Cocoa Markets and Value Chains: Implications For Sao Tome and Principe Organic Smallholders

¹Ibrahim Prazeres, ²Maria Raquel Lucas and Ana ³Marta-Costa

¹Center for Advanced Studies in Management and Economics (CEFAGE), Centre for Transdisciplinary Development Studies (CETRAD), Portugal gibaedy@gmail.com

²University of Evora and Center for Advanced Studies in Management and Economics, (CEFAGE), Portugal mrucas@uevora.pt

³University of Tras-os-Montes e Alto Douro (UTAD), Centre for Transdisciplinary Development Studies (CETRAD), Portugal amarta@utad.pt

Abstract: Cocoa is one of the main goods in the world agricultural trade markets, occupying the third position in exports. The paper introduces the cocoa value chain worldwide, its asymmetries, and the supply and value chain specific to the São Tomé and Príncipe (STP) organic cocoa. It aims to understand this value chain's internal and external tensions and analyse its potential to be inserted in the international markets. The study uses panel data analysis from the FAOSTAT database. The tensions mentioned are due to the asymmetries of international markets and those regarding the production of organic cocoa in STP. At the level of STP and, despite measures to support organic production as a valuable alternative to the country's development strategy, imbalances in the value chain persist that compromise the livelihoods of small producers responsible for most of production exported and the sustainability of the ecosystem.

Keywords: International markets, value chain, organic cocoa smallholders, Sao Tome and Principe (STP)

1. Introduction

Cocoa is one of the main goods in the world agricultural trade markets, occupying the third position in exports (Blare and Useche, 2013; Díaz-Montenegro, 2019; Galarza, 2012). It is mainly concentrated in the tropics, in Africa, which concentrates two thirds of world production and where Côte d'Ivoire is the main country with around 40% of the world production (Voora et al., 2019). Approximately 4 million tons of cocoa beans have been annually worldwide produced since 2010. The combined export value, of whole or broken grades, raw or roasted, amounted in 2017 to US \$ 8.6 billion, with an estimated the global cocoa market grows at an annual rate of 7.3%, from 2019 to 2025, to reach \$ 16.32 billion (Voora et al., 2019). The chocolate industry consumed about 43% of all cocoa in 2017, with a global retail market value of \$ 106.19 billion in 2017 and forecast to be \$ 189.89 billion by 2026 (Eghbal, 2018). Cocoa is produced mainly by hand, by about 5 million households, in more than 50 countries, of which 70% are small farmers, with one and three hectares. Even so, they represent more than 80% of the total cocoa available in the markets (Díaz-Montenegro et al., 2018; Voora et al., 2019) and guarantee the livelihood of 40 to 50 million people worldwide (Voora et al., 2019). Worldwide, the cocoa value chain is characterized by asymmetric power relations with increasing

control by some dominant companies that have the ability to decide how and where value is created

and distributed. Five companies account for 56% of the chocolate market, of which three account for half of the total cocoa supply. As a result, there is an asymmetric distribution of value, with producers receiving only 5% of the price paid by the final consumer, while marketing and processing activities capture 25% and the processing and sales of retail chocolate capture a 70% share of revenues (Abdulsamad et al. 2015; Fountain and Huetz-Adams, 2020; Squicciarini and Swinnen, 2016). In STP, the cocoa value chain is very fractional at the producer level, where approximately 70% of organic producers develop their activity in plots of less than 2 hectares (Prazeres, 2018; Prazeres and Lucas, 2020). In 2018, the number of organic cocoa producers was approximately 3300 (Prazeres, 2018) and cocoa, which occupied about 80% of the agricultural area, represented 90% of the country's export earnings (ANEME, 2018). In addition to its contribution to GDP, through the high weight of exports in the agricultural sector, the cocoa culture guarantees the livelihood of many families by creating jobs, developing local microeconomies and giving an international image to the country (Prazeres, 2018). This paper aims to characterize the cocoa market and value chain globally and in STP. It is intended to show the main dynamics and challenges that can reduce the asymmetries between the different actors and create value, as a way of reducing poverty and improving the quality of life of small agricultural households. In addition to this introduction, the document is structured in six sections. In the second, the used methodology in the development of the exploratory study is presented. The main characteristics of the international cocoa market, whether conventional or organic, form the body of the third section, which also includes the international cocoa value chain. The fourth focuses on the description of the organic cocoa value chain in STP. The fifth and last sections present, respectively, the implications for small producers related to the characteristics of the international market and the value chain and the main conclusions and perspectives for the continuity of the research.

2. Research Methods

The paper combined panel data from FAOSTAT (FAO, 2021) with literature review and field observation in order to look and characterize the cocoa market and value chain, globally and in STP, to know policies and practices development around the world and, to engender new ideas and directions for STP organic sector sustainability. The panel data analysis was carried out for the 20 main producing countries. It started with the identification and choice of the indicators and time period in FAOSTAT and its subsequent treatment and interpretation. The indicators, collected for the last available decade (2007-2017) included: (1) Production Area (ha); (2) Yield per hectare or Productivity (Kg/ha); (3) Total Production (Ton), (4) Exports in Volume (Ton); and (5) Exports in Value (1000 US \$). These indicators were chosen to allowed characterize the global cocoa market and its value chain, to compare the situation in STP to the other producing countries and, to show the contribution of agricultural exports of cocoa beans produced by small farmers to economic growth.

3. The Cocoa Market

The global production of cocoa beans registered an annual growth of 3% in the period of 2007-2018, reaching a world production of 5.2 million tons in 2017 (FAO, 2021), with a second global boom in the consumption of cocoa and chocolate occurring since 1990 (Squicciarini and Swinnen, 2016). Between 2007 and 2012, the annual growth in production occurred mainly due to the increase in the harvested area and not in productivity or yield per hectare. Favorable climatic conditions and an increase in the production area seem to be related to the verified expansion (Fountain and Huetz-Adams, 2018). According to these authors, climate stability in West Africa, especially after the El Niño phenomenon, policy environment to stimulate cocoa production in Ecuador and Peru, and the increase in cocoa farms in Africa, many of which established in old protected forests and with significant cocoa yields, have clearly contributed

to expanding the cultivated area. Global cocoa production is dominated by Africa, a continent that held, in 2017, 70.4% of global production and, in the last decade, showed an annual growth of the order of 3.8%. The American continent is as follows, with 15.4% of production and an annual increase of 5.3%. Finally, Asia, which has had annual decreases of 1% in the last ten years, contributes only with 13.2% of the global production, and Oceania has a marginal contribution (FAO, 2021). This situation can be visualized in Table 1. Cote d'Ivoire remains during all the years considered, as the main producer, accounting for about 40% of the total production and, consequently, it is the main exporter (FAO, 2021).

Table 1: Cocoa Total Production by Country (Ton)

Country	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Brazil	201651	202030	218487	235389	248524	253211	256186	273793	278299	213843	235809
Cameroon	212619	229203	235500	264077	240000	268941	275000	269228	274559	289312	295028
Colombia	39904	44740	44740	39534	37202	41670	46739	47732	54798	56785	56808
Côte d'Ivoire	1229908	1382441	1223153	1301347	1511255	1485882	1448992	1613241	1796000	1634000	2034000
Dominican Republic	42154	45291	54994	58334	54279	72225	68021	69913	75500	81246	86599
Ecuador	85891	94300	120581	132099	224163	133323	128446	156216	180192	177551	205955
Ghana	614500	680781	710638	632037	700020	879348	835466	858720	858720	858720	883652
Guatemala	10129	10414	10591	10713	11594	11666	12569	11204	11331	11567	11803
Haiti	8500	8000	8536	9353	10334	11464	12724	14633	15281	13305	14173
India	10180	10560	11820	12900	14400	13000	13000	15000	16000	17000	19000
Indonesia	740006	803593	809583	844626	712200	740500	720900	728400	593331	656817	659776
Madagascar	6465	6465	8000	10000	6500	8000	9000	10865	11535	11327	11010
Mexico	40000	50000	60000	50114	42175	38825	33284	26969	28007	26863	27287
Nigeria	360570	367020	363510	399200	391000	383000	367000	329870	302066	298029	328263
Papua New Guinea	49300	51500	59400	39400	47600	38700	41200	44402	45235	44491	44504
Peru	31387	34003	36803	46613	56499	62492	71175	81651	92592	107922	121825
São Tomé and Príncipe	2800	2000	2500	2600	2219	2230	2617	3200	3000	2813	2778
Sierra Leone	14000	10500	10000	19700	18000	18000	14850	15727	14927	14788	14670
Uganda	10006	13000	15000	15000	18000	16000	20000	27300	26600	29100	31312
Venezuela	18911	20457	20920	20955	22856	31993	29740	22854	24156	23254	23349

Source: Own elaboration with FAO data

In second place as an exporting country is Ghana, which was surpassed by Indonesia only in 2010 in terms of value exports and in the years 2009 and 2010 in terms of volume exports (Figure 1). STP represents a small proportion both in the total cocoa production, which has fluctuated over the years, remaining in 2017 at the same level as in 2007 (approximately 2800 tons), but showing positive evolution of exports, both in terms of volume and value.

Figure 1: Cocoa Exports by Country in Volume in 2017 (Ton)

Source: Own elaboration with FAO data

In 2017, Cote d'Ivoire dominates in all indicators, with the exception of productivity per hectare, where Madagascar holds the first position, but one modest position with regard to exports (Table 2).

In the case of STP, although it has the lowest productivity per hectare of all the countries analyzed, its position as an exporter is superior. A curious piece of evidence is related to the ratio between total cocoa production and exports in volume, for the year 2017, because there are some countries where export volume exceeds total production. This is the case of Ecuador, where volume exports represent 138.2% of total production, Madagascar (114%), Sierra Leone (253.9%) and STP (126%), which shows that there is some error or incongruity with the basic data provided by the different countries.

Table 2: Indicators by Country in Year 2017

Ranking	Area harvested in 2017 (ha)		Productivity in 2017 by há		Total Production in 2017		Exports in Value in 2017 (1000 US\$)		Exports in Volume in 2017 (Ton)	
	Country	ha	Country	Kg/ha	Country	Ton	Country	Exports (1000 US\$)	Country	Exports(Ton)
1 ^o	Côte d'Ivoire	4147459	Madagascar	8629	Côte d'Ivoire	2034000	Côte d'Ivoire	3505214	Côte d'Ivoire	1510082
2 ^o	Indonesia	1730002	Dominican Republic	5737	Ghana	883652	Ghana	1642052	Ghana	573334
3 ^o	Ghana	1690237	Ghana	5228	Indonésia	659776	Nigeria	598189	Nigeria	287632
4 ^o	Nigeria	1191812	Côte d'Ivoire	4904	Nigeria	328263	Ecuador	589750	Ecuador	284546
5 ^o	Cameroon	729049	Haiti	4858	Cameroon	295028	Cameroon	402956	Cameroon	221667
6 ^o	Brazil	590813	Mexico	4649	Brazil	235809	Peru	148705	Peru	58238
7 ^o	Ecuador	467327	Ecuador	4407	Ecuador	205955	Dominican Republic	135972	Dominican Republic	54891
8 ^o	Dominican Republic	150943	Uganda	4156	Peru	121825	Papua New Guinea	73487	Papua New Guinea	37744
9 ^o	Colombia	146011	Cameroon	4047	Dominican Republic	86599	Sierra Leone	70248	Sierra Leone	37240
10 ^o	Peru	145169	Papua New Guinea	4038	Colombia	56808	Uganda	54208	Uganda	27528
11 ^o	Papua New Guinea	110225	Brazil	3991	Papua New Guinea	44504	Indonesia	53537	Indonesia	23594
12 ^o	India	83000	Colombia	3891	Uganda	31312	Colombia	27326	Madagascar	12555
13 ^o	Uganda	75338	Indonesia	3814	Mexico	27287	Madagascar	22785	Colombia	11876
14 ^o	Venezuela	62119	Venezuela	3759	Venezuela	23349	Venezuela	22290	Venezuela	8268
15 ^o	Mexico	58690	Sierra Leone	3618	India	19000	São Tomé and Príncipe	8371	São Tomé and Príncipe	3501
16 ^o	Sierra Leone	40549	Nigeria	2754	Sierra Leone	14670	Haiti	5473	Haiti	2512
17 ^o	Haiti	29173	Guatemala	2711	Haiti	14173	Brazil	2936	Mexico	1032
18 ^o	São Tomé and Príncipe	26020	India	2289	Guatemala	11803	Mexico	2811	Brazil	754
19 ^o	Madagascar	12759	Peru	1067	Madagascar	11010	Guatemala	1901	Guatemala	149
20 ^o	Guatemala	4354	São Tomé and Príncipe	1067	São Tomé and Príncipe	2778	India	362	India	94

Source: Own elaboration with FAO data

World imports of cocoa and its processed products reached US \$ 9.34 billion in 2017, with Netherlands (25%), United States (13%), Germany (8.4%) and Belgium-Luxembourg (8.4%) being the main importers. The products in greatest demand were chocolate and other foods containing cocoa (57% of imports), raw or partially roasted cocoa beans (20% and cocoa powder without added sugar or other sweetener (8%) (OECD, 2020). As an agricultural commodity, the price of cocoa beans is volatile (Díaz-Montenegro, 2019; Utepi, 2007). Factors such as changes and climatic events, pests and diseases, fluctuations in production cycles, especially in large producing countries, variations in cocoa processors' inventories or changes in consumer markets influence the price. In the particular excess supply causes prices to fall and, at the same time, encourage farmers to harvest intensively and also to replace cocoa with other crops, increasing even more the saturation of the cocoa bean market and causing an even steeper drop in prices (Fountain and Huetz-Adams, 2018). As a result, there is a future shortage of grains, leading to price increases. Since supply in this market reacts slowly to price changes or demand pressures, when supply exceeds supply and prices increase, farmers have incentives to plant new trees. However, due to the length of the biological cycle, they take several years to reach their maximum productive performance, so farmers receive little benefit from the price increase (Díaz-Montenegro, 2019). The observation of international price in real terms at 2010 values for cocoa as a commodity shows price instability in the period considered (2007-2017). There was a rise until 2010 and between 2013 and 2016, but a decline between 2011 and 2012 and from 2016, representing a drop of approximately one third in 2017 (Figure 2). The price drops observed seem to be linked to the excess supply of cocoa and to the stagnation of demand in emerging economies (Brazil and Russia), due to the economic crisis and to the decline in the

consumption of chocolate in the USA, China and India (Díaz-Montenegro, 2019; Fountain and Huetz-Adams, 2018; ICCO, 2016; World Bank, 2019).

Figure 2: Real Cocoa Price (2010 value)

Source: Díaz-Montenegro (2019); World Bank (2019)

The demand for chocolate is elastic to price variations, but there are consumer segments focused on quality and brand (Squicciarini and Swinnen, 2016). Although the world consumption of cocoa has been decreasing in the last decade, chocolate consumers, especially in developed countries, are seen as fundamental to induce changes in attitudes towards sustainability. This situation is due to the growing interest in sustainable and organic products, the requirement for certification and authenticity and guarantee that does not harm the environment, and to the not exploitation of the workforce, which ensures fair trade (García-Herrero et al., 2019). If the fall in international cocoa prices persists, especially in the current state of the world pandemic, this could induce to a drop in the price of finished cocoa and chocolate products, which could stimulate consumption. For ICCO (2016), there is always a time lag between the reduction in the price of cocoa beans and its effects on the price to the consumer (ICCO, 2016). Sensory quality, together with labelling and information on the origin and method of production and processing of cocoa, are also important elements for their acceptance, appreciation and preference by the consumer (Silva et al., 2017). Tools that help to make cocoa traceable and assess the geographical origin of the beans used in the production of chocolate are also seen as essential (Acierno et al., 2017).

3.1 The Organic Cocoa Market

Despite the fact that the organic cocoa market represents only 0.5% of production, being a very small share of the total world cocoa market, the demand for this product has been increasing, with in some situations an inability of supply to meet demand for organic cocoa market. For this reason, and despite the social, environmental and economic problems faced by producers and countries, and the distance between producers and consumers who can value the product and its way of production, farmers have been sacrificing their few resources to produce organic cocoa, mainly in the least developed countries (García-Herrero et al., 2019). The main producer of organic cocoa is the Dominican Republic, with a market share of around 70%. Peru, Mexico and Ecuador hold about 20%, with the remaining 10% distributed between Ghana, Uganda, Bolivia and Brazil (ICCO, 2018). The estimate of this source is that the African continent will be able to produce about 9% of the organic cocoa market by 2022 although, to that end, it must plan, organize and certify production so that cocoa does not have to be marketed as conventional due to difficulties in market access. The organic cocoa market encompasses, in general, products such as cocoa powder, paste, butter and grains, which are used in confectionery, bakery, functional foods, healthy drinks, homemade food, pharmaceuticals, ointments and personal hygiene, among other possibilities. In the food industry, the main ingredient from cocoa and the driver of organic cocoa production is chocolate. Their demand by

consumers results from the growing awareness of health and, consequently, the demand for premium

organic chocolate, organic ingredients in functional foods, beverages and personal hygiene products. However, there is a lack of information and market links that allow small organic cocoa producers to supply high-demand regions such as North America, Western Europe, Japan and Asia-Pacific (except Japan), where there is an emerging cocoa market potential. Some emerging markets, including those in growing African countries, have also been linked to the demand for organic cocoa (EAL, 2020). It is expected that there will be significant increases in the demand for chocolate in emerging markets while in traditional markets with developed economies, the trend will go towards the preference for healthier and first quality chocolate products, expanding the range of prices offered for these products (ICCO, 2018). The price of organic cocoa, although it is, like the conventional, determined by the balance between world supply and demand, and pay attention to the quality and flavor, it is always higher than that of conventional cocoa (Prazeres, 2018).

3.2 The Global Cocoa-Chocolate Value Chain

The global cocoa-chocolate value chain is exposed in Figure 3. Its analysis shows, on the one hand, a large spatial distance between production, which occurs in a fragmented way in 5.5 million small rural properties of 1 to 3 hectares, in Africa, Latin America and Asia and consumers and, on the other hand, a governance system where few companies control the segments of consumption and the stages of cocoa processing and chocolate manufacture, where the value is created.

Figure 3: The Cocoa-Chocolate Value Chain

Source: Abdulsamad et al. (2015); Díaz-Montenegro (2019)

Some of the large companies involved in the global cocoa-chocolate value chain develop their activities simultaneously in the consumer markets, where they control high-value functions arising from the industrial manufacture of chocolate and branding, and in the intermediate processing markets, dominating the global supply chain for raw materials from cocoa and operating in markets of producing and consuming countries (Abdulsamad et al., 2015). According to these authors, the five leading companies in the consumer markets (Mondelez International 15%; Mars Inc. 14%; Nestle 12%; Ferrero 8%; and Hershey Co. 7%) are owners of well-known brands. They control high-value functions related to the manufacture of chocolate and the development and marketing of brands have great purchasing and negotiating power (Abdulsamad et al., 2015). Three of these leading companies dominate the global supply chains, being vertically integrated, they operate from the rural areas of the producing countries to the main ports in Europe and North America, where the advanced processing facilities are located. Barry Callebaut (23%), Cargill (15.3%) and ADM (12.7%) are examples of these vertically integrated supply chains that control approximately half of processed cocoa

worldwide (Abdulsamad et al., 2015). Upstream of the cocoa-chocolate value chain are the approximately five million small-scale farmers, ranging from one to three hectares of land (ICCO, 2016), which account for 90% of the global cocoa harvest (Purcell et al., 2018). They are a link in the value chain with less negotiating weight, more fragmented and geographically atomized and without financial capacity to face the risks resulting from price volatility (Fountain and Huetz-Adams, 2018). Furthermore, they are the most dependent on local commerce and their respective dealers, commission agents or purchasing agents from the international chocolate industries, who press downward prices (Abdulsamad et al., 2015). In addition, the processing (grinding) of cocoa beans is commonly carried out in importing countries, (especially in Holland, Germany and the United States), which owns approximately one third of the world mills and add the value corresponding to this operation (ICCO, 2016). The asymmetry in the power relations of the cocoa-chocolate value chain explains the formation and transmission of prices along the chain. In general, retail prices increase when the price of cocoa beans goes up, but they react more slowly when prices for cocoa beans go down. Thus, the fall in the prices of cocoa beans has different consequences for the different links in the chain. It will immediately and negatively affect farmers' incomes, but the rest of the players in the value chain can even increase their profit margins, albeit temporarily (Fountain and Huetz- Adams, 2018; 2020). Table 3 shows the differences in the distribution of value along the chain between the production activities carried out by the cocoa-producing countries (6.6%), transportation and marketing (6.3%), processing (7.6%), manufacturing (35.2%) and retail sales (44.2%).

Table 3: Distribution of Value in Cocoa-Chocolate Chain

Distribution of Value	Sales (\$)	Purchases(\$)	Value Added (\$)	Profit (\$)	Final Sale Price (%)
Farmers' Income (Weighted)	1,874	664	1,210	1,210	6,6
Ground transportation	1,971	1,874	97	Not available	0,5
Taxes Marketing Board	2,745	1,971	774	Not available	4,2
International Shipping	2,793	2,745	48	Not available	0,3
Cost per Arrival Fee	2,993	2,793	201	Not available	1,1
International Merchants Traders	3,038	2,993	45	15	0,2
Processors and Crushers	4,434	3,038	1,395	211	7,6
Manufacturer (per ton of cocoa sold)	10,858	4,434	6,425	870	35,2
Retail and Taxes	18,917	10,858	8,058	473	44,2

Source: Fountain and Huetz-Adams (2018); Díaz-Montenegro (2019)

Compared to the conventional cocoa value chain that of organic cocoa is not very different although, in some cases, it may be relatively shorter and more transparent, encompassing only producers, their associations or cooperatives and international customers. There are also some cocoa farmers who individually produce and process cocoa and sell it to traders and intermediaries of the large international companies that operate locally, receiving a premium price in relation to the market (Prazeres, 2018). However, because the access of cocoa farmers to this market is difficult, it is common to associate with cooperatives or associations of producers and, through these organizations, carry out the marketing of cocoa, with the required volume and quality (Prazeres, 2018). What can also happen is that producer organizations are held hostage by a major international negotiator and have few possibilities to set prices (Prazeres, 2018; Lwesya, 2018).

4. The Organic Cocoa Value Chain in STP

The organic cocoa value chain in STP involves five main links - cocoa production, supply and marketing, powder and butter processing, manufacturing and distribution of industrial chocolate and retailing to final consumers (Figure 4). The main stakeholders include cocoa producers, two cooperatives (CECAB and CECAC11), certification companies, cocoa traders, processors (associations or companies Satocao and Diogo Vaz, with their own production), chocolate manufacturers (national or international industry) and retailers. Despite its large size, the

international cocoa market is very concentrated, with few players representing a significant proportion of the market (Prazeres, 2018).

Figure 4: Organic Cocoa Value Chain in STP

Source: Prazeres (2018)

The production link is very atomized, involving approximately four thousand farmers distributed by two cooperatives, CECAB, which brings together the largest proportion of producers and CECAC 11, with about half of CECAB's cooperatives (Table 4), where the average per capita area is 2.1 hectares at CECAB and 1.6 hectares at CECAC11. Both cooperatives are financially supported by IFAD - Fund for the Development of Agriculture and the Project for Small Commercial Agriculture (PAPAC) and other several non-governmental organizations, such as ADAPPA (Action for Agricultural Development and Environmental Protection), the ADIL Zatona, FENAPA (National Federation of Small Farmers) and the CIAT (Center for Agronomic and Technological Research). Each of the cooperatives brings together several associations that receive the cocoa seed from the farmers who integrate them, organized by geographical areas (Prazeres, 2018). According to this author, the training of farmers and motivation strategies to guarantee production with the levels and quality required by the market, is carried out by the cooperatives that provide training to the technicians of the associations that integrate them and these, later, called "sociotechnicians" provide training and technical support to their producers, being paid for this task. These sociotechnicians replace the role of the extension services that belonged to the state.

Table 4: Organic Producers by Cooperative in STP

Cooperative	Producers (N°)	Total Area (ha)	Production (Kg)	Average per-capita Area (ha)	Productivity (Kg/ha)	Cocoa Price (Dbs/Kg dry)	Price FOB (€/Ton)
CECAB	2139	4560	965774	2,1	212	46550	2540
CECAC11	1135	1800	302000	1,6	168	5000	2816

Source: Prazeres (2018)

In addition to strictly agricultural work, cooperatives carry out other actions, such as socio-recreational activities in the communities, inviting specialists who contribute to raising awareness among farmers on various topics (domestic violence, gender equality, and alcohol consumption - a problem that affects 10 to 10 years). 15% of the members of the cooperatives - sexually transmitted diseases), the cooperatives finance small social works in the communities and provide support to the neediest (medicines, glasses, coffins).

Overall, the two cooperatives hold 90% of the country's organic cocoa producers and, in 2015, approximately 1300 tons of production in total. The fact that the vast majority of producers are formally integrated into a cooperative, could mean a greater capacity to negotiate with intermediaries and suppliers of goods and services and to sell cocoa directly, benefiting from its sale in value markets. However, this is not the case and cocoa farmers, especially the smallest ones, face several problems, among which, aging plantations, low renewal rate, lack of improved varieties and technical assistance. This situation highlights the need to rethink the organic cocoa value chain, through an integration model that encourages the formation of horizontal and vertical links, which link producers, cooperatives and other actors in the chain and guarantee the origin of cocoa through a legal figure such as the Protected Geographical Indication (Prazeres and Lucas, 2020). Of the 10% individual producers, not members of the cooperatives, the smaller ones deliver the cocoa beans to a buyer / dealer / intermediary who may be an employee or representative of a large company or an export agent. Of the larger private producers, of note Sotocao, in partnership with a chocolate manufacturer in Switzerland and Kennyson in Roça Diogo Vaz, with a chocolate factory and a store in the country and two more stores abroad, one in Portugal and another in France. Organic cocoa is restricted to the island of Sao Tome. In the case of the island of Principe, the cocoa product is not certified as organic, except for incipient quantities produced in the Roças Paciencia and Sundy, certified by the Portuguese company Agricert. Roça Fundao buys from small producers about half of the 75 tonnes of total cocoa production (not certified), the remainder being bought by chocolate producer Claudio Corallo, who also gives his name to the chocolate brand that produces chocolate in the city of Sao Thomas. The value chain consists of approximately 20 intermediaries or dealers (buyers and local agents or wholesalers) who are the main links between individual private producers and cooperatives, with industry, processing centres, brokers and exporters. These fulfil various functions such as granting credit to small cocoa farmers, providing basic products (rice, corn, sugar) or paying in cash. Intermediaries often operate on the credit of large exporters and, in this situation, can lend money to cooperatives, with which they reach pre-harvest agreements. They work with volume targets, demanding strict compliance and, in many cases, there are reports of the use of irregular commercial practices, such as errors in weighing the volume transacted with payment accordingly, inaccurate price information or quality complaints and uniformity of cocoa beans. All stakeholders in the value chain, from export traders (intermediaries), to those in charge of public organizations, cooperatives, development organizations, farmers and specialists, realize the importance of the quality of cocoa beans and the certification process as biological, for its price and final value. One of the interviewees, from a public institution, affirms the relevance of organic cocoa for environmental, economic and social sustainability. Another, from one of the cooperatives, highlighted the specificity of the São Tomé ecosystem for the production of high quality organic fine cocoa. The certification is carried out by a qualified entity, qualified to do so and independent from all other players in the value chain, it starts with planting, visiting lots and obtaining information on density, age, health status, location (for example, there is no certification of plantations close to workshops and backyards), status of maintenance of the lot, so that it is possible to make a projection of the production to be obtained. If the lot is in a condition to be certified, the owner is asked about the cultural operations it carries out and the quantity produced.

5. Implications for Small Cocoa Producers

In a global context of scarcity of resources, the relative inability of cocoa production to satisfy the growing demand and the attention given to its sustainability, a balance must be found between production and profitability, with respect for the environment and benefits for small cocoa producers and for society (Garcia-Herrero et al., 2019).

Added concerns of producer countries about price volatility and the dependence of few buyers, farmers' organizations weak or with little bargaining power, the loss of soil fertility and biodiversity, and the different understanding and interest in the development of sustainable cocoa by different links in the chain (Mithofer et al., 2017). Also due to the existence of gaps between the standards and practices of sustainability and governance of the cocoa value chain

(Moreno-Miranda et al., 2019) and the distance between the geographically highly atomized producers and the markets consumption (Prazeres, 2018). Development policies and programs in many countries have focused on expanding cocoa production and increasing productivity, regardless of the needs of small farmers for economically viable agricultural systems and market structures, which results in little bargaining power and low levels of income and well-being for producers (Mithofer et. al, 2017). In addition to increasing production and productivity, improving the livelihood strategies of small cocoa producers may involve other alternative methods, such as agro-cultural practices in land use and other resources, modes of production (for example, biological) and changes in the fermentation, transformation and commercialization processes (Salazara et al., 2018). Innovations and increased investments in sustainability in the cocoa chain, which are not just incremental changes, but help sustain transformation and industry and improve the rights, representation and quality of life of small producers, are essential (Nelson and Phillips, 2018), among these innovations, public-private partnerships stand out when they create governance rules that improve yields and services to producers, optimize productivity and, at the same time, limit environmental impacts (Ingram et al., 2018). Increasing the income of cocoa farmers and reducing poverty in rural areas is also achieved with the certification (Lwesya, 2018) the creation of Protected Designations of Origin and Protected Geographical Indication (Moreno-Miranda et al., 2019; Prazeres, 2018; Prazeres and Lucas, 2020) and quality improvements (Effendy et al., 2019). The governance of the global cocoa value chain, especially in the further downstream links, concentrated in a few agents, has created asymmetric power relations that block the distribution and transmission of upstream value for small producers. The share of the amount retained by the cocoa-producing countries was reduced by more than 50% in the period between 1970 and 1990. Producers in these countries (mainly those with a small farm size) had, at the same time, to bear the fall in market prices and, higher costs and greater risks, production due to the effects of climate change, market driven by the dynamics of global markets price volatility and, institutional, due to its inefficient or inadequate functioning. The worsening social and economic conditions in producing countries as a result of these power imbalances have triggered a proliferation of private governance responses, such as industry behavioural codes, certification standards and schemes or multistakeholder initiatives and, more recently, governance mechanisms public and regulatory (Abdulsamad et al., 2015). Different standards and certification schemes, with market-based approaches and the development of cocoa brands, can be included in the private governance processes that led to the expansion of supply. However, there has also been a drop in demand resulting from economic crises and other diverse contexts, such as the reduction in sugar and fat consumption or the appetite for chocolate (Abdulsamad et al., 2015; Fountain and Huetz-Adams, 2018; ICCO, 2016; World Bank, 2019). Even in these cases, there is an asymmetrical distribution of value along the chain, with the portion of the price paid by the consumer not reverting to certified cocoa producers (such as organic ones) very different from that considered for conventional cocoa farmers (Abdulsamad et al., 2015). Public governance mechanisms have the advantage of seeking a balance between the growth of the cocoa sector and the improvement of farmers' livelihoods (Abdulsamad et al., 2015). In the specific case of STP, the option taken by the state was to convert all cocoa plantations into organic cocoa. Currently, it can be said that all cocoa is produced in an organic way, promoting government support to producers and their cooperatives.

Most producers who sell their product to cooperatives receive a different price compared to the price of conventional cocoa, and the certification costs are borne by the cooperatives. The main problem for organic cocoa producers is scale and pressure to use land with alternative crops or activities, which are more profitable. There is a tension between the allocation of land for cocoa production and for other productive activities and there is also real estate pressure. The decision of farmers to plant cocoa or another crop is influenced by external factors, such as market prices and, also, by internal factors such as physical, human or natural capital that farmers rely on. The way in which these factors affect the decision of small cocoa producers in STP has not yet been studied, requiring a thorough investigation in order to assess the impact and provide solutions. Support for organic production, although it is mostly done by the state, through

cooperatives and respective associations, is not exclusive to this, with investments from the private sector (such as Satocao and Diogo Vaz), focusing on improving the fermentation process production systems, including commercial scale and increased market penetration. Whether through private or public governance, associating small producers with specialized value chains is an opportunity to alleviate poverty and improve their quality of life.

6. Final Remarks

There are several tensions between the different links in the cocoa value chain. In terms of the international market, these derive from the existing asymmetries between production, fragmented in about 5 million producers, the vast majority with less than 2 hectares of land and the consumer market, controlled by five large multinational companies and, from the small portion of value passed on to producers. At the level of STP and, despite measures to support organic production as a valuable alternative to the country's development strategy, imbalances in the value chain persist that compromise the livelihoods of small producers responsible for most of production exported and the sustainability of the ecosystem. Low productivity and the effects of climate change, combined with the drop in world prices and / or the lack of premium prices in the domestic market, are the main responsible for this situation. Even for the many producers who sell organic cocoa through cooperatives and are able to receive payments at higher prices, it is not entirely clear whether this strategy allows them to significantly improve their livelihoods, a situation that needs to be researched. Cooperatives and private companies have focused on technical solutions linked to improving agricultural practices, quality and market prices, with little information on price transmission and governance in the value chain, where the lack of bargaining power by contrasted with the concentration of power in other links in the chain. Addressing these issues from a full perspective would also require taking into account producers' livelihood conditions (e.g. local infrastructure, including schools, health, access to markets) to understand how cocoa production can contribute to its improvement.

Acknowledgment

Maria Raquel Lucas is pleased to acknowledge financial support from Fundação para Ciencia e a Tecnologia (grant UIDB/04007/2020).

References

- Abdulsamad, A., Frederick, S., Guinn, A., & Gereffi, G. (2015). Pro-Poor Development and Power Asymmetries in Global Value Chains. <https://doi.org/10.13140/RG.2.2.32872.88323>.
- Acierno, V., Alewijn, M., Zomer, P. & van Ruth, S. M. (2017). Making cocoa origin traceable: Fingerprints of chocolates using Flow Infusion - Electro Spray Ionization - Mass Spectrometry. *Food Control*, 81: 245-252. <https://doi.org/10.1016/j.foodcont.2017.10.002>. [CrossRef](#)
- ANEME - Associação Nacional das Empresas Metalúrgicas e Eletromecânicas (2018). Estudo de Levantamento e Caracterização das Empresas Industriais de São Tomé e Príncipe. Estudo São Tomé e Príncipe. Retrieved from: https://www.aneme.pt/site/wp-content/uploads/2018/09/Estudo_S%C3%A3o-Tom%C3%A9-e-Pr%C3%ADncipe-2018_VF-CORRIGIDA.pdf.
- Blare, T., & Useche, P. (2013). Competing objectives of smallholder producers in developing countries: examining cacao production in Northern Ecuador. *Environmental Economics*, 4(1): 71–79. Retrieved from: file:///Users/raquellucas/Downloads/ee_2013_01_Useche.pdf.
- Díaz-Montenegro, J. (2019). Livelihood strategies of cacao producers in Ecuador: Effects of national policies to support cacao farmers and specialty cacao landraces (PhD Program: Sustainability). Universitat Politècnica de Catalunya Institut de Sostenibilitat, Barcelona. Retrieved from: <https://upcommons.upc.edu/bitstream/handle/2117/170436/TJDM1de1.pdf>. [CrossRef](#)

- Díaz-Montenegro, J., Varela, E., & Gil, J. M. (2018). Livelihood strategies of cacao producers in Ecuador: Effects of national policies to support cacao farmers and specialty cacao landraces. *Journal of Rural Studies*, 63: 141-156. [CrossRef](#)
- EAL-EuroAfriLink (2020). Organic Cocoa market: Global challenges & opportunities. Retrieved from: <http://euroafrilink.com/second-blog/>.
- Effendy, D., Pratama M.F., Rauf, R.A., Antara M., Basir-Cyio, M. & Mahfudz (2019). Factors influencing the efficiency of cocoa farms: A study to increase income in rural Indonesia. *PLoS ONE* 14(4): e0214569. [CrossRef](#)
- Eghbal, M. (2018). Global Chocolate Industry: From Bean to Bar. Euromonitor International. Retrieved from: <https://blog.euromonitor.com/global-chocolate-industry>.
- FAO (2021). Faostat. Selected Indicators. Retrieved from: <http://www.fao.org/faostat/en/#country>
- Fountain, A. C., & Huetz-Adams, F. (2020). Cocoa Barometer 2020. USA Edition, 118 p. Retrieved from: <https://www.voicenetwork.eu/wp-content/uploads/2020/12/2020-Cocoa-Barometer.pdf>.
- Fountain, A., & Huetz-Adams, F. (2018). Cocoa Barometer 2018. USA Edition, pp. 1–72. Retrieved from: <https://www.voicenetwork.eu/wp-content/uploads/2019/07/2018-Cocoa-Barometer.pdf>.
- Galarza, J. A. V. (2012). Smallholders and “fine” cocoa’s supply chain: designing an experiment on social dilemmas in cocoa “quality manipulation” (Master Thesis). Universiteit Gent. Retrieved from: https://lib.ugent.be/fulltxt/RUG01/001/894/545/RUG01-001894545_2012_0001_AC.pdf.
- García-Herrero, L., De Menna, F., Vittuari, M. (2019). Sustainability concerns and practices in the chocolate life cycle: Integrating consumers’ perceptions and experts’ knowledge. *Sustainable Production and Consumption* 20: 117–127. <https://www.sciencedirect.com/science/article/pii/S2352550919300582>. [CrossRef](#)
- ICCO - International Cocoa Organization (2016). Quarterly Bulletin of Cocoa Statistics - August 2016. *Quarterly Bulletin of Cocoa Statistics*, XLIII(1). Retrieved from: <https://www.icco.org/about-us/icco-news/324-quarterly-bulletin-of-cocoa-statistics-august-2016.html>.
- ICCO - International Cocoa Organization (2018). Quarterly Bulletin of Cocoa Statistics, Vol. XLIV - No. 1. Retrieved from: <https://www.icco.org/about-us/icco-news/389-may-2018-quarterly-bulletin-of-cocoa-statistics.html>.
- Ingram, V., van Rijn, F., Waarts, Y. & Gilhuis, H. (2018). The Impacts of Cocoa Sustainability Initiatives in West Africa. *Sustainability* 10 42-49. [CrossRef](#)
- Lwesya, F. (2018). Towards Organic Agriculture: Assessing the Dynamics of Production and Exporting of Organic Cocoa in Tanzania. *Academic Journal of Economic Studies*, Vol. 4 (3): 25–31. <https://ideas.repec.org/a/khe/scajes/v4y2018i3p25-31.html>.
- Mithöfer, D., Roshetko, J. M., Donovan, J. A., Nathalie, E., Robiglio, V., Wau, D., Sonwa, D. J. & Blare, T. (2017). Unpacking ‘sustainable’ cocoa: do sustainability standards, development projects and policies address producer concerns in Indonesia, Cameroon and Peru?, *International Journal of Biodiversity Science, Ecosystem Services & Management*, 13 (1): 444-469. [CrossRef](#)
- Moreno-Miranda, C., Ordán, J., Moreno, R., Moreno, P. & Solís, J. (2019). Protected Designation of Origin and Sustainability Characterization: The Case of PDO Cocoa Arriba. *Agriculture* 9(10): 229. [CrossRef](#)
- Nelson, V. & Phillips, D. (2018). Sector, Landscape or Rural Transformations? Exploring the Limits and Potential of Agricultural Sustainability Initiatives through a Cocoa Case Study. *Business Strategy and the Environment* 27: 252–262. [CrossRef](#)
- OEC- The Observatory of Economic Complexity (2019). Cocoa beans trade. Retrieved from: <https://oec.world/en/profile/hs92/cocoa-beans?redirect=true>.
- Prazeres, I. C. & Lucas, M. R. (2020). Repensar a cadeia de valor do cacau biológico de São Tomé e Príncipe. *Revista de Ciências Agrárias*, 43(Especial). <https://doi.org/10.19084/rca.19045>.

- Prazeres, I. C. (2018). Estratégia de Marketing e Criação de Valor do Cacau Biológico de São Tomé e Príncipe no Mercado Internacional (Trabalho de Projeto do Mestrado em Gestão, especialização em Marketing), Escola de Ciências Sociais, Departamento de Gestão, Universidade de Évora. Retrieved from: <http://hdl.handle.net/10174/25358>.
- Purcell, T., Martinez-Esguerra, E., & Fernandez, N. (2018). The Value of Rents: Global Commodity Chains and Small Cocoa Producers in Ecuador. *Antipode*, 50(3), 641–661. [CrossRef](#)
- Salazara, O. V., Ramos-Martín, J. & Lomasc, P. L. (2018). Livelihood sustainability assessment of coffee and cocoa producers in the Amazon region of Ecuador using household types. *Journal of Rural Studies* 62:1-9. [CrossRef](#)
- Silva, A. R. A., Bioto, A. S., Efraim, P. & Queiroz, G. C. (2017). Impact of sustainability labeling in the perception of sensory quality and purchase intention of chocolate consumers. *Journal of Cleaner Production*, 141: 11-21. [CrossRef](#)
- Squicciarini, M. P., & Swinnen, J. (2016). The economics of chocolate. In: M. P. Squicciarini & J. Swinnen (Eds.). New York: Oxford University Press. [CrossRef](#)
- Utepi - Unidad Técnica de Estudios para la Industria (2007). Estudio Agroindustrial en el Ecuador: Competitividad de la Cadena de Valor y Perspectivas de Mercado. Programa Integrado entre el Ministerio de Industrias y Competitividad y la Organización de las Naciones Unidas para el Desarrollo Industrial, Quito - Ecuador. Retrieved from: https://www.unido.org/sites/default/files/2007-11/71789_TCB_No.16.Cacao_Estudio_Agroindustrial_en_el_Ecuador_0.pdf.
- Voora, V., Bermúdez, S., & Larrea, C. (2019). Global Market Report: Cocoa. Sustainable Commodities Marketplace Series 2019. IISD-The International Institute for Sustainable Development. Retrieved from: <https://www.iisd.org/system/files/publications/ssi-global-market-report-cocoa.pdf>.
- World Bank (2019). World Bank Commodity Price Data. Retrieved from: <http://www.worldbank.org/en/research/commodity-markets>.