

Do cocoa certification schemes improve producers' performance ? Evidence from Centre Region Cameroon

Michael Brice Talla Sadeu, Syndhia Mathe & Jules René Minkoua Nzie

Michael Brice Talla Sadeu : PhD Candidate, University of Dschang. Corresponding author : mikasadeu@gmail.com ; +237694060750

Syndhia Mathe : PhD, CIRAD, UMR INNOVATION, Yaoundé, Cameroun. INNOVATION, Univ Montpellier, CIRAD, INRAE, Montpellier SupAgro, Montpellier, France. Science & Technology Policy Research Institute, CSIR-STEPRI, Ghana

Jules René Minkoua Nzie : Associate Professor - Département d'économie publique, FSEG/ Université de Yaoundé 2, Cameroun

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Résumé :

Dans les chaînes de valeur agricoles, en particulier le cacao, les normes environnementales et sociales deviennent de plus en plus importantes pour relever les défis de la durabilité. L'objectif principal de cet article est d'examiner le rôle de la certification principalement sur les rendements et les revenus des producteurs de cacao dans la région du Centre Cameroun. De juin à juillet 2017, une enquête auprès des producteurs de cacao certifiés et non certifiés a été menée dans les arrondissements de Ngoumou et Mbangassina. A la fin de l'enquête, un échantillon total de 114 producteurs certifiés et non certifiés a été obtenu. En utilisant l'analyse coûts-bénéfices, dans cette phase préliminaire du processus de certification, les résultats montrent qu'il n'y a pas de différence significative de coûts entre les producteurs certifiés et non certifiés pour chacun des arrondissements. Il n'y a pas non plus de différence de prix entre le cacao certifié et le cacao non certifié et le paiement de la prime de certification n'est pas systématiquement réparti. Cependant, l'analyse des bénéfices montre en moyenne des rendements et des bénéfices significativement plus élevés pour les producteurs certifiés. Néanmoins, cette augmentation des bénéfices serait principalement due à la mise en œuvre de bonnes pratiques agricoles plutôt qu'à la certification elle-même. En outre, l'étude du revenu agricole montre que les ménages dont le revenu est basé sur le cacao restent en moyenne en dessous du seuil de pauvreté. L'un des défis à long terme pour le secteur du cacao au Cameroun est de combiner l'objectif du gouvernement d'augmenter la production avec celui d'améliorer la qualité. A cette fin, les avantages des systèmes agroforestiers prédominants au Cameroun devraient être exploités pour produire une masse critique de cacao durable et de qualité qui permettrait une augmentation significative des prix à la production.

Mots-clés : Analyse coûts-bénéfices, cacao certifié, Rainforest Alliance, UTZ

Abstract :

In agricultural value chains, in particular cocoa, environmental, and social standards are becoming increasingly important in meeting sustainability challenges. The main aim of this article is to examine the role of certification primarily on the yields and incomes of cocoa

farmers in the Central Cameroon region. From June to July 2017, a survey of certified and non-certified cocoa producers was conducted in the districts of Ngoumou and Mbangassina. At the end of the survey, a total sample of 114 certified and non-certified producers was obtained. Using the cost-benefit analysis, in this preliminary phase of the certification process, the results show that there is no significant difference in costs between certified and non-certified producers for each of the districts. There is also no price difference between certified and non-certified cocoa and the payment of the certification premium is not systematically distributed. However, the profit analysis shows on average significantly higher yields and profits for certified producers. Nevertheless, this increase in profits would mainly be due to the implementation of good agricultural practices rather than the certification itself. Additionally, the exploration of on farm income shows that cocoa-based households remain on average below the poverty line. One of the long-term challenges for the cocoa sector in Cameroon is to combine the government's objective of increasing production with that of improving quality. To this end, the advantages of the predominantly agroforestry systems present in Cameroon should be exploited to produce a critical mass of quality and sustainable cocoa that would allow a significant increase in producer prices.

Keywords : Certified cocoa, UTZ, Rainforest Alliance, cost-benefit analysis

Introduction

In agricultural value chains, in particular cocoa, environmental, and social standards are becoming increasingly important in meeting sustainability challenges (Lee, 2010 ; Tennhardt et al., 2022). Third-party certification schemes such as those proposed by the Rainforest Alliance (now including Universal Trade Zone (UTZ)), Fair Trade, or Ecocert, aim to provide a guarantee of compliance with standards, thus creating buyer and consumer confidence in certified products (Astrid et al., 2017). Indeed, the increase in global demand for cocoa has been accompanied in recent years by increasing demands for high-quality, responsibly produced cocoa. This includes issues such as workers' rights, child labour, deforestation and the livelihoods of producers. (Kuit et Waarts, 2015 ; Lambin et al., 2018). In this context, third-party certification schemes would be a way for cocoa producers to prove that their products comply with these requirements (N'Dri, 2016) but also a way to access privileged markets (Seydou, 2015).

However, in contexts where the governance of the commodity chain is weak, i.e. where the means of control are limited and coordination between the links of the commodity chain is weak, the implementation of the certification process and its potential effects on producers are not obvious. Indeed, cocoa production is dominated by small and vulnerable producers (Bandanaa et al., 2021) ; certification represents an opportunity for them but imposes investment costs at entry to comply with the standard requirement. It therefore becomes important to be able to assess the performance of cocoa producers in the preliminary phases of the certification process in a context where the contribution of certification to this performance is being debated (Ingram et al., 2018 ; Lemeilleur et al., 2015). Indeed, Reardon et al. (2003) and Van Der Meer (2006) argue that certification standards are not adapted to smallholder farmers. Compliance with standards requires human, material, financial, and informational resources. Lack of access to these resources and the costs of certification are common factors that explain the difficulty for small producers to comply with these rules (Busch et Bain, 2004). Blackman and Rivera (2010) reviewed 37 studies on the effects of certification on 12 sustainable standards in different commodities such as coffee and bananas in several countries, mainly in Latin America. Of these studies, only six conclude on

the robust, positive socio-economic impacts of certification (Kuit et Waarts, 2015), including higher prices, improved profits, and better land tenure security.

Some studies focusing on cocoa are showing the positive effects of certification for smallholder farmers. In Côte d'Ivoire, Ingram et al. (2018) analyse the contribution of UTZ certification services to farmer groups and its impacts. The authors show the impacts in terms of increased yields, improved incomes, and improved working and living conditions for producers. Iddrisu et al. (2020) also finds in their Ghana study that RA-UTZ certification helps to improve yields and incomes of producers. One of the rare studies in Cameroon, such as that of Ngoucheme et al. (2015), shows the positive effects of UTZ certification on yields and gross margins in the Mefou-Akono and Nyong and So'o departments.

Introduced to Cameroon since 1887 by the German colonial administration, cocoa is of considerable economic importance (Ngwang et Meliko, 2021). Indeed, in 2010, cocoa brought in more than 250 billion CFA francs to the state's revenues, or about 3 % of the gross domestic product (Folefack et al., 2015) and provides a living for an average of four hundred and fifty thousand farmers (Lescuyer et al., 2019). There are four major production basins in Cameroon, the South West with 50 % of national production, the Centre (35 %), the South (10 %), and the East (5 %) (Langrand, 2013). However, due to political instability in the South West region, the latter lost its leadership in 2018 to the Centre region, which now represents 50.36 % of national production (Lescuyer et al., 2019). Cocoa farming is mostly practised by smallholders in agroforestry systems that involve a combination of cocoa trees (main crop) and other associated, multi-species and multifunctional trees (Jagoret, 2011). The average plot size is estimated at 1.5 ha for average yields between 400 and 1,000 kg/ha (Eyenga et al., 2017).

The economic crisis of the 1990 s, followed by the Structural Adjustment Programmes (SAPs), led to a change in farming practices on cocoa farms. Vogel et al. (2020) note that between 1985 and 1997 there was a stagnation in the cocoa area under cultivation, a decline in production due to fungal attack, and neglect of cocoa fields in favour of deforestation for food crop production, coupled with the migration of cocoa labour to food production. However, a considerable increase in production was observed in the late 1990 s. At the same time, a decline in cocoa quality was observed in line with the reduction in support services from the state to producers (technical and financial support, provision of inputs) but also from producer organisations (Lescuyer et al., 2019). Indeed, insufficient phytosanitary treatments, coupled with poor fermentation, drying and storage conditions, led to a decline in the quality of Cameroonian cocoa, which was rejected from European ports in 2013 because it contained traces of smoke and polycyclic aromatic hydrocarbons (Lenou et al., 2020 ; Ngwang et Meliko, 2021).

Since the fall in cocoa prices in 2000, there has been a deterioration in the living conditions of producers. Hutz-Adams et al. (2016) observe that, over the last 15 years, the majority of producers have been living below the poverty line, set at \$1.90 per person per day by the World Bank, and have been unable to break out of the vicious circle of low productivity and low incomes. Cocoa certification in Cameroon is seen as a way to improve both the quality and sustainability of cocoa production and the living conditions of producers (RA, 2017). Until 2011, there were no certified cocoa farms in Cameroon. This situation changed in 2013 when Cameroon exported 5,446 tons of certified cocoa out of a total of 230,000 tons produced (about 3 %) (Ifeyi, 2016) before increasing to 55,000 tons of certified cocoa for the 2018-2019 campaign out of a total of 241,000 tons traded (about 23 %) (Lescuyer et al., 2019).

The certification systems encountered in the Central Cameroon region are RA and UTZ. RA certification is based on three main points : (1) the conservation of biodiversity and natural resources, (2) a farm planning and management system, (3) decent livelihoods associated with wellbeing and respect for human rights (Kuit and Waarts, 2015). These livelihoods are linked to factors such as the prohibition of child labour under 15 years of age on the farm, respect for community rights, and respect for the legal minimum wage.

In the case of UTZ, it is a certification that is also oriented towards sustainable agriculture with an emphasis on ethical standards (the fight against child labour on farms) and Good Agricultural Practices (GAP), mainly focused on cocoa regeneration, shade level management, fertiliser application, fermentation, cocoa drying, as well as integrated pest management (Dohmen et al., 2016). The proximity of the two standards RA and UTZ led to their merger in January 2018 shortly after the data collection that enabled this work to be carried out.

In contrast to the existing literature, this study simultaneously analyses the effects of the preliminary phase of Rainforest Alliance and UTZ certification on the performance of cocoa farmers in Cameroon. Beyond the observation of differences in performance, this study deepens the analysis to see if the potential productivity gains resulting from certification allow for a significant improvement in the living conditions of producers. Another contribution of this study is the estimation of costs related to the working time of household members in the cocoa farm, which is often neglected in other studies.

Following the previous introductory section, the presentation of the methodological elements will be addressed in Section two. The main results of the study will be presented in Section three and the discussion of these results will be dealt with in Section four.

Material and method

Presentation of the study area

The Centre region was chosen as the study area because it alone represents 35 % of national production at the time of the study (Langrand, 2013). In Cameroon, as elsewhere, the development of certification has taken place through cooperatives because of the small size of the production units. Member producers individually pass tests to acquire certification. These tests are based on the specifications of the certifying body, which include the application of good agricultural practices, the prohibition of child labour, and the presence of native trees in the cocoa farm. Thus, within the same cooperative, there may be certified producers and non-certified producers. The sampling plan for this article is based on the only two cooperatives involved in certification programmes in the Central region at the time of the study. These are MBANGASSUD and SOCAMAK, representing the districts of Mbangassina and Ngoumou respectively (*Figure 1*).

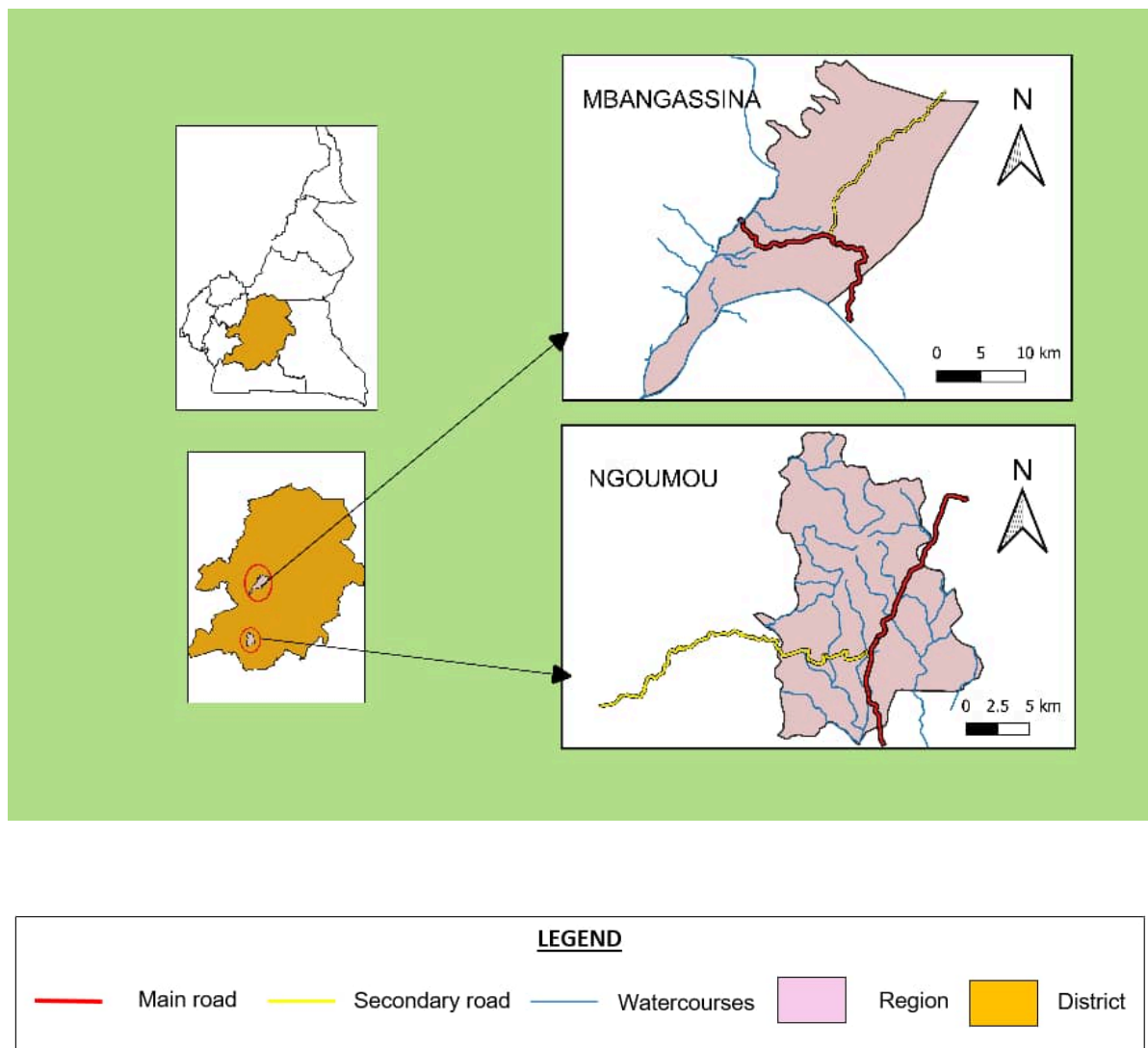


Figure 1. Presentation of the study area

Source. Authors (from QGIS software)

Description of study area

The Central production basin covers an area of 68,953 km² between the 3rd and 6th degree of North latitude and between the 10th and 15th degree of East longitude (Ngoucheme et al., 2015). The average altitude is between 500 m and 1000 m above sea level. This basin belongs to the belt of plateaus that form the western and northern edge of the Congo Basin. Despite the climatic changes observed in recent years, the central region is often characterised by a “Guinean” type of climate, with average temperatures of 25° C and an annual rainfall of 1500 to 2000 mm³/year divided into two distinct wet seasons (bimodal rainfall regime) allowing for two crop cycles and a staggered cropping calendar with staggered sowing and harvesting. The low insolation and constantly high hygrometry (between June and October) favour the development of crop and animal diseases. They also contribute to the difficulty of traditional crop drying and storage (IRAD, 2019). The soils are

mostly ferralitic, acidic, clayey and red or yellow in colour depending on the length of the wet season ; they have a low capacity to retain nutrients and are rapidly depleted after cultivation, which explains the traditional practice of slash-and-burn agriculture followed by fallow periods to restore soil fertility (IRAD, 2019).

Data collection

A survey was conducted among certified and non-certified cocoa producers in the above study areas between June and July 2017. These data on production and sales relate to the 2015-2016 cocoa season. A stratified sampling method was used to select the producers to be surveyed. The study first considered the main production areas that host the certification schemes studied. Then, on the basis of the number of producers registered by each of the cooperatives hosting the certification schemes studied, and with reference to Oseni et Adams' (2013) work, producers were selected according to socio-economic variables such as age and gender that influence the adoption of innovations (certification). Farm size was also set as one of the selection criteria.

However, due to the difficulty for some cooperatives to provide certain individual data such as the distribution of member producers by farm size and age of their plots, the snowball method was combined with the stratified sampling method. At the end of the collection, a sample of 114 producers was obtained, divided into two groups : a group of certified producers comprising 76 individuals, including 37 RA certified producers surveyed in Mbangassina and 39 UTZ certified producers surveyed in Ngoumou. And a group of non-certified producers comprising 60 individuals including 17 non-certified producers surveyed in Ngoumou and 21 producers surveyed in Mbangassina. It is important to note that within the above cooperatives, certified producers represent 88 % in MBANGASSUD and 67 % in SOCAMAK, which is why the sample includes more certified than non-certified producers (*Table 1*).

Table 1. Summary table of sampling

	MBANGASSUD	SOCAMAK	Total
Total number of cocoa farmers	420	650	1,07
Percentage of certified	0,88	0,67	77.5 %
Surveyed population	58	56	114
— Of which certified	37	39	76
— Percentage of certified	0,64	0,7	0,66

Methodology

Cost-benefit analysis (CBA) is a major tool used in the evaluation of projects and programmes. It provides a set of values useful in determining the performance of a programme from an economic perspective (Oseni, 2013). Conceptually simple, its results are easy for decision-makers

to understand and are therefore very much favoured in programme evaluations. CBA, already used in different scientific works (Folefack et al., 2021 ; Folefack et al., 2015 ; Norton, 2013 ; Oseni et al., 2013 ; Victor et al., 2010), allows us to analyse the effects of certification on cocoa farmers by measuring their performance against non-certified producers.

In the framework of this work, the costs listed and collected through the questionnaire for each household are : the cost of equipment (**C_M**) which takes into account the depreciation of each piece of equipment over its lifetime (Jagoret et al., 2010) ; the cost of labour (**C_{MO}**), where a distinction is made between the cost of family labour, which is the product of the number of hours of work/day for each member of the household and the price of a working day (2,000 CFAF) ; and the cost of non-family labour, corresponding to the labour cost based on the task carried out by individuals external to the household. The cost of inputs (**C_I**), which takes into account lifetime depreciation exclusively for cocoa trees and the fruit trees planted between the cocoa trees. Cost of certification (**C_C**) identifies the expenses related to the audit process and training of producers. These expenses are nil in the context of this study as certification is still in its preliminary phase and is mainly carried out through (loosely structured) cooperatives, so these costs are borne by the exporters. However, costs related to the transport of producers for GAP training related to certification were accounted for. Due to producers' difficulties in providing us with information on training periods and durations, the opportunity cost related to the time spent in training for certification was not taken into account in the study. The opportunity cost related to land and possibly land rental costs was not taken into account in this work because the producers surveyed do not rent land and mainly practise cocoa farming on it, which they consider to be profitable.

According to the previous cost description, the total production cost for each type of production (certified and non-certified) is equal to the sum of the different production-related costs incurred by the farmers. The total costs for certified (**C_{TC}**) and non-certified (**C_{TNC}**) cocoa-based agroforestry systems are given by equations (1) and (2) respectively :

$$C_{TC} = C_M + C_{M0} + C_1 + C_C \quad (1)$$

$$C_{TNC} = C_M + C_{M0} + C_1 \quad (2)$$

As far as profits are concerned, the elements allowing the calculation were also collected through the questionnaires and include income from certified (**REC_c**) and non-certified (**REC_{nc}**) cocoa farms. This is income from the sale of certified (**R_{CC}**), respectively non-certified, cocoa and income from the sale of other crops grown on the cocoa farm (**R_{AC}**). In fact, as recommended by certification, the fruit from these trees very often constitutes a source of income for the producers. We should point out that in Cameroon cocoa is mostly produced in an agroforestry system where cocoa is associated with fruit and forest trees. This implies that this source of income concerns both certified and non-certified farms.

The yearly average cocoa price given by the cooperatives was taken as the reference price and only the quantities of certified cocoa sold as such by certified producers were considered.

As certification is still in its preliminary phase in Cameroon, to date certified and non-certified producers sell their cocoa at the same price, with the difference that certified producers benefit from a premium of 40 Fcfa/Kg. The **REC_c** (respectively **REC_{nc}**, considering that non-certified cocoa farmers do not benefit from the premium) is calculated as in the following equation (3) :

$$RECC = RCC + RAC \quad (3)$$

Where :

$$R_{CC} = \text{Quantities produced} \frac{\text{price} + \text{premium}}{\text{Kg}}$$
$$R_{AC}(i) = \sum (\text{Quantities produced}(i) * \text{unit price}(i))$$

However, households can produce non-agricultural income such as call box or transportation services. In this paper, these incomes have not been included.

Results

Throughout this section, the statistical description of the variables is presented in turn, followed by the effect of certification on producers' incomes and production costs, and finally the effect of the certification premium on producers' profits and the ability of these profits to lift cocoa farmers out of poverty.

Statistical analysis of variables

In the Mbangassina district, 84 % of the certified producers surveyed are male compared to 71 % of the non-certified ones. The average plot size is 4.4 ha for certified producers compared to 4.2 ha for non-certified producers. The difference-in-means test reveals that there is no difference in overall size and by area between certified and non-certified producers. On the other hand, with regard to the age of the producers, it can be seen that certified producers are significantly older on average than non-certified producers. However, when analysed by age group, certified and non-certified producers are statistically the same age. On the other hand, it can also be seen that there are no significant average differences between certified and non-certified producers for variables such as household size, education level and age of plots (*Table 2*).

Table 2. Socio-economic variables by district and type of producer

	Mbangassina				Ngoumou			
	RA	NC	Diff	Pr (T<t)	UTZ	NC	Diff	Pr (T<t)
Men (%)	84	71	-	-	82.1	100	-	-
Plot size (ha)	4.4	4.2	0.2	0.8	3.7	2.8	0.9	0.16
[1-3]	2.2	1.9	0.2	0.2	2.2	1.7	0.5	0.15
[4-6]	4.8	5.2	0.4	0.3	4.8	4.3	0.5	0.2
[7 and more]	9.7	10.5	0.8	0.7	9.1	10	0.9	-
Farmers' age (years)	51.9	44.1	7.8**	0.03	55.2	50.2	5	0.12
≤ 30 years	28	28	0	-	-	-	-	-
[31-40]	37	36.4	0.6	0.7	38	35	3	-
[41-50]	46.2	42	4.3	-	46.2	45.6	0.6	0.7
[51-60]	53.3	54.5	1.2	0.5	55.2	55.6	0.4	0.8
[61 and over]	72.1	63.7	8.4	0.11	69	69	0	1
Household size	7.7	9.1	1.4	0.2	8.3	7.8	0.5	0.6
Level of education	2.5	2.6	0.7	0.6	2.8	3.1	0.3	0.14
Age of plots (years)	18.7	18.5	0.2	0.9	28.4	29.3	0.9	0.8

RA : Rainforest Alliance ; NC : Non-certified ; Diff : Difference between certified and non-certified producer, *** (significant at 1 %) ; ** (significant at 5 %) ; * (significant at 10 %).

According to Table2, in Ngoumou, 82.1 % of the certified producers surveyed are men, compared to 100 % of non-certified ones. The average plot size is 1.6 ha for certified producers versus 1.4 ha for non-certified producers. The difference-in-means test also reveals that there is no difference in overall size and by area subgroups between certified and non-certified producers. Looking at the age of producers, on average certified producers are 55 years old compared to 50 years old for non-certified producers. However, the difference-in-difference test of the mean reveals that both categories of producers have the same age. Table 2 also shows that certified and non-certified farmers have similar characteristics in terms of household size, education level and age of plots.

On average, whether in the Ngoumou or Mbangassina district, Table 2 shows that the socio-economic characteristics of the producers (size and age of plots ; size, level of education and age of producers) are statistically identical. On the one hand, this leads us to believe that in Central

Cameroon, access to certification is not conditioned by the above-mentioned variables. It can be concluded that certification does not select efficient farms at the expense of less efficient ones. On the other hand, since the population studied has on average the same characteristics, the comparison of performance between certified and non-certified farms by district is appropriate.

Certified producers have significantly higher incomes than non-certified ones.

Table 3 presents the total average amounts relating to the production process of certified and uncertified cocoa. It highlights the total income received by cocoa producers. For the Ngoumou district, it shows that UTZ certified producers have an average total income per hectare of 464,249 FCFA/year compared to 162,523 FCFA/year/ha for non-certified producers. This is a significant average difference at the critical 1 % threshold of 301,726 FCFA/year/ha.

In the Mbangassina district, RA-certified producers have an average annual income per hectare of 972,721 FCFA compared to 677,346 FCFA/ha for non-certified producers. This is a significant average difference of 295,375 FCFA/ha at the critical threshold of 5 %.

Table 3. Analysis of the effect of certification on the performance of cocoa producers

	Variables	Certified	Not Certified	Difference	t	Pr (T<t)
NGOUMOU	PTC (Fcfa/ha/year)	318 564.9	278 569.4	39 995.4	1.07	0.28
(UTZ Certified)	Yields (kg/ha/year)	323.2	144.5	178.7***	3.59	0.00
	TR (Fcfa/ha/year)	464 249.1	162 523.4	301 725.7***	4.46	0.00
	Margin (Fcfa/ha/year)	145 684.2	— 116 046	261 730.2***	4.79	0.00
	SP Margin (Fcfa/ha/year)	99 075.6	— 116 046	215 121.6***	4	0.00
MBANGASSINA	TPC (Fcfa/ha/year)	443 839.6	361 805	82 034.6	1.49	0.13
(RA Certified)	Yields (kg/ha/year)	787.2	579.7	207.5	1.59	0.11
	TR (Fcfa/ha/year)	972 721.3	677 345.7	295 375.6**	1.87	0.03
	Margin (Fcfa/ha/year)	528 881.7	315 540.8	213 340.9**	1.78	0.04
	SP Margin (Fcfa/ha/year)	425 563	315 540.8	110 022.2	1	0.31

PTC = total cost of production ; Yield = yields ; TR = total revenue ; SP margin = certified producer margin without premium ; *** (significant at 1 %) ; ** (significant at 5 %) ; * (significant at 10 %).

These results are consistent with those of Folefack et al. (2021) and Iddrisu et al. (2020), which respectively showed in the South West Cameroon region for Fairtrade certification and in Ghana for UTZ and RA certification that certified producers have higher incomes than non-certified producers. These results are mainly justified by the positive and significant difference in yields of

certified producers compared to non-certified producers. This is also true in the context of this study, where differences in yields of 178.7 and 207.5 kg/ha/year are observed in the districts of Ngoumou and Mbangassina respectively. These differences in yields in favour of certified cocoa farmers are particularly significant in the district of Ngoumou.

Certification does not significantly increase production costs, but it does change their structure.

In general, certified producers have higher economic production costs per hectare than non-certified producers, but these differences are not significant. *Figure 2* below shows that in the district of Ngoumou, the main expense for all producers is related to the cost of labour, which represents 62.3 % and 73.2 % of the total cost for certified and non-certified producers respectively. This is followed by expenditure on the purchase of equipment, which represents respectively 22.8 % and 17.66 % of the total cost.

In the Mbangassina district, we also note that producers certified as non-certified spend more on labour remuneration, which represents 69.05 % and 68.63 % of the total cost respectively. This is followed by expenditure on the purchase of inputs, which represent 18.54 % and 16.39 % of the total cost respectively. It is important to specify that here the cooperative directly takes 50 Fcfa/kg per producer from the sale to supply them with inputs. This mechanism is not implemented in the cooperative in the Ngoumou district.

The results show that in certified farms the use of non-family labour is higher. However, this difference is more pronounced for certified producers in Mbangassina, where almost half of the costs are based on non-family labour. These results are also in line with those found by Folefack et al. (2021). The latter showed that there is no difference in costs between Fairtrade certified and non-certified producers. They justify this result by the fact that certified and non-certified producers generally use the same type of material. In the context of this study, this result can also be justified by the fact that the estimated family labour is taken into account.

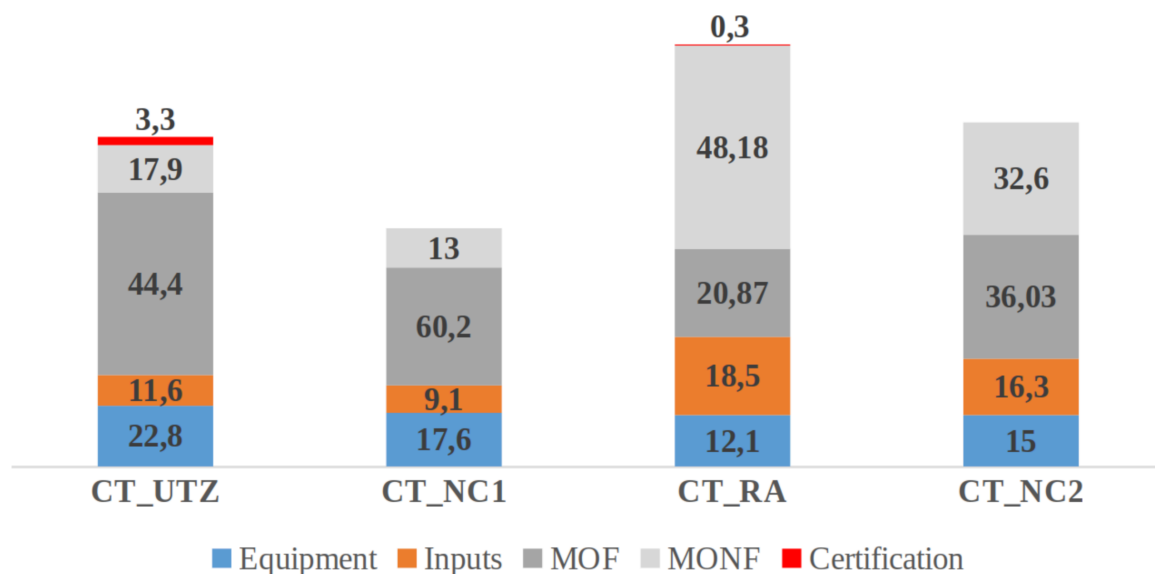


Figure 2. Percentage distribution of total costs

Detailed note : CT : Total cost ; NC1 : Non-certified from Ngoumou district ; NC2 : Non-certified from Mbangassina district, MOF : Family Labour, MONF : Non-Family Labour

Source. Authors (based on data collected from cocoa producers)

The certification premium does not significantly increase producer profits

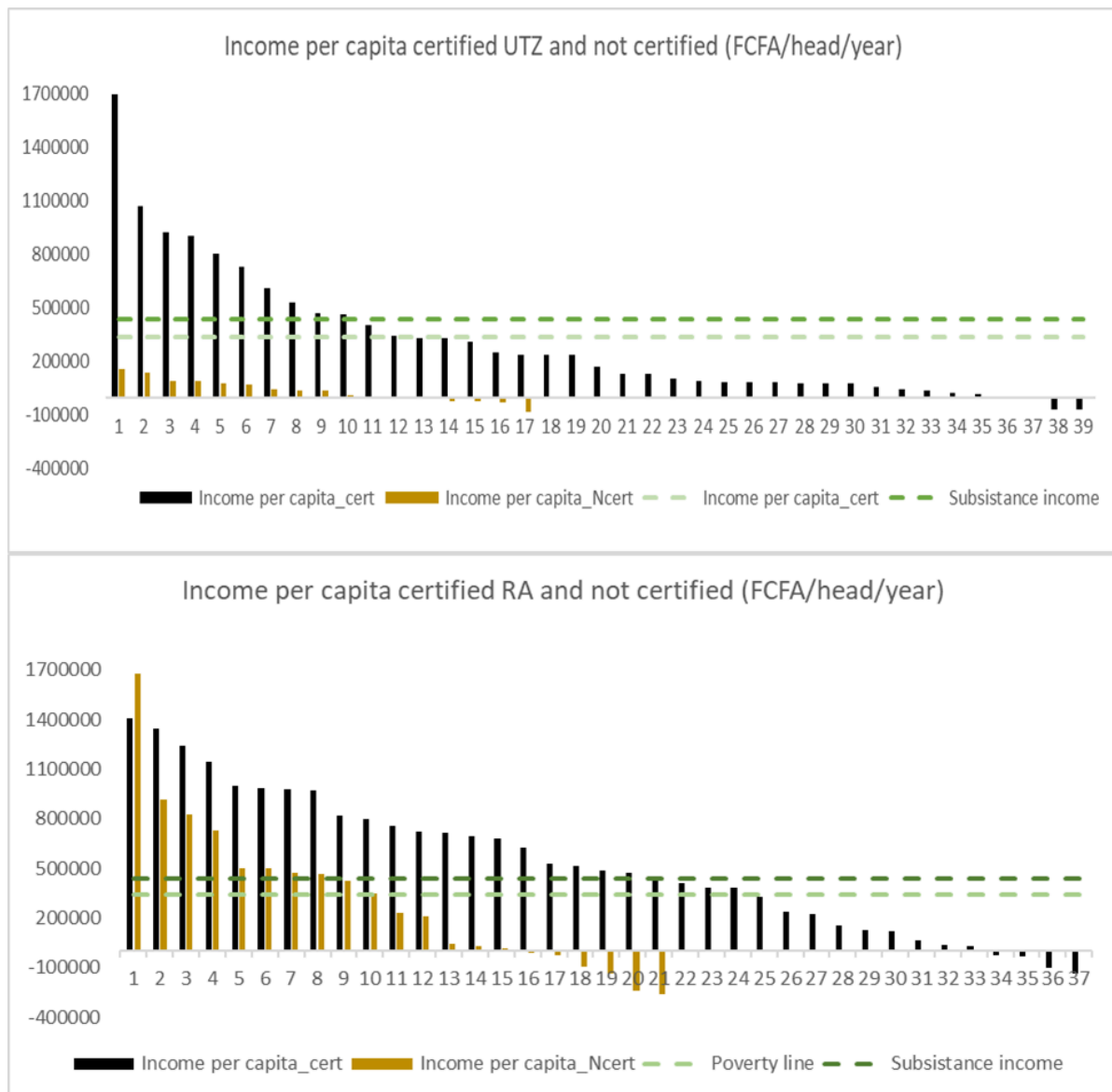
Table 3 presents the profits of certified and non-certified cocoa-based agroforestry systems for each of the districts studied. For the Ngoumou district, it shows that UTZ-certified producers have an average annual profit of 145,684 FCFA/ha compared to an annual loss of 116,046 FCFA/ha for non-certified producers. This is a significant annual average surplus at the critical 1 % threshold of 261,730 FCFA/ha in favour of UTZ certified producers, reflecting the fact that the profit margin of the latter is much higher than that of non-certified producers. The results show significant differences in yield between certified and non-certified producers at 178.7 kg/ha. In addition to the low yields, the negative economic margin of non-certified producers in this zone is noted.

In the Mbangassina district, it is noted that RA certified producers have an average annual profit of 528,882 FCFA/ha compared to 315,541 FCFA/ha for non-certified producers. This represents a significant average profit margin at the critical 5 % threshold of 213,341 FCFA/ha in favour of RA-certified producers. This result also reflects the fact that, from a statistical point of view, the profit of RA-certified producers is much higher than that of non-certified producers.

These results are due to the significant difference between the yields of certified and non-certified producers, particularly in Ngoumou, and possibly to the premium that certified producers receive. Given that certified and non-certified cocoa is sold at the same price, the premium should be a lever to improve the income of certified farmers. This is in line with the results of Ngoucheme et al. (2015), who found that certified producers earn on average 201,327.5 FCFA/ha more than non-certified producers. However, it can be seen from *Table 3* above that, by removing the premium of 40 FCFA/Kg, which is currently not an incentive for producers to join certification (Nlend Kott et al., 2019), the profits of certified producers remain positive and significant, particularly in Ngoumou. This result shows that the increase in producers' profits is more due to the increase in yields as a result of GAP than to the premium.

Contribution of benefits to improved livelihoods of cocoa agroforest-dependent households

Figure 3 below shows the distribution of certified and non-certified producers according to the level of income produced per capita and per year. Indeed, the income must meet the needs of the household that is dependent on cocoa farming. To the household income is added the remuneration of the family labour force.



Figures 3. Income from cocoa agroforestry (CFAF/head/year) compare to the poverty and living income lines.

Detailed note : Cert : certified ; Ncert : non-certified

Source. Authors (based on data collected from cocoa producers)

This figure helps to show the value of the income generated by certification in improving household livelihoods. However, it also shows that there is still significant progress to be made to ensure that this income enables households dependent on cocoa agroforestry to exceed the poverty line set in Cameroon at 339,715 CF AF/year/head (INS, 2014), or even the subsistence income of 435,929 CF AF/year/head (Ingram et al., 2018). Indeed, for household's dependent on UTZ-certified agroforests, 25.6 % and 30.8 % exceed the subsistence income and poverty lines respectively, while for non-certified households none exceed these lines. In Mbangassina, 62.2 % and 70.3 % of household's dependent on RA-certified products exceed the subsistence income and poverty lines respectively, while for non-certified ones, the figures are 47.6 % and 52.4 % respectively. This

result is in line with that of Ingram et al. (2018), who showed in the case of Côte d'Ivoire that, on average, UTZ certification does not induce an increase in income that allows producers to escape from poverty. This is mainly due to the fact that, despite the increase in yields, they are still below the expected potential.

Discussion

The technical performance of certified producers

In this section, two main results are discussed firstly the positive relation between certification and yields and secondly the production cost equivalence between certified and non-certified producers. Certification in its preliminary phase produces positive effects on producer yields. In fact, there is a significant difference between Ngoumou producers of +123 % on average for certified producers. This difference is all the more important as the plots are ageing and are between 28 and 30 years old on average. This improvement in yields is also found in Mbangassina but is more moderate (+36 %) but yields are already high in this area because the producers of the MBANGASUD cooperative are in an area of concentration of interventions (Ministry of Agriculture, German cooperation). They have often already received training on good practices and apply them totally or partially in their plots. The use of inputs can also be an explanatory factor for the increase in yield. It is important to note that the results for Mbangassina producers are similar to those of Norton (2013) and Iddrisu et al. (2020) in Ghana, Oseni et al. (2013) in Nigeria, and Folefack et al. (2021) in Cameroon. All of which show that certified cocoa farmers have higher yields than non-certified farmers, particularly because of the good farming practices acquired during the training process..

After a simulation in which the income from the premium (40 CFA francs/kg) received by certified producers was removed, it was found that certification through the premium does not increase producers' profits. Knowing that certified and non-certified producers sell cocoa beans at the same price, the increase in profits would be due more to GAP. GAP would allow for an increase in yields and consequently in producer profits. Tsiboe et al. (2016) have shown that GAPs conveyed by RWHs contribute among other things to increased yields in Cameroon and other sub-Saharan African countries.

The second result shows that production costs between certified and non-certified producers are not significantly different. This result is contradictory to those of Norton (2013) in Ghana and Oseni et Adams (2013) in Nigeria, who found that certified producers spend more than non-certified ones, mainly because of labour and input costs. Despite the fact that certification recommends new practices that increase labour costs in particular, this difference in results could be explained in part by the fact that, unlike most studies, in this work the opportunity cost of family labour was estimated and taken into account. Indeed, taking into account the opportunity cost of family labour, which is particularly high among non-certified producers, could mitigate the overall effect of increased costs for certified producers. On the other hand, in Ghana and Nigeria, for example, cocoa producers are directly burdened by the certification process, as are auditing costs. As highlighted above, in Cameroon, because certification is still in a preliminary phase, cooperatives are not yet well structured, and all these burdens are borne directly by exporters. Certification is not individual in Cameroon, and is carried out through cooperatives. Therefore, the performance of producers is not only linked to certification, but also to the level of structuring of cooperatives and their capacity to provide services. However, over the last two years, producers have shown

downward fluctuations and delays in premium payments. The premium, initially set at 50 Fcfa/kg and supposed to be distributed in September to help producers pay for their children's schooling, is usually paid in December at the earliest at 40 Fcfa/ha. Moreover, there is no price differentiation between certified and uncertified cocoa. Unlike producers like Côte d'Ivoire and Ghana, RA and UTZ certification is quite new in the Cameroonian cocoa sector. Indeed, the socio-institutional context for the development of certified cocoa farming is not sufficiently mature and does not yet allow for real recognition of the producers invested in certification (Nlend Kott et al., 2019).

From the effect of the socio-institutional context to the economic performance of certified producers and the development of certification

The results show the benefits of certification for producers. They are consistent with Astrid et al., (2017)'s findings in that RA certification significantly improves the income of producers in Ghana. Similarly, Folefack et al. (2021) and Iddrisu et al. (2020) have shown in Cameroon and Ghana respectively that certification significantly improves the profits of cocoa farmers. However, these results should be considered at the level of households that are dependent on these activities. This study enlightens the an incentive for producers to invest in certification because of its contribution to improving incomes. It also notifies that the ability of certification to actually contribute to lifting producers out of poverty is constrained by structural effects. Indeed, according to Nlend Kott et. al. (2019) certification can only develop in a favourable institutional and socio-economic context. This context, which is characterised, among other things, by identical prices per kilogram between certified and uncertified cocoa and the low level of certification premiums, currently favours bulk cocoa and limits the adherence of producers to certification. This trend may be expected to change in a context where pressure from international buyers on the government for sustainable cocoa production is increasing.

However, it should be noted that this study has some limitations. Indeed, if the cost-benefit method seems appropriate in this preliminary phase of certification, the results obtained should be considered with reserve. Quasi-experimental or others econometrics methods would provide more robust results. Furthermore, the choice to study members of cooperatives could lead to a bias because non-certified producers who are not members of cooperatives are not taken into account.

Conclusion

This article analyses the effect of certification on the performance of cocoa farmers in the Centre region of Cameroon. Despite the limitations of the farmer declaration and one-pass based survey, The results show that certification contributes to generating better incomes. They also show that the premium plays a minor role and understood the weight of the socio-institutional context. However, it is important to specify that, while the increase in income depends on several factors. This study does not distinguish the relative contribution of these factors. These include the contribution of factors such as good agricultural practices and the contribution of inputs. In all cases, certification does not succeed in increasing significantly the income of producers above the poverty line, or even a decent income.

RA certification places a special emphasis on forest conservation and strongly encourages agroforestry. This appears to be a real opportunity for producers in Central Cameroon as they generally have (certified or not) native trees but also fruit trees within the cocoa farms. This could

therefore facilitate producers' access to certification while reducing costs and thus be able to meet buyers' demand.

One of the medium-term challenges for the cocoa sector in Cameroon would be the combination of the government objective of production increase and improving the quality of cocoa beans. In addition to the quality effects resulting from better drying and fermentation conditions for cocoa beans, the advantages of predominantly agroforestry systems should be exploited to produce a critical mass of quality and sustainable cocoa that would allow for a significant increase in farm gate prices.

One recommendation to enable cocoa farmers to have income that would allow them to escape poverty is to put in synergy certification and GAP conveyed through the farmer's field schools (FFS). Certification would effectively bring better cocoa prices and GAP better yields.

Despite the aspects addressed in this study, there are still many research perspectives. Indeed, it would be interesting to assess the performance of certification on its social and environmental objectives, aspects not taken into account in this study. Furthermore, the improvement in farmers' incomes in this study is essentially attributed to good agricultural practices that help to increase crop yields. However, these results, which are justified by the literature in certain country contexts, have not yet been empirically tested in the case of Cameroon. It is therefore of interest for future work to test the effect of good agricultural practices induced by certification compared with other certification processes (Structuring cooperatives ; training producers in farm management and organisational capacity-building, etc.) on farmers' performance.

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