
CAN CERTIFIED COCOA WIN ON ALL FRONTS? A COMPARATIVE ANALYSIS OF THE TRADE-OFFS BETWEEN REDUCING DEFORESTATION, DEFEATING CHILD LABOUR AND INCREASING PRODUCERS' INCOME IN FOUR COUNTRIES

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Abstract

This report makes a synthesis of four cocoa value chain reports (in Nicaragua, Sao Tome and Principe, Cameroon and Papua New Guinea) in the framework of the VCA4D project and showcases three aspects of sustainability, naming producers' revenues, child labour and deforestation. The potential contribution of certification schemes to the sustainability of the cocoa value chain is studied in the four countries, by comparing the situation of certified and non-certified producers with respect to these three sustainability criteria. The states have obviously a role to play in the sustainable development of the cocoa sector, and we also consider the interactions between public policy and private certification programmes. This relation can be either cooperation, competition or indifference.

Overall, in the four sampled countries, small producers of cocoa remain rather poor and cocoa cannot be their only sufficient source of revenues. However, their situation is not helpless since certified producers reach additional revenues that can help them escape poverty. With respect to child labour, there is no acute concern in any of the four countries since it is not structurally part of the production system. Deforestation is so far not a predominant issue in these four cocoa-producing countries, but this issue will probably grow in importance with the coming European regulation on imported deforestation.

The predominant certification programmes offer a premium to cocoa growers, which is considered too low to reach a decent revenue for the producers. The four countries have not either adopted public policy to guarantee a satisfactory level of price to the producers. The struggle against child labour is tackled in all certification programmes. The same goes for deforestation although none of the standards provides sufficient details on deforestation and forest degradation levels.

The most observed interactions between certification schemes and public regulation are cooperation and indifference. What explains indifference is that governments are usually not deeply involved in the development of the cocoa sector due to lack of resources. However, this can also lead to cooperation since government can rely on certification programmes to improve cocoa producers' livelihoods.

Introduction

Cocoa (*Theobroma cacao*) is a commodity that is cultivated mainly in West and Central Africa (more than 70% of global production) and in South America. The cocoa value chain is at the crossroads of economic, social and environmental issues, which should be tackled simultaneously to achieve sustainable production. In this report, we decided to put the emphasis on three – economic, social and environmental – criteria that are at the heart of sustainability issues for cocoa production worldwide:

- Producers' revenue: Increasing the income of small cocoa producers is a major challenge in the fight against poverty in rural areas (Voora *et al.*, 2019), securing the commodity chain and giving producers room to improve the quality and efficiency of their production (Timmer, 2009).
- Child labour: The abusive involvement of children in cocoa production is a crucial problem in several cocoa-producing countries (especially in West Africa), which has not yet been solved (Luckstead *et al.*, 2019).
- Deforestation: The expansion of cocoa plantations is often done at the expense of forests and contributes to greenhouse gas emissions (Kroeger *et al.*, 2017). Other agro-ecological models should be promoted for cocoa production.

The choice of these criteria is in line with the work done within the French Stratégie Nationale de lutte contre la Déforestation Importée¹ (SNDI) and the French Initiative for Sustainable Cocoa (FRISCO). The SNDI was introduced in 2018 and targeted to end the import of unsustainable forest or agricultural products contributing to deforestation by 2030. The FRISCO has a threefold objective that embraces giving a decent revenue to producers in the sense of the "[Living Income Community of Practice](#)"², ending imported deforestation and fighting against forced labour and child labour (IFCD, 2022). This threefold objective is shared by other European initiatives (Belgian, German, Swiss, Dutch) in favour of sustainable cocoa, which have recently adopted a common roadmap.

The desire to move towards a deforestation-free cocoa is also endorsed by the proposed European regulation on import of certain commodities and products associated with deforestation and forest degradation (Procedure 2021/0366/COD). This regulation is currently being negotiated between the European Commission, the Council of the EU and the European Parliament. It is intended as a response to the EU's contribution to global deforestation in relation to its consumption of agricultural and forestry products (Cuypers *et al.*, 2013). At the scale of European countries, the consumption of chocolate products is the third largest source of tropical deforestation, after soy and oil palm. Moreover, the European market is the main destination of cocoa produced in the world (Alliot *et al.*, 2016), which places the EU as the main contributor to the deforestation associated with this commodity.

In this context, the VCA4D (Value Chain Analysis for Development) studies provide important data, on the one hand, to support the development of efficient and sustainable value chains in producing countries and, on the other hand, to prepare an adapted implementation of the future European regulation to fight against imported deforestation. In a few southern countries, several "*Cocoa talks*" workshops have been initiated by the EU Delegations with all stakeholders to address these two challenges, and the cacao-dedicated VCA4D reports provide relevant information to feed these debates. These reports allow estimating the three sustainability criteria we have selected in four countries. They give the background to this synthetic and comparative study, which is split in three parts.

¹ National Strategy to combat Imported Deforestation.

² Living Income is the net annual income required for a household in a particular place to afford a decent standard of living for all members of that household. Elements of a decent standard of living include food, water, housing, education, health care, transport, clothing, and other essential needs including provision for unexpected events.

First, we do a review and a comparative analysis of these criteria between these four countries in order to question their performance while taking into account the economic and institutional differences existing between these countries.

Second, beyond a simple comparison of the national data, we question the role of private certification schemes in the performance of these three criteria, by comparing the results achieved for certified versus non-certified cocoa. There is considerable debate about the advantages (Lwesya, 2018) and disadvantages (Kroeger *et al.*, 2017) of using private certification to support the development of sustainable cocoa worldwide. Moreover, certification is seen in the proposed EU regulation against imported deforestation as a complementary tool to ensure due diligence of tropical commodities (Lescuyer *et al.*, 2022). And, more specifically for cocoa, the Rainforest Alliance and FairTrade certification mechanisms are currently performing well in helping to combat deforestation, although there is room for improvement (Carimentrand, 2021). However, private certification still only affects a small or medium proportion of cocoa producers in all countries.

Finally, we examine the possible interactions between private certification schemes and public regulation to govern the cocoa commodity chain in the four countries. A summary of the types of interaction between these two modes of regulation of the commodity chain is made to conclude the report.

Setting the scene 1 - What is expected from certification?

We expect from certification programmes that, on the one hand, they introduce changes in producers and firms practices to achieve greater sustainability and, on the other hand, they provide final consumers with goods that are actually sustainably produced (RESOLVE, 2012). Certification is therefore based both on specifications that describe sustainability requirements for the producers and on traceability systems that ensure a reliable connection between sustainable production sites and the labelled end products.

This study focuses on the first part of the certification systems, which promotes sustainable practices of primary – and possibly secondary – producers. The specifications established to define sustainable production in the field contain a large number of principles, criteria and indicators. Three criteria appear to be important in the current international cocoa production debate: deforestation (environmental aspect), child labour (social aspect), and decent revenues (economic aspect). These three criteria are present in most cocoa certification schemes, but their importance varies according to the purpose of the standards. For instance, the Fair Trade scheme places major emphasis on proper remuneration of producers, whereas organic labels pay much attention to the use of chemical inputs. But whatever the sustainability standard and the national/local context in which it is implemented, it will be difficult to consider that a cocoa is sustainably produced if it does not respect at least the three criteria that we have chosen, given the importance that they have today for European actors (consumers, firms, states).

Certification can have an influence on producers' practices in a direct or indirect way. In the first case, producers who decide to get certified must operate changes in their practices to comply with the specification of the standard. In the second case, indirect impacts refer to changes in behaviour of actors other than certified ones (Figure 1). Indeed, numerous actors are involved in a value chain and they all interact with each other triggering peer influence and integration within the chain.

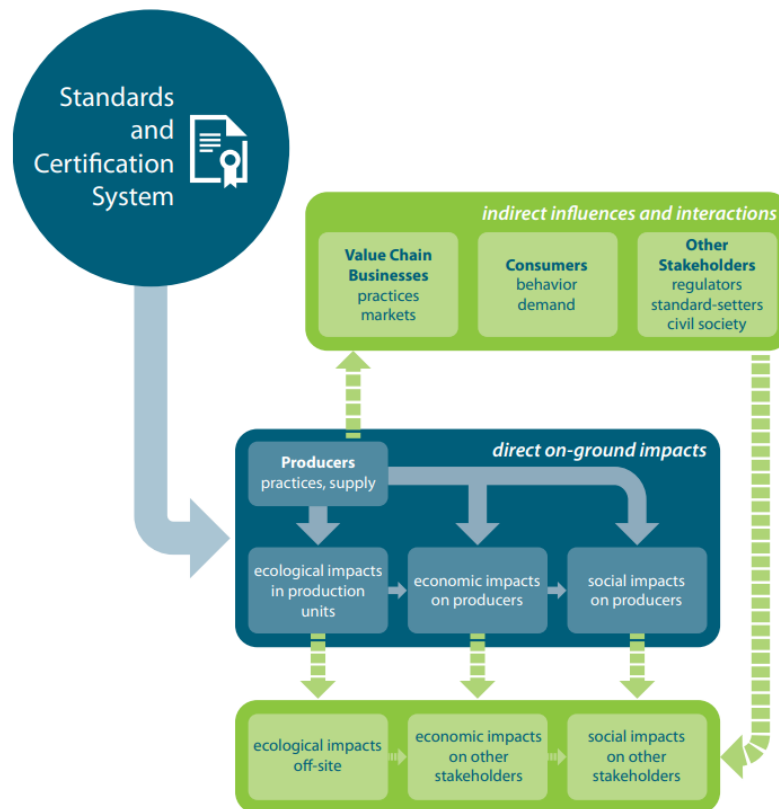


Figure 1 : Multidimensional impacts of certification (RESOLVE, 2012)

Impacts are usually classified as ecological, economic or social. Ecological impacts encompass impacts on the ecosystem integrity, biodiversity, pollution and waste and they are usually positive. But studies are often limited to their understudied area, meaning that extrapolation of results is very difficult. The influence of the sustainability standard on forest cover or forest degradation is a more recent concern, at least as far as agricultural commodities are concerned, and is still poorly documented

Economic impacts are driven by minimum selling price and premiums used to provide technical assistance to producers. Though, higher prices received by producers might be offset by higher labour costs to meet certification standards. However, certification still offers an access to a niche market and to credit (business opportunities). The global economic benefits of certification are mitigated since, even if certified producers are better-off than non-certified farmers, the gains are not sufficient to definitively escape poverty.

Finally, social impacts include respect of local rights, or living and working conditions, among others. They might be under-studied because it is harder to evaluate improvement in living and working conditions as it deals with qualitative changes. The use of child labour is a major concern for the cocoa sector. It seems that participation to certification increases the likelihood for a child to go to school (Arnould *et al.*, 2009).

Setting the scene 2 - Interactions between certification systems and public policy

There is still little empirical evidence to prove that certification has direct large-scale impacts, either at a spatial scale or within a full sector (RESOLVE, 2012). It remains unlikely that certification fully transforms a sector to meet sustainability objectives. Therefore, it needs to

cooperate with other form of governance either public or private. However, the majority of certification systems are not designed to interact with other form of governance, which might then be at the expense of greater impacts if synergy with other regulatory systems was possible. Indeed, certification systems allowed public and private institutions to enhance policies favouring more sustainable goods, which would not have been possible if they relied on their own capacities. The government has the power to enforce standards by the law and certification system can initiate a movement of change. On one hand, government agencies should not act as if certification systems were enough to solve all the problems but consider them as tools to support policies to reach sustainability since they can bring rapid changes in practices where the government is unwilling or unable to act. On the other hand, certification systems require a legal foundation to work to their maximum potential. The government is the one providing legal framework on resource management regimes, property rights, law banning illegal product, and international trade agreements. The government is a powerful actor that can participate to anchor certification systems as it is a policy maker and enforcer as mentioned before. Besides, it benefits from a strong purchasing power that can be used to buy only certified products for instance. It is also a funder and tax breaker meaning that it can provide financial assistance to producers seeking to get certified. The government can be an opinion shaper in order to add credibility and legitimacy to its actions and eventually it is an expert hence it can provide technical assistance and maintenance (through traceability systems for example).

Certification systems and governments interact with each other in different ways. There are three types of interaction that can characterized these relations (Savilaakso *et al.*, 2016). First, there can be **competition** when certification systems are seen as competitive instrument to alter the role of governments over the management of resources. Then, there can be **indifference** between the two entities when both evolve side by side without dialogue. Finally, there can be **cooperation**. This last case is divided into three scenarios (Figure 2). First, the government may supersede the certification system by incorporating this system into the law through the effects of policy learning and norm generation. Second, they can be in symbiosis when they interact with each other, while remaining independent and autonomous, to address a policy problem where actions of each entities reinforce the ones of other entities. Finally, there can be a hybrid form when there is an explicit or implicit division and sharing of functions between the two entities.

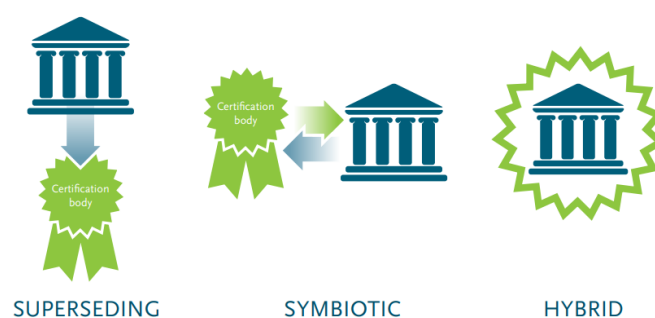


Figure 2 : Typology of interactions (RESOLVE, 2012)

The indirect impacts of certification stem from its interaction with other entities such as the government (Figure 3). The learning and demonstration impact occurs when certified producers provide an example of success that other producers want to emulate. In this case, certification can demonstrate that some innovations or standards are worth being adopted by the government to reach a greater scale. The interactions between the two entities can increase the credibility of the certification system and/or their participants. Besides, it can improve the capacity development of the government when certification systems' entities spill

over into other governance mechanisms (traceability system, legality verification, etc). It can also lead to a development of infrastructure by creating political and technical infrastructure to support future certification. Eventually, certification systems can lead to more formal regulatory processes through building coalition.

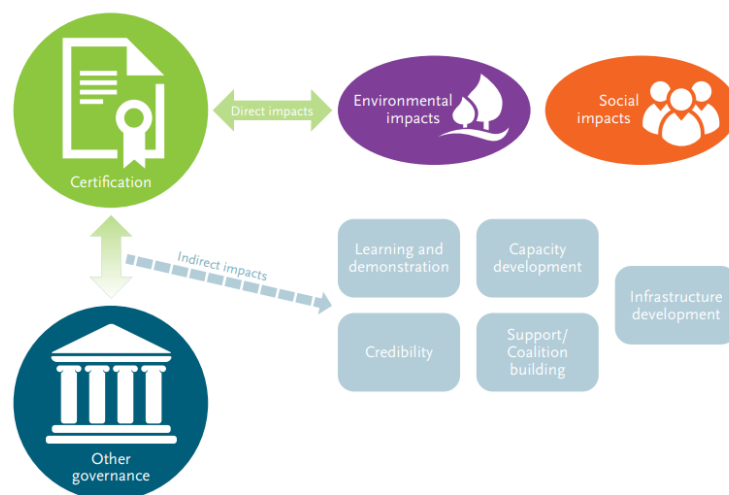


Figure 3 : Mechanisms of interaction and indirect impacts (RESOLVE, 2012)

Methods

The report is based on the four VCA4D reports focusing on cocoa for Nicaragua (Fréguin-Gresh *et al.*, 2022), Sao Tome and Principe (Brito *et al.*, 2019), Papua New Guinea (Lescuyer *et al.*, 2019) and Cameroon (Lescuyer *et al.*, 2020). The focus was put on the three criteria of producers' revenues, child labour and deforestation as they are considered as key elements in sustainable production of cocoa. The choice of criteria follows the French strategy developed within the French Initiative for Sustainable Cocoa. These three criteria were systematically assessed in the VCA4D reports with the same methodological framework. In a first stage, our analysis relies on these secondary data, without questioning their reliability. However, these four reports did not grant equal importance to the analysis of certification schemes, due to national circumstances or to the complexity of collecting information. Therefore, we completed the data from the VCA4D reports by a literature review. Most of the time, the additional content brought by the literature referred to child labour and deforestation.

Lastly, in a third stage, seven interviews were undertaken to deepen the analysis of the cocoa value chain in the sampled countries, mostly with the authors of the VCA4D reports. This final stage of the survey aimed to collect qualitative data missing in the reports and to discuss the analyses we had conducted, particularly on the influence of certification and on interactions with public modes of governance of the cocoa sector at the national level.

Results - Analyses at the national level

After having presented the role of certification programmes and government, we will introduce the countries understudied (Cameroon, Nicaragua, Papua New Guinea and Sao Tome and Principe) to highlight their characteristics regarding decent revenues for producers, child labour and deforestation. In addition, we showcase that trade-offs may exist between these criteria. Trade-offs can be defined as balancing factors that can hardly be attainable at the

same time. All along the analysis, we also assess how certification may contribute to reducing the negative trade-offs between the three sustainability criteria we have chosen.

These four countries do not contribute in the same way to the global cocoa trade, nor are they similarly engaged in the implementation of sustainability certification schemes. The reasons for such differences are detailed in the country analyses, but Table 1 presents the main data to frame and put into perspective the comparative analysis between these countries.

Table 1: Cocoa sectors for the 4 countries in a glimpse

	Cameroon	PNG	STP	Nicaragua
Annual production (ton of dry beans)	240 000	38 000	3 500	7 500
% Certified	22%	7%	30%	54%
% High quality	13%	11%	10%	63%
% Exports	98%	75%	90%	79%

Nicaragua

The cocoa value chain has been weakened by the 2018 crisis in Nicaragua. On the one hand, the crisis led to a decrease in FDI³. This context of uncertainties triggered the suspension of some initiatives for developing the cocoa value chain. On the other hand, the national strategy to keep increasing the production of “fine and flavour” cocoa and to train producers on new technologies was not implemented due to a lack of financial and human resources. Besides, the drafting of the strategy was not based on producers’ propositions and therefore it was more an empty shell than a real plan to organize the cocoa value chain.

The annual production of Nicaragua amounted to 6,939t in 2018 including 2,053t of Rainforest Alliance certified cocoa, 330t of organic cocoa and 113t of Fairtrade certified cocoa. The total value added of the chain was 551 million USD in 2018. The value chain is composed of four types of agents: farmers, cooperatives and intermediaries, international exporters and importers (Figure 4). There are four types of producers considered: small independent producers (P1), small organized producers (P2), independent producers under contract for companies (P3), medium-sized companies (P4) and large-scale companies (P5). More than half of cocoa producers are part of a cooperative (57%) and 95% of cooperatives are certified meaning that 54.15% of producers benefits from a certification. There are three systems of cultivation : traditional (organic); semi-extensive (mix); technical (chemical) with the agroforest system as a cultivating method which is usually more sustainable regarding environmental issues as it safeguards biodiversity.

³ Foreign Direct Investments.

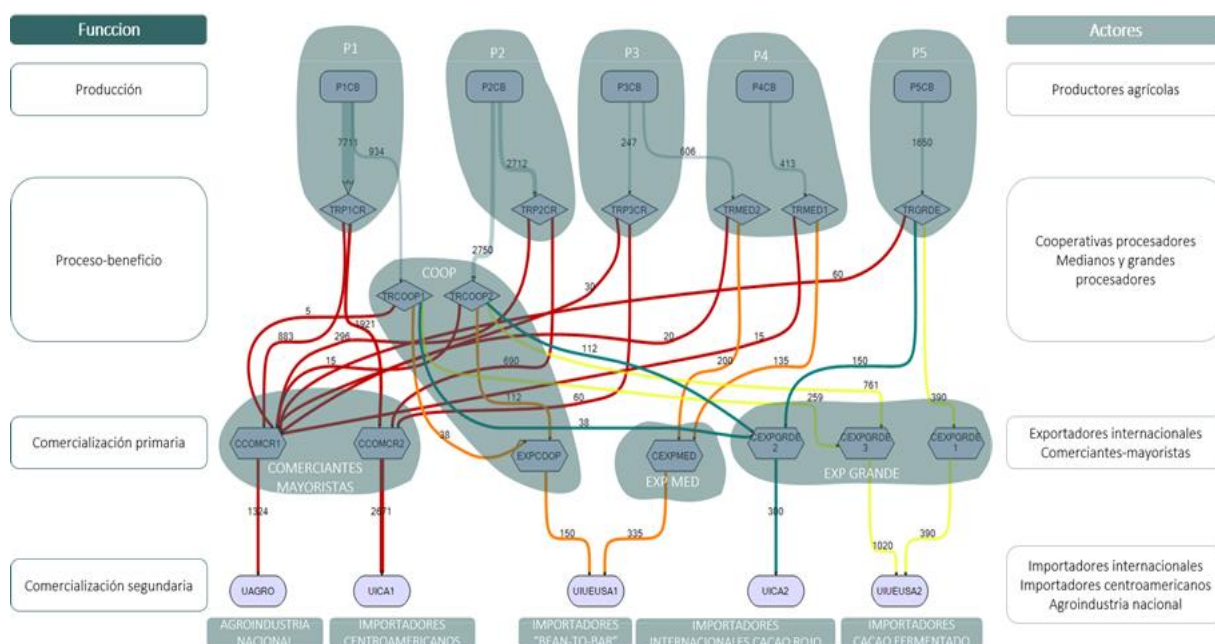


Figure 4 : Map of the cocoa value chain in Nicaragua (Fréguin-Gresh *et al.*, 2021)

Decent revenue

Independent producers under contract are those who earn the most with a rate of 1 175 USD/years as they deliver certified cocoa with a premium price. The net revenues of small independent and organized producers are 543 USD/year and 532 USD/year respectively. The difference does not seem to be significant, but it integrates the various supports (technical assistance, inputs, etc) received by the organized producers through their cooperatives, which decrease their production costs and boost their net revenues. This may explain why so many producers are involved in a cooperative. Small and medium producers generate positive net profits while large-scale companies generate a negative net profit. The last point calls into question the reason of the implementation of large-scale farms. Revenues of all small producers are under the minimum wage set at 1503 USD/year in 2021 but cocoa represents less than half of their revenue. Lastly, they devote only 45 to 60 days to cocoa production so their revenue is proportional to the time they spend for cocoa production. Thus, with an average of 52.5 days working in the cocoa production, small independent producers earn 16.7 USD/day, small organized producers earn 18.6 USD/day and independent cocoa growers under contract earn 20.5 USD/day.

In terms of revenue distribution (Table 2), independent producers capture 9% of the net income generated by the whole chain while certified producers capture 55%. These shares are greater than their respective part of the total chain actors (6.8% and 42%). Regarding small independent producers, the opposite conclusion is true. They represent 50% of the total actors and capture only 33% of the value added. Even though, producers receive 89% of the cocoa value chain revenues, at an individual level they receive a revenue that is below the minimum wage.

Table 2 : Share of net profit and value added of the different types of producers in Nicaragua (Fréguin-Gresh *et al.*, 2021)

Agents	Value Added Creation (%)	Net Income Distribution (%)	Number of agents (%)
Small independent producers	33	43	50
Small organized producers	37	55	42
Small independent producers under contract	6	9	6.8
Medium-sized companies	5	1	0.2
Large scale companies	8	-12	0.1
Other actors	11	4	0.9
Total	100	100	100

Employment is divided in three categories: permanent (55%), temporal (13%) and domestic work (32%). Compared to the other countries, domestic work is not predominant.

Child labour

Child and teenagers work with their parents. There is no evidence of child protection mechanisms from dangerous work. The levels of school attendance are low: 70% for initial education and 80% for primary and secondary school. Thus, there is evidence that child labour exists in Nicaragua as we can consider that children not attending school are working and even when they attend school they can still work after school and during week-ends. But overall, Nicaragua employed teenager labour and not child labour.

Deforestation

It is difficult to assess the dynamics of land use change for cocoa production as Nicaragua classified some cocoa plantation as forested areas. Besides, according to the report VCA4D (Fréguin-Gresh *et al.*, 2021), in the main cocoa-producing region (Waslala) deforestation is primarily due to livestock farming and timber harvesting. Moreover, cocoa plantations have a lifetime of more than 20 years hence potential deforestation linked to cocoa production is not intensive at all. Cocoa is almost only linked to reforestation since the crop has been grown in previously deforested areas (Orozco-Aguilar *et al.*, 2021) or in degraded land or in replacement of coffee production due to climate change. However, in some remote areas where the regulation of the forest is weak due to the quasi absence of policies related to environmental and resources management, primary forests can be replaced by cocoa plantations.

Certification's influence in a nutshell

Table 3: Benefits of certification regarding the three criteria of interest in Nicaragua

	Certified producers	Non-certified producers
Decent revenues	Earn around 18.6 USD/day.	Independent producers earn 16.7 USD/day. Independent producers under medium-term contract earn 20.5 USD/day
Child labour	Rainforest Alliance and Fairtrade certifications tackle this issue in their criteria.	The school attendance rate are low indicating that child may work with their parents in the field instead of going to school.

	13% of certified cocoa is organic, whose label does not tackle child labour.	
Deforestation	RA standard (82% of certified producers) partly tackles this issue.	Cocoa-related deforestation does not seem to be a concerning issue.

Implications

According to Del Carpio (2008), there is an inverted U-shape that exists between income and child labour in Nicaragua. It means that increasing the income of a household leads to an increase of child labour up to a certain point. This result is quite concerning since most of the development programmes for the cocoa value chain are targeting an increase in producers' revenues and that cocoa producers are usually poor then they will fit in the left part of the inverted U-shape in which income and child labour are positively correlated. Therefore, if not taken into consideration, child labour may increase while producers' income increases as well. Additionally, the authors highlighted that providing a cash transfer for children going to school, physical work of children is declining. Hence, one way of fighting against child labour in cocoa plantation could be to grant households with cash transfer to increase the incentive to send their children to school.

Cocoa cultivation can be either a source of deforestation or reforestation (Orozco-Aguilar *et al.*, 2021). The factors that are linked to deforestation in Nicaragua are "aging farmers, low cocoa prices, low profitability and technical knowledge" and "income from cocoa, low cocoa prices, and farmers' political incidence". Besides, small producers of cocoa with low yields could trigger more deforestation to grow more cocoa to meet market demand.

There is no relationship that seems to appear between private certification programmes and government. Indeed, the regulation of the cocoa value chain is very poor in Nicaragua hence the government does not exert power on the chain. Most of the norms that govern the chain comes from private certification and international exporters to meet demand.

Sao Tome and Principe

Sao Tome and Principe is a very poor country as 66% of people were below the poverty line (2 USD/day) in 2010. Cocoa production seems to be a potential source for economic growth. Indeed, the production of cocoa beans in 2017 was of 3,551t and the production of pulp cocoa of 9,864t was associated with value added of 5.6 million € (approximately 5.9 million USD). In all the cocoa produced, 1,065t of cocoa beans and 2,958t of pulp cocoa were certified. This contributed to 17.3% of the total agricultural GDP and 2.1% of the total national GDP. Cocoa represents 90% of the country's export. The economic potential of cocoa in Sao Tome and Principe lies in the quality and not in the quantity (represents 1/1000 of global production). The preponderant type of cocoa is the Forastero. About 30% is ranked as "fine and flavour" cocoa, but this figure is underestimated according to some actors. The organic production is more profitable than the conventional one therefore obtaining a premium certification would be the last step for producers. In terms of governance, the Ministry of Agriculture and Rural Development is in charge of the cocoa sector and is responsible for elaborating policies for the agricultural sector, but the main support to producers comes from two cooperatives (CECAB⁴ and CECAQ¹¹⁵) providing services to smallholders for the production and marketing of cocoa. The two cooperatives are in charge of more than 50% of the cocoa export. They allowed a significant improvement in living conditions for cocoa-producing families

⁴ Cooperative for the production and export of organic cocoa.

⁵ Quality cocoa export cooperative.

(COMPRAN report, 2020). Eventually, the coordination at the level of medium-sized producers is weaker.

Actors of the cocoa value chain are characterized by four elements (Figure 5): their type of cocoa (conventional or certified), their size (small or medium-sized producers), their type of production (cocoa butter or dried cocoa, or both) and their type of products (dried cocoa or chocolate). Hence the following typology for the cocoa value chain: small producers of dry cocoa associated in two cooperatives (3331), medium-sized companies producing dry cocoa (12) and small producers of pulp cocoa (4270) who sell to medium-sized companies. The first two types can be either certified or conventional. Producers perform all the activities (planting, harvesting, fermenting; drying, exporting) and there are no economic agent such as collectors, wholesalers or retailers. Therefore, we can expect that producers earn more revenue than if there were many intermediaries.

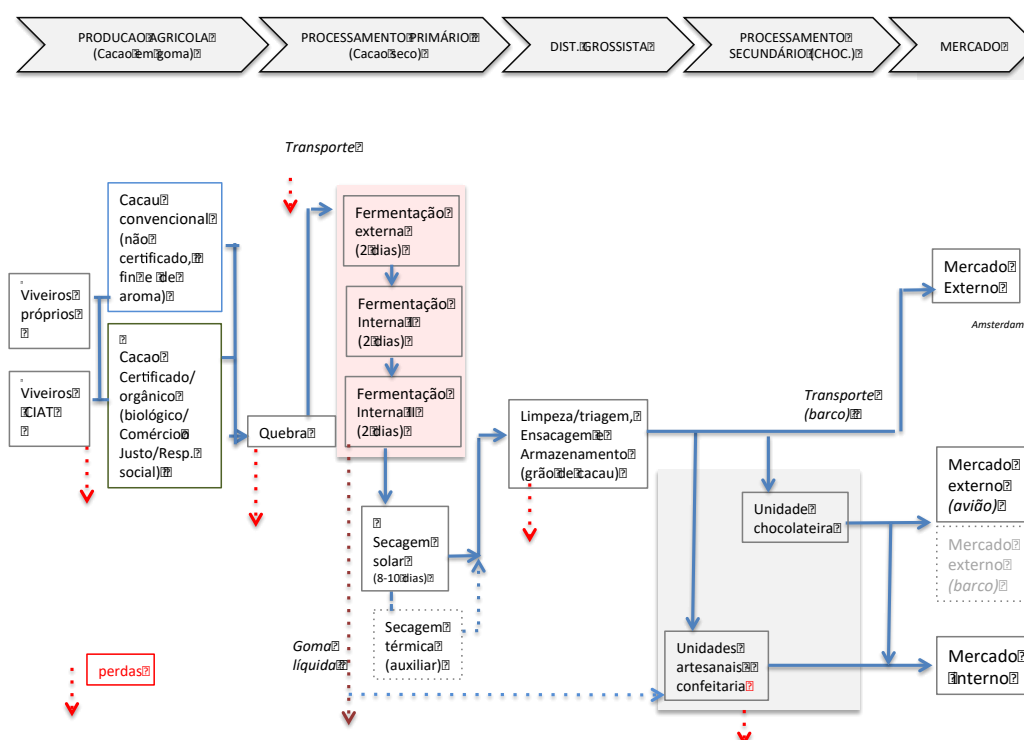


Figure 5 : Scheme of the cocoa commodity chain in São Tomé and Príncipe (Brito *et al.*, 2019)

Decent revenue

Cooperative members prefer to be independent rather than salaried because of the benefits they get from cooperatives. On the contrary, non-organized small producers prefer to be salaried in medium-sized companies to secure an income even if it is low. Minimum wages are set at 49 USD/month in the public sector and 35.5–71 USD/month in private sector. Small producers receive a benefit, which is below the minimum wage. Hence, they need to combine their cocoa production with other crops (coffee, vanilla or fruit). The most critical situation is that of small pulp cocoa producers as they have higher costs than benefits. This is explained by the fact that they face low-productivity due to low investment in the plantations that they rent to the land owners. It is worrisome as they represent 56% of producers.

Looking at the resilience of cocoa farmers is one way to examine the economic sustainability of the value chain. If international price of cocoa falls by 10%, medium-sized companies do

not make profit, which is worrisome as they represent more than half of the production. Small certified and conventional producers are more resistant to falling prices, as prices should decrease by 40% for these producers to become non-profitable. Even better, certified medium-sized companies continue to resist a price drop of 50%. This highlights the preponderant role of certification.

The distribution of the value added is very profitable for the workers (44%) and the producers (42%), which make cocoa an inclusive sector (Table 4). Labour is concentrated in small pulp producers (51%) and certified small producers of pulp and dried beans (33%). Distribution of the value added is favourable to salaried and small producers. However, at an individual level, revenues are low and cocoa-producing families live in situation of poverty. Therefore, the remuneration seems better in medium or large-scale farms as they offer formal employment.

Table 4: Share of net profit and value added of the different types of producers in Sao Tome and Principe (Brito *et al.*, 2019)

Agents	Value Added Creation (%)	Net Income Distribution (%)	Numbers of agents (%)
Small certified producers of pulp cocoa and beans	32	33	36
Small conventional producers of pulp cocoa and beans	6	7	7
Small producers of pulp cocoa	22	-7	56,
Medium-sized producers of certified pulp cocoa and beans	2	4	0,03
Medium-sized producers of conventional pulp cocoa and beans	365	61	0,12
Medium-sized producers of beans	2	2	0,04
Total	100	100	100

Child labour

The work code is being revised to exclude the worst forms of child labour. Many children are compelled to work with their family in addition to their school work. Between 2002 and 2014, a strong awareness campaign was launched in the objective of ending child labour. According to the ILO, 22.6% of the children between age 5 and 14 are working and 25% of the children between 7 and 14 study and work at the same time. However there exist disparities between rural and urban area. Also, there is no official data, in particular for the cocoa sector. In 2014, the rate of child working was estimated at 8%. There may be a huge difference between families producing organic or sustainable cocoa and the other farms with certification as the certification requires no child labour.

Officially, child labour does not exist in Sao Tome and Principe but, in reality, the majority of children do participate in plantation work. However, this does not appear to be a barrier to schooling. Indeed, school attendance rates are 90% for primary school and 60% for secondary school. School is free and compulsory until age 12. Trade unions fight to increase the minimum legal age to work to 16 instead of 14. Between 12 and 14 year old, children can only work in the informal sector in which they are more likely to be exposed to the worst form of labour. In the Principe island for example, 26% of 14-18 year old teenagers are exposed to the worst form of child labour. However, the work in cocoa production is not particularly dangerous so children are relatively protected from the most unsafe work. Besides, half of the national production is certified Fairtrade which banishes child labour.

Deforestation

In the case of certificated cocoa, transport to the port and to the fermentation sites is the main contributor to the impact on resources. The two major contributing stages to ecosystems are the production stage (use of pesticide) and transport to fermented plants. More than 90% of the negative impact of the value chain on land use comes from the production stage. The ecosystem quality is determined by the land use category (87.4%). Conventional cocoa has more damaging effects (in terms of number and magnitude) on environmental and human health issues. The negative impact of the value chain on land use coming from the production stage is higher in case of conventional cocoa. The assessment of the environmental impacts generated by the value chain found that the conventional cocoa production systematically presents higher absolute impacts on human health, ecosystem quality and resource depletion. In case of land use, the negative impact of conventional cocoa is 3.6% higher than that of certified cocoa.

The alteration in land use due to an increase in productivity or to a phenomenon of production concentration ("land sparing") led to a high impact on ecosystems. However, policies of sustainable intensification of cocoa production are still valid according to the authors. Indeed, deforestation is mainly due to the development of industrial palm oil plantation. Besides, two other factors of deforestation are the expansion of urban areas and the change of land use from plantations (cocoa mainly) to food-growing areas (COMPRAN project, 2020). Cocoa is then linked to deforestation not because forests are destroyed to plant cocoa but because cocoa cultivation are deforested to grow other crops. One way to avoid this deforestation could be to invest in the renewal of cocoa plantation. In addition, cocoa can be linked to deforestation in the sense that to have a good quality cocoa good driers are needed and they are made of wood (Sylvain Dardel, personal communication, July 16th 2022).

Certification's influence in a nutshell

Table 5: Benefits of certification regarding the three criteria of interest in Sao Tome and Principe

	Certified producers	Non-certified producers
Decent revenues	Certified producers are more resilient to price drop.	Similar profit rate but un-certified cocoa producers are much more sensitive to price variations
Child labour	Half of the national production is Fairtrade certified which bans child labour.	Children work with their parents but it does not jeopardize their schooling.
Deforestation	Rainforest Alliance partly tackles this issue.	Cocoa-related deforestation is not considered as an issue

Implications

Child labour and deforestation are not big issues in the cocoa producing system. Therefore, it is difficult to assess the trade-offs that could exist. What would be interesting is to know whether deforestation and child labour would be an issue to cope if the revenue of cocoa producers decreased creating an adverse event.

In terms of relation between certification programmes and government, indifference is the type that can characterize it. Indeed, the government has no means to be able to get deeply involved in the development of the cocoa value chain hence most of the initiatives comes from private actors.

Cameroon

Cameroon is the fifth cocoa producer in the world. The state was deeply involved in the cocoa production until mid-1990s, when cocoa sector represented 15% of the primary sector GDP and 3% of total GDP. The several Structural Adjustments Plans drastically reduced public support to the cocoa sector, which had a negative influence on the quality of the cocoa but a substantial impact on the production, with a double of the production over the last two decades.

The major part of the cocoa production is done with the Trinitario variety whereas the old cultivations were planted with the Forastero variety. These two varieties allow to produce fine and flavour cocoa, that is reputed for its “brick red” color. We could then expect that producers sell their production at a good price. However, the lack of traceability prevents many cocoa growers to demonstrate the origin of their beans and to be paid the price they should. Cameroon produced 242,000t of cocoa in 2019 among which 59,957t are certified by Rainforest Alliance. The cocoa value chain value added amounted to 218 billion USD.

The value chain can be divided into four categories of actors at the national scale: suppliers, producers, intermediaries, processing companies, and exporters (Figure 6). There are four types of producers: small cocoa farms under shade and without external support (200,000), small cocoa farms under shade and with external support (45,000), small cocoa farms without shade (full sun in savannah) and with external support (45 000), medium-sized cocoa farms (3 000) and large-scale cocoa farms (300). There are also various types of relation between buyers and producers: bilateral and stable relationships between cooperatives and export firms, official markets organised by the state agencies to gather producers and buyers, individual sale to informal traders (“coaxers”). Additionally, cocoa processing plants are usually highly concentrated and belong to international firms.

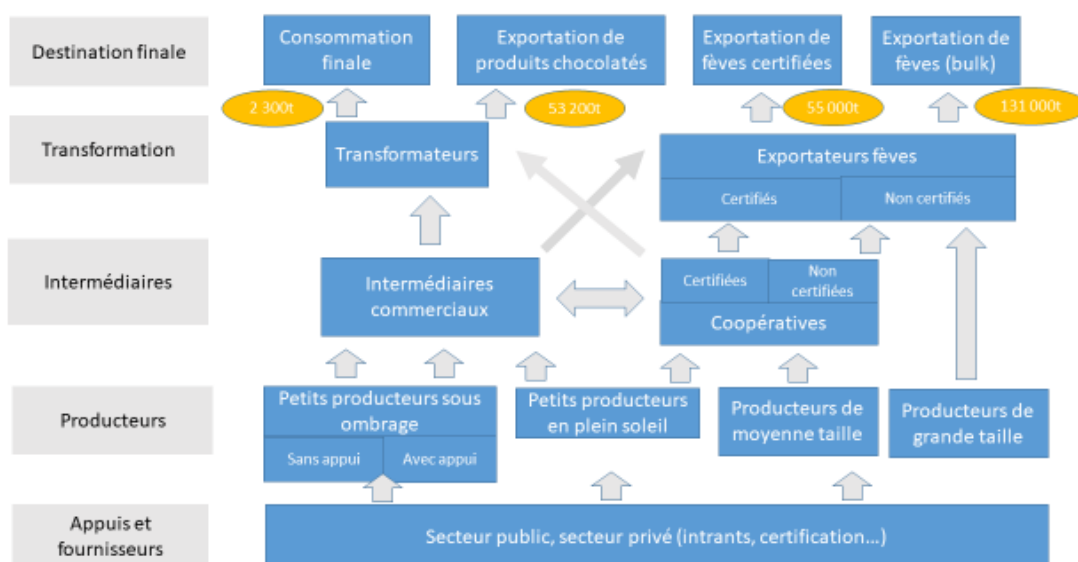


Figure 6 : Representation of the cocoa commodity chain in Cameroon (Lescuyer *et al.*, 2020)

For the government, cocoa is seen as an income to be increased and profitability is sought in the short or medium term. But a large part of cocoa production is environmentally sustainable since about two third of the production is grown in agroforestry. The endeavour of the government to abide by sustainability standards is due to the fact that Europe is launching a deforestation-free cocoa importation programme.

Decent revenue

Small cocoa farms in forest areas and without external support generate a net profit of 4% while they rely mostly on domestic work, which is hardly remunerated (Table 6). On the opposite, small cocoa farms with shade and external support get a profit rate of 24%. This could be explained by the fact that 30% of their production is certified and, therefore, better valued. This highlights the role of certification in remuneration. Small cocoa farms without shade and with external support benefit from a net profit of 15%. This profit rate is even higher if the external support is considered. On the opposite, large-scale cocoa farms get a negative net profit of -73%, which is explained by catastrophic yields per hectare. Coaxers get a net profit of only 2% that proves their precarious situation, unlike what it is often claimed. Cooperatives also have a low net profit of 1% but it corresponds to their role. Non-certified cocoa export companies make a net profit of 4.9% while certified ones have a net profit of 11.8% showing the preponderant role of certification in remuneration. The greatest net profit (29%) is made by cocoa processing plants. This is due to the fact that they are in a quasi-monopolistic situation.

Table 6: Share of net profit and value added of the different types of producers in Cameroon (Lescuyer *et al.*, 2020)

Agents	Value Added Creation (%)	Net Income Distribution (%)	Number of actors (%)
Small farm with shade and without external support	16	3	62
Small farm with shade and external support	11	19	14
Small farm without shade and with external support	20	12	14
Medium-sized farms	8	2	0,9
Large-scale farms	0	-1	0,05
Other actors	45	65	9.05
Total	100	100	100

Comparing the distribution of the net profit and the value added among the different type of producers, we see that only small farms with shade and external support enjoy a net profit that is higher than their contribution to the value added of the value chain. Only export companies offer employment in the sense of full-time salaried jobs (2800/year). The cocoa value chain is mostly anchored in the informal sector. Indeed, self-employment represents 293 000 jobs, local workers 29 200 and domestic work 29 200. Only 0.7% of employment generated by the cocoa value chain belongs to the formal economy. Non-certified export of cocoa is the dominant sub-sector of the value chain and involves a large number of actors. But at an individual level, revenues are low and represent only a secondary source of money for individuals.

Child labour

As child labour is circumscribed to holidays and week-ends, it does not infringe on school attendance. Contrariwise, attendance rates are higher in cocoa-producing regions as revenues from the production help the farmers to send their children to school. Hence, child labour is not an integral part of the cocoa production. However, child work mostly on the fields and so they are not protected from dangerous and hard work. They are exposed to the use of pesticide which is toxic and pesticide bags are heavy. Among certified production, Rainforest Alliance is prevailing and it offers a guarantee for child labour free cocoa since it is a stickler for compliance of this criteria additionally to the protection of forests.

Deforestation

The growth in cocoa production in Cameroon from the end of the 1990s is not due to a massive regeneration of old cocoa plantations planted in the years 1950-60, but by an extension of new cocoa plantations in forest zones in the first period, then in tree savannah and gallery forest zones for the last fifteen years. This expansion of cocoa farming has been done partly to the detriment of the forests. The preponderant part of the impact on human health and on ecosystem of the cocoa production comes from deforestation (66.8% and 68.4% respectively). Small farms without shade and with external support are the ones having the least amount of impact on human health and the ecosystems. However, there are uncertainties on the rate of deforestation due to the lack of area of cocoa plantation inventory. Moreover, it is hard to evaluate the impact of certified cocoa on forest cover due to a lack of localisation of this type of production but certification is evolving for taking into consideration zero deforestation (e.g. Rainforest Alliance).

Certification's influence in a nutshell

Table 7: Benefits of certification regarding our three criteria in Cameroon

	Certified producers	Non-certified producers
Decent revenues	Net profit rate of 24% for certified small producers in forest area and of 15% for certified small producers in savannah	Net profit rate of 4% for un-certified small cocoa growers (mainly in forest area)
Child labour	Rainforest Alliance and Fairtrade standards tackle this issue in their criteria.	Children may work with their parents but it does not jeopardize their school attendance.
Deforestation	23% of the national production is certified Rainforest Alliance which partly tackles this issue in its requirements.	Without external support, there is a risk that producers will extend their lands to increase their production.

Implications

Promoting deforestation-free cocoa would be more promising on the short run with certified small-scale cocoa growers and medium-sized cocoa farmers. For the other categories of producers (small-scale producers without support, or large-scale farms), there are obvious trade-offs between higher revenues and deforestation. The development of the non-certified cocoa sub-sector could have a huge impact on forest cover and if producers are not helped there is a risk that deforestation continue while revenues at an individual level remains low. The development of the certified cocoa sub-sector seems to implement a good dynamic between higher revenues and less deforestation. However, this production is limited to producers that have already adopted good practices, i.e. about a third of the total number of producers.

The development of cocoa processing plants may be a solution to increase revenues as they benefit net profits and they are source of formal employment. But the increasing demand for cocoa they need could lead to deforestation.

Since the liberalization of the cocoa sector in the end of 1990s, the government is less involved in the production but public organizations are still in charge of the regulation of the sector. As the public regulation has not yet met international demand for legal, sustainable and deforestation-free cocoa (Lescuyer and Bassanaga, 2021), certification is a tool to achieve these goals. On the one hand, Nlend Nkott *et al.* (2019) noted that “Private certification has become the main support mechanism for smallholders, which means that it can no longer be considered as a complementary approach to public action”, indicating that certification has superseded the government. However, private certification cannot be a perfect substitute of public regulation since it does not benefit all farmers. On one hand, farmers with low skills and opportunities face much higher cost to get certified. On the other hand, farmers that are in overcapacity cannot sell their whole certified production. This leads to a “waste” of certified cocoa. But private certification also offers technical solutions, for instance for traceability, that are not available to the public administration. A hybrid governance of the cocoa commodity chain, combining private sector and public administration tools and approaches, would therefore be of real interest. The symbiotic relation appears to be a solution to achieve deforestation-free cocoa standards with public regulation in charge of defining what is legal cocoa (in terms of ecosystem conversion and labour right). Besides, one of the reason why certification is not adopted by small farmers is that they lack information about its benefits (Nlend Nkott *et al.*, 2019); hence public agencies could provide this information. There is a need for building public-private partnerships to better develop the cocoa sector in Cameroon.

Papua New Guinea

The cocoa value chain in Papua New Guinea (PNG) is characterized by a dual rural economy naming either producers are cultivating cocoa to subsist or they reach international or local markets. The reason of this duality is that 46% of rural population lives within 4 hours travel to a major service centre and 38% within 8 hours. So it implies difficulties to access inputs and a limited access to training. Hence, the state can only have a limited impact on producers for whom subsistence is the main purpose of their agricultural activities. On the other hand, cocoa is largely exported as it represents 14% of agricultural exports value (2004-2006). The country produced 33 300t of cocoa in 2018 and it generated a value added of 206 000 000 PGK (approximately 58,000 000 USD). Among this production, 2 500t were Rainforest Alliance certified and 146t Fairtrade certified. The cocoa value chain is important in the economy of Papua New Guinea since cocoa production has two advantages naming that it provides activity and income as well as tax revenues and that 16% of the PNG households are involved into the cocoa value chain. There are two niches cocoa producers can have access to. The first one is the certified cocoa, especially the Fairtrade and Rainforest Alliance certifications, and the second one is to produce a quality cocoa to supply countries seeking for specific flavour or quality. However, the second niche currently represents only 0.2% of the country’s production due to overall poor quality and high logistic costs. Indeed, only 25% of the cocoa production falls under the “fine and flavour” appellation.

The value chain is divided between input suppliers, producers, processors, trader and final consumers (Figure 7). The production of dry beans is divided between small producers for subsistence characterized by a low-intensity production and business-oriented producers characterized by a high-intensity production. The production of wet beans is divided between certified and non-certified strategies. The access to fermentaries is the main driver in the decision of producing either wet or dry beans. We can classify producers according to two production strategies. Either they are relying on a low-labour-input strategy and cocoa represent only a secondary activity for them or on a high-farming-input strategy. Large-scale plantation represents less than 2% of cocoa production and have been excluded from the analysis. Intermediate traders are no longer numerous and there is a direct link between small producers and exporters.

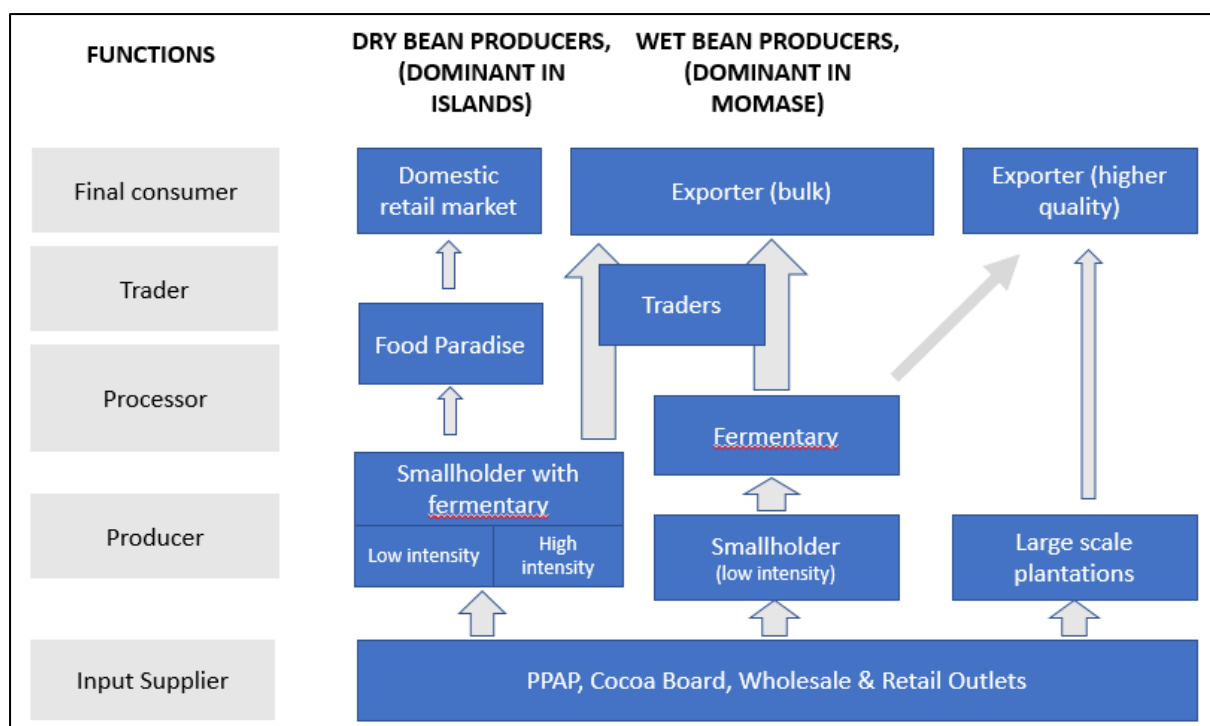


Figure 7 : Description of the complete cocoa value chain in PNG (Lescuyer *et al.*, 2018)

The Papua New Guinea Cocoa Board (PNGCB) is in charge of regulating and developing the cocoa sector as well as of providing budgetary support to the sector in order to promote its sustainable development. There is a public-private cooperation: “The project approach considers the government’s role as the regulator and supporter of industry, while engaging the private-sector to roll out good agricultural practices and facilitate uptake by smallholder farmers” (Department of Agriculture and Livestock, 2017). The government is involved in the development of a primary farm assurance for smallholders with the support of the association Outspan-cocoa, which both assist producers and buyers in adopting the Rainforest Alliance certification scheme. The public and private organizations share a common vision of the production model in which small producers should be encouraged to specialize themselves into intensive cocoa production. To do so, the PNGCB is in charge of regulating and promoting the sector but it does not have enough budget to face these issues. The support for the development of the chain is actually coming from external financing (e.g. PPAP⁶). However, farmers do not necessarily see the benefits of this investment as the main investments are directed towards research and not towards technical assistance and training for farmers. Therefore they may not want to cooperate by funding the industry of research and development.

Decent revenue

The minimum wage is set at 3.5 PGK/hour (around 1 USD/hour) which is higher than the poverty line level (2 USD/day). 90% of the labour used in wet beans subsistence-oriented production is domestic and not remunerated. This category gets a net profit of 42% but their activity would not be profitable if all the workforce was paid. We have the same pattern for dry beans production by subsistence-oriented producers except that they earn a net profit of 8%. This low return to production is explained by the fact that fermentaries are located in areas

⁶ Productive Partnership in Agriculture Project. A World Bank project aiming at improving the livelihoods of smallholder cocoa and coffee producers through improvement of the performance and the sustainability of value chains in cocoa-and-coffee-producing areas.

where the demand for dry beans is low. As well, in fermentaries, most of the labour is unpaid. The net profit of certified fermentaries is 28% while that of non-certified fermentaries is 12%.

In terms of revenue distribution, subsistence-oriented producers of wet and dry beans are the main beneficiaries as they get 32% and 27% of total revenues and generate more than 56% of the total direct value added of the chain (Table 8). Therefore, these producers are remunerated more than what they produce. Usually, cocoa producers have indeed very high value added/turnover ratios thanks to low inputs and subsidies to cover their intermediate consumption. Therefore, from a macro viewpoint, the cocoa industry is profitable and from a micro viewpoint, cocoa offers a moderate source of income for rural households. However, only export companies offer full-time salaried jobs. Most of the work done in the cocoa chain belongs to the informal economy (150,000) with domestic work representing between 75% and 90% of the labour used.

Table 8: Share of net profit and value added of the different types of producers in Papua New Guinea (Lescuyer *et al.*, 2018)

Agents	Value added creation (%)	Net income distribution (%)	Number of agents (%)
Subsistence-oriented wet bean producer	18	24	-
Certified subsistence-oriented wet bean producer	3	5	-
Subsistence-oriented wet bean producers (all)	21	29	61
Subsistence-oriented dry bean producer	38	9	25
Business-oriented dry bean producer	8	10	2
Certified fermentaries	3	6	0,2
Non-certified fermentaries	16	14	11
Other actors	34	32	0.8
Total	100	100	100

Child labour

Child labour is not an acute concern. Indeed, the majority of cocoa plantations belongs to smallholders who do not lack adult workforce. Even though it is possible that children help their families, it does not involve hard labour and does not interfere with schooling since schooling is highly valued in the country (Ivo Syndicus, personal communication, June 26th 2022).

Deforestation

Cocoa cultivation does store carbon but it would never compensate the loss due to transformation of forest into cocoa production lands (deforestation as conversion of land use). Cocoa does not seem to contribute to deforestation in PNG as it is covered in the classification "Other" which represents only 1% of deforestation drivers (VCA4D report, 2019). Indeed, there are no primary forests left in PNG so if the definition of deforestation only involved primary forest then there is no deforestation possible. However, cocoa is included in shifting cultivation patterns (63% of deforestation). This is rather a consequence than a cause since it is likely that in places where there is suitable landscape for cocoa production the cocoa expansion rate will be large. The area of land converted for cocoa cultivation would be at most 1%.

Certification's influence in a nutshell

Table 9: Benefits of certification regarding our three criteria in Papua New Guinea

	Certified producers	Non-certified producers
Decent revenues	Net profit for certified wet beans producers is about 52%	Net profit for uncertified wet bean producers and for (intensive) business-oriented dry bean producers is around 42%. Net profit is only 8% for non-intensive dry bean producers
Child labour	Rainforest Alliance and Fairtrade certifications tackle this issue in their criteria	Little risk of child labour.
Deforestation	7% of the national production is RA-certified which partly tackles this issue in its requirements.	Cocoa is not considered as a major driver of deforestation but contributes to indirect shift in cultivation patterns.

Implications

The strategy of public and private organizations is to convert smallholders into business men specialized in cocoa growing and processing. It aims at increasing producers' incomes. However, there could be unforeseen consequences. First, this would mean that producers rely only on cocoa to earn income that is less secure than growing different crops. Besides, environmentally speaking, it is better to grow cocoa in agroforestry system that implies not to be specialized in one crop. Eventually, if producers are looking to increase their income while being specialized in cocoa the only thing they could do is to increase their cultivation leading to deforestation. Hypothetically, they could also intensify their production but the major constraint for producers would be to deploy work since they are reluctant to hire people other than family and that it would cost too much money. Additionally, the production of wet beans is the major concern with respect to impact on the ecosystems. The land use that drives the ecosystem impact is almost equal to the inverse of the yields. It means that if producers extend their cultivation (which is what private and public organizations want in the end as they want them to increase their production) it would reduce their yields and therefore their rentability will go down. The same trade-off between deforestation and decent revenue as seen before is also valid in the PNG context.

Another strategy advocated is to increase the production of certified cocoa to increase producers' revenues. But this strategy works only for producers living near fermentaries which would lead to even more geographical disparities between producers. Moreover, certification has a residual role due to the low amount of certified production. Besides, the majority of PNG cocoa export are directed towards Asia and Southeast Asia countries that do not care much about the quality of the product. Hence, there is no incentives for producers to certify cocoa.

Even though certification programmes are residual and the government is not really involved in the development of the cocoa value chain there is a form of symbiosis (cooperation) between the two that emerges from the support that the government is giving to the private association Outspan-Cocoa which is involved in the Rainforest Alliance certification.

Conclusion - Comparative analysis of the certification's influence on cocoa sustainability

Assessment of the performances along the three criteria

The assessment for the decent revenue performance is based on two variables: (1) the level of producers' revenue with regard to the poverty line (1.90 USD) and (2) the percentage of the international price that producers receive. Grade 0 is the worst mark and 4 is the best one (Figure 8).

Nicaragua is given the best grade since the revenues of cocoa farmers are about 6 to 7 times the poverty line in both certified and non-certified cases. In Cameroon and Papua New Guinea, there is a large difference in terms of revenue comparing certified cocoa and non-certified cocoa, which shows that certification contributes to improve rural livelihoods. Cameroon has a strategy to produce large quantity of cocoa instead of promoting quality. In the case of Papua New Guinea, most cocoa is exported to Asian countries that are not demanding for the quality of cocoa. To be exported to sensitive western markets, certified cacao must be associated with quality; hence the discrepancy in revenues between certified and non-certified producers. On the contrary, Nicaragua and Sao Tome and Principe trade high quality cocoa that remains unchanged whether producers are certified or not.

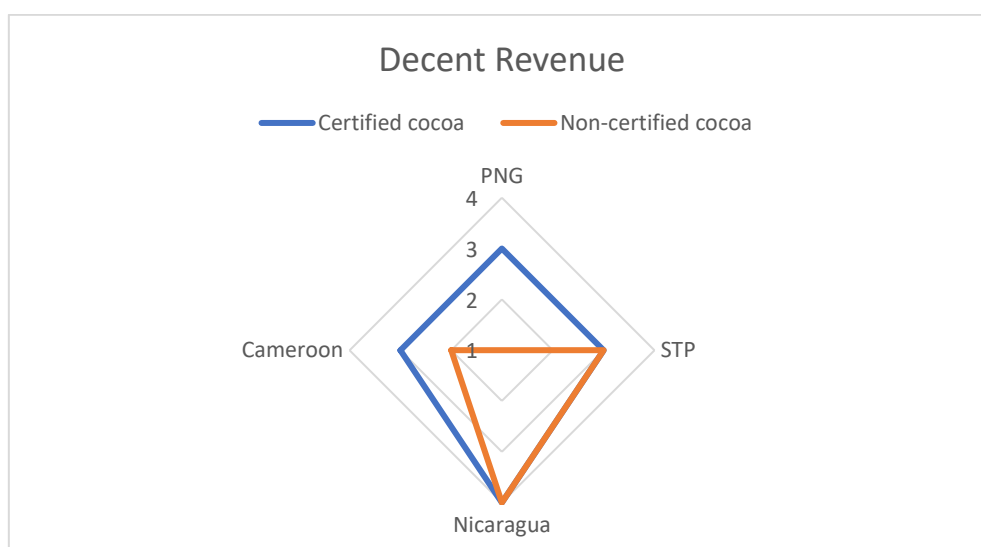


Figure 8 : Evaluation of the performance in terms of decent revenue

The evaluation of the performance in terms of child labour in the cocoa production is based on (1) whether child labour is integral part of the production system and (2) whether children can be exposed to the worst form of child labour (Figure 9). Grade 0 is the worst grade and it is attributed when child labour is fully part of the production system. The best score is 4 which corresponds to the case where there is no (or almost no) child labour. We supposed that certification incorporating a standard regarding child labour guarantees full compliance thereof. Hence, certified cocoa is always granted the maximal grade of 4.

Nicaragua suffers from a bad marking in the case of non-certified cocoa due to teenagers' involvement in cocoa harvesting. In Cameroon, the grade is low because of the exposure to some occasional form of child labour especially during the peak of harvest period. Nonetheless, working in the cocoa field does not prevent child from going to school. As reminded before, Cameroon cocoa sector is turned towards quantity which needs a lot of workforce. Hence, children may work with their parents in order to meet the demand. Besides,

complying with the no-child-labour standard is only required in the certified cocoa production. Therefore, Nicaragua can still sell its quality cocoa even if teenagers are involved in the cocoa production system.

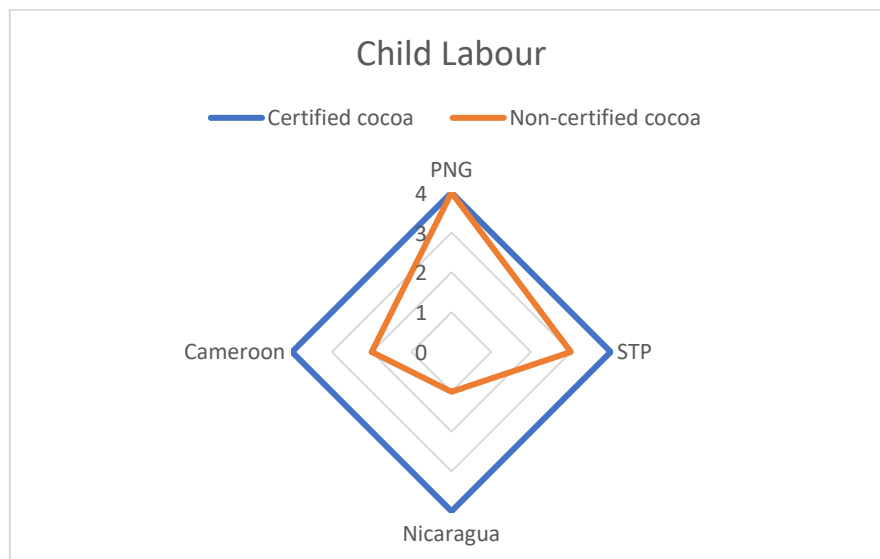


Figure 9 : Evaluation of the performance in terms of child labour

Finally, deforestation is evaluated on the basis of: (1) whether cocoa growing is done in former forested areas, (2) whether there is a latent risk of deforestation due to the fact that the main way for producers to increase their production is to extend their cultivation, and (3) whether the country supports effective deforestation-free programmes (Figure 10).

Cameroon has a low grade due to the combination of the pressure to increase production as a long-term national development strategy with the predominance of forested areas in the south part of the country. In Papua New Guinea and Sao Tome and Principe, deforestation is not such a risky situation since there is no primary forests left. In Nicaragua, cocoa production contributes more to reforestation than deforestation since it replaces former coffee plantation or degraded land. Besides, no large areas of cultivation are needed to produce quality cocoa, which limits the willingness to deforest.

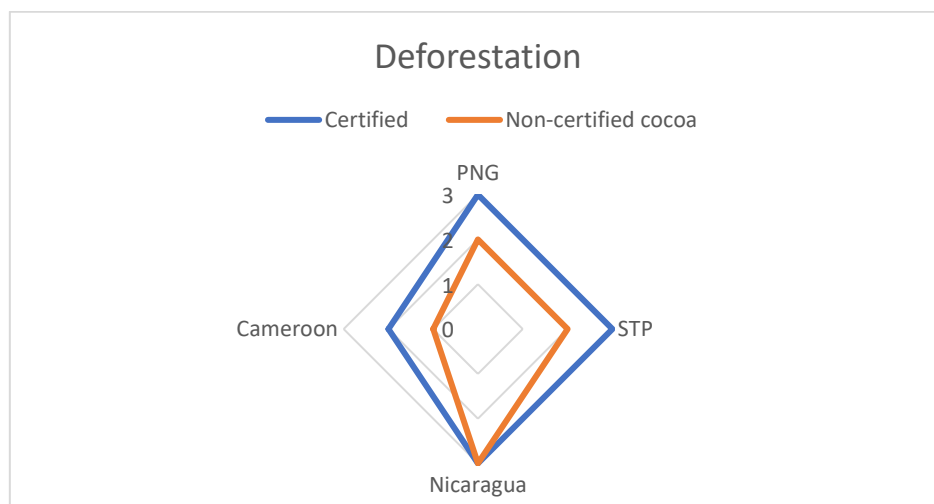


Figure 10 : Evaluation of the performance in terms of deforestation

On average, Nicaragua appears to be the best performer in the case of certified cocoa as well as for non-certified cocoa. The least graded country for each type of cocoa is Cameroon. It can probably be explained by the fact that for Cameroon, cocoa is only a commodity to sell, and the production is considered for the quantity and not the quality. Overall, the performance of a country seems to depend on the scale of production, whether quality or quantity is promoted, the presence of primary forest or the anchoring of voluntary certifications.

As a conclusion, certification may not be the most convenient solution to develop cocoa in a more sustainable way for countries that already rely on the quality of their cocoa since it does not add a significant value to the cocoa. Indeed, the gap of performance between certified and non-certified cocoa is smaller when cocoa promoted for its quality. On average, Sao Tome and Principe is the country where quality is the most important and the gap between the two cases is the smallest (0.7 points). On the contrary, the gap between certified and non-certified cocoa is more significant for Cameroon (1.33 points).

Interactions between certification and public regulation of the cocoa sector

Several types of interaction can be established between private approaches to resource governance - such as sustainability certification - and the more traditional modes of public regulation. In this section, we apply this analytical framework to the four selected countries, before drawing some lessons.

In Nicaragua, all the criteria are characterized by indifference (Table 10). Indeed, the state is weakly regulating the cocoa sector, hence there can be neither cooperation nor competition.

Table 10 : Nature of the interactions between certification and public regulation in Nicaragua

Criterion	Certification	Public regulation	Nature of the interaction
Decent revenue	Earn 7 times the poverty threshold (1.90 USD/Day)	Lack of regulation and support	Indifference
Child labour	31%% of certified cocoa incorporates this criterion (Rainforest Alliance and Fairtrade)	International conventions related to child labour are ratified	Indifference
Deforestation	30% of certified cocoa incorporate this criterion (Rainforest Alliance)	No specific action	Indifference

Like in Nicaragua, the government of Sao Tome and Principe does not have enough means to invest in the cocoa value chain and indifference is the predominant interactions between public policy and certification (Table 11). A major part of investments comes from the private sector, especially to ensure cocoa's quality and good taste.

Table 11 : Nature of the interactions between certification and public regulation in Sao Tome and Principe

Criterion	Certification	Public regulation	Nature of the interaction
Decent revenue	Organic cocoa offers two premium: 300 USD/t of organic cocoa and 200 USD/t for Fairtrade cocoa (Gustavo Saldarriaga, personal communication, July 26 th , 2022)	Support the COMPRAN project that aims at fighting poverty. Yet, the private sector is mostly in charge of developing the cocoa value chain	Indifference
Child labour	50% of the national production is Fairtrade certified	International conventions related to child labour are ratified	Indifference
Deforestation	Not assessed	In theory, the government regulates deforestation but its governance is very weak (Gustavo Saldarriaga, personal communication, July 26 th , 2022)	Indifference

The certified volume of cocoa in Cameroon has been multiplied by 8 between 2016 and 2019 (Lescuyer and Bassanaga, 2021). However, certification programmes do not influence all producers (Table 12) and there is a risk that a two-tier cocoa sector emerges which cannot be acceptable for the public authorities (Nlend Nkott *et al.*, 2019).

Table 12 : Nature of the interactions between certification and public regulation in Cameroon

Criterion	Certification	Public regulation	Nature of the interaction
Decent revenue	Earn 1.4 times more than non-certified producers	Absence of public subsidies	Superseding: private certifications are the main support for smallholders
Child labour	At least 24% of the cocoa production is free from child labour (Rainforest Alliance label)	International conventions related to child labour are ratified	Indifference
Deforestation	24% of certified cocoa incorporate this criterion (Rainforest Alliance)	In charge of defining what is legal cocoa and promote deforestation-free cocoa to be able to export to Europe in the coming years	Partial symbiosis: legal cocoa is still to defined

The regulation by the Papua New Guinea government of the cocoa sector is not very significant but it is directed towards a symbiotic interaction with certification programmes (Table 13).

Table 13 : Nature of the interactions between certification and public regulation in Papua New Guinea

Criterion	Certification	Public regulation	Nature of the interaction
Decent revenue	Earn 1,4 time the poverty threshold (1.90 USD/Day)	Support the PPAP project that aims at developing the cocoa sector (promote the increase of certified cocoa)	Symbiosis
Child labour	0,8% of certified cocoa incorporates this criterion (Rainforest Alliance and Fairtrade)	International conventions related to child labour are ratified	Indifference
Deforestation	0,7% of certified cocoa incorporate this criterion (Rainforest Alliance)	Support of Rainforest Alliance by the intermediary of the private association OUTSPAN-COCOA	Symbiosis

The analysis among the four selected countries shows first that the nature of the interaction is always indifference for the child labour criterion. Indeed, this criterion comes from the grid of analysis of cocoa production in West Africa (Ghana, Côte d'Ivoire) which might not be so relevant applied to other countries. In the cocoa case, child labour is never part of the production system, therefore it makes sense that government are not investing in programmes fighting against child labour as there is no need to.

Second, with regard to the decent revenue the idea is to assess if governments and voluntary certifications help closing the gap between the actual income of farmers and a decent living income according to *The Living Income Community of Practice*. Voluntary certifications participate to closing this gap by offering farmers the access to niche markets where premium prices are granted. Governments have also a role to help farmers to access more sustainable inputs and practices and to provide them expertise. Most of the time in our cases, the nature of the interaction that predominates is indifference. This can be explained by the fact that usually governments have not enough resources to develop the cocoa sector and improve the farmers' livelihoods. Most investments are coming from the private sector that is looking for financial return. Besides, in the case of Nicaragua, cocoa does not represent a large production in rural economy, hence investing in cocoa may not be the most effective way to fight against farmers poverty in these countries. In the case of Cameroon, cocoa is an important commodity but the state does not have any more a strong presence on the ground. Unlike Ghana and Côte d'Ivoire, it has not set a minimum wage for cocoa farmers which could help closing the gap mentioned above. However private certifications are becoming the major support for these farmers, that is why superseding qualifies the relation. Eventually, like in Papua New Guinea, there is a form of symbiosis that emerges through the support of the government for a project involving voluntary certifications. Besides, Papua New Guinea is the country for which the gap between certified cocoa and non-certified cocoa performance was the most important in terms of decent revenues. Hence, it seems relevant that the government engages a close relationship with voluntary certifications.

Finally, for the criterion on deforestation, the nature of relation is more diverse. In Cameroon and Papua New Guinea, a form of symbiosis is emerging. In Nicaragua, the financial performance is similar for certified and non-certified cocoa, so it may explain the indifference of the government vis-à-vis private certification. In Sao Tome and Principe, indifference may come from the fact that there is no deforestation in the country related to cocoa production.

The forthcoming EU regulation against imported deforestation is likely to force several states to better take into account the environmental impacts of cocoa production. If producing countries do not want to damage their cocoa trade with Europe, they will have to act against deforestation. In the absence of quick solutions to this problem, certification can be at least a temporary palliative for these states to maintain a certain level of exports. A mixed public-private governance of the cocoa sector is likely to be established in several countries, whose development and implementation methods will have direct impacts on the standard of living of farmers, child labour, and forest cover.

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