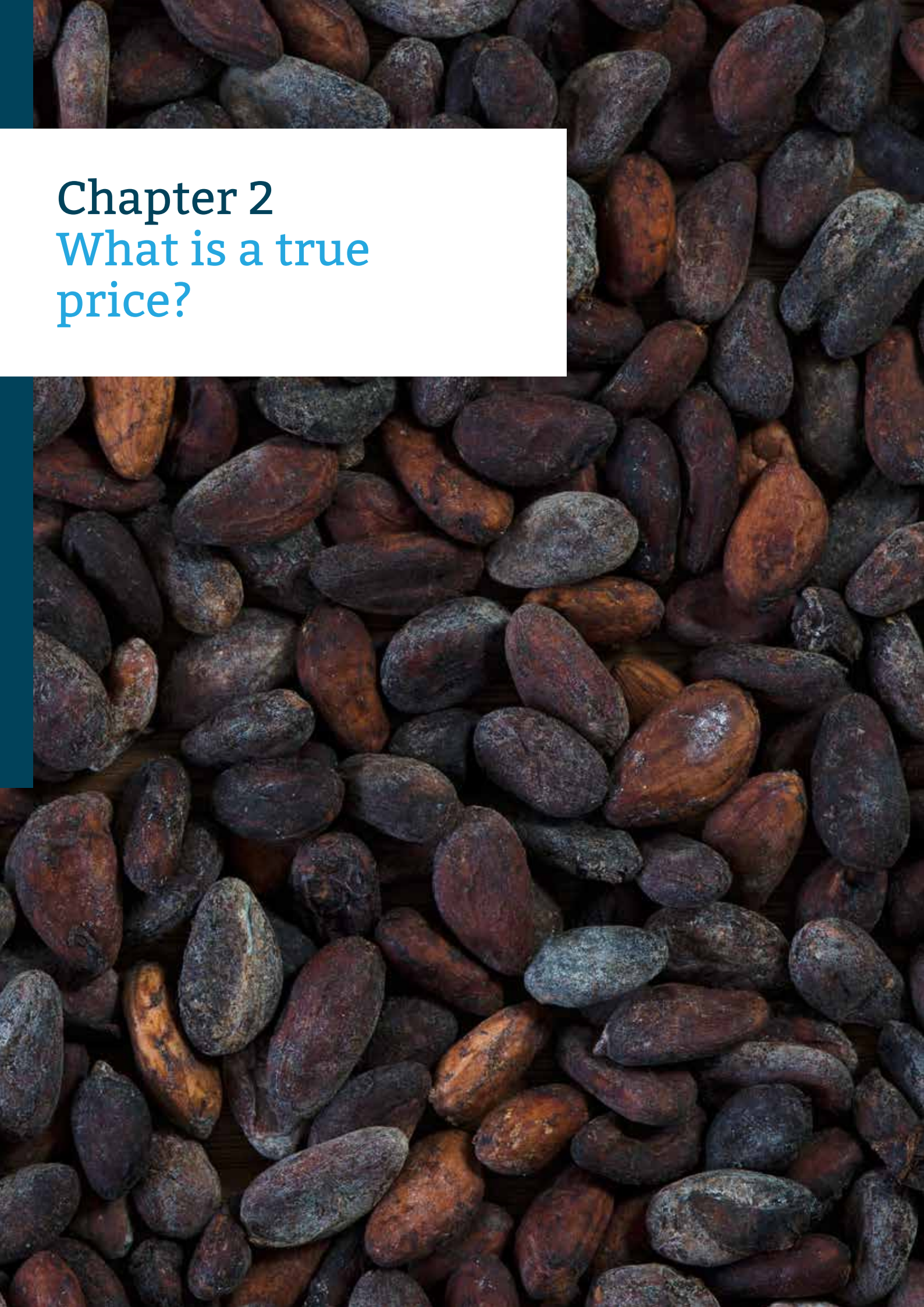
1 The 29% specifically refers to the export of cocoa beans (and not to other cocoa products, such as cocoa powder or butter)

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

3 In this report, no specification of the investigated certification mechanism is provided due to confidentiality reasons

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



The background of the slide is a dense, close-up photograph of almonds. The almonds are in various shades of brown, from dark chocolate to a lighter, almost greyish-brown, suggesting they might be roasted or have different varieties. They are scattered across the entire frame, creating a textured, organic pattern.

## 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 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 2. 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 2 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.

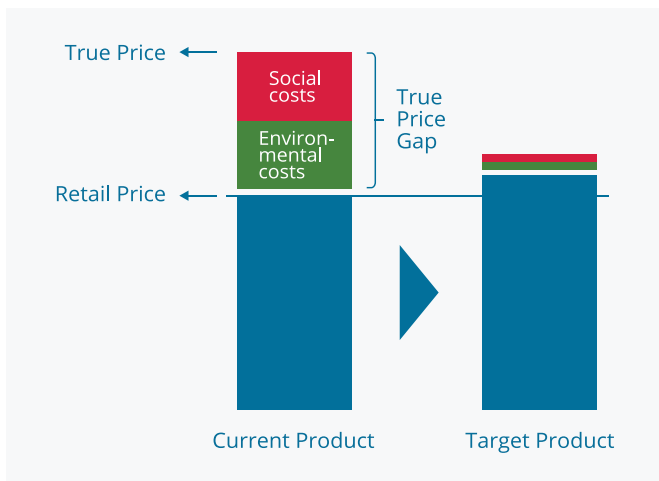


Figure 3 Reducing the true price of a product

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<sub>2</sub> 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<sub>2</sub> 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<sub>2</sub> 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<sup>5</sup>, 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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<sup>5</sup> 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 cocoa from Ivory Coast



### 3.1 Size of external costs of cocoa cultivation

The calculated true price of conventional cocoa beans is €7.10/kg cocoa beans. This is the sum of the farm gate price (€1.35/kg cocoa beans) and the external costs of cultivation (€5.75/kg cocoa beans). The latter is also called the true price gap.

The true price gap is more than four times as large as the farm gate price of cocoa beans. This shows that at farm level there are substantial hidden costs relative to the market price. Social costs account for 84% of total external costs of cultivation. Environmental costs are relatively low, mainly due to low pesticide and fertilizer application rates and neither water nor energy use during cultivation.

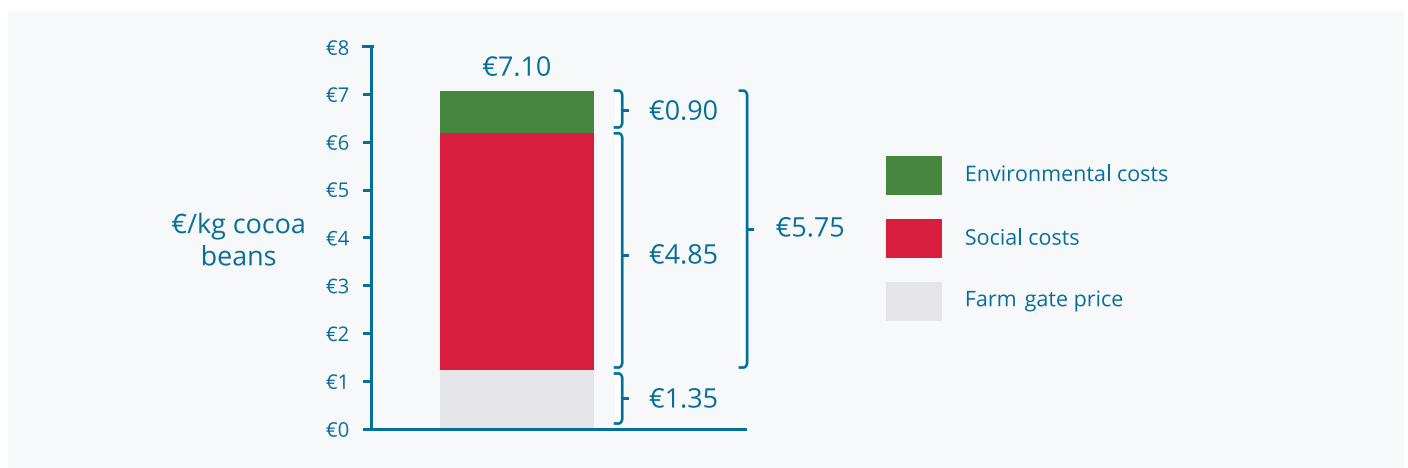


Figure 4 True price of 1 kg cocoa beans

## 3.2 Most material externalities of cocoa cultivation

The most material externalities during the cultivation of conventional cocoa in Ivory Coast are income, land use and child labour:

- **Income (54%):** more than half of the external costs during cocoa cultivation result from the underpayment of hired workers and the underearning of family workers;
- **Land use (13%):** deforestation and other land degradation, caused by the establishment of new farm land and plantations, is the second largest externality;
- **Child labour (11%):** child workers remain common in the Ivorian cocoa industry, often performing hazardous tasks and missing out on education.

### 3.2.1 Income

Underpayment of hired workers and underearning of smallholder farmers constitute by far the largest external cost in cocoa cultivation in Ivory Coast. Hired workers receive an average total wage of €1.6/day, which is only about 20% of the living wage. A farmer household earns on average €3.5/day from the activities on its cocoa farm, which results in a yearly income of around 40% of the living income<sup>6</sup>. On an annual basis, the wage of workers is €477, while the legal minimum wage is €659. The annual living wage for an Ivorian worker, as calculated by True Price, is €2,869. This size of poverty is not only problematic for the livelihoods of workers and their families, but as well triggers other social issues, such as child and forced labour (Potts, et al., 2014).

It is hard 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

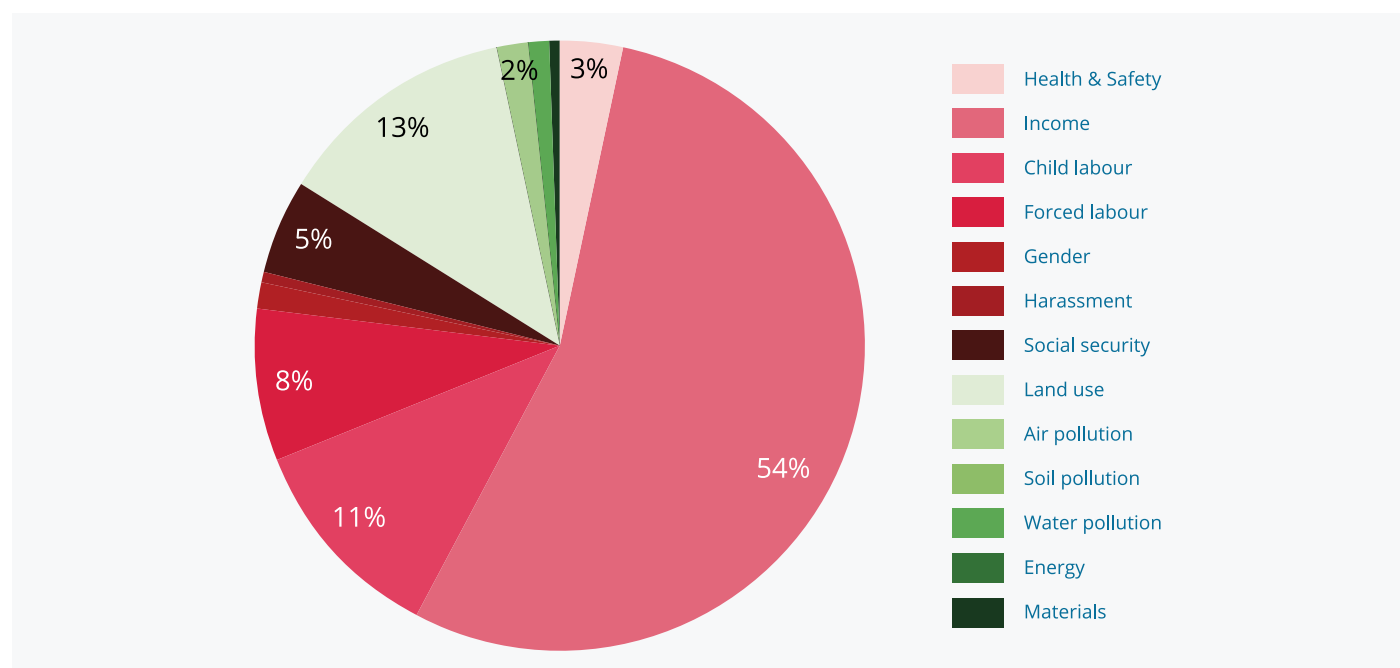


Figure 5 Share of each externality in the total external costs of conventional cocoa cultivation



(e.g. by adopting GAP's) and raising minimum cocoa bean prices are a few possible routes in decreasing the external cost of income.

## 3.2.2 Land use

Deforestation and land degradation, due to the establishment of new cocoa farm land, result in the second largest external cost in Ivorian cocoa cultivation. To give an example, 57% of cultivated cocoa land originates from primary forest. This causes an irreversible loss of biodiversity and results in significant carbon emissions.

## 3.2.3 Child labour

Child labour is a widely recognized issue in Ivory Coast. 14% of total farm labour are child workers, of which 6.9% are forced. According to Tulane University, a projected total of 819,921 children worked on cocoa-related activities<sup>7</sup> during a one year period (2007/2008) in Ivory Coast alone, and they were frequently involved in hazardous activities (Tulane University, 2011).

Governmental action has a substantial role to play in reducing this external cost. In 2013, the Ivorian government began implementing its National Action Plan against Trafficking, Exploitation, and Child Labor, launched a pilot program for a national child labour monitoring system and continued funding various social programs to address child labour. However, according to a 2013 report from the United States Department of Labor, more actions are needed, as Ivory Coast still lacks a compulsory education law and gaps remain in enforcement efforts and in children's access to education (Bureau of International Labor Affairs, 2013).

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6 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.

7 An update of this report (Tulane University, 2015) shows an increased projected total of 1,303,009 children working on cocoa related activities during 2013/2014 in Ivory Coast. These new numbers were published after closure of the true pricing analysis and, as such, have not been incorporated into the end results.

*The data mentioned in this chapter are extracted from the True Price literature database (see Key data Sources for an overview of the main literature sources used)*







### 3.3 Division of external costs over the cocoa supply chain

In the cocoa supply chain, 92% of the researched external costs take place during the cultivation phase. Transportation of cocoa beans – within Ivory Coast and to Europe for processing – accounts for 3% of total external costs and processing of cocoa beans to chocolate has a share of 5%. As the labour productivity (FTE/kg processed cocoa beans) during processing is high, the external costs per kg of cocoa beans in this phase are low. 91% of the external costs made during processing are environmental costs. Social costs are relatively low, as processing takes places in West-Europe, where social conditions are usually better.

### 3.4 Difference between certified and conventional cocoa

In this research conventional cocoa was compared to certified cocoa on those externalities for which data was available. When no distinctive data for certified farms was available, the same situation as for conventional farms was assumed. As such, the outcomes of this comparison should be interpreted with care. It is highly plausible that certified cocoa might even have lower external costs than what this research suggests. Also, it is important to realize that these results do not show the impact of the standard-setting organisation, as they are not corrected for selection effects. For this an analysis is needed with a difference-in-difference (DID) research

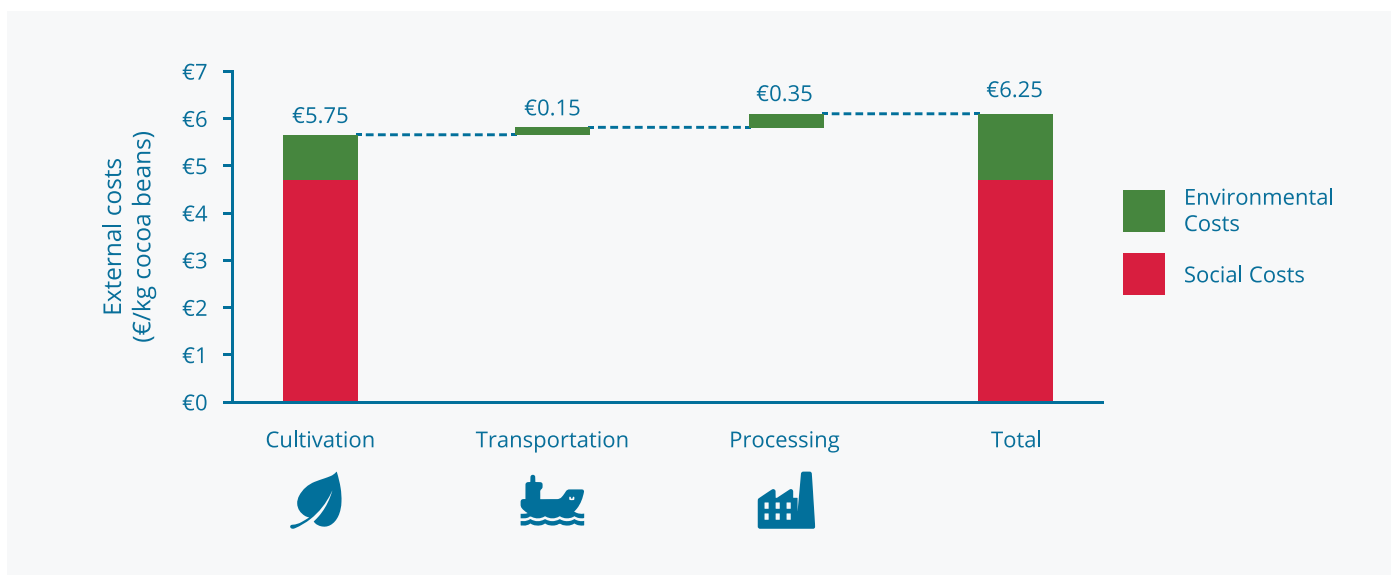


Figure 6 Division of external costs over the cocoa supply chain

design. This requires specific impact data for two groups of certified and conventional (control) farms over multiple periods in time.

The external costs of cultivation of certified cocoa are about 16% lower than conventional cocoa. 60% of this change is caused by increased productivity of certified cocoa farms, which results in lower external costs per kg of cocoa beans. 30% of this change is a direct result of better



social conditions. For example, certified farms have demonstrably lower rates of child labour and occupational accidents. The remaining 10% of the reduction is due to better environmental conditions on certified farms, such as lower rates of deforestation. Application rates of herbicides and fertilizers are demonstrably higher in certified farms, yet this causes higher yields which actually reduces environmental costs per output product<sup>8</sup>.

Income remains the most material externality (63% of total external costs) on certified farms, as only family labour has a slightly higher income due to higher profits. No distinctive data on forced labour was found for certified farms. As a result, forced labour is the second largest external cost on certified farms (9.2% of total external costs). 39% of the certified cocoa farm land originates from primary forest, compared to 57% for conventional farms. Despite this positive evolution, land use remains a highly material externality on certified farms (8.8% of total external costs).

Certified farms are on average more profitable than conventional cocoa farms. This is caused by higher yields, likely due to Good Agricultural Practices (GAP), and a higher farm gate price for cocoa. As mentioned earlier, the increased farmer income results in a decreased external cost of underearning for family labour. It was found that on conventional farms a family worker has a yearly income of €1,132, whereas a family worker on a certified farm earns €1,232 per year. This corresponds to a yearly profit of €229/ha on conventional farms vs. € 341/ha on certified farms. Figure 8 represents the revenues, costs and net income for the average conventional and certified farm.

<sup>8</sup> There is a tipping point in applying more agrochemicals and fertilizers, when yield increases no longer outweigh the environmental costs per kg of output product. Also, it is important to note that the choice of the type of fertilizers and pesticides is highly relevant to the size of the environmental costs

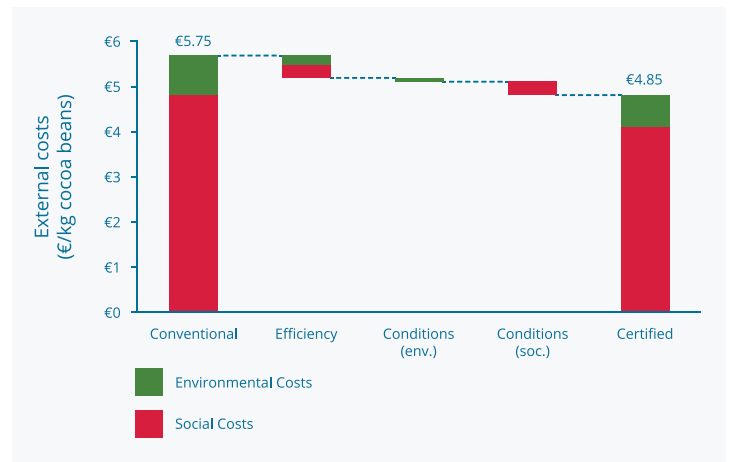


Figure 7 Reduction of external costs for certified cocoa

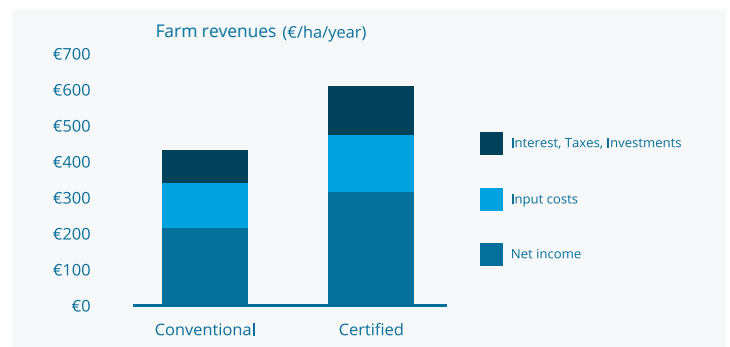


Figure 8 Revenues (split up in costs and net income) for the average conventional and certified farm



# Chapter 4

## Results in context



## 4.1 What is the true price of a chocolate bar?

An interesting perspective arises, when considering the true price at retail level, in addition to farm level. The average retail price of a chocolate bar is estimated around €1.20 for a conventional chocolate bar<sup>9</sup>. The external costs of cultivation, transportation and processing of cocoa and chocolate production required for a chocolate bar are around €0.40. These costs only reflect the external costs of the ingredient cocoa and, as such, do not represent the external costs of the entire chocolate bar. However, it provides an indication of what the total true price of a chocolate bar will look like. Excluding sugar and milk, the true price of a chocolate bar is around €1.60. If the external costs of production for the other ingredients, like sugar and milk powder, are comparable to cocoa beans, the true price will be around €2 per chocolate bar.

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<sup>9</sup> The conventional chocolate bar weighs 100g (containing 66g of cocoa beans to achieve a cocoa percentage of 50%) and is sold in a European supermarket



Figure 9 True price of a chocolate bar

## 4.2 How does cocoa compare to other sectors?

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

### 4.2.1 Farm level

Compared to other sectors, the external costs of smallholder cocoa cultivation are about 4, 8 and 1.5 times higher than for coffee (Vietnam), tea (Kenya) and cotton (India) respectively. Cocoa cultivation in Ivory Coast has the highest ratio of social to environmental costs. For coffee cultivation in Vietnam and cotton cultivation in India, environmental issues predominate.

Figure 10 also shows how farm gate prices for Vietnamese green beans and Kenyan green leaf are closer to their respective true farm gate prices. Ivorian cocoa beans and Indian seed cotton clearly have substantial hidden costs.

The cultivation of Kenyan green leaf appears to be the most lucrative of the four commodities, with profits climbing up to €2,000 per hectare of certified 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. The high yields in this sector are largely responsible for the low external costs per kg green leaf.

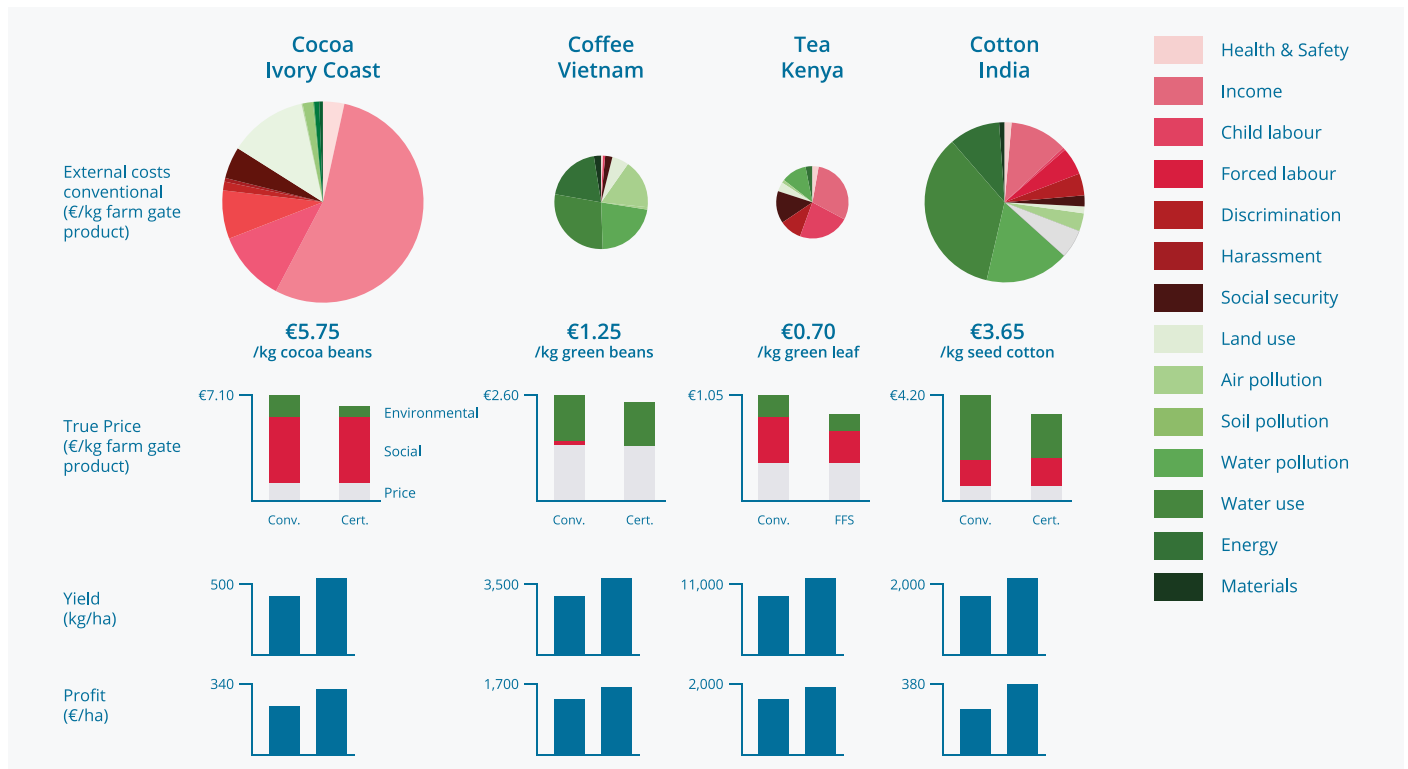


Figure 10 True farm gate prices of four country-specific commodities (conventional and certified) and their corresponding yields and profit values

## 4.2.2 End product level

The total external costs of cultivation, transportation and processing are €6.23/kg cocoa beans, which is about 3 and 5.5 times higher than for Vietnamese coffee and Kenyan tea, but about 2 times lower than for Indian cotton. This is due to the high external costs of cotton processing.

Figure 11 shows how the retail prices of chocolate, roasted coffee, tea and cotton T-shirts relate to their corresponding true retail prices. Again, 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.

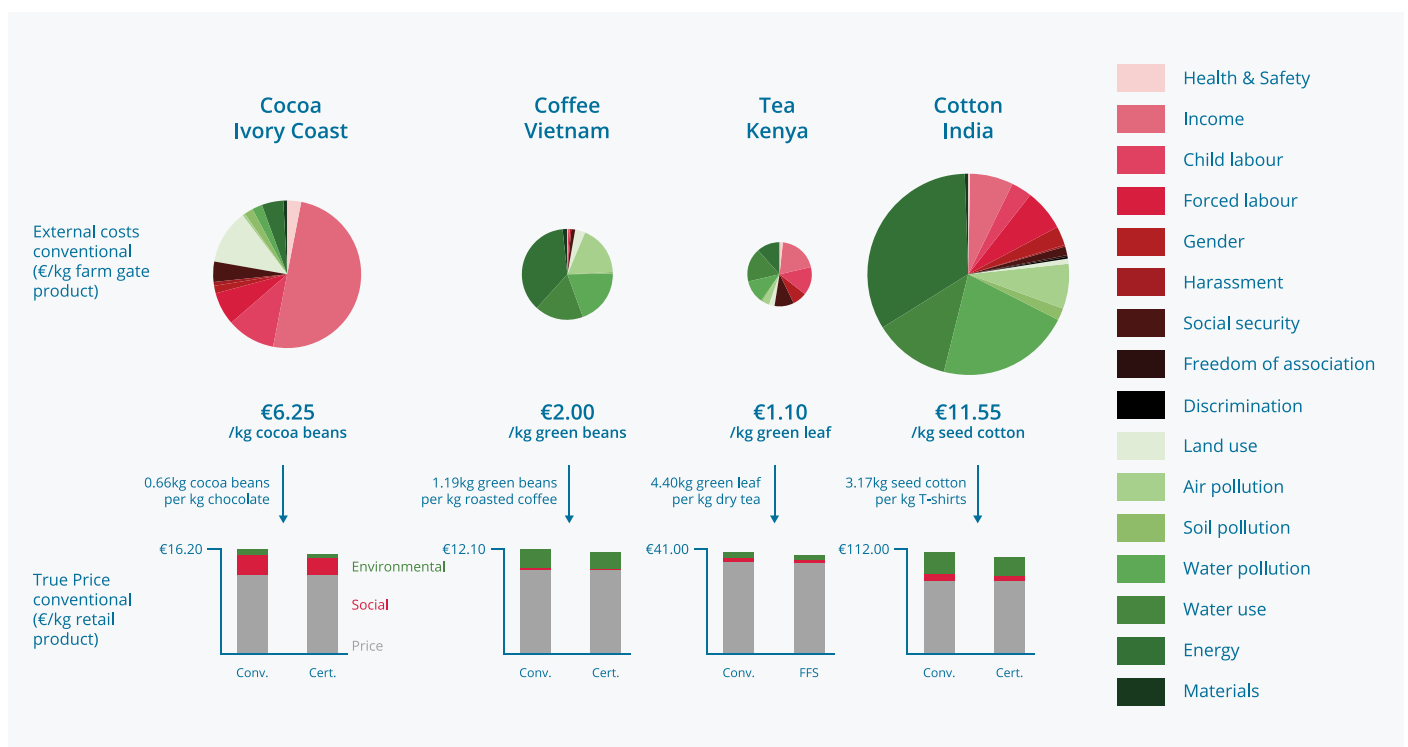


Figure 11 True retail prices of four country-specific commodities (conventional and certified). External costs on this slide include cultivation, transportation and processing, but exclude retail, consumption and end-of-life treatment.

## 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 1 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 transportation and processing phase had a less rigorous nature, but still provide a robust estimate. The retail phase was excluded from this study, due to 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 cocoa beans produced by smallholders in Ivory Coast, transported to Europe and processed in Europe.

### Conventional versus certified cultivation

As mentioned earlier, this study does not attribute external cost reduction to the standard-setting organisation, 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 certified and conventional (control) farms over multiple periods in time.

Moreover, it is important to note that when no impact data for certified farms was found, equal values as for conventional farms were used. This may have resulted in an overestimation of the external costs for certified cocoa beans.

### 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 all plant waste is returned to the field as organic fertilizer and has a negligible economic value.

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 externalities of cocoa production in Ivory Coast. 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 (Figure 12).

In this study it was found that 92% of all external costs throughout the cocoa supply chain occur during the cultivation phase. It is, as such, sensible to focus future interventions on this phase. Furthermore, this study showed that in order to reduce the external costs of cocoa cultivation in Ivory Coast, most impact can be created by focusing interventions on (i) increasing income and wages for farmers and workers, (ii) reducing land degradation, (iii) reducing child labour and (iv) reducing forced labour.

There are various approaches to tackle these challenges. For example, by implementing good agricultural practices farmers can learn how to increase their yields, which in turn can reduce the external costs per kg of cocoa beans. Another approach can be to improve the social and environmental conditions on farms, by discouraging farmers to use highly toxic pesticides or encouraging them to purchase personal protective equipment for their workers,

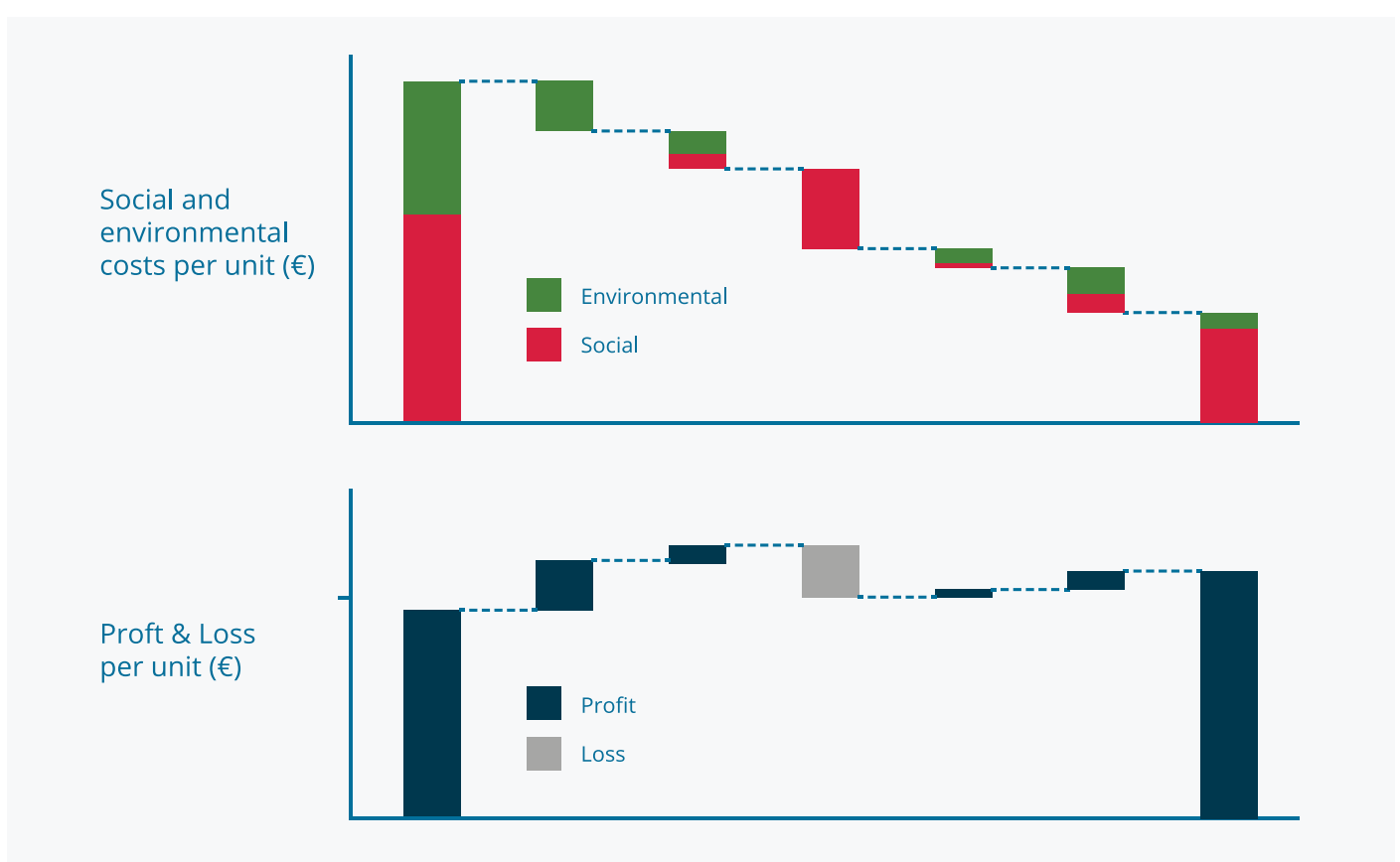


Figure 12 Hypothetical business case analysis of possible interventions

as to reduce accident rates. In order to select the most 'profitable' interventions, the social or environmental return on investment can be calculated for each intervention. This shows the reduced external costs for each euro invested in the intervention.

As an example, working towards zero deforestation has the potential to further reduce the external costs of certified cocoa cultivation by 6% (€0.30/kg cocoa beans) and the external costs of the total certified cocoa supply chain by 5.5%. Improving yields, by improving fertilizer application rates<sup>10</sup>, has a positive impact on the income of family labour and the size of the overall external costs per kg of cocoa beans. However, net environmental costs increase, as higher fertilizer usage results in higher energy use, materials use, air pollution, soil pollution and water pollution. Nevertheless, this intervention has the potential to reduce external costs of certified cocoa cultivation by around 32% (€1.55/kg cocoa beans) and the external costs of the total certified cocoa supply chain by around 29%.

## 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.

<sup>10</sup> This intervention was based on the findings of the report Cocoa and fertilizers in West-Africa by CIRAD and IDH (Ruf & Bini, 2012)

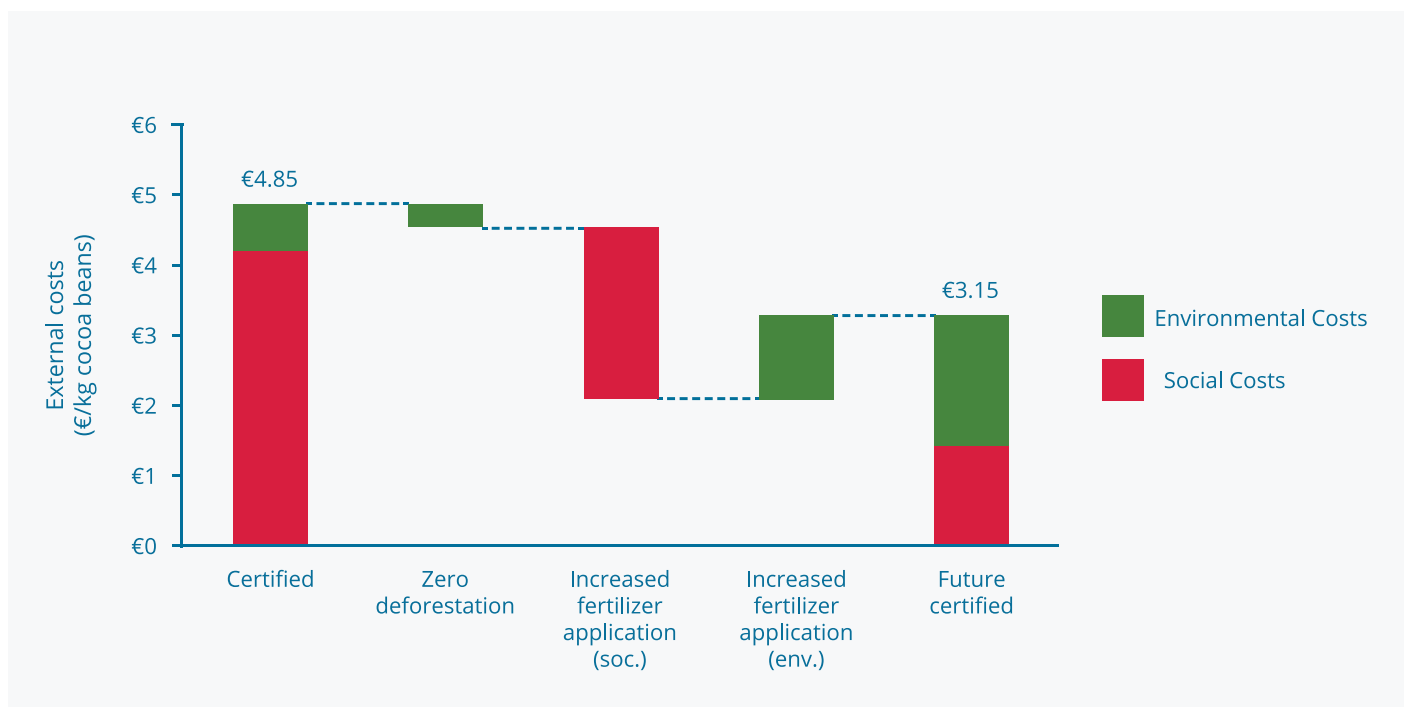
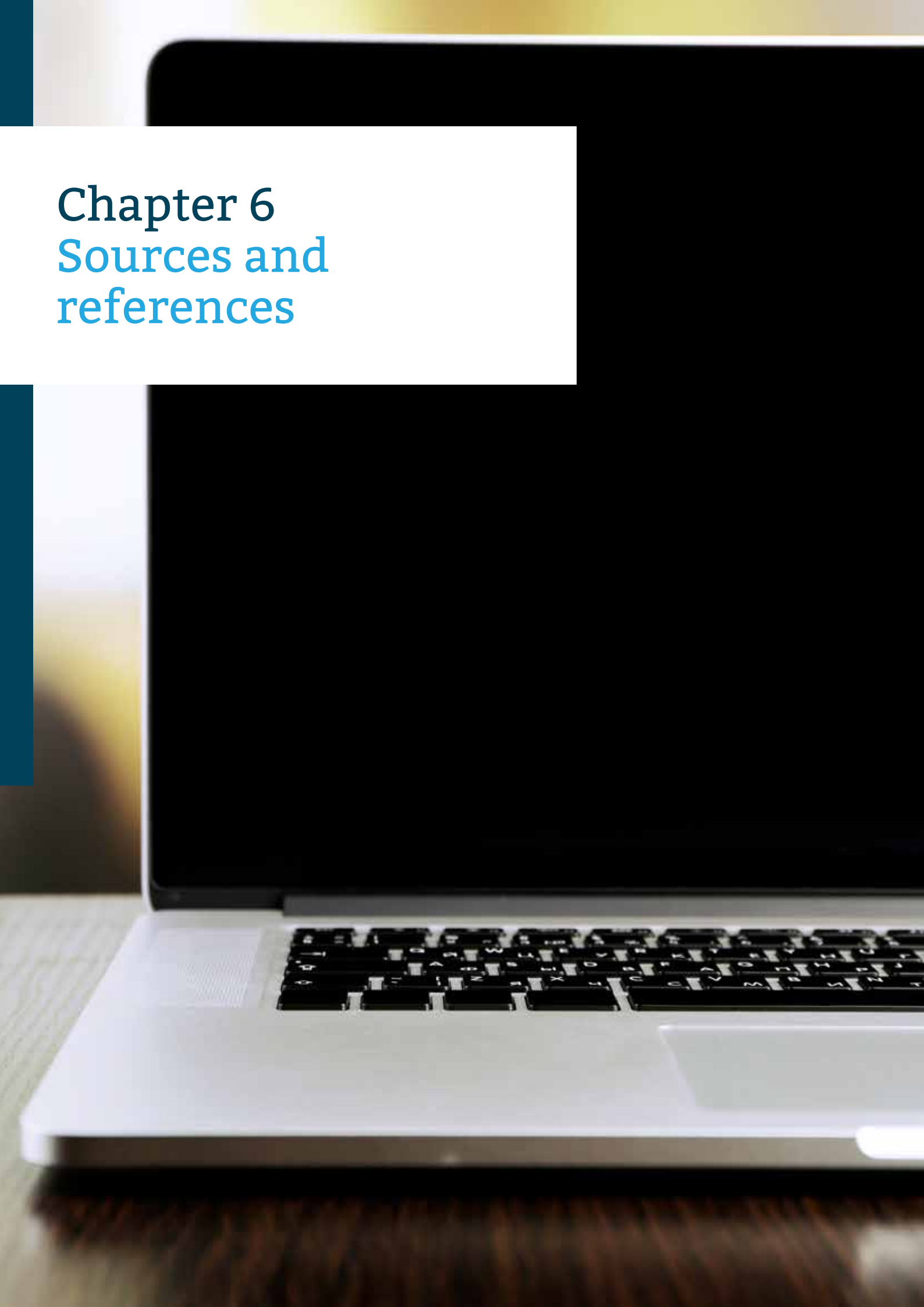


Figure 13 Effect of possible interventions on the external costs of cocoa cultivation









# 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 14 provides an overview of the key literature sources used in the study.

Key literature	
General (includes environmental & social)	<p>COSA. (2013). <i>Rainforest Alliance Certification on Cocoa Farms in Côte d'Ivoire</i>. New York: Rainforest Alliance.</p> <p>Fountain, A., &amp; Hütz-Adams, F. (2015). <i>Cocoa Barometer 2015</i>. Barometer Consortium.</p> <p>Hatlø, A., Kebede, T. A., Adebaba, P. J., Elvis, C. (2012). <i>Towards Côte d'Ivoire Sustainable Cocoa Initiative (CISCI). Baseline Study Report</i>. Oslo: Fafo Institute for Applied International Studies.</p> <p>Ingram, V., Waarts, Y., Ge, L., van Vugt, S., Wegner, L., Puister-Jansen, L., Ruf, F., Tanoh, R. (2014). <i>Impact of UTZ Certification of cocoa in Ivory Coast. Impact assessment framework and baseline</i>. Den Haag: LEI Wageningen UR.</p> <p>KPMG. (2012). <i>Cocoa Certification. Study on the costs, advantages and disadvantages of cocoa certification commissioned by the International Cocoa Organization (ICCO)</i>. The International Cocoa Organization.</p> <p>KPMG. (2013). <i>Improving smallholder livelihoods: Effectiveness of certification in coffee, cocoa and cotton</i>. SUSTAINEO.</p>
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Figure 14 Overview of key literature

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Washington: U.S. Department of Labor's Bureau of International Labor Affairs

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