Sustainable Farming in Tropical Asian Landscapes (SFITAL) Project

A review of the governance of value chains and the environmental and social management system for cacao for sustainable production and processing practices:

The case of Davao de Oro, Philippines

Author: Julieta A. Delos Reyes

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Executive Summary

1. The Philippines is among the top 25 countries in the world producing cacao products, but its share is dismal at less than 1%. Its major exports are cacao beans, but imports processed products. The country has negative trade balance for cacao from 2011-2020.
2. The Davao Region accounts for almost 78% share in national production. Within Davao Region, Davao de Oro, with its suitable soil and climate, is also a very ideal site. This study focuses on the cacao value chain in Davao de Oro, Philippines, aiming to identify bottlenecks that hinder the takeoff and progress of the province's cacao industry. It surveyed 91 value chain actors, including farmers, collector agents, assemblers-wholesalers, export companies, processors, and retailers.
3. The country has established environmental and social management standards (ESMS) through standards and certification codes and guidelines for cacao production and processing. Since 1997, the Agriculture and Fisheries Modernization Act or Republic Act (RA) 8435 has required the development of national-level standards for good agriculture. Additionally, the Food Safety Act (RA 10611) led to the creation of the Philippine Good Agricultural Practices (PhilGAP). The Bureau of Agriculture and Fisheries Standards (BAFPS) has issued several codes, including Philippine National Standards (PNS)/BAFPS 104:2011 for Philippine Cacao Beans, PNS/BAFPS 88:2012 for Philippine Tablea, and PNS/BAFPS 293:2020 for National Food Control System. The Philippines, as a member-country of the ASEAN, also follows the ASEAN GAP for cacao, and its own GAP and Good Management Practices standards align with this and other food safety protocols.
4. GAP and GMP certification in the Philippines have not been popular even if the application for certification is free. One of the identified reasons is compliance with required processes prior to inspection is seen as difficult and cumbersome. Also, transitioning from conventional practices to GAP and GMP entails significant costs, and farmers fear they cannot manage the low income during the initial stages of transition.
5. The buying and selling terms are determined by the buyers of the farmers, the majority of whom claimed that they were satisfied with the terms they have with their trading partners. Only a handful of farmers had special affiliation with their buyers, and these are those with long-term tie-up. The export company had no formal relationship ties with the buying stations, thus there is no written contract.
6. Most of the farmers had moderate to strong trust with their fellow farmers, but they have not been collaborating when it comes to marketing. Some of them, however, are benefitting from collective endeavors such as attendance to training programs together, and as one group, they are requesting assistance such as equipment from implementing agencies, which they use as a group also.
7. There is a weak transfer of information between farmer-producers and all the rest of the cacao value chain participants. Highest level of satisfaction was reported for the relationship between cacao producers and input providers and the least was between cacao producers and company agent. In terms of governance types, relational governance proved to be the most effective type.
8. Farmers express awareness and desire for change towards agroforestry but lack technical knowledge and ability. Other value chain participants show lower readiness for change, particularly in terms of knowledge and technical ability.

9. Urgent actions needed include addressing technical knowledge gaps, implementing income augmentation measures during the transition period to agroforestry and GMP, and facilitating collaboration for more transparent and fairer value chain governance.

Introduction

Rationale

The 2017-2022 Philippine Cacao Industry Roadmap identifies the cacao industry as having a high potential to address the poverty in the country through employment generation. Value addition in cacao can create livelihood opportunities, especially for people in the rural areas. The multiplier effect in the country's economy could be far-reaching. The local cacao industry, if developed to its full potential, can take advantage of the demand gap for chocolate in the world since trends in production in the major suppliers are sloping downwards. The Philippines' strategic location vis-à-vis possible trading partners is another advantage that can be capitalized to increase its share in the world trade for cacao.

The Davao Region, which includes Davao de Oro, is dubbed as the Philippines' "cacao capital" owing to its supply of around 78% of the country's total cacao production. However, despite the suitable agroclimatic conditions and the same endowment of resources, Davao de Oro is not performing as good as its neighboring provinces. Data from the Philippine Statistics Authority revealed that Davao de Oro produced only 741.68 MT from the total area planted of 5,580 hectares. This is dismal compared to Davao del Norte's 1,435.59 MT from 5,999 hectares area planted. Davao del Sur had an even better performance by producing 1,247.93 MT from just 915 hectares of cacao plantations.

Objectives of the Study

The above scenario points to the fact that there remains untapped resources in Davao de Oro, requiring careful analysis for more strategic courses of actions towards increasing the region's cacao yield, and eventually, the country's. This study looked at the governance of the cacao value chain in Davao de Oro to determine the bottlenecks that need to be unclogged to jumpstart the province's cacao industry to be sustainable and at least be at par with the performance of its neighboring provinces. The objectives of this study were to:

1. identify the positioning of the Philippine cacao industry at the global, national, and provincial markets;
2. assess the existing policies and programs that encompass the environmental and social management system (ESMS), standards, and certifications for cacao products and their attendant processes;
3. evaluate the relationships between and among the different actors of the cacao value chain;
4. determine the possibility of the existing cacao value chain to migrate to more sustainable production and processing practices like agroforestry and good manufacturing practices (GMP), respectively; and
5. provide recommendations for the transformation of the Davao de Oro cacao value chain into a global value chain that is more sustainable and responsive to better opportunities worldwide.

Methodology

Methodological Framework

Figure 1 depicts the methodological framework used in this study. The methods and tools were listed as they were used to achieve the given objectives.

Sampling and Sample Selection

Governance encompasses both formal and informal processes and institutions that influence investments, incentives, and innovations. It involves resolving trade-offs through interactions among laws, institutions, policies, and social norms that frame and guide decision-making (Kennedy and Liljeblad, 2016). Governance as used in this paper is concerned with the nature of relationships among actors within the cacao value chain. Such relationship could be supportive, adversarial, or simply nonchalant.

The study sampled a total of 91 cacao value chain actors which include farmers, collector agents, assembler-wholesalers, export companies, processors, and retailers in Davao de Oro. For the farmers, random sampling was implemented based on the list of cacao growers and farmers' associations provided by the Davao de Oro Project Coordinating Unit of the Department of Trade and Industry's Rural Agro-industrial Partnership for Inclusive Development and Growth (DTI-RAPID) project and respective Municipal Agriculturist's Offices (MAGROs) of Maco, Nabunturan, and New Bataan. Farmers were randomly selected from the list of members of 16 farmer groups in Nabunturan, seven farmer groups in Maco, and seven farmer groups in New Bataan.

On the other hand, for the collector agents, assemblers, assembler-wholesalers, export companies, processors, and retailers, purposive sampling was done due to limited number of actors present in the area. The sampling was based on information provided by local enablers in Davao de Oro, such as DTI-RAPID, MAGROs, and Kennemer Foods International.

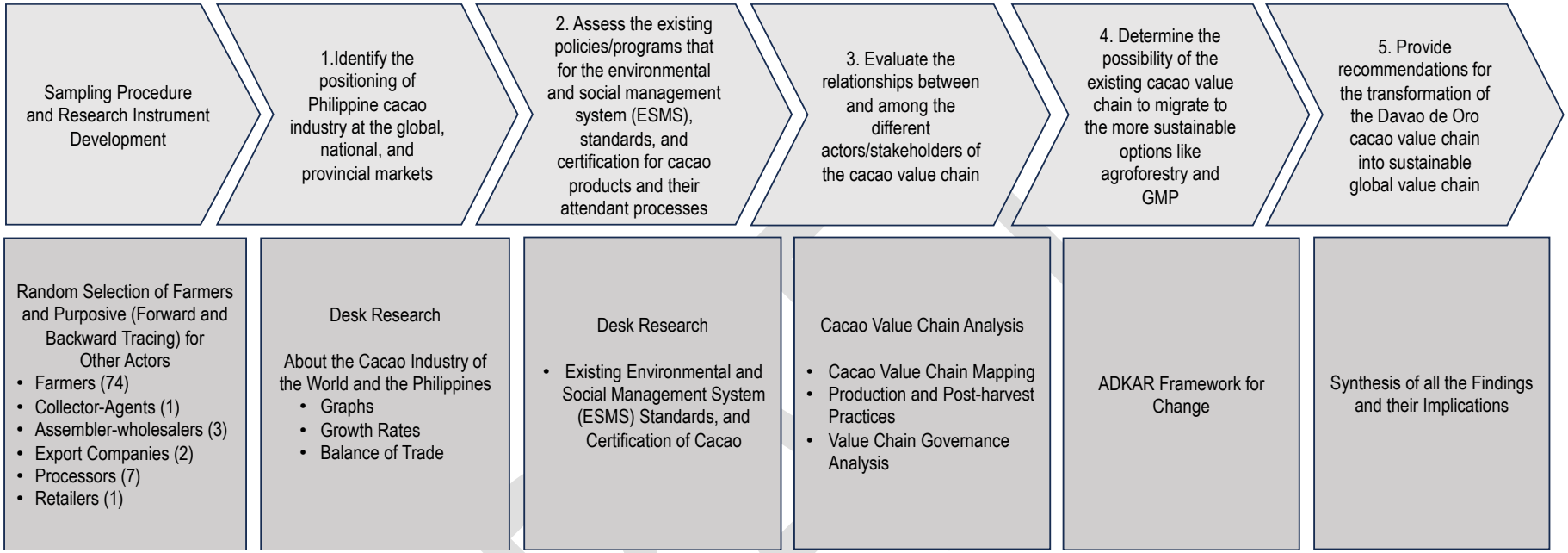


Figure 1. Methodological framework

Research Instruments, Data Collection Procedure, and Analysis

An interview schedule was developed for face-to-face data collection from cacao farmers in Davao de Oro. The research instrument (see Appendix 1) has four main sections: Parts I and II are for the interviewer identity and respondent's identity (demographics), respectively; Part III is for the supplier and buyer relationships; and Part IV is for the evaluation of the value chain and its governance.

The evaluation of supplier and buyer relationships centered into vertical relationships among the different value chain participants while for farmers, the evaluation centered into horizontal relationship. Indicator statements tackle presence of formal contractual agreements, determination of buying and selling terms and conditions, transfer of information, participants' ability to transact, information sharing and collaboration, trust, among many others. Responses for strength of relationship are from 0 to 3, where 0 = none, 1 = weak, 2 = moderate, and 3 = strong.

The evaluation section specifically asked for an assessment on whether the following different types of chain governance "Worked" or "Did Not Work": modular governance, relational governance, captive governance, and hierarchical governance. Aside from this, the evaluation section was divided into two subheadings: measuring sustainability of change for the sustainability of cacao farming among farmers, and of cacao business among the other supply chain participants. The ADKAR elements examined for the cacao value chain at the farmers' level are composed of different indicators where the responses can be chosen from a 5-point agreement scale (1=strongly disagree to 5=strongly agree):

a) **A**wareness why change is needed (five indicator statements)
b) **D**esire to implement a change (five indicator statements)
c) **K**nowledge needed to make the shift to cacao agroforestry production system successful (five indicator statements)
d) **A**bility to apply cacao agroforestry production system (five indicator statements)
e) **R**einforcement to track and improve cacao agroforestry production system (five indicator statements)

The ADKAR elements analysis for shifting to GMP for the other supply chain participants and evaluations were based on the following indicators where the responses can be chosen from a 5-point agreement scale (1=strongly disagree to 5=strongly agree):

a) **A**wareness why change is needed (five indicator statements)
b) **D**esire to implement a change (five indicator statements)
c) **K**nowledge needed to make the shift to GMP successful (five indicator statements)
d) **A**bility to apply GMP (five indicator statements)
e) **R**einforcement to track and improve GMP for environmental sustainability and governance (five indicator statements)

Results and Discussion

Positioning of the Philippine Cacao Industry at the Global, National, and Provincial Markets

The Global Producers

The top 25 cacao producing countries in the world account for 99.38% of the world production. The Ivory Coast has been at the top for the longest time with 39.35% share in production in 2022. Next in rank are Ghana (17.10%) and Indonesia (12.76%). Among the countries in Southeast Asia, only Indonesia and the Philippines were able to make it to the top 25 but then, the Philippines' share was dismal at 0.14%, placing it at 24th rank (Table 1). It is worth mentioning that Indonesia and the Philippines have almost the same climatic conditions and both are highly suitable growing areas for cacao. So, the question is, "How come Indonesia is able to produce so much and the Philippines cannot?"

Table 1. Top 25 cacao producing countries, 2022

RANK	COUNTRY	VOLUME OF PRODUCTION (MT)	PERCENT SHARE
1	Ivory Coast	2,034,000	39.35
2	Ghana	883,652	17.10
3	Indonesia	659,776	12.76
4	Nigeria	328,263	6.35
5	Cameroon	295,028	5.71
6	Brazil	235,809	4.56
7	Ecuador	205,955	3.98
8	Peru	121,825	2.36
9	Dominican Republic	86,599	1.68
10	Colombia	56,808	1.10
11	Papua New Guinea	44,504	0.86
12	Uganda	31,312	0.61
13	Mexico	27,287	0.53
14	Venezuela	23,349	0.45
15	Togo	22,522	0.44
16	India	19,000	0.37
17	Sierra Leone	14,670	0.28
18	Haiti	14,173	0.27
19	Guatemala	11,803	0.23
20	Madagascar	11,010	0.21
21	Guinea	10,638	0.21
22	Liberia	8,552	0.17
23	Tanzania	8,548	0.17
24	Philippines	7,009	0.14
25	Nicaragua	6,600	0.13
	Total	5,168,692	99.38*
	World Total	5,201,110	100

*Percent share of the top 25 producing countries in the world
Source of basic data: Philippine Statistics Authority

There are four types of cacao products being internationally traded by the Philippines: cacao beans, cocoa butter, fats and oils, cocoa paste, and cocoa powder and cake. Cacao beans are practically raw because they are only dried and fermented. Cocoa butter, on the other hand, is an edible fat derived from cacao beans which can be used in making chocolate, ointments, toiletries, and pharmaceutical products. Similarly, cocoa paste is a value-added product formed from the dried cocoa liquor, which is produced from the ground cacao beans. Cocoa powder is made from cacao bean particles which were left behind after extraction of cocoa butter from the cacao beans to produce cocoa cake for grinding later. It contains 8-26% cocoa butter. It is more commonly used in the production of drinks, cake fillings, ice cream, among many others (Caligiani et al., 2016).

The Philippines has been exporting cacao beans (68%) and importing processed ones (98%). These imported processed products were dominated by cocoa powder and cake accounting for 95% of all the cacao products imported for the period 2011 to 2020. In terms of value of exports, again, the largest share was achieved for cacao beans at 59% only; because its price was the second lowest (2,635.39 USD/ton) among all the four export products of the country. Also, the country's share in value of cocoa powder was only 9% because it had the lowest export price of 2,209.65 USD/ton. In contrast, its share in value of cocoa butter, fats, and oil went up to 29% primarily due to its highest export price of 5,011.42 USD/ton (Table 2). This implies that exporting value-added products, such as cocoa butter, instead of beans only will be more economically rewarding aside from the fact that it can generate livelihood and employment locally. The Philippines has been largely importing cocoa powder and cake comprising 96% of all imported cacao products. Value-wise, it was found to be a little lower at 95% for cocoa powder (Table 2). This is due again to the low price of this product and more importantly, its use as an ingredient to many other products sold at a high price. Please see Appendix 2 for more detailed data.

The above realities have some important implications for the country's cacao industry, not only for livelihood and employment generation, but for import substitution as well. For instance, it has been losing so much foreign exchange due to importation. It has also been missing the opportunity to take advantage of the positive domino effect on the whole economy of producing them locally that can result from employment generation. Likewise, opting to export cocoa butter and oil that command the highest price among the cacao products leaves cocoa powder and cake as by-product in the country. The fact that this latter product has so much uses in the country, as evidenced by its high importation, indicates a ready market if the product is produced locally.

Table 2. Average share in volume and value exports and imports, by type of cacao product, Philippines, 2011-2020

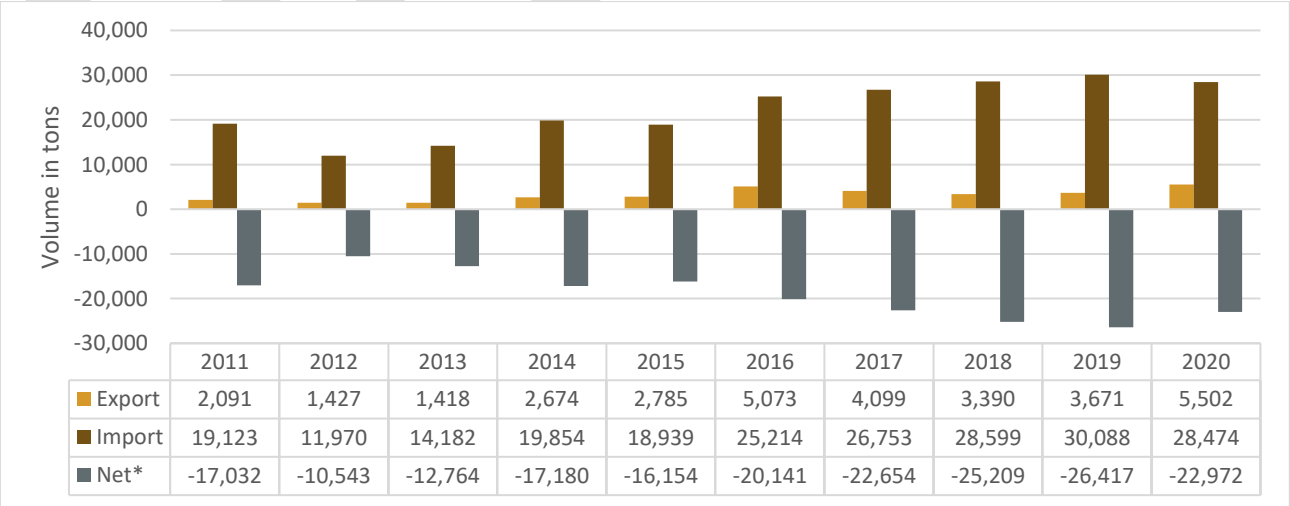
Trade Type	Cocoa Beans	Cocoa Butter, Fats & Oil	Cocoa Paste	Cocoa Powder & Cake	All Products
Export					
Volume (tons)	21,711	5,518	923	3,978	32,130
Share (%)	68	17	3	12	100
Value (USD'000)	57,217	27,653	3,236	8,790	96,896

Share (%)	59	29	3	9	100
Import					
Volume (tons)	3,879	2,309	3,540	213,468	223,196
Share (%)	2	1	1	96	100
Value (USD'000)	10,210	5,775	13,668	541,906	570,906
Share (%)	2	1	2	95	100
Trade Balance					
Volume (tons)	17,832	3,209	-2,617	-209,490	-191,066
Value (USD'000)	47,007	21,878	-10,432	-533,116	-474,010

Source of basic data: FAOStat

Balance of Trade

Going into more details, while the country is both exporting and importing cacao products, it had negative trade balance (net importer) for the period 2011 to 2020 (Table 2). Negative trade balance ranged from a low of 10,543 in 2012 to a high of 26,417 tons in 2019 (Figure 2). This was largely fueled by the importation of cocoa powder and cake totaling 213,468 tons for the 10-year period (Table 2). It is good to note, however, that exports have been increasing faster than the imports with computed average growth of 25% and 7%, respectively. Another important note is the fact that the country is a net exporter of cacao beans and cocoa butter and oil with a total net export of 17,832 and 3,209 tons, respectively, in the 10-year period (Table 2). This suggests that the country has the technology and skill for the production of this high-value product, which it can maximize for future knowledge sharing and industry expansion. As discussed above, expanding the production of cocoa butter can also expand the local production of the cocoa powder and cake, which is a by-product that is highly demanded in the local market.

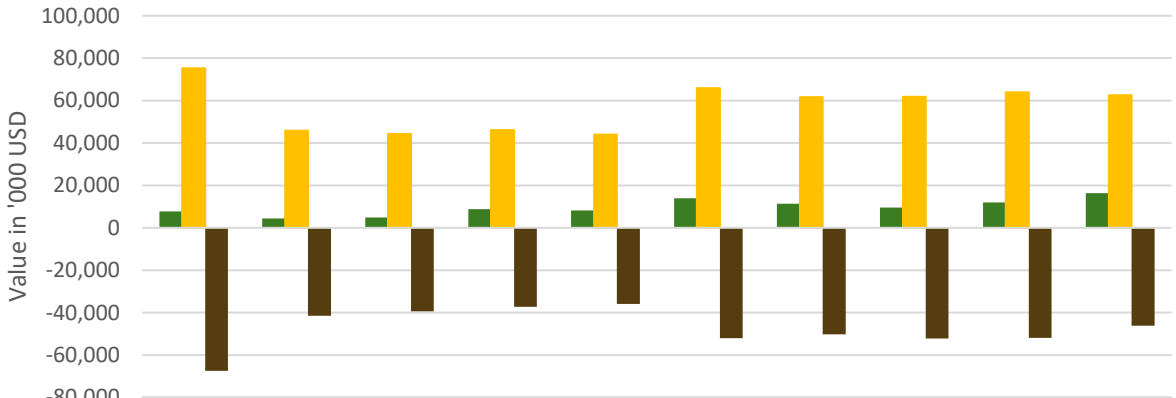


	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Export	2,091	1,427	1,418	2,674	2,785	5,073	4,099	3,390	3,671	5,502
Import	19,123	11,970	14,182	19,854	18,939	25,214	26,753	28,599	30,088	28,474
Net*	-17,032	-10,543	-12,764	-17,180	-16,154	-20,141	-22,654	-25,209	-26,417	-22,972

Figure 2. Cacao trade balance (volume in tons), Philippines, 2011-2020
Source: FAOStat

In terms of value, the country is losing so much foreign exchange from the importation of cocoa powder and cake with net imports amounting to USD 532,463,000 for the period 2011

to 2020. It is also a net importer of cocoa paste worth USD 10,432,000 in the same period. The value of net exports of cacao beans and cocoa butter, fats and oil were USD 47,007,000 and USD 21,878,000, respectively. Overall, for the 10-year period studied, the highest value of net imports of cacao products amounted to USD 75,165,000 in 2011 (Figure 3). Again, this translates to the amount of foreign exchange lost for the country, not to mention the possible gains in the economy had these been produced locally. Looking at the overall balance of trade annually, highest negative balance was experienced in 2011 (-USD 67,450,000) and again, it was due to the importation of cocoa powder and cake. The least was in 2015 (-USD 35,824,000).



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Export	7,715	4,341	4,901	8,790	8,115	13,885	11,420	9,501	11,934	16,294
Import	75,165	45,777	44,327	46,070	43,939	65,873	61,638	61,710	63,886	62,521
Net*	-67,450	-41,436	-39,426	-37,280	-35,824	-51,988	-50,218	-52,209	-51,952	-46,227

Figure 3. Cacao trade balance (value, '000 USD), Philippines, 2011-2020
Source: FAOStat

Regional Share in Cacao Production

The Davao Region is a giant when it comes to cacao production in the Philippines, contributing more than 78% to the country's total (Figure 4). The suitability of the region to the agroclimatic requirements of cacao trees is the main contributor to this advantage in cacao production. The Department of Agriculture-Bureau of Plant Industry (DA-BPI, undated) recommended cacao to be cultivated in areas with rainfall ranging from 1,250 to 3,000 mm per year and temperature varying between 18 to 32°C. It is suitable in Type IV climate which is characterized by evenly distributed rainfall all year round. Meanwhile, DA-Regional Field Office 11 stated that Davao Region has Type II climate, which covers Davao Oriental and most parts of Davao de Oro, and Type IV climate, that bears upon the rest of the region. The region's annual rainfall varies from 1,673.3 to 1,941.8 mm annually and its average temperature is between 28 to 29°C. Being outside the typhoon belt, it is not directly hit by typhoons and is rarely affected by high winds (DA-RFO11, 2014), hence it has the agroclimatic advantage when it comes to production of cacao. Very far in the second and third positions are Regions X (Northern Mindanao) and Region IX (Zamboanga Peninsula) with production shares of 3.88% and 2.75%, respectively. Similar to Davao Region, the northern part of Zamboanga has Type IV climate and also not within the country's typhoon belt. Likewise, Northern Mindanao is of Type II and Type IV climate. While they are yet to be

regarded as production regions, it is highly possible that they too are well-suited to the production of cacao.

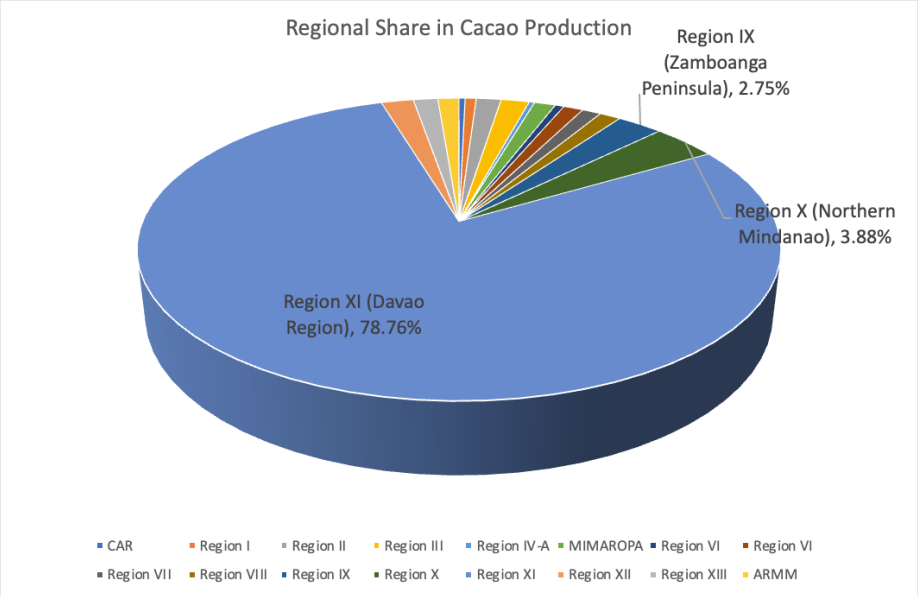


Figure 4. Regional share in cacao production, 2010-2021
Source of basic data: Philippine Statistics Authority

Cacao production in the Philippines has been growing for the last 11 years at an average rate of 6.61%, although there were declines in 2011 and 2012 at a rate of 3.25% and 0.52%, respectively. By year, 2018 recorded the highest growth rate of the country's cacao production at 13.90%. By region, it can be seen in Table 3 that, on the average, highest growth rates were experienced by Region III (17.72%) and Region IX or Zamboanga Peninsula (16.09%). In contrast, Regions VIII (-4.42%), X (-3.82%), and BARMM (-1.90%) suffered declines. Clearly, the Davao Region is the country's leader in cacao production and its production volume has been increasing through time (Figure 5). The same goes for area planted (Figure 6).

Table 3. Growth rate in cacao production, by region, Philippines, 2011-2021

Province	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	*Average*
CAR	1.67	3.79	45.35	31.30	11.90	-0.32	-27.58	21.21	-5.27	24.73	5.49	***10.21***
Region I	-3.03	-5.71	-7.33	2.32	-0.22	0.87	3.72	9.60	6.10	4.13	1.42	***1.08***
Region II	-23.11	-3.04	12.77	7.58	21.50	38.15	-10.90	13.85	-6.01	0.76	25.15	***6.97***
Region III	3.20	4.78	-1.82	6.81	12.96	61.42	8.85	91.94	44.15	28.75	-66.13	***17.72***
Region IV	-0.88	-6.20	-3.28	4.73	-31.99	23.38	10.41	9.00	26.34	2.69	7.27	***3.77***
MIMAROPA	6.79	5.37	2.34	25.79	11.12	-8.12	0.69	4.80	12.41	5.29	28.78	***8.66***
Region V	0.32	4.67	3.76	1.61	2.88	6.21	-2.45	1.81	3.63	-7.70	3.22	***1.63***
Region VI	-11.57	4.47	1.12	-3.45	7.72	3.75	9.60	16.45	11.99	20.02	15.48	***6.87***
Region VII	-2.66	2.41	5.63	-2.56	13.13	22.32	17.80	6.73	10.54	-2.60	-4.54	***6.02***
Region VIII	-4.45	-1.85	-16.24	-17.94	-4.58	-3.41	-3.61	-4.56	1.29	1.02	5.72	***-4.42***

Region IX	-7.61	2.55	-10.18	23.95	2.12	-2.84	13.57	7.38	39.76	51.63	56.60	***16.09***
Region X	-28.57	-44.22	-11.15	-10.41	-6.72	9.81	7.90	9.36	16.28	14.64	1.07	***-3.82***
Region XI	3.16	4.03	2.16	13.57	12.70	3.12	13.39	12.32	3.75	8.26	7.99	***7.68***
Region XII	-0.89	1.73	6.94	18.14	11.04	-10.21	17.28	63.68	6.01	19.45	11.07	***13.11***
Region XIII	-52.82	8.31	-8.83	2.70	1.53	8.29	23.58	41.85	36.94	5.20	3.53	***6.39***
BARMM	-9.91	-8.85	2.58	-3.98	2.04	-1.06	-2.25	0.00	0.56	-0.07	0.06	***-1.90***
Philippines	***-3.25***	***-0.52***	***0.92***	***11.32***	***10.97***	***3.98***	***11.92***	***13.90***	***6.33***	***10.04***	***7.06***	***6.61***

Source of basic data: Philippine Statistics Authority

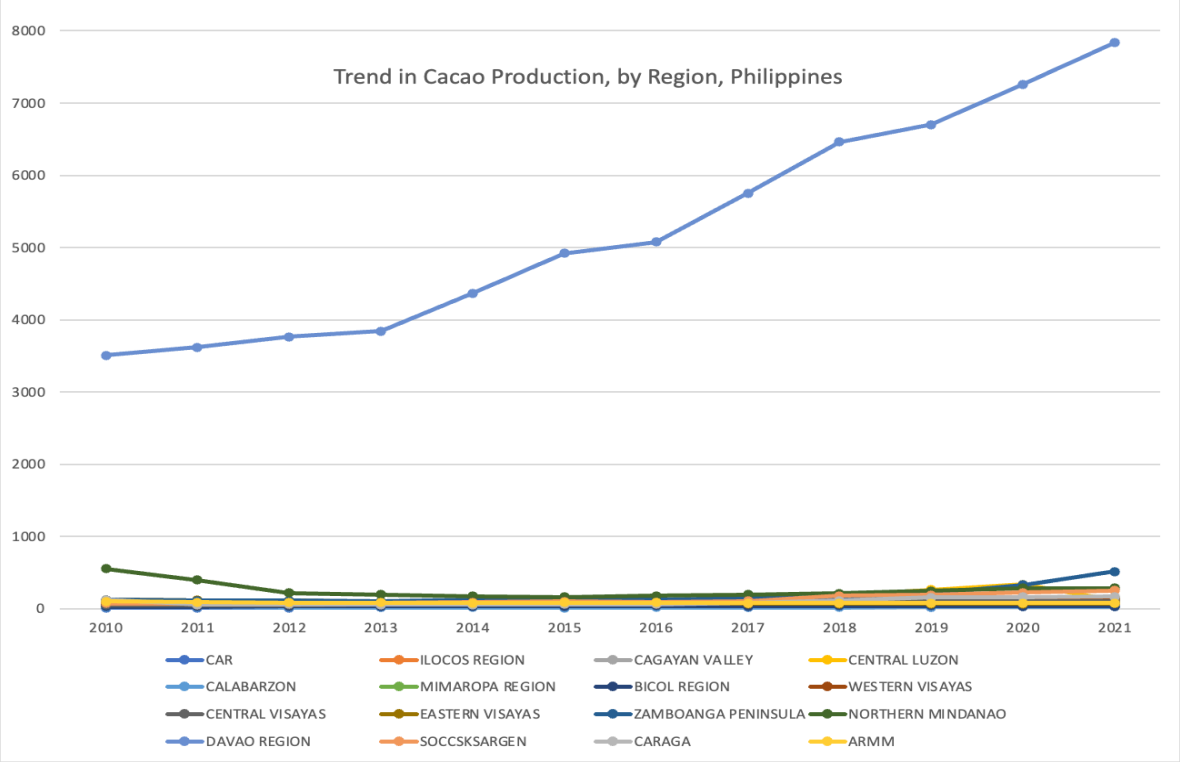


Figure 5. Trend in cacao production by region, Philippines 2010-2021

Source of basic data: Philippine Statistics Authority

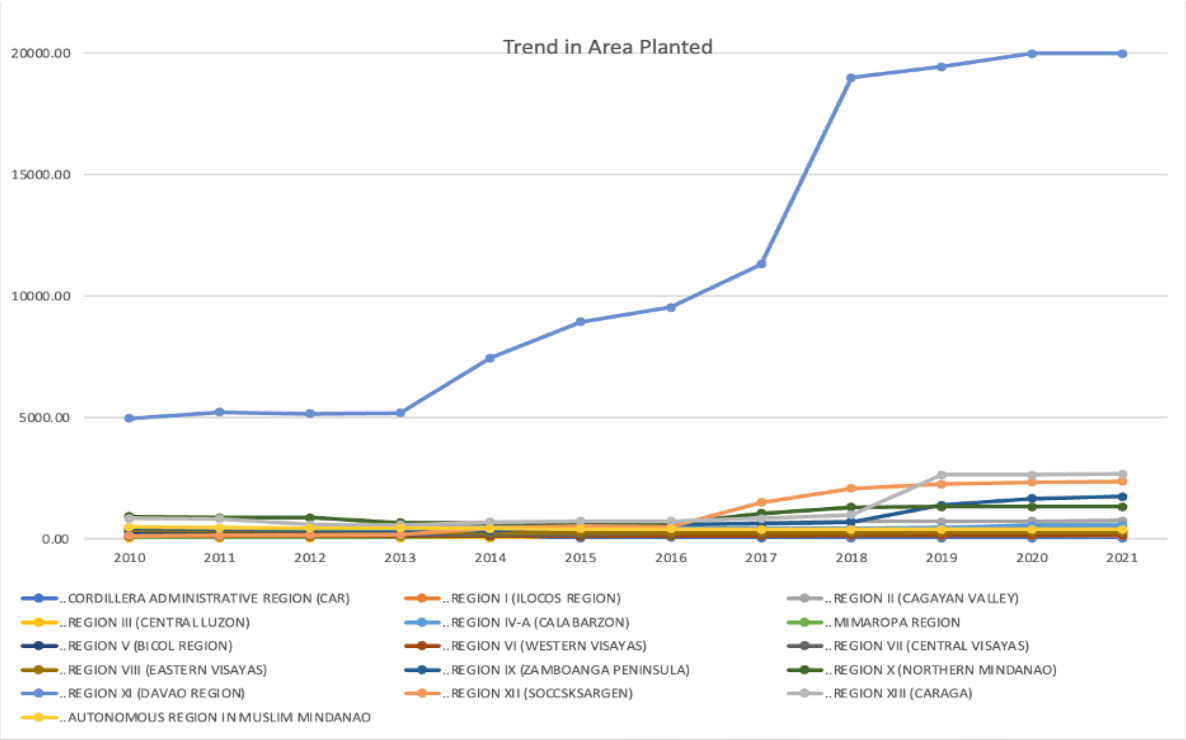


Figure 6. Trend in area planted to cacao, Philippines, 2010-2021
Source of basic data: Philippine Statistics Authority

Davao Region as the Major Producing Area

Within Davao Region, Davao City is a runaway producer as it contributed 38.58% (Figure 6) of the region's average annual production of 5,258.72 tons in 2010-2021. The province's production trend has also been increasing (Figure 7) at 12.6% per year (Table 6). In terms of area planted, this city also had the highest in the region at 26.82% but this is considerably lower than its share in production for the same period. This implies that the city has been achieving higher yield compared with the other provinces in the region. Davao Occidental is a relatively new player in the cacao industry of the region as it started only in 2019, hence its average share for the last two years was only 0.55% and 0.43%, on the average, in terms of volume and value, respectively (Table 6 and Table 7, Figure 8 and Figure 9).

Ther highest yield in the region was achieved by Davao del Sur which peaked in 2014 only to decline sharply the following year and slowly increased afterwards. Yield for the rest of the regions has been declining, although a few started to rise beginning 2020 (Figure 10).

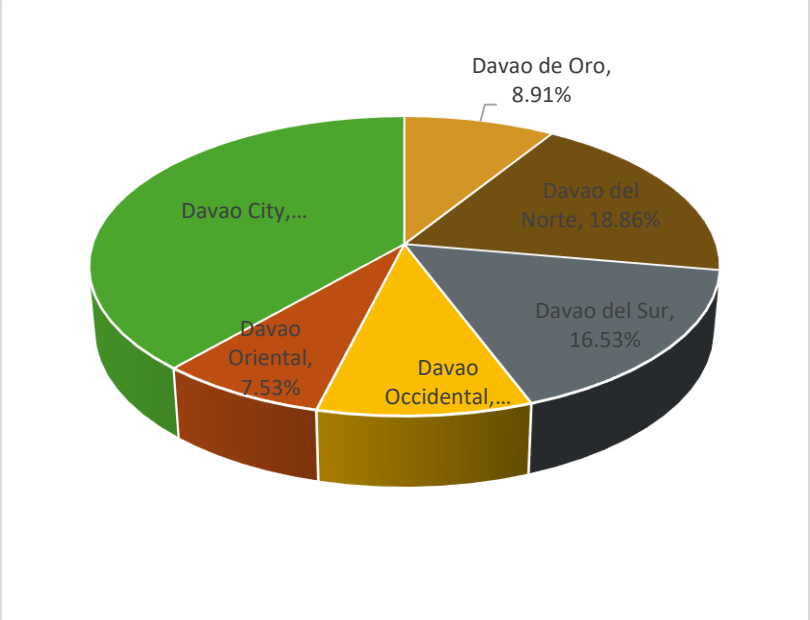


Figure 7. Average provincial share in cacao production, Davao Region, 2010-2021
Source of data: Philippine Statistics Authority

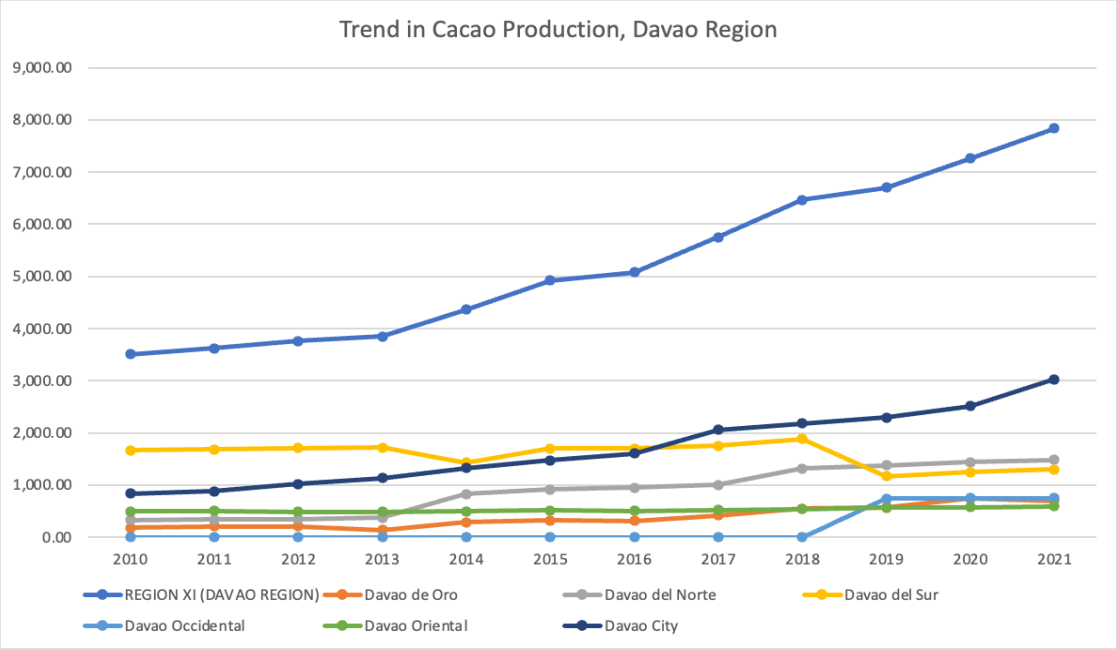


Figure 8. Trend in cacao production, Davao Region, 2010-2021
Source of basic data: Philippine Statistics Authority

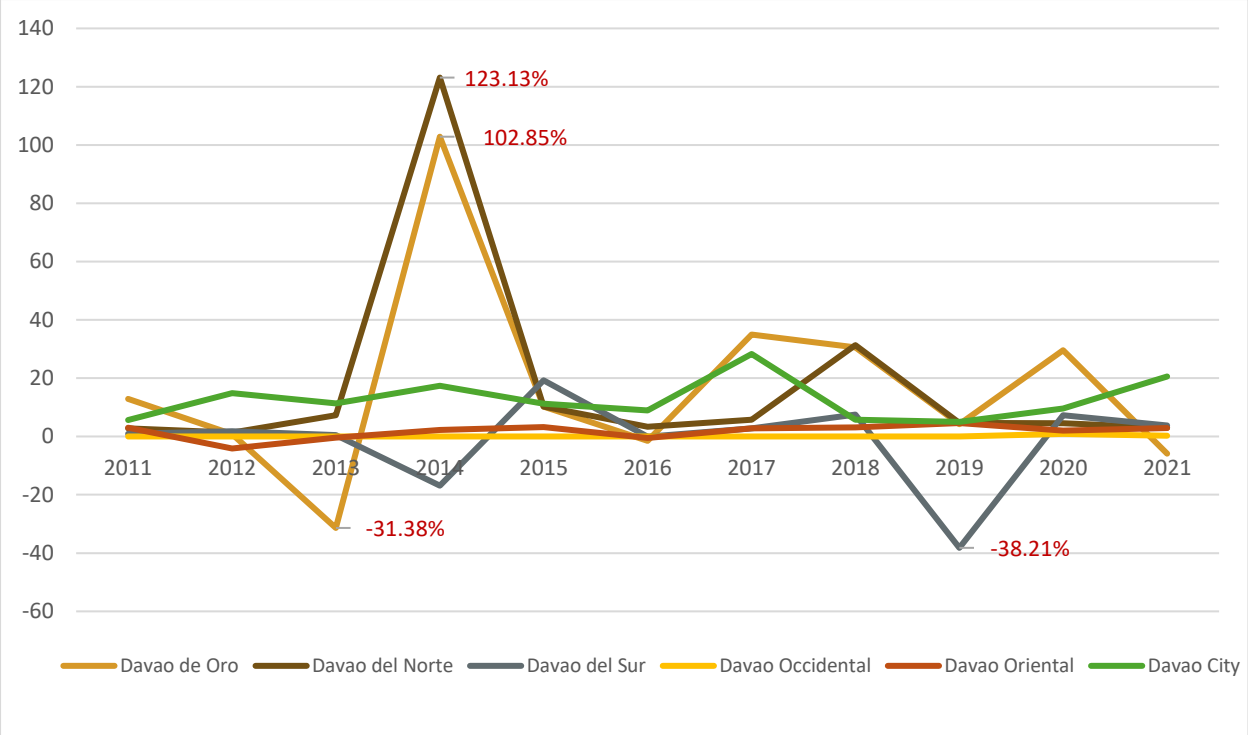


Figure 9. Growth rate in cacao production, by province, Davao Region, 2011-2021

Source of basic data: Philippine Statistics Authority

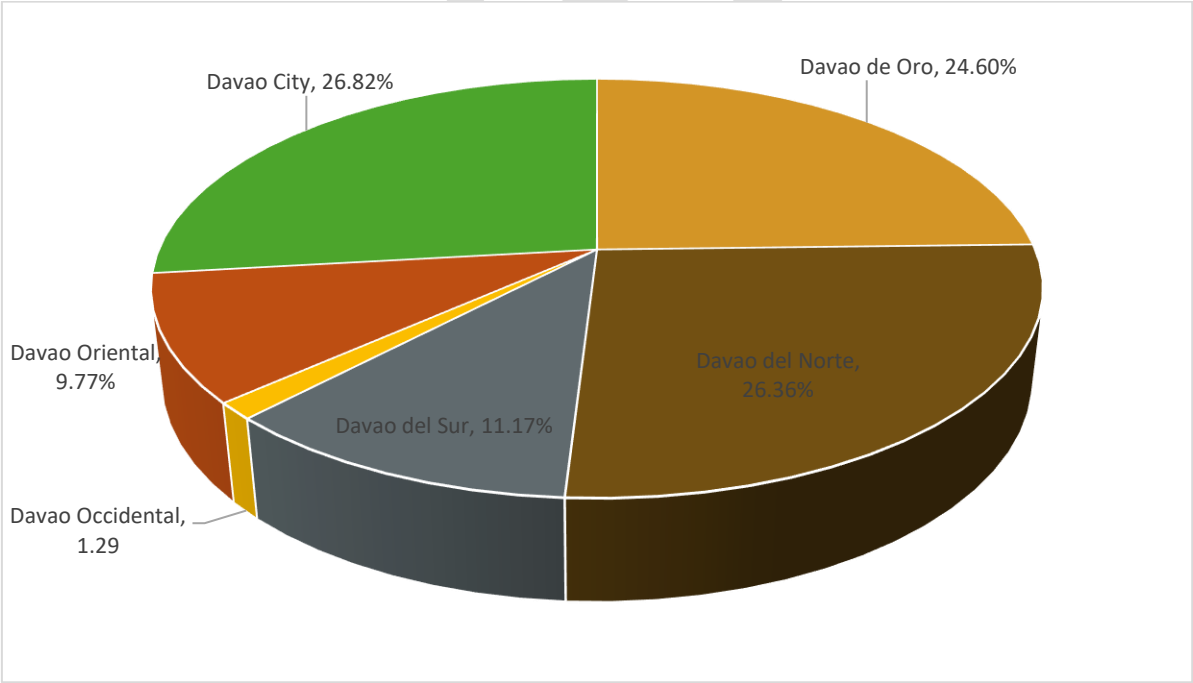


Figure 10. Provincial share in area planted, Davao Region, 2010-2021

Source of basic data: Philippine Statistics Authority

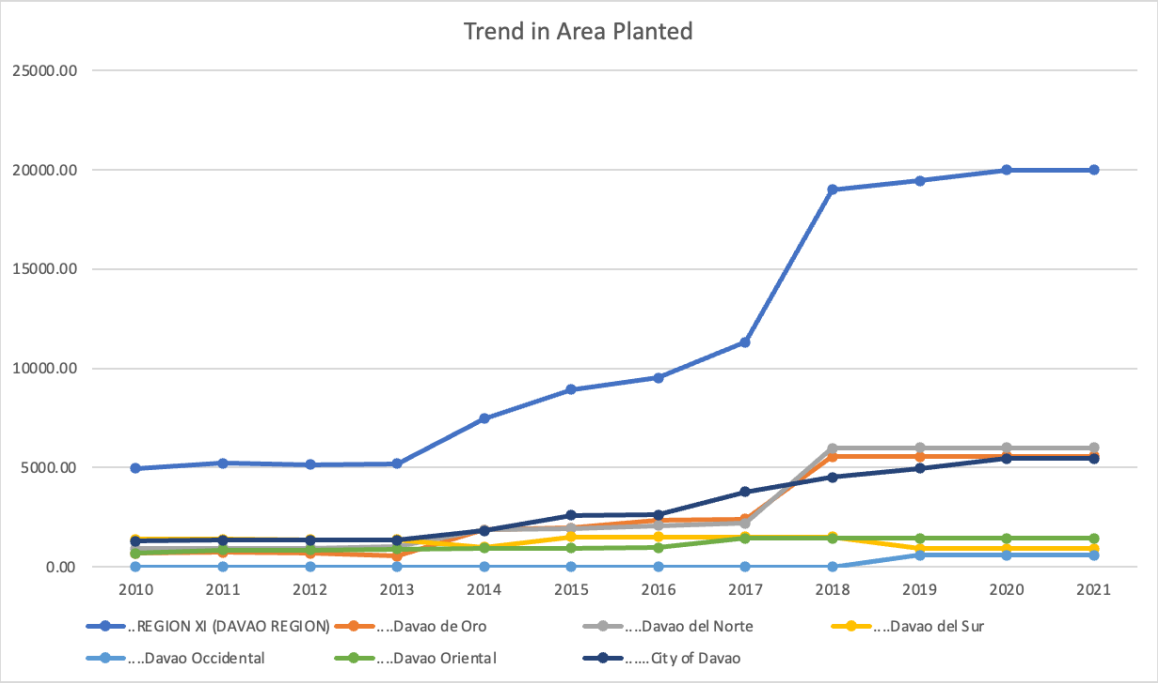


Figure 11. Trend in area (hectare) planted, by province, Davao de Oro, 2010-2021

Source of basic data: Philippine Statistics Authority

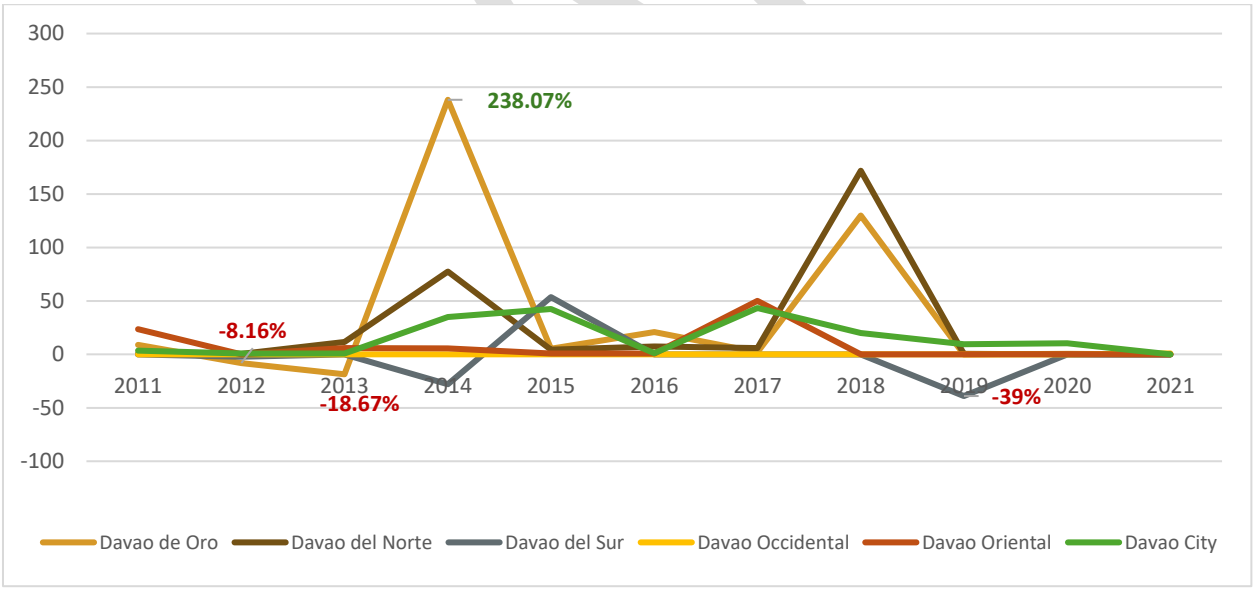


Figure 12. Growth rate in area planted to cacao, by province, Davao Region, 2011-2021

Source of basic data: Philippine Statistics Authority

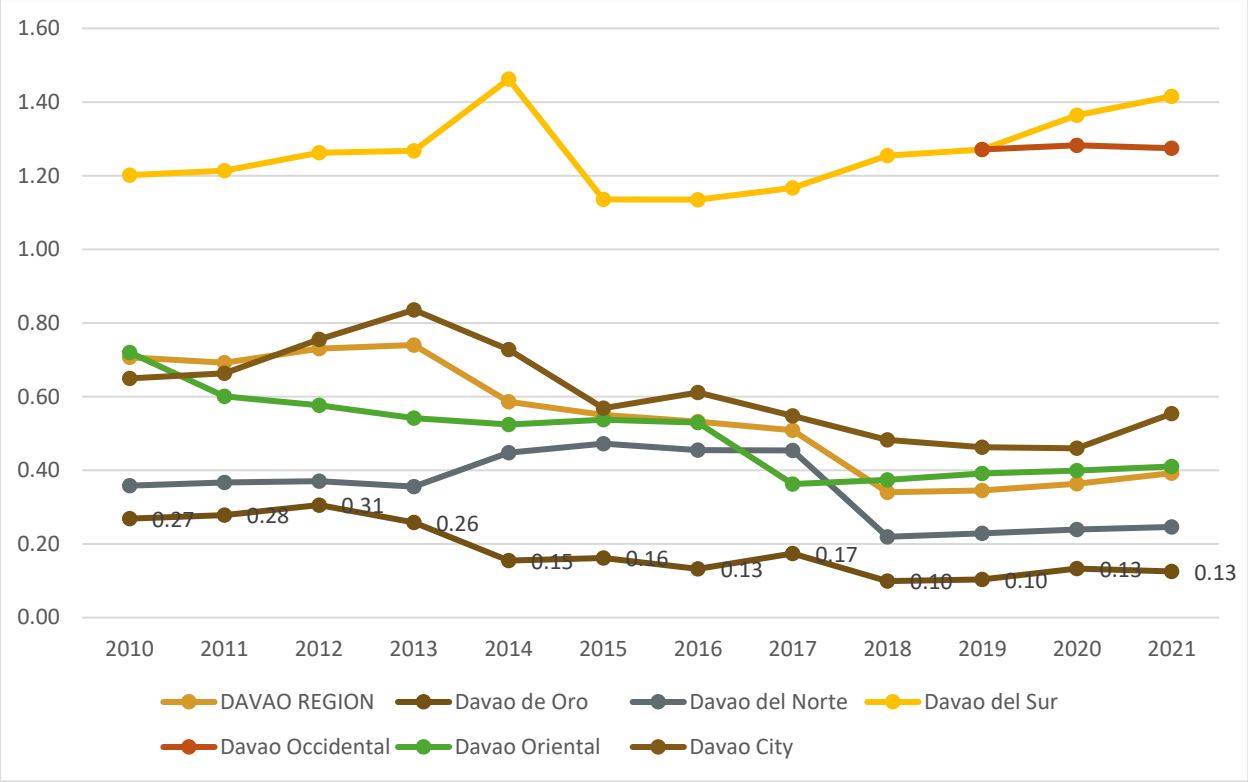


Figure 13. Trends in yield (tons/ha) by province, Davao Region, 2010-2021

Source of basic data: Philippine Statistics Authority

Existing Environmental and Social Management System (ESMS), Standards, and Certification of Cacao

An environmental and social management system (ESMS) is important to ensure the sustainability of cacao business operations which should be anchored on economic, social, and environmental pillars. Compliance with sanitary and phytosanitary standards is crucial especially if cacao products are to be sold in other countries with stringent quality requirements. Currently, there are existing standards that should ensure the safety and quality of cacao products for local consumption and also for global trading. PNS-BAFPS, the agency attached to the DA has set the Code of Practice for Philippine Cacao Beans (PNS/BAFPS 104:2011), which, if fully implemented, can ensure the food safety and quality of cacao products that will be produced and sold within and outside of the country.

> "*This Code of practice for Philippine cacao beans addresses the essential principles of food safety applicable to primary production, post-harvest and processing operations. It focuses on Good Agricultural Practices (GAP), Good Hygienic Practices (GHP) and Good Manufacturing Practices (GMP) that will help control microbial, chemical and physical hazards associated with all stages of cacao production from primary production to transport and shipment of cacao. Particular attention is given to minimizing microbial hazards and Ochratoxin A contamination.*" (PNS-BAFPS, 2011)

More recently, the Principles and Guidelines for National Food Control System (PNS/BAFPS 293:2020) was passed. In this guideline, the International Standard of the Codex Alimentarius

Commission (CAC) Principles and Guidelines for National Food Control System (CAC/GL 82-2013), provisions of which are also pertinent to cocoa processing, was adapted with modifications to suit the local conditions in the Philippines. The following quotes are focused on food safety and quality:

> *"While the focus of the Principles and Guidelines for National Food Control Systems is on the production, packing, storage, transport, handling and sale of foods within national borders, the document is consistent with and should be read in conjunction with relevant Codex texts and the national food safety legislation. Codex texts of particular relevance include the Principles for Food Import and Export Inspection and Certification (CAC/GL 20-1995), the Guidelines for the Design, Operation, Assessment and Accreditation of Food Import and Export Inspection and Certification (CAC/GL 26-1997), the Guidelines for Food Import Control Systems (CAC/GL 47- 2003) and the Guidelines for the Exchange of Information between countries on rejections of imported foods (CAC/GL 25-1997). Reference to these texts relating to food import and export control is important since, while the national food control system is ultimately responsible for the safety of food offered within its border, in today's global market, much food is sourced from outside the country; hence, properly designed import and export control systems, as part of the overall national food control system, are essential."* (PNS-BAFPS, 2020)

Beyond the borders of the Philippines, the ASEAN GAP for Cacao (ASEAN Cocoa Club – Technical Working Group on Good Agricultural Practices, 2018) is envisioned to contribute to sustainable agriculture which should be a common goal within the region. It sets the standards that farmers in the ASEAN region are expected to follow in cacao production, with the end goal of improving not only the income of the farmers and the whole industry but also the society and all those involved in the cacao value chain. The recommended farming and processing practices should lead to sustainable production of high-quality products that are priced higher, so that the farmers can earn more income. At the same time, the production process does not leave harmful footprints in the environment resulting to better living conditions for them and their families. The GMP is basically the same except that it is geared towards processing. It is equally important as GAP and recognizing this, there is a separate code for this in the Philippines - the PNS/BAFPS 88:2012 (Code of Practice for Philippine Tablea). This code basically covers the following:

> *"… the essential principles of food safety and quality from selection of cacao beans to transport of the Philippine Tablea. It focuses on general quality parameters, Good Hygienic Practices (GHP) and Good Manufacturing Practices (GMP) that will help control microbial, chemical and physical hazards associated with cacao.*
>
> *The Code provides general recommendations to allow flexible and uniform adoption even as processing practices are diverse. Therefore, this Code is also applicable to micro and small-scale producers."* (PNS-BAFPS, 2012)

On a more general note, as early as 1997, the development of national-level standards related to good agriculture has already been mandated in the Philippines by RA No. 8435 or the Agriculture and Fisheries Modernization Act of 1997 (AFMA). In addition, the above-mentioned Codes are further supported in RA No. 10611 or the Food Safety Act, which sets

the framework for the development and implementation of food safety regulations in the country. To this effect, the PhilGAP has been implemented since 2013. In PhilGAP, certification is required and is solely done by the DA. Certification is the granting of official recognition that an applicant's agricultural practices follow the specified standards for quality. PhilGAP certification can be applied for either by an individual farmer or by a group (e.g., cooperatives, associations, etc.). According to the Jollibee Group Foundation (2019), individual application is less tedious because the assessment is focused on the day-to-day activities in a single farm such that timing of inspection is solely determined by a farmer-applicant's readiness and preparation. This is in contrast when group certification is applied for, wherein an internal control system (ICS) is a strict requirement. While only a few members will be physically inspected, preparation takes a longer period because ICS should specify procedures and protocols for internal inspection and corrective action, list of production standards, the inspection rules and the prescribed documentation.

> *"A functioning ICS secures members' compliance of PhilGAP, increasing their likelihood of passing assessment. The internal inspection required in the ICS also ensures*
> *more thorough application of the standards. Essentially, in proving an ICS works, documentation must be consistently performed. However, ICS formulation requires more commitment from members of group applicants. Application for assessment may also be delayed if some members are not ready, and certification is withheld if a group member fails the assessment."* (Republic of the Philippines, 2013)

However, while GAP and GMP concepts have been long introduced into the country, the rigorous requirements of inspection and the high cost of compliance to set standards prevent the widespread adoption of certification. Aside from this, the initial shift to GAP will result to relatively lower income for the farmers for at most three years and a smallholder farmer cannot sustain his/her farm operations let alone pay for the needs of the family with such meager income. Certification is also voluntary, so there is less pressure to comply among the chain participants.

Also, farm record keeping, which is a must in the certification process (especially for promoting traceability), is not a common habit among Filipino smallholder farmers. Many find them cumbersome to do and still many more are not equipped with the knowledge on proper farm record-keeping. For example, PNS focuses on traceability as an overarching concept that promotes sustainability. For exportable goods, which include cacao, if the importing country requires it, the exporter is obligated to implement a traceability system allowing the importer to trace or keep track of where the product originated and its relevant components, including accurate product description. To facilitate traceability, the PNS-BAFPS Code of Practice requires that production, processing and distribution records be kept, during a period equivalent to the shelf life of cacao beans plus six more months. Among the records to be kept are:

- types, varieties and sources of planting materials;
- types of pesticides and fertilizers and usage;
- production site with lot codes;
- suppliers of agricultural inputs;

- lot number of agricultural inputs;
- water management practices;
- use of agricultural chemicals;
- water quality and safety; and
- pest control and cleaning schedules of premises, facilities, equipment and containers.

On top of these, detailed records of the following fermentation and drying operations per lot were recommended to be kept:

- incoming materials (growers, lot numbers);
- fermentation and drying data (batch code, temperature and time of fermentation, physico-chemical analysis, etc.);
- storage temperatures; and
- cleaning schedules for premises, facilities, equipment and containers.

The above requirements are too much for small- and medium-scale farmers, hence, they are discouraged from seeking certification, without which they cannot access the export market.

Cacao Production Practices

For cacao production, the farmers need to perform a myriad of activities details of which are discussed below (DA, undated):

Seeding and Nursery Management

For seeding, the most important activity is deciding what variety to use as there are currently nine cacao clones to choose from. These include BR25 (CC-99-05), ICS 40, UIT 1 (CC-99-02), K1, K2, S5, UF18. Based on recent conversations with farmers and cooperatives in Davao de Oro, the most common clones used in the area are UF18 and BR25. For propagation using seeds, the following steps should be followed:

- Only take seeds from mature, healthy pods.
- Choose seeds that are of the same size. Discard bloated and irregularly shaped seeds.
- Choose larger seeds since there is a greater chance that they will grow into seedlings that are active and quick to expand.
- By rubbing the seeds with sand or sawdust, the mucilage that covers the seeds can be removed.
- To effectively remove the mucilage, wash the seeds.
- Cacao seeds are susceptible to fungal infection, which may prevent germination. Ideally, cleaned seeds should be soaked in fungicide solution for roughly 10 minutes, strictly adhering to the labeled instructions for concocting solutions.
- For 24 hours, distribute the seeds on moist sacks and cover them with wet newspaper.
- Keep it moist but adequately aired to avoid the growth of fungi.
- Begin gathering seeds that have begun to sprout (a pigtail-like root appears on one side). Germination often begins two days later.

- In prepared polybags, sow the pre-germinated seeds at about 1 cm deep. Make sure to plant seeds with the pigtail root facing downward.
- Combine fully composted organic resources to enhance soil properties like nutrient content, water-holding capacity, and soil texture.
- Sterilize soil if possible by heating soil and water in drums or other handy containers. Spraying formalin solutions on soil can occasionally help sterilize it but using solar drying to sterilize soil is the most affordable method.
- In terms of physical attributes, loamy to sandy loam soils are the best substrate for growing seedlings.
- Lime is applied to soils with pH levels below 5.

When starting a nursery, it is crucial to carefully consider various criteria, with the choice of location being most vital. It is advisable to select a flat area with favorable water tables, which are conducive to setting up shallow wells and irrigation canals. Having natural water sources such as rivers or creeks nearby is beneficial, but it has to be ensured that salty water does not seep in. Additionally, implementing a reliable drainage system is essential to prevent any accumulation of standing water. Provisions for the following requirements should be assured:

- Seedlings that are 0 to 2 months old need 70 to 80 percent shade. However, to get seedlings ready for field planting, shade should be gradually removed.
- Polybags containing cacao seedling are arranged depending on how long the seedlings will be kept in the nursery. For ease of grafting, polybags rearrangement needs to be done methodically. For instance, typically, a twin-row with an alternate path of 45-cm-wide is advised. When the seedlings are 2 to 3 months old, widen the space to promote seedling growth and prevent paling of the plant due to excessive loss of shade.
- Seedling distance should be 25 to 30 cm from the middle of the polybag. When the seedlings are kept in the nursery for a longer time, the distance should be steadily increased.

Weeding

Weeding could be done by hand or by mulching with materials like rice hulls that are readily available. In the nursery, weeds typically do not pose an issue, and when they do, they are easily removed with little effort. Weeds that are growing along the gaps between the blocks can be removed with scythes. Herbicide application is not advised.

Fertilizer Application

After the first leaf has hardened, fertilizer should be applied, and the outcome of the soil analysis should be used as a guide. It is advised that a soil analysis be performed for the planned planting areas. However, if soil analysis cannot be done, farmers can incorporate 15 to 35 grams of diammonium phosphate (18–48-0) per bag, depending on the size of the polybag. To prevent leaf burning, granular fertilizer is also applied after the leaves have completely dried.

Culling/Selection

Weak-growing seedlings should be removed from the nursery to guarantee regular growth and development of the seedlings to be placed in the field. Bags holding non-germinating seeds and tiny, wrinkled seedlings should also be removed.

Transplanting

One week prior to field planting, the polybags must be rotated a few degrees to lessen the shock experienced by the seedlings while transplanting. The process is carried out for seedlings whose leaves have stiffened and, in particular, for those whose roots have reached the soil. The soil needs to be watered for a few days after that. Field planting must begin as soon as the wet season begins. Field planting during the dry season is not advised unless irrigation is available.

Soil Requirement. The best soil is made up of aggregated clay or loamy sand with 50% sand, 30 to 40% clay, and 10 to 20% silt. Deep soil, about 150 cm and with pH of 5.0 to 6.5, is most suitable for the growth of cacao.

*Climatic Requirement***.** The level of rainfall for cacao farming ranges from 1,250 to 3,000 mm per year, preferably 1,500-2,000 mm with no more than a three-month dry period. The optimal temperature for cacao is between a mean minimum of 18°C and a mean maximum of 30 to 32°C. The region should be located between 300 and 1,200 meters above sea level or about 700 meters above sea level. The optimum environment for cacao is Type IV, which has an annual rainfall that is equally distributed.

Establishment of Shade Crops. The fragile leaves of cocoa seedlings will burn if exposed to direct sunlight, hence the need to integrate shade crops. The seedlings must therefore be shielded from direct sunshine for the first several years to ensure their safety, survival, and health. The ability of cocoa leaves to create carbohydrates through photosynthesis, which then leads to production of cacao pods, is inhibited by direct sunlight and the source of energy for growth is carbohydrates.

Staking and Spacing. Stakes are used to indicate planting sites using cable wire of the proper size and length for a straight-line planting guide. The most common distance is 1.5 to 2.0 x 6.0 m (2,300 trees/ha), double hedge row for high density planting. For low density, 3 x 2m distance will result to 1666 plants/ha or if 2.5 x 2.5 m (1600 plants/ha). The planting density for cocoa depends on soil richness, shade provided by nearby trees and tree crops, and other factors.

Planting. This should be done in the early morning or late afternoon when direct sunlight is not that strong. Planting seedlings with young, tender flush leaves is not advised since they are more vulnerable to sunburn, planting shocks, and stress. The start of the rainy season is the ideal time to plant on a field. The size of the hole should be sufficient to contain the soil mass ball that goes with the seedling. Typically, a hole is 30 cm long, 30 cm wide, and 30 cm deep.

Care and Maintenance

Weeding. This is done manually using the sickle-removal method or ring weeding at one meter from the stem.

Fertilizer Application. The recommended rates of fertilizer application for different ages of trees in the absence of soil analysis are provided in Table 4 (PCARRD, 1989).

Table 4. Schedule of fertilizer application for cacao

MONTHS AFTER FIELD PLANTING	FERTILIZER APPLICATION/PLANT (g)		
	N	P	K
1	6.4	6.4	6.4
4	8.5	8.5	8.5
8	8.5	8.5	8.5
12	12.8	12.8	12.8
18	17.0	17.0	17.0
24	27.0	27.3	38.5
Total	80.5	80.5	91.7

Pest Management. A wide variety of natural enemies, including predators, parasites, diseases caused by insects, nematodes, and other helpful organisms, attack pests in the cacao agroecosystem. Two of the more common diseases are cacao pod rot caused by *Phytophthora palmivora* and vascular streak dieback (VSD) caused by *Ceratobasidium theobromae*. Sanitation, proper pruning, good irrigation and drainage, and removal of infected plant parts along with nutrient management are highly recommended (Solpot, 2020). In addition, integrated pest and disease management, which is making the most of the natural enemies that are already present in the field, is highly recommended to lessen dependency on chemical pesticides.

Pruning

Pruning involves the removal of excessive or misaligned branches from cacao trees, typically during dry periods or after harvesting. This practice encourages the emergence of fresh branches and leaves, thereby enhancing the trees' productivity. Furthermore, pruning allows sunlight to penetrate, facilitating flower pollination. Initially, pruning is aimed at regulating the tree's height, ideally maintaining it at around five feet. Subsequent pruning sessions focus on eliminating weak branches, retaining only three or four robust ones, and shaping and controlling the tree's height. Pruning is typically carried out using sharp saws or pruning shears during dry months or post-harvest (DA-BPI, n.d.).

Harvesting

Picking cacao for harvesting is a challenging task. Knowing when the pods are ripe is one of the toughest obstacles because cacao that is not fully ripe has not yet produced its full flavors and smells but overripe fruits will begin to germinate (International Cocoa Organization, undated). Even those on the same tree do not all ripen at the same time. Thus, during harvesting, the use of pruning shear is recommended to avoid harvesting green and overripe pods. Destroying the blossoms should also be avoided.

Postharvest Practices

DA-BPI (undated) recommends the postharvest practices presented below.

Pod Breaking

After harvest, the pods are broken. Beans are scooped out of the husk and the placenta is removed. For pod opening, the ideal method is to crack the pod with a non-sharpened steel blade and then twist it open usually with the use of a wooden mallet.

Bean Fermentation

During fermentation, the beans are turned after 48 hours, and then turned again after 96 hours using bare hands or wooden instruments. The fluids that come out during the process should be drained. Adequately made baskets or wooden boxes with slats are ideal containers during fermentation, with banana leaves, jute sacks, or cloth rags used to cover the beans. The pulp drips out of the beans and can drop through the openings in the fermenting boxes during the fermentation process. Fermentation takes 5 to 6 days.

Bean Drying

As soon as fermentation is done, the beans are dried in the sun on drying trays or baskets that are periodically turned. When rain comes, beans are covered with plastic or relocated to a dry location. The bean clusters are then separated, then the placenta is removed from the pod, along with flat, broken, or germination-prone beans before drying.

Aging and Storing

Finally, after the drying stage, cacao beans need to be aged. This step can last from 30 days up to a year. The beans are stored in sacks in a storage house. However, humidity levels should be constantly checked because while the cacao beans are maturing, they might pick up some humidity once more. Ensure that 8% humidity is not reached because molds can get in.

Bagging and Storage

Bean bags should be kept in a dry, well-ventilated area on a wooden pallet. Hot beans should not be placed into plastic bags to prevent the growth of mold and moisture. The weight of all harvested pods, the dates of wet bean fermentation and drying, and the dates of harvest should be recorded.

Cacao/Cocoa Value Chain Participants

The general value chain is composed of segments, operators or players with their corresponding functions, and the business enablers. In particular, the cacao value chain in Davao de Oro depicted in Figure 14 is composed of six segments: input provision, cacao production, trading, processing, local consumption, and exportation. A total of 91 cacao value chain participants in Davao de Oro were covered in this study. They comprised of farmers (n=74), collector agent (n=1), assembler-wholesaler (n=3), wholesaler (n=3), export company (n=1), processor (n=8), and retailer (n=1).

The average age of all the chain participants interviewed for this study was 56 years but the youngest was 28 years old (exporting company) and the oldest were the wholesalers (66 years old). The cacao farmers were, on the average, 57 years old, well within the reported age of an average Filipino farmer of 57 to 59 years old (USAID, 2022). The lone collector agent is also young at 33 years old. The respondents were dominated by females (51%) and the farmers were comprised of 54% females. Wholesalers are all males, but the collector agent is a female, and processors are 71% female (Table 5).

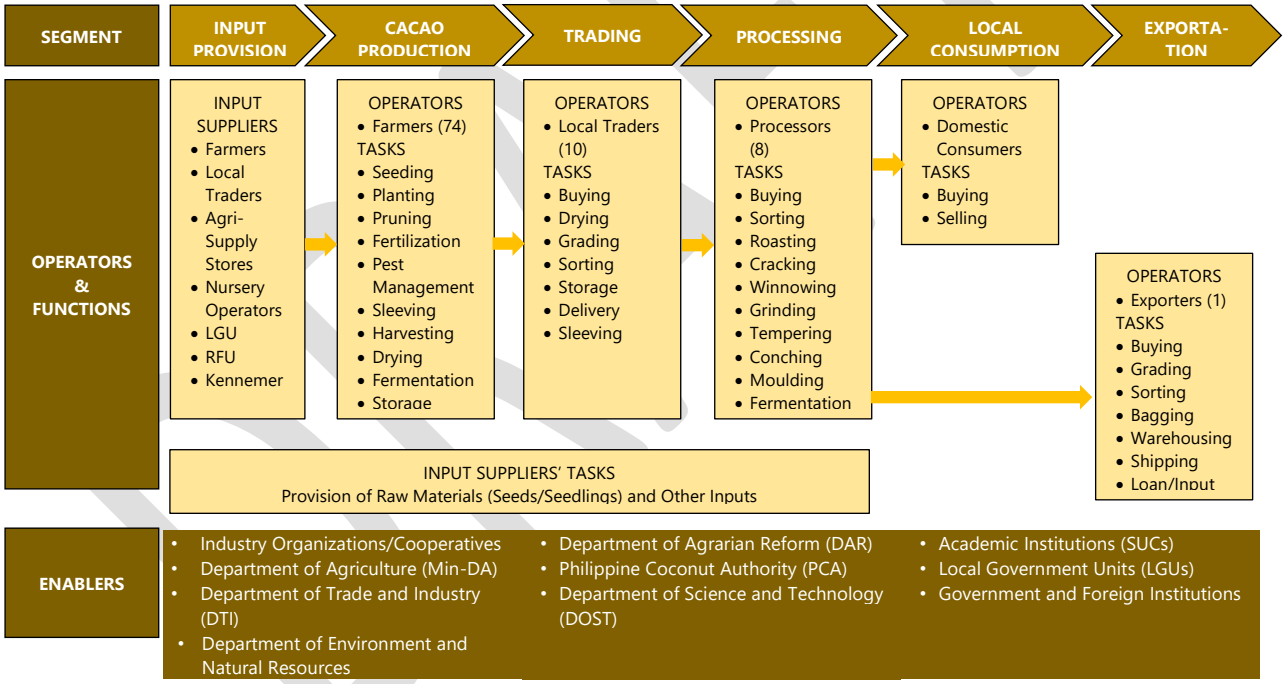


Figure 14. Cacao value chain, Davao de Oro, Philippines, 2022

Input Suppliers

For input provision, the input suppliers can be one or all the following: farmers, local traders, agri-supply stores, nursery operators, the local government units (LGUs), and the regional field units (RFUs) of DA. Most often, inputs are in the form of cacao seedlings, fertilizer, and some pesticides. Sometimes, farmers provide their fellow farmers with cacao seedlings. Along with some nursery operators who sell, the LGUs and the RFUs maintain their own nurseries for cacao seedlings which they distribute for free to the farmers. They also occasionally provided vermicast and synthetic fertilizers such as 14-14-14. Local traders, on

the other hand, provide money for buying inputs like fertilizer and pesticide. In this case, the farmers are often tied to sell their produce to the lender-trader. Fertilizers, other chemicals, and tools and equipment like pruning shears are available in agri-supply stores. In addition, Kennemer Foods International, which is an export company, is also providing high quality seedlings and loan to the farmers. The farmers supply the beans (dried or wet beans) not only to the traders but to the processors as well, which the latter use in coming up with value-added products.

Farmers

For the cacao production node, a total of 74 farmers were interviewed, 54% of whom are female. Age range was 31 to 80 years, but the average was 57 years (Table 5), well within the current average age of Filipino farmers of 57 to 59 years. Generational succession in farming is seen as a problem in Philippine agriculture with many of the younger people regarding work in the agriculture sector as a less paying job (USAID, 2022).

Table 5. Age and gender distribution by type, 91 cacao value chain participants, Davao de Oro, Philippines, 2022

CHARACTER-ISTIC	F (n=74)		C-A (n=1)		A-W (n=3)		W (n=3)		R (n=1)		P (n=7)		EC (n=2)		ALL (n=91)	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Age																
20-30	0	0	0	0	0	0	0	0	0	0	1	14	2	100	3	3
31-40	7	9	1	100	1	33	0	0	0	0	0	0	0	0	9	10
41-50	13	18	0	0	1	33	0	0	0	0	0	0	0	0	14	15
51-60	26	35	0	0	1	33	1	33	1	100	2	29	1	100	31	34
61-70	22	30	0	0	0	0	1	33	0	0	3	43	0	0	26	29
71-80	6	8	0	0	0	0	1	33	0	0	1	14	0	0	8	9
Average		57		33		45		66		53		58		28		56
Gender																
Male	34	46	0	0	1	33	3	100	0	0	2	29	0	0	40	44
Female	40	54	1	100	2	67	0	0	2	100	5	71	1	100	51	56

F = Farmer; C-A= collector agent; A-W=assembler-wholesaler; W=wholesaler; EC=export company; P=processor; R=retailer

Local Traders

Local cacao traders in Davao de Oro are composed of collector-agent (1), assembler-wholesalers (3), wholesalers (3), and retailers (1). Wholesalers were the oldest at 66 years old while the collector-agent was the youngest at 33 years old (Table 5). Being older, wholesalers have been long in the business and they know almost everybody in the industry. It is to be expected that the collector-agent will be younger because her work requires her to move from one cacao farmer to another to buy cacao beans, suggesting the need for more stamina and agility that are possessed by younger people. In the same manner, assembler-wholesalers were also relatively younger at 45 years old as they too need to be more mobile to assemble cacao beans from fragmented farmers. Comparatively, traders are performing fewer functions than the farmers.

Export Company

Only one cacao exporting company was identified in the area: Kennemer Foods International, Inc. (KFI). KFI is an international organization that is involved in the production and marketing of agricultural products. It has become a very important player in the cacao industry of the country particularly because it specializes in trading of high-quality cacao beans. For the company to ensure its supply of good quality cacao beans, KFI entered into cacao production and purchasing agreements with several cooperatives and farmers' organizations within the Davao Region. Included in the agreement is KFI's provision of high-quality seedlings and training of farmers on proper cultivation of cacao plants for assured supply of good quality cacao beans. Aside from these, the company extends loans to cooperatives/associations and implements a buy-back system that allows KFI to get 50% of farmer's produce and the remaining 50% can be traded by the farmer somewhere else. Recently, however, this was put on hold as the company tries to rationalize management of its resources. It also performs various value-adding activities such as grading, sorting, bagging, warehousing, and shipping.

Processors

Eight processors were interviewed for this study. They were dominated by female (71%) and about 58 years old, on the average. They perform the greatest number of value-adding functions that turn cacao beans into cocoa butter, cocoa paste, and cocoa powder and cake. The Apex Employees and Community Multi-purpose Cooperative is also engaged in processing of tablea and chocolate and extends loans to farmers. It is also into trading of cacao products and is set to export soon. These processors sell different product forms to the domestic market and to the export company.

Relationships Between and Among the Value Chain Participants

Horizontal (Farmer-to-Farmer) Relationship

Farmer-to-farmer relationship was assessed based on the following four parameters: information sharing, collaboration in marketing, trust, and collective initiative. Farmers had to choose among the following responses: 0 = none, 1 = weak; 2 = moderate; and 3 = strong. They were also asked on the competition level but all of them claimed that there was no competition among them.

The highest mean rating was computed for trust (2.25), with 78% of the farmers stating that they have moderate (19%) and strong (59%) trust to their fellow farmers, helping them become comfortable dealing with them. There were a few (21%), however, who do not or just weakly trust their farmer-colleagues (Table 6). Although they said that there is no competition among them, still a minority are wary that they could be misled by their fellow farmers into something that is not truly beneficial for the improvement of their cacao farming business.

Table 6. Rating on farmer-to-farmer relationship, 74 farmer-respondents, Davao de Oro, Philippines, 2022

Parameter	Rating on Relationship								
	None (0)		Weak (1)		Moderate (2)		Strong (3)		Mean
	No.	%	No.	%	No.	%	No.	%	
Information sharing	1	1	12	16	32	43	29	39	2.20
Collaboration in marketing	46	62	6	8	10	14	12	16	0.84
Competition level	74	100	0	0	0	0	0	0	0.00
Trust	9	12	7	9	14	19	44	59	2.25
Collective initiative	6	8	13	18	28	38	27	36	2.03

Information sharing is all about imparting details about prices, cacao production techniques, pest and disease management, and sources of inputs. The farmer-respondents claimed to have moderate (43%) to strong relationship (39%) with their fellow farmers when it comes to information sharing with mean rating of 2.20 (Table 6). Among those that are shared are techniques on how to graft new trees that will be used to replace old ones, how to prune existing trees for increased yield among many others. Pruning needs to be done properly for the correct level of shade that would help promote higher yield.

For collaboration on marketing, the highest percentage (62%) of the farmers reported that they have not been collaborating with anybody. Only 30% said that they had moderate (14%) and strong (16%) marketing collaboration, resulting to a mean rating of only 0.84. In these instances, farmers talk to each other with regards to deciding where and to whom to sell their cacao. This accords them mutual benefit of having better market that pays them higher prices. In terms of collective initiatives, there were 55 farmers, equivalent to 74%, who are benefitting from collective endeavors. Those who reported this, said that they are attending training programs together, and as one group, they are requesting assistance such as equipment from implementing agencies, which they use as a group also (Table 6). They feel that this is more advantageous for them because they are better heard as one voice of many since more often, they are dealing with common problems and issues.

Vertical Relationships

Types of Sellers and their Buyers

The farmers have several buyers (Table 7). The assembler-wholesalers were their most popular buyers, comprising about 41%, while the company agent was only one. Interestingly, there were also farmers who are selling to farmer-buyers (11%). On the other hand, the assembler-wholesalers were selling to the company agent and to buying stations while the wholesalers were selling to fellow wholesalers and company agent. Only four farmers were reported to have been ethnically tied with their buyer but the rest of the chain participants had no existing tie-up with their buyer. These four tie-ups are formalized through a written contract.

For buying and selling terms determination, the cacao trading business in Davao de Oro is dominated by the buyers, with 84% of the farmers claiming that the traders had the upper hand and 9% saying that the price they set tend to be accepted by their buyer. Those who managed to negotiate were about 7%. Also, when asked on whether they were satisfied with their current terms with their buyers, 69% of the farmers answered that they were satisfied (Table 9). All the traders reported that they were satisfied with the terms they have with their trading partners.

Only one collector agent and one assembler-wholesaler claimed that they bought equipment as requested by their buyer. Among the farmers, 23% claimed that they had special affiliation with their buyer because of long-term tie-up. On the other hand, the rest of the respondents did not have special affiliation with their buyers even if they (collector agent and assembler-wholesaler) bought equipment as required by their buyers (Table 7).

When asked on whether they will be burdened with additional cost if their tie-up with the buyer is cut, 38% of all the respondents answered Yes. This cost comes in the form of having no assured buyer for their produce (Table 7).

Relationship Between the Cacao Value Chain Participants

Assessment of the vertical relationship between the cacao value chain participants was done by requesting the respondents to give their rating (0=none; 1=weak; 2=moderate; and 3=strong) on seven indicator statements. There were five nodes considered within the value chain: input providers and cacao producers; cacao producers and collectors/assemblers; cacao producers and assembler-wholesalers; cacao producers and wholesalers; cacao producers and buying stations; and cacao producers and others (Table 8).

Table 7. Type of sellers and buyers and some aspects of buying and selling, cacao value chain participants, Davao de Oro, Philippines 2022

ITEM	SELLER								TOTAL	
	Farmer (n=74)		Collector Agent (n=1)		Assembler-Wholesaler (n=3)		Wholesaler (n=3)			
	No.	%	No.	%	No.	%	No.	%	No.	%
Type of Buyer										
Collector Agent	5	7	0	0	0	0	0	0	5	6
Assembler-Wholesaler	30	41	0	0	0	0	0	0	30	37
Wholesaler	21	28	0	0	0	0	2	67	23	28
Buying Station	9	12	0	0	1	33	0	0	10	12
Company Agent	1	1	1	100	2	67	1	33	5	6
Farmer-Buyer	8	11	0	0	0	0	0	0	8	10
Relationship (Tie) with the Buyer										
Family	0	0	0	0	0	0	0	0	0	0
Ethnic	4	5	0	0	0	0	0	0	4	5
None	70	95	1	100	3	100	3	100	77	95
With Written Contract										
Yes	4	5	0	0	0	0	0	0	4	5
None	70	95	1	100	3	100	3	100	77	95
Buying/Selling Terms Determination?										
Seller	7	9	0	0	0	0	1	33	8	11
Buyer	62	84	1	0	3	0	2	67	68	89
Both (negotiation)	5	7								
Satisfaction with the current terms										
Yes	51	69	1	100	3	100	3	100	58	72
No	23	31	0	0	0	0	0	0	23	28
Bought equipment as required by buyer										
Yes	0	0	1	100	1	33	0	0	2	3
No	74	100	0	0	2	67	0	0	74	97
Special affiliation with the buyer										
Yes	17	23	0	0	0	0	0	0	17	21
No	57	77	1	100	3	100	2	67	63	79
Burdened with additional cost if tie with the buyer is cut										
Yes	28	38	1	100	1	33	1	33	31	38
No	46	62	0	0	2	67	2	67	50	62

In terms of transfer of information, a weak relationship exists between farmer-producers and all the rest of the cacao value chain participants. The mean ratings on the relationships ranged from 0.52 (between cacao producers and collector/assemblers) to 1.58 (between cacao producers and assembler-wholesalers). The lowest rating was noted between cacao producers and collector/assemblers because collectors are simply doing the collection of cacao products, usually dried beans, for sale to the next downstream participants and nothing more. Although in a few instances, some of them gave some product and processing specifications but still, the rating for this was weak (1.52).

On the other hand, for the relationship between the cacao producers and the assembler-wholesalers, the rating was highest but still relatively weak because the latter are the ones in close communication with the producers as they need to buy in bulk for distribution to the different downstream traders. In particular, they inform the producers of the required product standards thus, the rating for this was moderate at 2.90. They also give the producers some product and processing specifications, hence the moderate rating of 2.00 (Table 8). They, however, do not share confidential product processing information. This is not surprising since all the respondents claimed that this function has not been practiced with any of their trading partners.

The mean rating for the relationship between cacao producers and buying stations was the second highest but still weak at 1.44. Buying stations provide information on the required product standard hence the rating was 2.33. Adhering to product standards is crucial for buying stations because one of their downstream partners is the exporting company which has stringent quality requirements. This is the same reason why they also provide product and processing information to the cocoa producers hence the rating was moderate at 2.28 (Table 8).

Table 8. Vertical relationships, cacao value chain participants, Davao de Oro, 2022

Indicator Statement	Rating on Relationship				
	None (0)	Weak (1)	Moderate (2)	Strong (3)	Mean Rating
	In Percent				
Between input provider and cocoa producers (n=4)					***1.39***
Giving of product and processing specification	25	0	50	25	1.75
Relying on special tools, machine, or technology	50	0	0	50	2.50
Requiring product standard	50	25	25	0	0.75
Sharing of confidential product processing information	100	0	0	0	0.00
Product delivery specifications easy to comply with	50	0	0	50	1.50
Product specifications easy to produce	25	0	25	50	2.00
Processing done by self, due to lack of alternatives	50	0	25	25	1.25
Cocoa Producers & Collector/Assembler (n=8)					***0.52***
Giving of product and processing specification	25	25	50	0	1.25
Relying on special tools, machine, or technology	100	0	0	0	0.00
Requiring product standard	3	50	1	0	0.75
Sharing of confidential product processing information	8	0	0	0	0.00
Product delivery specifications easy to comply with	75	0	12	12	0.25
Product specifications easy to produce	25	62	12	0	0.88
Processing done by self, due to lack of alternatives	75	0	25	0	0.50
Cocoa Producers & Assembler-Wholesaler (n=10)					***1.58***
Giving of product and processing specification	0	30	40	30	2.00
Relying on special tools, machine, or technology	0	70	10	20	1.50
Requiring product standard	0	10	50	40	2.90

Indicator Statement	Rating on Relationship				
	None (0)	Weak (1)	Moderate (2)	Strong (3)	Mean Rating
	In Percent				
Sharing of confidential product processing information	10	0	0	0	0.00
Product delivery specifications easy to comply with	50	0	30	20	1.20
Product specifications easy to produce	50	0	0	50	1.50
Processing done by self, due to lack of alternatives	40	10	0	50	1.60
Cocoa Producers & Wholesaler (n=10)					***0.96***
Giving of product and processing specification	20	20	20	40	1.80
Relying on special tools, machine, or technology	100	0	0	0	0.00
Requiring product standard	0	30	20	50	2.20
Sharing of confidential product processing information	100	0	0	0	0.00
Product delivery specifications easy to comply with	70	0	10	20	0.80
Product specifications easy to produce	70	0	10	20	0.80
Processing done by self, due to lack of alternatives	60	0	10	30	1.10
Cocoa Producers & Buying Stations (n=18)					***1.44***
Giving of product and processing specification	2	2	2	12	2.28
Relying on special tools, machine, or technology	11	0	1	6	1.11
Requiring product standard	3	0	3	12	2.33
Sharing of confidential product processing information	18	0	0	0	0.00
Product delivery specifications easy to comply with	39	0	6	56	1.78
Product specifications easy to produce	39	11	0	50	1.61
Processing done by self, due to lack of alternatives	56	11	11	22	1.00
Cocoa Producers & Others (n=1)					***0.57***
Giving of product and processing specification	100	0	0	0	0.00
Relying on special tools, machine, or technology	0	0	0	100	3.00
Requiring product standard	0	100	0	0	1.00
Sharing of confidential product processing information	100	0	0	0	0.00
Product delivery specifications easy to comply with	100	0	0	0	0.00
Product specifications easy to produce	100	0	0	0	0.00
Processing done by self, due to lack of alternatives	100	0	0	0	0.00

Other Participants and their Relationship with the Sellers

Assembler-wholesalers and the export company were interviewed regarding their relationship with their sellers. All the assembler-wholesalers bought directly from the farmers

and the lone export company bought from buying stations, one of which was ethnically tied but there was no written contract. Among all the sellers, the assembler-wholesalers were the ones determining the buying and selling terms, and since they are setting the terms, they are satisfied with them. None of them bought equipment for their buyer. They claimed to have special affiliation with their buyer, but they will not be burdened with additional cost if the tie with their buyer is cut (Table 9).

On the other hand, the buying station had no formal relationship with the export company, thus there is no written contract. Buying and selling happens when needed and when available in the buying stations. When they sell, their buyers determined the buying/selling terms and so far, they are satisfied with them. They did not buy equipment for their buyer, had no special affiliation with buyer and will not be burdened with additional cost if tie with their buyer is cut (Table 9).

Table 9. Type of relationship with the seller, other value chain participants, Davao de Oro, Philippines 2022

ITEM	BUYER				TOTAL	
	Assembler-Wholesaler (n=3)		Export Company (n=1)			
	No.	%	No.	%	No.	%
Type of Seller						
Farmer	3	100	0	0	3	60
Buying Station	0	0	2	100	2	40
Relationship (Tie) with the buyer						
Family	0	0	0	0	0	0
Ethnic	1	33	0	0	1	20
None	2	67	2	100	4	80
With Written Contract						
Yes	0	0	0	0	0	0
None	3	100	2	100	5	100
Who determines the buying/selling terms?						
Seller	0	0	0	0	0	0
Buyer	3	100	2	100	5	100
Both (negotiation)						
Satisfied with the current terms						
Yes	3	100	2	100	5	100
No	0	0	0	0	0	0
Bought equipment as required by buyer						
Yes	0	0	0	0	0	0
No	3	100	2	100	5	100
Special affiliation with the buyer						
Yes	3	100	0	0	3	60
No	0	0	2	0	2	40
Burdened with additional cost if tie with the buyer is cut						
Yes	1	33	0	0	1	20
No	2	67	2	100	4	80

Satisfaction on the Relationship Between Cacao Producers and Value Chain Participants

The highest level of satisfaction was reported for the relationship between cacao producers and input providers. That is, 66% of cacao producer-respondents stated that they are satisfied with their relationship with their input suppliers and only 7% reported otherwise. On the other hand, the least satisfaction was noted between cacao producers and company agent with only 9% reporting, although it had the second highest proportion who claimed they were neither satisfied nor dissatisfied. Those who were unsatisfied with their relationship with the company agent were found to be 8%. Between cacao producer and wholesaler, those who reported to be satisfied totaled 28 percent but those who were neutral were higher at 44% (Table 10). One of the reasons for this is the fact that the wholesaler, as the farmer's buyer, sets the selling/buying terms which might not have always been favorable to the farmers.

Similarly, the relationship between the producer and the company agent and another chain participant has not been that satisfying as well since their responses converged more on the neutral side (Table 10). Again, the fact that the buyers are the ones setting the trading terms might have been contributory to this.

Table 10. Level of satisfaction on the relationship of farmers with other value chain participants, 74 cacao producer-respondents, Davao de Oro, Philippines, 2022

CHAIN PARTICIPANTS	RATING ON RELATIONSHIP					
	Satisfactory		Neutral		Unsatisfactory	
	Freq.	%	Freq.	%	Freq.	%
Cacao Producer and Input Provider	49	66	20	27	5	7
Cacao Producer and Collector/Assembler	13	18	53	72	8	10
Cacao Producer and Collector/Assembler-Wholesaler	32	43	23	31	19	26
Cacao Producer and Wholesaler	28	38	33	44	13	18
Cacao Producer and Company Agent	7	9	61	82	6	8
Cacao Producer and Others	9	12	63	85	2	3

Effectivity of Governance Types

Dietz (2011) defined governance as the power to exert control along the chain for a particular purpose. Good and effective governance in value chains has a high potential to improve the capacity and capability of smallholder participants through the leadership on other actors allowing the smaller ones to strengthen their position (Dietz, 2011). There are

many ways how governance is carried out along the value chain, and they vary from place to place and among chain participants.

For this study, the value chain participants were requested to evaluate whether the following four types of governance Worked or Did Not Work for them: modular governance, relational governance, captive governance, and hierarchical governance.

Relational governance proved to be the most effective type of governance as attested by 76% of the respondents asserting that this is effective for them (Table 11). In this type of governance there is mutual reliance in terms of transfer of information and availing of related services and they accept that one actor has more control over the other. This is despite the fact that the vertical relationships between cacao producers and the value chain participants were rated as weak to moderate only. This could have been more effective had these vertical relationships been strong.

In contrast, the other three types were considered ineffective. For instance, modular governance was considered ineffective by 56% of the chain participants claiming that it did not work for them (Table 11). In modular governance, the supplier provides product or service consistent with the specifications of the buyer. The sole responsibility of providing consistent cacao products (in terms of quality and quantity) rests with the supplier. This could have been due to the limitations in resources (e.g., financial, equipment, etc.) and even technical knowledge, that also restrain their ability to comply with buyer stipulations. The value chain segment of cacao in Davao de Oro goes up to exportation and the export market is very stringent when it comes to quality assurance, which many producers, including processors, find hard to satisfy.

Even more ineffective were hierarchical governance and captive governance. In hierarchical governance, there is high vertical integration and managerial control within the set of chain participants. All products are manufactured in-house (as opposed to outsourcing some components) because the process is complicated. More often, this happens for products whose buyer specifications are difficult to consistently follow. In Davao de Oro cacao production, this type of governance proved ineffective as reported by 89% of the farmer-respondents (Table 11). One of the possible reasons is that most of the growing areas planted with cacao are of varying soil type which, for better yield, must be managed differently according to soil fertility. For instance, knowledge on physical properties of the soil is important in determining how it will be tilled or irrigated and even the timing of fertilizer application. In the same manner, the chemical properties of the soil should dictate the amount and type of fertilizer to be applied (Villason & Olguera, 2020). These information are rarely known to the cacao farmers, hence they find it difficult to supply consistent quantity and quality of cacao. This is not surprising since the result of the assessment on vertical relationships had weak to moderate ratings when it comes to providing information on product standard requirements (Table 11).

In captive governance, the small-scale cacao suppliers are controlled by few buyers who may invest on product and process upgrading and implements a high degree of monitoring. This is especially true for buyers who are keen on quality standards, such as those who are into

exportation and catering to high-end markets. Again, captive governance is ineffective in Davao de Oro as reported by 77% of the value chain participants (Table 11).

Table 11. Effectiveness of governance by type, 91 value chain participants, Davao de Oro, Philippines, 2022

Type of Chain Governance	Effective			
	Yes		No	
	Frequency	Percentage	Frequency	Percentage
Modular governance	40	44	51	56
Relational governance	69	76	22	24
Captive Governance	21	23	70	77
Hierarchical Governance	10	11	81	89

Viability and Sustainability of Shifting to Agroforestry (ADKAR Model for Change)

The Philippines' strategic location to foreign markets heightened the interest of local farmers and exporters to push for a more progressive cacao industry that can compete with other major cacao-growing nations and promote growth among smallholder farmers. In fact, the Philippine Cacao Industry Roadmap 2017-2022 aimed to transform and empower cacao farmers to become sustainable cocoa communities. This however, entails some changes on the things that these farmers have been doing for their cacao farms. Looking at the Awareness, Desire, Knowledge, Ability, and Reinforcement (ADKAR) model, there are five elements that need to be examined for a positive change to take effect among the chain participants, namely: awareness on the need for change; desire to support and participate in the change; knowledge on how to change; ability to implement required skills and behaviors; and reinforcement to sustain the change (Hiatt, 2006).

For this study, five indicator statements were developed for each of these five elements wherein the respondents had to express their agreement using a five-point Likert scale. Mean rating was computed and to contextualize this, the methodology done by MOR Associates (2012) for Stanford Information Technology Services 2012 Client Satisfaction Survey was adapted where percent total negatives and total positives were computed. This was done for farmers and for other chain participants. Tables 12 to 16 show the results of the said computations.

Awareness on Why Change is Needed

Level of awareness on why change is needed reflects understanding of the nature of the change, the motivation behind it, and the risk of doing business as usual. In addition to

knowing "what's in it for me," it entails knowing the internal and external factors that prompted the need for change (Hiatt, 2006).

Table 12 shows that among the cacao farmer-respondents, the computed mean rating for this element was 4.40, and on the average, the total positive responses were around 78% suggesting that they tend to "agree" to the given indicator statements. Considering the five indicator statements, the highest mean rating (4.60) was computed for "*There is a need to restore degraded lands planted to cacao"* and *"I need to do something to improve my income from my cacao farming business"*. The low income currently generated from their farming business is a very tangible trigger for cacao farmers to feel the need for change because income level determines the way their family lives at present and will live in the future. They also claimed that existing cacao farms have problems on pests and diseases, and they need to do something about it since it is negatively affecting cacao yield and thus, their income from cacao farming. Similarly, land degradation can be visible and through time they have observed the negative effects of such degradation on cacao yield. Least mean awareness score (4.0) was noted for *"There is low adoption of agroforestry by cacao farmers in Davao de Oro,"* although they agreed that indeed there is low adoption of agroforestry in the area (Table 12). The fragmented location of cacao farms might have been contributory to this finding because of the less likelihood of knowing the condition of all the farmers if they are dispersed.

Table 12. Awareness on why change is needed, 74 cacao farmer-respondents, Davao de Oro, 2022

Awareness Statements	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)	Mean Rating	Total Negatives (%)	Total Positives (%)
1. There is a need to strengthen the ability of cacao production areas in Davao de Oro to adapt or recover from extreme weather conditions (e.g. too much rain, too high temperature, long dry spell, etc.).	0	0	15	5	54	4.5	0	80
2. There is a need to restore degraded lands planted to cacao.	0	0	12	6	56	4.6	0	84
3. Currently, existing cacao farms have problems on pests and diseases.	0	3	10	8	53	4.5	4	82
4. I need to do something to improve my income from my cacao farming business	0	1	13	4	56	4.6	1	81
5. There is low adoption of agroforestry by cacao farmers in Davao de Oro.	2	4	20	16	32	4.0	8	65
Average						***4.4***	***4***	***78***

Desire to Implement a Change

The second element of the ADKAR model is desire to implement a change. Desire is the driving force behind an individual's decision to support and take part in a change (Hiatt, 2006). It might be difficult to entice an individual to desire change because other people are always involved if a desired change is to actually happen. There is very little that can be done by an individual unless these other people also get involved. Thus, in the case of cacao farmers in this study, their desire to shift to cacao agroforestry was measured by asking them on their motivation to follow the advice of and/or willingness to share some information to some people and institutions regarding cacao agroforestry. There was also a question on willingness to collaborate with them and a direct question on willingness to shift to cacao agroforestry (Table 13).

Table 13. Desire to implement a change, 74 cacao farmer-respondents, Davao de Oro, 2022

Desire Statements	Not At All (1)	Little (2)	Moderately (3)	Much (4)	Very Much (5)	Mean Rating	Total Negatives (%)	Total Positives (%)
1. How motivated would you be to follow the advice of the following regarding cacao agroforestry?								
a) Your family	0	0	3	12	59	4.8	0	96
b) Other Farmers	0	1	3	13	57	4.7	1	95
c) Your Buyer/Seller	0	6	9	4	55	4.5	8	80
d) Government (extensionists)	0	4	10	3	57	4.5	5	81
e) NGO/INGO	0	8	7	2	57	4.5	11	80
f) Members of the Academe/Researchers	0	9	7	3	55	4.4	12	78
g) Workers	0	9	7	4	54	4.4	12	78
Average						***4.6***	***5***	***85***
2. How willing would you be to share your cacao farming experiences to the following?								
a) Your family	0	0	3	13	58	4.7	0	96
b) Other Farmers	0	0	4	12	58	4.7	0	95
c) Your Buyer/Seller	1	4	8	6	55	4.5	7	82
d) Government (extensionists)	0	3	10	5	56	4.5	4	82
e) NGO/INGO	0	1	14	3	56	4.5	1	80
f) Members of the Academe/Researchers	0	3	12	4	55	4.5	4	80
g) Workers	0	5	10	4	55	4.5	7	80
Average						***4.6***	***5***	***85***
3. If you are already practicing cacao agroforestry, how willing would you be to share your knowledge to the following?								
a) Your family	0	0	2	12	60	4.8	0	97
b) Other Farmers	0	0	6	10	58	4.7	0	92
c) Your Buyer/Seller	0	2	10	6	56	4.6	3	84
d) Government (extensionists)	0	5	9	4	56	4.5	7	81
e) NGO/INGO	0	5	10	3	56	4.5	7	80

Desire Statements	Not At All (1)	Little (2)	Moderately (3)	Much (4)	Very Much (5)	Mean Rating	Total Negatives (%)	Total Positives (%)
f) Members of the Academe/Researchers	0	5	10	4	55	4.5	7	80
g) Workers	0	6	9	4	55	4.5	8	80
Average						***4.6***	***6***	***85***
4. If you are producing cacao now, how willing would you be to shift to cacao agroforestry?	0	2	12	8	52	**4.5**	**3**	**81**
5. If you want to shift to cacao agroforestry production how willing you be to collaborate with the following?								
a) Your family	0	0	2	13	59	4.8	0	97
b) Other Farmers	0	0	5	11	58	4.7	0	93
c) Your Buyer/Seller	0	3	12	3	56	4.5	4	80
d) Government (extensionists)	0	5	11	2	56	4.5	7	78
e) NGO/INGO	0	5	10	3	56	4.5	7	80
f) Members of the Academe/Researchers	0	5	11	3	55	4.5	7	78
g) Workers	0	5	11	3	55	4.5	7	78
Average						***4.6***	***6***	***84***

In general, cacao farmers in Davao de Oro wanted some changes to happen in their cacao farms. This is evident in the computed means for all the indicator statements, which is 4.6, except for *"If you are producing cacao now, how willing would you be to shift to cacao agroforestry?"* which had a 4.5 mean rating. The average total positives were 85% but for willingness to shift to cacao agroforestry, it was only 81% (Table 13). This might have been because the farmers know that there is low adoption of cacao agroforestry in the region. More often, Filipino farmers tend to copy what their fellow farmers have been doing especially if their farms are adjacent to each other. Therefore, if they know that their fellow farmers are not keen on adopting cacao agroforestry then, they too will feel the same. This is supported by the panelists' view from the Project Rebound webinar by the Inquirer who noted that "Filipino farmers are already aging and not as open to learning, much less adopting new technologies" (Inquirer Project Rebound, 2021). The cacao farmer-respondents for this study were 57 years old, on the average.

Another reinforcement to this is the fact that with regards to seeking/heeding advice and sharing information and knowledge, the other cacao farmers are among those that will be big influencers, second to family, with mean rating of 4.7 and total positives ranging from 92 to 95%. Own buyer and sellers can also have some positive influence in terms of giving advice and in information sharing. It is out of the ordinary, however, that those from the academe/researchers were among the least desired source of advice or collaborator. They claimed that more often researchers just interview them to get information and then nothing happens in the end to help them. The local non-government and international non-government organizations are almost in the same boat as the academe/researchers, but they

are a bit more highly regarded (Table 13). These findings should have some implications on any intervention that will be planned for the cacao farms in the area.

Knowledge Needed to Make the Shift to Cacao Agroforestry Production System Successful

Knowledge refers to the information and preparations essential to change. It encompasses information about behaviors, procedures, arrangements, abilities, responsibilities, and strategies that are required to effect the change to cacao agroforestry.

Table 14 reveals how knowledgeable the farmer-respondents are about cacao agroforestry. Knowledge of monoculture is also needed for better appreciation of agroforestry, and it can be said that the farmer-respondents have good knowledge about the meaning of monoculture, that is, they know that *"Monoculture farming means growing only one type of crop at any one time on a specific field."* About 88% of them either agreed (26%) or strongly agreed (62%) to this statement. However, on a negative note, only 41% of them agreed (20%) and strongly agreed (20%) on the statement *"Cacao monoculture may deplete soil, resulting to soil erosion and land degradation."* About 20% were neutral about this resulting to a mean rating of only 3.1. These are indicative of lack of knowledge among the farmer-respondents about the bad effects of monoculture hence this has been their continuing practice.

Table 14. Distribution by knowledge needed to make the shift to cacao agroforestry production system successful, 74 cacao farmer-respondents, Davao de Oro, 2022

Knowledge Statements	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)	Mean Rating	Total Negatives (%)	Total Positives (%)
1. Monoculture farming means growing only one type of crop at any one time on a specific field	0	0	12	26	62	4.5	0	88
2. Cacao monoculture may deplete soil, resulting to soil erosion and land degradation.	16	23	20	20	20	3.1	39	41
3. Cacao agroforestry incorporates cacao with other trees and crops at any one time	0	1	15	9	74	4.6	1	84

Knowledge Statements	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)	Mean Rating	Total Negatives (%)	Total Positives (%)
on the same field or space.								
4. Cacao agroforestry systems can bring a wide range of ecological benefits such as biodiversity conservation of flora and fauna, carbon sequestration, preserving and strengthening soil moisture and fertility, promotes pest control, among many others.	0	0	19	9	72	4.5	0	81
5. Yields in high-diversity agroforestry systems can be as high as those in full-sun production.	4	7	23	9	57	4.1	11	66
Average						***4.2***	***17***	***72***

Only 84% was the total positives for the correct definition of cacao agroforestry, and this came mostly from those who strongly agreed (74%). Cacao agroforestry is a crop diversification strategy that incorporates other plants within a cacao farm. Thus, the farmers need to have technical information on what kinds and combinations of plants that can go along well or be compatible with cacao trees.

Alongside with this is the lack of knowledge on alternative sources of fertilizer that could complement the needs of all the crops planted in the cacao agroforestry system. Additionally, they can only be enticed to adopt if they know the benefits that can be generated once they practice agroforestry. The likelihood of adoption is high among the farmer-respondents since the mean rating for "*Cacao agroforestry systems can bring a wide*

range of ecological benefits, such as biodiversity conservation of flora and fauna, carbon sequestration, preserving and strengthening soil moisture and fertility, promotes pest control, among many others" was high at 4.5, with total positives of 81%. However, it is still a must that they be taught that with proper management practices, "*Yields in high-diversity agroforestry systems can be as high as those in full-sun production*" because their mean rating for this was only 4.1, with low total positives of only 66% because the neutral responses accounted for were 23% (Table 14).

Ability to Apply Cacao Agroforestry System

Ability is crucial in turning knowledge into action. It is attained when a certain change has been implemented at the required performance levels (Hiatt, 2006). It should be noted that for this element, there were three indicator statements that were written in the negative context hence, in the analysis, the more relevant would be the proportion of total negatives. Also, the overall average was taken only for the mean rating, which was computed at 3.38—leaning more towards neutral and suggesting the need for enhancement (Table 15).

Table 15. Ability to apply cacao agroforestry production system, 74 cacao farmer-respondents, Davao de Oro, 2022

Ability Statements	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)	Mean Rating	Total Negatives (%)	Total Positives (%)
1. I cannot decide on adopting agroforestry system of production because I have land tenure issues.	62	11	16	5	5	1.8	73	11
2. I cannot afford the cost of shifting to cacao agroforestry system.	21	18	26	30	5	2.8	39	35
3. I do not have the technical knowledge on combining trees/crops with my cacao trees.	3	4	27	47	19	3.8	7	66
4. I usually get along well with people especially if it will help me in	0	0	19	15	66	4.5	0	81

Ability Statements	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)	Mean Rating	Total Negatives (%)	Total Positives (%)
cacao farming business.								
5. I like to lead especially if the task involves a group of people.	3	11	24	11	51	4.0	14	62
Average						***3.38***	***26.6***	***51***

Taking into consideration the individual indicator statements, it seems that in general, land tenure is not a big issue among the cacao farmers in Davao de Oro since the total negatives was 73% for the statement *"I cannot decide on adopting agroforestry system of production because I have land tenure issues."* There were, however, around 10% who agreed and strongly agreed to this and 16% who were neutral. While they can be considered a minority, there is still a need to look into this because their adoption of agroforestry maybe hindered by the fact that they are not the main decisionmakers when it comes to the adoption of the technology.

Considering the indicator statement *"I cannot afford the cost of shifting to cacao agroforestry system,"* the total negatives was found to be 39% only while the total positives was 35%, implying that financing the requirements for shifting would be a problem to almost half of the cacao farmers. Even more problematic would be their inadequacy in terms of technical know-how as indicated by the 66% total positives and only 7% total negatives for the statement *"I do not have the technical knowledge on combining trees/crops with my cacao trees"* (Table 15). As mentioned earlier, agroforestry requires a combination of crops, and technically, the characteristics and agroclimatic requirements of those plants should complement each other for more effective and efficient cacao farming operations. This knowledge, however, is difficult to obtain for common farmers because more often, the farmers are of low educational attainment, so knowledge enrichment is really necessary. According to Hiatt (2006), intellectual capability can also play a role in developing abilities. Thus, enhancing knowledge will help a lot in this endeavor.

Psychological readiness is also important in embracing change. For this study, this was measured using the indicator statement *"I usually get along well with people especially if it will help me in cacao farming business."* It can be seen in Table 15 that it had the highest mean rating of 4.5, with total positives of 81%. There were no negatives but there were neutrals, accounting for 19%. Another indicator of psychological readiness is the statement *"I like to lead especially if the task involves a group of people."* This indicator statement had a mean rating of 4.0, with total positives of 62%, total negatives of 14%, and those neutral with 24% (Table 15). Willingness and ability to lead are prerequisites to a successful change, especially so that in the case of the cacao farmer-respondents for this study, the fellow farmers are considered as second-best source of information and wanted to be shared with agroforestry information by the cacao farmers.

Reinforcement to Track and Improve Cacao Agroforestry Production System

Reinforcement is any action or occurrence that strengthens and bolsters the change in a person or an organization. Carefully executed reinforcements uphold the change and prevents the return to old unwanted ways of performing work. Reinforcement is important in building momentum during the transition period to change (Hiatt, 2006). For this study, the indicator statements to measure the presence of possible reinforcements centered more on the association with accomplishments and accountability systems. Two statements were crafted for association with accomplishments: *"3) I am willing to accommodate people/agencies for a farm visit/tour to showcase how I am doing with my cacao agroforestry business";* and *"5) I am willing to enter into contests/competitions to showcase my achievement in cacao farming."* For statement #3, the mean rating was 4.5 and the total positives were 84% without negatives although there were 16% neutral. Statement #5 garnered a little lower mean rating of 4.4 and the total positives was much lower at only 74% because it had total negatives (9%) and neutral (16%) (Table 16). These imply that generally, planning larger scale activities with other cacao farmers and encouraging them to join contests would help in ensuring that they will continue to do their best for the change to become sustainably successful.

Table 16. Reinforcement to track and improve cacao agroforestry production system, 74 cacao farmer-respondents, Davao de Oro, 2022

Reinforcement Statements	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)	Mean Rating	Total Negatives (%)	Total Positives (%)
1. I am willing to attend monthly meetings for the tracking of my progress in cacao agroforestry production system.	0	0	15	15	70	4.6	0	85
2. I am willing to keep records of my farm and cacao business activities and share them for the continued improvement of the business.	0	4	20	11	65	4.4	4	76
3. I am willing to accommodate people/agencies for a farm visit/tour to showcase how I am doing with my cacao agroforestry business.	0	0	16	16	68	4.5	0	84

Reinforcement Statements	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)	Mean Rating	Total Negatives (%)	Total Positives (%)
4. I am willing to apply for a certification (e.g., GAP/GMP), if needed to improve my cacao business.	1	1	15	15	68	4.5	3	82
5. I am willing to enter into contests/ competitions to showcase my achievement in cacao farming.	7	3	16	11	63	4.2	9	74
Average						***4.4***	***5***	***80***

On the other hand, for the accountability systems, three indicator statements were crafted and presented to the respondents: "*1) I am willing to attend monthly meetings for the tracking of my progress in cacao agroforestry production system"; "2) I am willing to keep records of my farm and cacao business activities and share them for the continued improvement of the business"; and "4) I am willing to apply for a certification (e.g., GAP/GMP), if needed to improve my cacao business.*" Statement #1 had a mean rating of 4.6 and total positives of 85% without negatives but there were neutral (15%). This is a good sign that the farmer-respondents will be serious in their effort to change to cacao agroforestry because they will have to report their progress in the monthly meetings. For Statement #2, computed mean rating was 4.4 and total positives was 76% but there were 4% total negatives and 20% neutral (Table 16). This statement is all about keeping records and many Filipino farmers are not keen on keeping farm records, which might have been the apprehension of those who disagreed and were neutral. This should be easily addressed by training on proper farm record keeping.

Lastly, for Statement #4, even if the GAP/GMP certification is a tall order for any farmer in the Philippines because of its tedious process and the high cost it entails to change their practices, still the cacao farmer-respondents indicated their willingness to apply for certification. Considering the responses in Table 16, this statement had a mean rating of 4.4 and total positives of 82% and only 3% total negatives. Those who were neutral accounted for 15%. Again, in terms of accountability systems, this is a good indication that there is a big possibility that the change to cacao agroforestry can be made sustainable if properly monitored for accountability.

Viability and Sustainability to Change to GMP (Other Supply Chain Participants)

The succeeding discussions are for the eight other participants in the supply chain of cacao in Davao de Oro: input provider, collector/assembler, assembler-wholesaler, wholesaler, and

company agent. In general, the results obtained from the analysis done for them were less desirable in all the elements of the ADKAR model.

Awareness on Why Change is Needed

In terms of awareness on why change is needed, the mean rating was only 4.2, with 65% total positives. The highest mean rating (4.5) was obtained for the statement *"Consumers are now more concerned with food safety and expect to be provided with safe products,"* with highest total positives of 75%. It is a welcome development that they are aware of this but then, this awareness has not been translated into positive action because they themselves were aware that there is low adoption of environment-friendly technologies, among which are GMP. This is also despite the fact that they were aware that "*The environment is already degraded, and efforts should be done to protect it from further degradation*" as indicated by the 62% who strongly agreed to this statement. About 62% of them strongly agreed that "*There is a high demand for cacao products in both the local and international markets*" and they "*need to standardize and keep records of everything being done in the processing/handling of cacao/cocoa products*" (Table 17).

Table 17. Awareness on why change is needed, eight other chain participants, Davao de Oro, 2022

Awareness Statements	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)	Mean Rating	Total Negatives (%)	Total Positives (%)
1. There is a high demand for cacao/cocoa products in both the local and international markets.	0	0	25	13	62	4.4	0	75

Awareness Statements	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)	Mean Rating	Total Negatives (%)	Total Positives (%)
2. I need to standardize and keep records of everything being done in the processing/ handling of cacao/ cocoa products.	0	0	38	0	62	4.3	0	63
3. Consumers are now more concerned with food safety and expect to be provided with safe products.	0	0	25	0	75	4.5	0	75
4. The environment is already degraded, and efforts should be done to protect it from further degradation.	0	0	38	0	62	4.3	0	63
5. There is low adoption of environment-friendly (e.g., GMP) technologies by cacao processors in Davao de Oro.	0	12	38	0	50	3.6	12.5	50
Average						*4.2*	*13*	*65*

Regardless of the relatively high mean ratings on awareness, the high percentage of those who claimed they were neutral in all the four statements is actionable for more effective shift to environment-friendly technologies.

Desire to Implement a Change

For this group of chain participants, the required change is the shifting to the performance of GMP. Again, questions on willingness to follow the advice, sharing of experiences on GMP, willingness to shift to GMP were asked. Other processors were among the would-be effective motivators for this group of respondents when it comes to adoption of environment-friendly technologies with a mean rating of 4.4 and total positives of 88%. Also, while the family was noted to have the lowest mean rating of 3.5, it had 88% total positives (Table 18). These findings imply that these groups can be counted as effective shift motivators.

The mean ratings for those whom the respondents are willing to share their cacao business experiences to were highest for other processors (4.5), family (4.4), and respondent's buyer/seller (4.4). Aside from family, in terms of doing, business processors and buyers/sellers have direct contacts and therefore, they usually have established relationship and have built trust among themselves. It is also important that they were willing to share their business experiences to workers with a mean rating of 4.4 (Table 18). Aside from built trust in them, this goes to show that these other supply chain participants can mentor their workers, suggesting the possibility of sustaining the cocoa business for a longer period of time.

Table 18. Desire to implement a change, 8 other chain participants, Davao de Oro, 2022

Desire Statements	Not At All (1)	Little (2)	Mode-rately (3)	Much (4)	Very Much (5)	Mean Rating	Total Negatives (%)	Total Positives (%)
1. How motivated would you be to follow the advice of the following regarding environment-friendly (e.g., GMP) technologies?								
a) Your family	0	0	12	25	62	3.5	0	88
b) Other Processors	0	12	0	25	62	4.4	13	88
c) Your Buyer/Seller	0	12	25	0	62	4.1	13	63
d) Government (extensionists)	0	12	25	0	62	4.1	13	63
e) NGO/INGO	0	12	25	0	62	4.1	13	63
f) Academe/ Researchers	0	12	12	12	62	4.6	13	75
g) Workers	0	12	25	0	62	4.1	13	63
Average						***4.1***	***13***	***72***
2. **How willing would you be to share your cacao/cocoa business experiences to the following?**								
a) Your family	0	0	25	12	62	4.4	0	75
b) Other Processors	0	0	12	25	62	4.5	0	88
c) Your Buyer/Seller	0	0	25	12	62	4.4	0	75
d) Government (extensionists)	0	12	25	0	62	4.1	13	63
e) NGO/INGO	0	1	2	0	5	4.1	13	63
f) Academe/ Researchers	0	1	2	0	5	4.1	13	63
g) Workers	0	0	2	1	5	4.4	0	75
Average						***4.3***	***13***	***71***
3. **If you are already doing GMP, how willing would you be to share your knowledge to the following?**								
a) Your family	0	0	0	0	8	5.0	0	100
b) Other Processors	0	0	0	25	75	4.8	0	100

Desire Statements	Not At All (1)	Little (2)	Mode-rately (3)	Much (4)	Very Much (5)	Mean Rating	Total Negatives (%)	Total Positives (%)
c) Your Buyer/Seller	12	0	12	12	62	4.1	13	75
d) Government (extensionists)	12	12	12	0	62	3.9	25	63
e) NGO/INGO	12	12	12	0	62	3.9	25	63
f) Academe/ Researchers	12	12	0	12	62	4.0	25	75
g) Workers	12	12	0	12	62	4.0	25	75
Average						**4.3**	**23**	**79**
4. If you are processing/trading cacao/cocoa now, how willing would you be to adopt GMP?	0	12	12	0	75	4.4	13	75
If you want to shift to cacao/cocoa GMP how willing you be to collaborate with the following?								
a) Your family	0	0	0	12	88	4.9	0	100
b) Other Processors	0	0	12	12	75	4.6	0	88
c) Your Buyer/Seller	0	0	25	12	62	4.0	0	75
d) Government (extensionists)	0	0	25	12	62	4.0	0	75
e) NGO/INGO	0	0	25	12	62	4.0	0	75
f) Academe/ Researchers	0	25	12	0	62	4.0	25	63
g) Workers	12	12	12	0	62	3.9	25	63
Average						***4.3***	***25***	***77***

Knowledge Needed to Make the Shift to GMP Successful

Majority (62%) of the other supply chain participants strongly agreed on the given knowledge statements but the mean ratings were computed to be only 4.0 which corresponds to "agree" (Table 19). There are those who responded neutral, hence the total positives were found to be 75% only. This indicates that these respondents somehow have knowledge on the benefits from GMP and how it works in general. Even then, more enhancement in terms of knowledge, maybe on the details of implementing GMP, can be imparted.

Table 19. Knowledge needed to make the shift to good management practices (GMP) system successful, 8 other chain participants, Davao de Oro, 2022

Knowledge Statements	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)	Mean Rating	Total Negatives (%)	Total Positives (%)
1. Good manufacturing practices (GMP) promotes maintenance of high quality facility and sanitary environment for production of high quality products for consumers	0	0	25	12	62	4.0	0	75

Knowledge Statements	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)	Mean Rating	Total Negatives (%)	Total Positives (%)
and others manufacturers/processors.								
2. When implemented, GMP helps to assure the identity, benefits, and quality of products.	0	0	25	12	62	4.0	0	75
3. GMP can help cut down on losses and wastes, protect the company, consumer, and the environment from harm.	0	0	25	12	62	4.0	0	75
4. Any raw materials for processing should be handled and stored properly and should be well-documented (e.g. where from, when produced, etc., for traceability).	0	0	25	12	62	4.0	0	75
5. Every cacao/cocoa processor should strive to meet GMP standards.	0	0	12	25	62	3.5	0	88
Average						***4.0***	**-**	***78***

Ability to Apply Good Management Practices

It seems that the respondents' successful shift to GMP will be hampered since those who "agreed" and "strongly agreed" with the statement *"I do not have the technical knowledge needed to enable me to shift to GMP"* were found to be 25% and 38%, respectively, while the remaining 38% were neutral. There were no total negatives for this statement. Among the ability statements, the *"I cannot decide on adopting GMP because I do not own the property where my factory is located"* had the lowest rating of 2.4 and the highest total negatives of 50%. Most of them own the property where their factory is located. Half of the respondents can afford the cost of shifting to GMP as indicated by those who disagreed and were neutral about the statement *"I cannot afford the cost of shifting to GMP"* with 12% and 38% share, respectively (Table 20).

In contrast, the attitude of the respondents can facilitate the shift to GMP because both statements "*I usually get along well with people especially if it will help me in cacao processing business*" and *"I like to lead especially if the task involves a group of persons"* had high mean rating of 4.4 and 75% total positives (Table 20).

Table 20. Ability to apply good manufacturing practice, 8 other chain participants, Davao de Oro, 2022

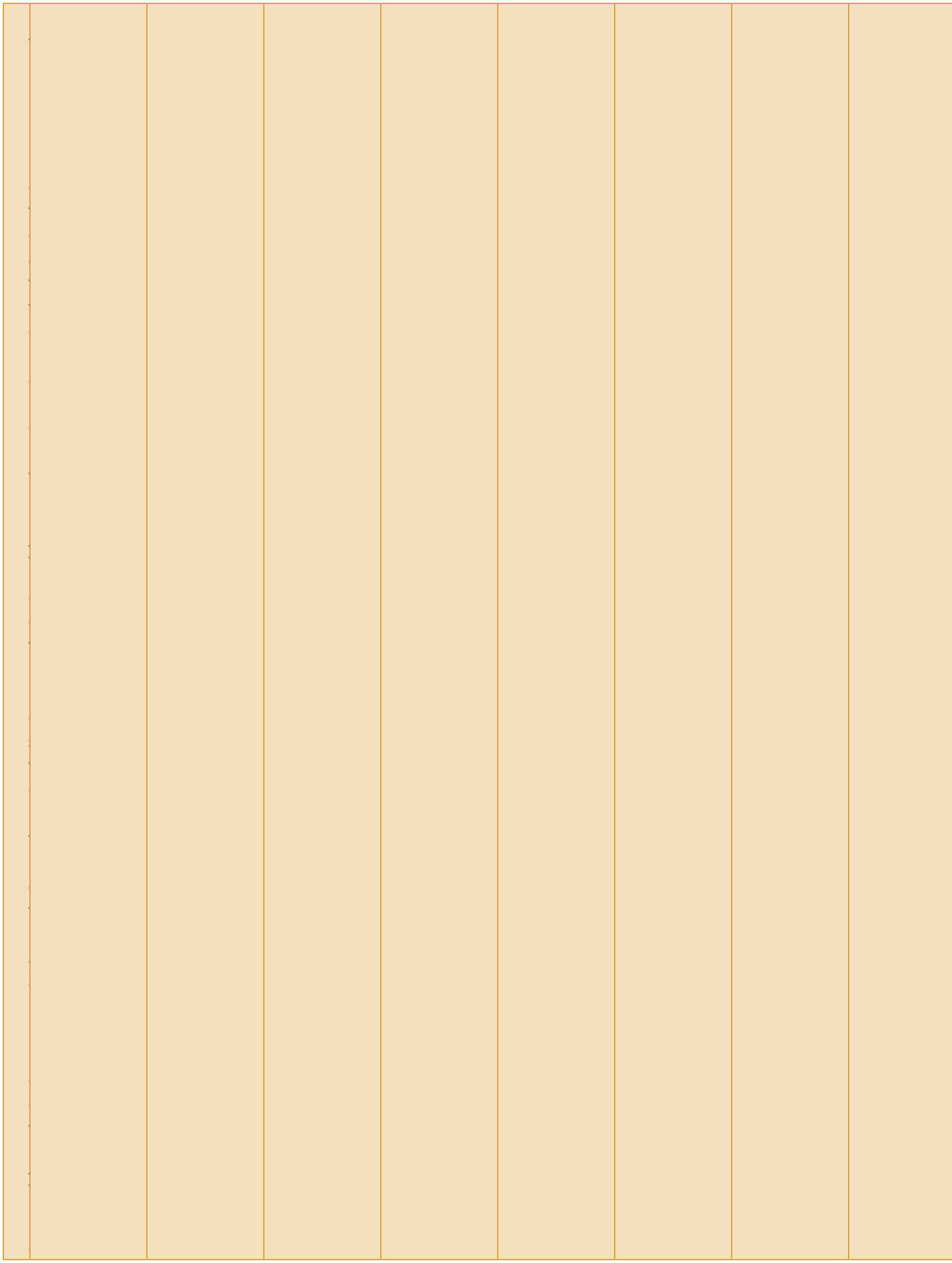
Ability Statements	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)	Mean Rating	Total Negatives (%)	Total Positives (%)
1. I cannot decide on adopting GMP because I do not own the property where my factory is located.	38	12	25	25	0	2.4	50	25
2. I cannot afford the cost of shifting to GMP.	0	12	38	38	12	3.1	13	50
3. I do not have the technical knowledge needed to enable me to shift to GMP.	0	0	38	25	38	3.6	0	63
4. I usually get along well with people especially if it will help me in cacao processing business.	0	0	25	12	62	4.4	0	75
5. I like to lead especially if the task involves a group of persons	0	0	25	12	62	4.4	0	75
Average						***3.6***	***31***	***58***

Reinforcement to Track and Improve GMP

Reinforcements to track and improve GMP will not be that problematic for the other value chain participants because the mean ratings for all the indicator statements ranged from 4.1 to 4.4 although the total positives were quite lower within the range of 63 to 75% (Table 21). This means that those in the neutral stage will have to be convinced further on the benefits of GMP both to cacao businesses and to the environment.

Table 21. Reinforcement to track and improve GMP for environmental sustainability and governance, 8 other chain participants, Davao de Oro, 2022

Reinforcement Statements	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)	Mean Rating	Total Negatives (%)	Total Positives (%)
1.	12	0	12	12	62	4.1	13	75

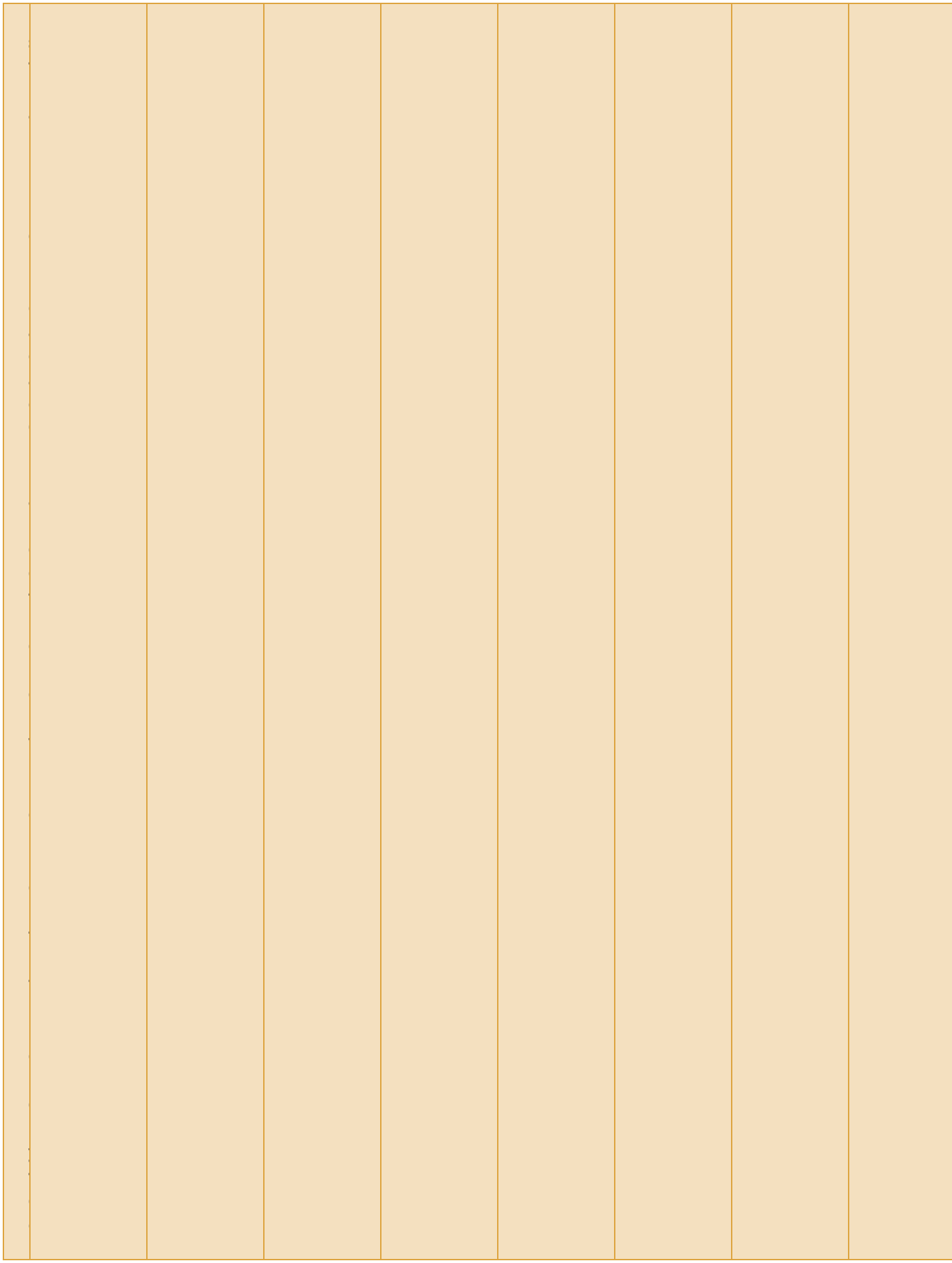


2.	0	0	38	12	50	4.1	0	63

3.	0	0	25	12	62	4.4	0	75

4.	0	0	25	12	62	4.4	0	75

5.	0	0	25	12	62	4.4	0	75



Average						*4.2*	*13*	*73*

Expected Length/Duration of Cacao Business

The average expected length or duration of the cacao business of the Davao de Oro cacao chain participants is 25 years, which is equivalent to the average productive life of a cacao tree (San Diego Zoo Wildlife Alliance Animals & Plants, undated). The greater majority (54%) even had shorter cacao business life expectation of only 10 to 20 years (Table 22). This is a cause for concern because while this is the natural cycle for a cacao tree, good farm management practice should teach a cacao farmer to plant replacement trees at planned intervals to ensure consistent harvests for a longer period.

Table 22. Expected length or duration of cacao/cocoa business, 91 value chain participants, Davao de Oro, Philippines, 2022

DURATION (years)	FREQUENCY	PERCENTAGE
10-20	49	54
21-30	17	19
31-40	3	3
41-50	17	19
51-60	2	2
>60	1	1
No response	2	2
Average	25	

In relation to the above, given the perceptions on the interest of cacao farmer's children to enter and/or continue the cacao business, it can be said that the cacao business in Davao de Oro may face problems of phasing out or discontinuity in about 25 years. This is because among the 91 value chain participants, only 59% see their children entering the cacao business and 70% see them continuing their existing cacao business (Table 23). This mindset might have been caused by the low income being generated from their existing cocoa business and farmers would not want their children to experience the same predicament in

the future. This problem is common in the Philippine agriculture sector, not just in the cacao industry.

In terms of the possibility of mainstreaming environmental protection, 80% of the respondents believed that whatever they do now in their cacao business has long term effects on the environment. This is a positive situation that can be taken advantage of for more rigorous efforts to protect the environment while improving cacao production and processing. The remaining 20% remains a cause for concern for environmental protection to be successful as they believed otherwise. This, however, can be expected to be easily addressed because 95% of the respondents responded YES to the question *"Would you be willing to help protect the environment even if it would mean additional costs in doing business?"* The residual 5% expressed apprehension on the "additional costs" because of the low income they receive from their cacao business, hence their response was NO (Table 23).

Table 23. Perception on interest of children in cacao/cocoa business and on environmental protection, 91 value chain participants, Davao de Oro, Philippines, 2022

STATEMENTS	YES		NO	
	Frequency	%	Frequency	%
Do you see your children entering the cacao/cocoa business?	54	59	37	41
Do you think your children would want to continue your cacao/cocoa business?	64	70	27	30
Do you believe that what you do now in your business has some long-term effects (either negative or positive) on the environment?	73	80	18	20
Would you be willing to help protect the environment even if it would mean additional costs in doing business?	86	95	5	5

Conclusions and recommendations

Conclusions

In general, it can be said that the Philippines is losing so much in its cacao global trade in terms of foreign exchange because it has negative trade balances in all the years studied. Nevertheless, the existing ESMS, standards, and certifications could facilitate the shift to sustainable cacao production, particularly the implementation of cacao agroforestry.

It can be concluded that majority of the cacao farmer-respondents were aware that there is a need to change the status quo or the business-as-usual scenario because their lands are already degraded, they have problems on pests and diseases, and their income from cacao farming are low. They also have the desire to change and would be more willing to share their experiences in agroforestry to their family and fellow farmers. This desire for change is complemented by their knowledge of the ill-effects of monoculture and the benefits of shifting to cacao agroforestry, although there were also some of them whose agroforestry knowledge will need to be beefed up.

While there seems to be quite substantial knowledge on agroforestry, the ability of the farmer-respondents to apply the agroforestry system for more sustainable cacao production was the lowest, due to the high cost of adoption and limited technical knowledge. On a positive note, only a few of them have land tenurial problems. It is imperative then that these challenges be addressed by enablers by providing capacitation and financing. Once the shift has been implemented, there will be no problem in terms of reinforcements because a greater majority of them were willing to go the extra mile to make the shift more sustainable.

In the same manner, the other value chain participants were aware of the need for change and are willing to adopt GMP. Similarly, limited knowledge and technical ability were key challenges for this set of respondents and would need more focus for a successful GMP for cacao products.

Recommendations

Based on the above conclusions, there are urgent actions that need to be done for the shift to become successful. This pertains to **enhancing the technical knowledge (including the preparation of ICS) of the farmers and other value chain participants on agroforestry and GMP for cacao processing. Hands-on (learning-by-doing) training on this should be given priority as well**. The academe, in partnership with the DA-ATI and local government units, can best deliver this kind of training. Equally important is the necessity of implementing stop-gap measures to augment the income of the small-hold farmers during the initial years of the shift to agroforestry. This should improve their ability to implement the change, which had the lowest rating.

Within the cacao value chain, there are already a lot of enablers and support service providers, and these are mostly for input provision. However, for a sustainable cacao industry

in the Davao Region, and for Davao de Oro province to catch up, the **implementation of a systems approach is a necessity**. The systems approach views farm decision making to start from input provision all the way up to the end of the value chain, including not only the players but also the attendant activities, their requirements, and their consequences to the activities and predicaments of all the value chain participants. For example, it is not enough that the enablers, particularly, the government, is providing cacao seedlings to the farmers. There is a need to determine whether they are of the right variety needed by the intended markets, or do they have special production management needs that the farmers should be aware of and appropriate techniques that they should be learn?

There is also the big question of sustainability of input provision. Is it possible for the government and other enablers to provide those inputs for free forever? This is a material concern because, for efficiency, government assistance should not be regarded as a continuous program. In terms of future supplies of inputs, can they be accessed by the chain participants at the right time, in the form they need it, and at the right price? In the same manner, during value addition process, it is not enough that the processors are able to come up with a product. There is again these questions on the demands of the market, particularly the quantity and quality that they require. While there are inputs, there are also outputs, and some may be regarded as by-products that can still be sold while there are those that are regarded as wastes already. The question of when, how, and where to dispose these waste is also a main concern for environment protection.

More importantly, in conjunction with the recommended systems approach, the **identification and assignment of a lead agency is paramount in the governance of the value chain**. This is supported by the results of this study which found relational governance to be the most effective type of governance.

In relational governance, there is mutual reliance in terms of transferring information and availing related services, while accepting that one actor has more control over the other. With a single lead agency, governance can be clearly defined, and priorities will be well supported, provided that all the actor—including enablers and other support service providers—are adequately consulted and are in the same page with the lead agency. Unless a lead agency will be well-defined, there will be no clear and systematic courses of action that will be sustainable. There is always this possibility of finger-pointing as to who will do what, and when things get rough or wrong, the same finger-pointing can happen. It is true that all these agencies have their own essential roles to play in the whole industry but there should be a lead agency that will stir the rudder after all the proper courses of actions and the attendant support have been democratically decided upon. As of now, the country has the Philippine Cacao Industry Council, which is driven by the private sector, mostly cacao processors, and is working with the Department of Agriculture – High Value Crops Development group and the Department of Trade and Industry as co-chairs. However, since the Council is private sector-led, working with government entities, there are still differences in priorities and challenges in terms of priorities and access to funding.

On top of the identification of a lead agency, there should also be **effective clustering of cacao industry players for the achievement of economies of scale both in production and marketing activities and in the procurement of inputs**, where volume discounts can

be availed of by a group or cluster. Clustering of value chain participants into manageable groups will enable easy access to enablers and support service providers like the government. This has been documented as an experience by the farmer-respondents of this study when they attended training programs together, and as one group, they were able to request assistance such as equipment from implementing agencies, which they use as a group also. On the part of the enablers, it will be easier and less costly for them to transact business with farmer clusters or groups than individual farmers. Clustering also promotes the more effective relational governance.

The proposed clustering is also consistent with the Farm and Fisheries Clustering and Consolidation (F2C2) Program of the DA which is embodied in DA AO 27 series of 2020 dated 5 August 2020. F2C2 advocates the grouping of producers

> *"within a community or adjacent communities on the basis of proximity of their production areas, similarity of inputs, shared production activities/processes and/or common final products, where there is potential for unified management of production activities, sourcing of inputs, access to financing, processing, logistics, storage, marketing and enhanced quality of produce."* (DA, 2020)

Once clustered, marketing tie-ups can be facilitated to assure the producers that there will be market for their group produce. In this case, the DTI will have a crucial role to play.

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Appendices

Appendix 1: Survey Questionnaire

APPENDIX 3

OBJECTIVE The main objective of study in which this instrument will be used is to review the governance of value chains (GVC) of cacao in the Philippines particularly the **case of Davao de Oro**	*Sustainable Farming in Tropical Asian Landscapes (SFITAL) Project in Davao de Oro (Region XI)* **COCOA COMMODITY VALUE CHAIN GOVERNANCE AND SUSTAINABILITY QUESTIONNAIRE**	**CONFIDENTIALITY** The researchers take the responsibility of guarding the sanctity and confidentiality of all the information generated through this instrument. Data collected will be used for academic/research purposes only.

I. INTERVIEWER'S IDENTITY

Interview Name: _____ Interview Date: _____ District: _____ Village:_____

II. RESPONDENT'S IDENTITY

Respondent Code: _____. Name of Respondent: _____ Age of Respondent: _____ Mobile Number. _____

Address: _____ Type of Value Chain Actor[1]: _____

[1]Type of Value Chain Actor: 1 = Farmer; 2 = Collector/Assembler; 3 = Assembler-Wholesaler; 4 = Wholesaler; 5 = Export Company; 6 = Others (please specify) _____

III. SUPPLIER AND BUYER RELATIONSHIP

A. Relationship with the BUYER (please consider TOP 3 buyers):

Who is the Buyer of Your Cocoa? (State Name of the Buyer)	Type of Buyer[2]	Mobile Number	With Written Contract? YES/NO	Who Determines the Buying and Selling Terms and Conditions?				
				You as Seller (pls. check)	Your Buyer (pls. check)	Both (negotiation) (pls. check)	Are You Happy with the Current Terms? YES/NO	Are You Happy with the Current Terms? Remarks
1.								

2.								
3.								

[2]Type of Buyer: 1 = Collector/Assembler; 2 = Assembler-Wholesaler; 3 = Wholesaler; 4 = Buying Station; 5 = Company Agent (Company name: _____
6 = Others (please specify) _____

B. Additional Investment as a Supplier (***continuation of previous table, so same name of buyers***)

Who is the Buyer Your Cocoa? (State Name of the Buyer)	Please Choose Tie/s: 1=Family 2=Ethnic 3=None	Did You Have to Buy Equipment as Requested by the Buyer? YES/NO	Do You Have Special Affiliation with this Buyer? YES?NO	Are You Burdened with Additional Cost if You Leave This Buyer? YES/NO	Who Determines the Buying and Selling Terms and Conditions?			Are You Happy with the Current Terms?	
					Buyer (pls. check)	Seller (pls. check)	Both (negotiation) (pls. check)	Yes/No	Remarks
1.									
2.									
3.									

[2]Type of Buyer: 1 = Collector/Assembler; 2 = Assembler-Wholesaler; 3 = Wholesaler; 4 = Buying Station; 5 = Company Agent (Company name: _____
6 = Others (please specify) _____

C. Relationship with the SELLER (please consider 3 TOP sellers):

From Whom Do You Buy Your Cocoa? (State the Name of the Seller)	Type of Seller[3]	Mobile Number	With Written Contract? Yes/No	Who Determines the Buying and Selling Terms and Conditions?			Are You Happy with the Current Terms?	
				Buyer (pls. check)	Seller (pls. check)	Both (negotiation) (pls. check)	Yes/No	Remarks
1.								
2.								
3.								

[3]Type of Buyer: 1 = Farmer; 2 = Collector/Assembler; 3 = Assembler-Wholesaler; 4 = Wholesaler; 5 = Buying Station; 5 = Others (please specify _____

D. Additional Investment as a Supplier (***continuation of previous table, so same name of sellers***)

From Whom Do You Buy Your Cocoa? (State Name of the Seller)	Please Choose Tie/s: 1=Family 2=Ethnic 3=None	Did You Have to Buy Equipment as Requested by the Seller? YES/NO	Do You Have Special Affiliation with this Seller? YES?NO	Are You Burdened with Additional Cost if You Leave This Seller? YES/NO	Who Determines the Buying and Selling Terms and Conditions?			Are You Happy with the Current Terms?	
					Buyer (pls. check)	Seller (pls. check)	Both (negotiation) (pls. check)	Yes/No	Remarks
1.									

2.									
3.									

E. Pricing and Product Quality Determination

Who is the Buyer of Your Cocoa? (State Name of the Buyer)	Who Sets the Quality of the Product					Who Sets the Price?				
	You as Seller (pls. check)	Your Buyer (pls. check)	Both (negotiation) (pls. check)	With Written Contract? YES/NO	Do You Trust This Buyer to Comply with the Set Quality? YES/NO	You as Seller (pls. check)	Your Buyer (pls. check)	Both (negotiation) (pls. check)	Price Fixed in Contract? YES/NO	Do You Trust this Buyer to Follow Set Price? YES/NO
1.										
2.										
3.										

F. Vertical Relationships (Complexity of the transfer of information)

Parameter	Input Provider & Cocoa Producers (provide details)	Rating on Relationship[a] 3 = Strong 2=Moderate 1 = Weak 0 = None	Cocoa Producers & Collector/ Assembler (provide details)	Rating on Relationship[a] 3 = Strong 2=Moderate 1 = Weak 0 = None	Cocoa Producers & Assembler-Wholesaler (provide details)	Rating on Relationship[a] 3 = Strong 2=Moderate 1 = Weak 0 = None	Cocoa Producers & Wholesaler (provide details)	Rating on Relationship[a] 3 = Strong 2=Moderate 1 = Weak 0 = None	Cocoa Producers & Buying Station/Company Agent (provide details)	Rating on Relationship[a] 3 = Strong 2=Moderate 1 = Weak 0 = None	Cocoa Producers & Others (provide details)	Rating on Relationship[a] 3 = Strong 2=Moderate 1 = Weak 0 = None
Giving of product and processing specification												
Relying on special tools, machine, or technology												
Requiring product standard												
Sharing of confidential product processing information												
[a]Rating on Relationship: 0=If not practiced; 1=Seldom or minimally practiced; 2=practiced frequently but not with all players; 3=Commonly practiced												

G. Vertical Relationships (Complexity of the transfer of information) continued …

Parameter	Input Provider & Cocoa Producers (provide details)	Rating on Relationship[a] 1 = YES 2 = NO 3 = Neuttral	Cocoa Producers & Collector/ Assembler (provide details)	Rating on Relationship[a] 1 = YES 2 = NO 3 = Neuttral	Cocoa Producers & Assembler-Wholesaler (provide details)	Rating on Relationship[a] 1 = YES 2 = NO 3 = Neuttral	Cocoa Producers & Wholesaler (provide details)	Rating on Relationship[a] 1 = YES 2 = NO 3 = Neuttral	Cocoa Producers & Buying Station/Company Agent (provide details)	Rating on Relationship[a] 1 = YES 2 = NO 3 = Neuttral	Cocoa Producers & Others (provide details)	Rating on Relationship[a] 1 = YES 2 = NO 3 = Neuttral

Product delivery specifications easy to comply with												
Product specifications easy to produce												
Processing of done by self due to lack of alternatives												

H. Vertical Relationships (Translation/codifying of information and knowledge) continued…

Parameter	Input Provider & Cocoa Producers (provide details)	Rating on Relationship[a] 1 = YES 2 = NO 3 = Neuttral	Cocoa Producers & Collector/ Assembler (provide details)	Rating on Relationship[a] 1 = YES 2 = NO 3 = Neuttral	Cocoa Producers & Assembler-Wholesaler (provide details)	Rating on Relationship[a] 1 = YES 2 = NO 3 = Neuttral	Cocoa Producers & Wholesaler (provide details)	Rating on Relationship[a] 1 = YES 2 = NO 3 = Neuttral	Cocoa Producers & Buying Station/Company Agent (provide details)	Rating on Relationship[a] 1 = YES 2 = NO 3 = Neuttral	Cocoa Producers & Others (provide details)	Rating on Relationship[a] 1 = YES 2 = NO 3 = Neuttral
Is every transaction flexible?												
Is every transaction easy to understand?												
Do buyers need to detail each transaction to you?												
Do you depend on the buyer to translate a transaction?												
Are there any transactions that can't be translated?												

I. The Supplier's Ability to Transact

Parameter	Input Provider & Cocoa Producers (Mention Skill	Rating on Relationship[a] 1 = YES 2 = NO 3 = Neuttral	Cocoa Producers & Collector/ Assembler (Mention Skill)	Rating on Relationship[a] 1 = YES 2 = NO 3 = Neuttral	Cocoa Producers & Assembler-Wholesaler (Mention Skill)	Rating on Relationship[a] 1 = YES 2 = NO 3 = Neuttral	Cocoa Producers & Wholesaler (Mention Skill)	Rating on Relationship[a] 1 = YES 2 = NO 3 = Neuttral	Cocoa Producers & Buying Station/Company Agent (Mention Skill)	Rating on Relationship[a] 1 = YES 2 = NO 3 = Neuttral	Cocoa Producers & Others (Mention Skill)	Rating on Relationship[a] 1 = YES 2 = NO 3 = Neuttral
Your capability to understand the transaction 1 – 10 (10=very capable)												
Special skill to UNDERSTAND the job asked by the buyer?												
Special skill to DO the job asked by the buyer?												
Relying on the buyer's expertise to understand and do the job?												
Are there any transactions that can't be translated?												

J. Horizontal Relationship

Parameter	Farmer to Farmer (Describe the relationship and provide details)	Rating on Relationship[a] 3 = Strong 2 = Moderate 1 = Weak 0 = None
Information sharing*		
Collaboration in marketing		
Competition level		
Trust		
Benefits from collective initiative		

*Specify the type of in formation shared

[a]Rating on Relationship: 0=If not practiced; 1=Seldom or minimally practiced: 2=practiced frequently but not all players 3=Commonly practiced

Governance is the existing relationship or the power to exert control along the chain for a particular purpose. Good and effective governance in value chains has a high potential to improve the capacity and capability of smallholder participants through the leadership on other actors allowing the smaller ones to strengthen their position (Dietz, 2011). Please indicate your satisfaction on your relationship with the different chain actors

IV. EVALUATION		
Parameter	Rating on Chain Governance (Relationship) 1 = Satisfactory; 2 = Neutral 3 = Unsatisfactory	Remarks (Please provide reason and example)
Cocoa Producer & Input Provider		
Cocoa Producer & Collector/Assembler		
Cocoa Producer & Collector/Assembler-Wholesaler		
Cocoa Producer & Wholesaler		
Cocoa Producer & Buying Station		
Cocoa Producer & Company Agent		
Cocoa Producer & Others		

K. General Opinions

1. In your opinion, has the above governance changed the way you think or feel as a farmer/collector-assembler/assembler-wholesaler/wholesaler/company agent? _____ YES _____ NO

   a. If YES, in what aspects?
   _____
   _____
   _____
   _____

   b. Please provide example
   _____
   _____
   _____
   _____

2. There are many ways on how governance is carried out along the value chain, and they vary from place to place and among chain participants, please evaluate them on whether THEY WORKED OR DID NOT WORK.

Type of Chain Governance	Brief Description	Worked/ Did Not Work 1= YES 2=NO	Provide Example	Is there any special influence from this place that makes this governance work differently here? Please indicate.	Please indicate any change you want to be implemented to this type of governance (THE ONE CARRIED OUT HERE)	What else do you think is necessary for you to understand this governance and be more effective participant?
Modular Governance	The supplier provides product or service following the specifications of the buyer					
Relational Governance	There is mutual reliance in terms of transfer of information and related services but one actor has more control over the other.					
Captive Governance	Small suppliers are controlled by few buyers who may invest on product and process upgrading and implements a high degree of monitoring.					
Hierarchical Governance	There is high vertical integration and managerial control within a set of chain participants. All					

	products are manufactured in-house (as opposed to out-sourcing of some components) because process is complicated.					

3. Have you heard about cacao certification? Y/N
   If yes, do you know the purpose of cacao certification? Do you know the benefits of cacao certification?
4. Have you been involving in any cacao certification program? Y/N. If yes, what is your motivation/reason to be involved?
5. If there is a performance-based contractual agreement requiring collective action, applying GAP and a series of conservation agriculture efforts that aims at improving social and environmental values, and possibility in providing additional income, are you willing to join? What is your reason for willing/not willing to join?
6. Have you heard about traceability? Y/N If yes, do you know the purpose of cacao traceability? Do you know the benefits of cacao traceability?

L. Measuring Sustainability of Change (ADKAR Framework)

ADKAR Elements	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
Awareness why change is needed					
1. There is a need to strengthen the ability of cacao production areas in Davao de Oro to adapt or recover from extreme weather conditions (e.g. too much rain, too high temperature, long dry spell, etc.).					
2. There is a need to restore degraded lands planted to cacao.					
3. Currently, I have problems on pests and diseases in my cacao farms.					
4. I need to do something to improve my income from cacao production.					
5. There is low adoption of agroforestry by cacao farmers in Davao de Oro.					
Do you want to add any reasons for changes toward good agricultural practices and cacao AF?[open question] _____					
Desire to implement a change	**Not At All (1)**	**Little (2)**	**Moderately (3)**	**Much (4)**	**Very Much (5)**
1. How motivated would you be to follow the advice of the following regarding cacao agroforestry production system?					
a) Your family					
b) Other Farmers					
c) Your Buyer/Seller					
d) Government (extensionists)					
e) NGO/INGO					
f) Members of the Academe/Researchers					
g) Workers					
2. How willing would you be to share your cacao farming experiences to the following?					

a) Your family					
b) Other Farmers					
c) Your Buyer/Seller					
d) Government (extensionists)					
e) NGO/INGO					
f) Members of the Academe/Researchers					
g) Workers					
3. If you are already practicing cacao agroforestry, how willing would you be to share your knowledge to the following?					
a) Your family					
b) Other Farmers					
c) Your Buyer/Seller					
d) Government (extensionists)					
e) NGO/INGO					
f) Members of the Academe/Researchers					
g) Workers					
4. If you are producing monoculture cacao now, how willing would you be to shift to cacao agroforestry?					
5. If you want to shift to cacao agroforestry production how willing you be to collaborate with the following?					
a) Your family					
b) Other Farmers					
c) Your Buyer/Seller					
d) Government (extensionists)					
e) NGO/INGO					
f) Members of the Academe/Researchers					
g) Workers					

ADKAR Elements	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
Knowledge needed to make the shift to cacao agroforestry production system successful					
1. Monoculture farming means growing only one type of crop at any one time on a specific field					
2. Cacao monoculture may deplete soil, resulting to soil erosion and land degradation.					
3. Cacao agroforestry incorporates cacao with other trees and crops at any one time on the same field or space.					
4. Cacao agroforestry systems can bring a wide range of ecological benefits such as biodiversity conservation of flora and fauna, carbon sequestration, preserving and strengthening soil moisture and fertility, promotes pest control, among many others.					
5. Yields in high-diversity agroforestry systems can be as high as those in full-sun production.					
Do you think any additional knowledge needed thus farmers shift to a cacao AF production system?					
Ability to apply cacao agroforestry production/processing system					
1. I cannot decide on adopting agroforestry system of production because I have land tenure issues.					

2.	I cannot afford the cost of shifting to cacao agroforestry system/GMP.					
3.	I do not have the technical knowledge on combining trees/crops with my cacao trees/doing GMP.					
4.	I usually get along well with people especially if it will help me in cacao farming/processing business.					
5.	I like to lead especially if the task involves a group of people.					
	Do you think any additional ability is needed for the adoption of cacao AF production/processing system?					
Reinforcement to track and improve cacao agroforestry production/processing system						
1.	I am willing to attend monthly meetings for the tracking of my progress in cacao agroforestry production/processing system.					
2.	I am willing to keep records of my farm and cacao business activities and share them for the continued improvement of the business.					
3.	I am willing to accommodate people/agencies for a farm visit/tour to showcase how I am doing with my cacao agroforestry/processing business.					
4.	If am willing to apply for a certification (e.g., GAP/GMP), if needed to improve my cacao business.					
5.	I am willing to enter into contests/competitions to showcase my achievement in cacao business.					
	Do you think any additional reinforcement is needed so that farmers/processors can continue and improve their cacao AF production/processing systems?					

Any further comments or questions that you want to add?

_____

_____

_____

Appendix 2: Volume (in tons) of export and import by type of cocoa product, Philippines, 2011-2020

PRODUCT	YEAR										
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Cocoa Beans											
Export	124	298	498	1,976	1,904	2,493	3,437	3,069	3,060	4,852	21,711
Import	302	148	218	524	277	635	692	606	175	302	3,879
Net*	-178	150	280	1,452	1,627	1,858	2,745	2,463	2,885	4,550	17,832
Cocoa Butter, Fats, and Oil											
Export	920	629	474	645	363	602	645	299	580	361	5,518
Import	805	304	376	163	85	345	34	76	61	60	2,309
Net*	115	325	98	482	278	257	611	223	519	301	3,209
Cocoa Paste											
Export	260	300	300	0	0	4	9	2	0	48	923
Import	244	199	155	108	144	472	362	409	883	564	3,540
Net*	16	101	145	-108	-144	-468	-353	-407	-883	-516	-2,617
Cocoa Powder and Cake											
Export	787	200	146	53	518	1974	8	20	31	241	3,978
Import	17,772	11,319	13,433	19,059	18,433	23,762	25,665	27,508	28,969	27,548	213,468
Net*	-	-	-	-	-	-	-	-	-	-	-209,490
	16,985	11,119	13,287	19,006	17,915	21,788	25,657	27,488	28,938	27,307	

*Derived by subtracting imports from exports
Source of basic data: FAOStat

Appendix 3: Value (in USD'000) of export and import by type of cocoa product, Philippines, 2011-2020

PRODUCT	YEAR										
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Cocoa Beans											
Export	356	639	1,078	4,460	5,731	7,391	8,379	7,643	7,859	13,681	57,217
Import	1,072	371	584	1,686	877	2,031	1,696	1,591	0	302	10,210
Net*	-716	268	494	2774	4854	5360	6683	6052	7859	13379	47,007
Cocoa Butter, Fats, and Oil											
Export	3,122	2,065	2,241	4,271	2,016	3,533	2,934	1,739	3,901	1,831	27,653
Import	1,531	701	830	531	207	632	210	426	344	363	5,775
Net*	1,591	1,364	1,411	3,740	1,809	2,901	2,724	1,313	3,557	1,468	21,878
Cocoa Paste											
Export	992	1,000	1,000	0	0	68	50	4	0	122	3,236
Import	1,022	747	588	428	606	1,702	1,626	1,351	3,277	2,321	13,668
Net*	-30	253	412	-428	-606	-1,634	-1,576	-1,347	-3,277	-2,199	-10,432
Cocoa Powder and Cake											
Export	3,245	637	582	59	368	2,893	57	115	174	660	8,790
Import	71,540	43,958	42,325	43,425	42,249	61,508	58,106	58,342	60,265	59,535	541,253
Net*	-	-	-	-	-41881	-	-	-	-	-	-532,463
	68,295	43,321	41,743	43,366		58,615	58,049	58,227	60,091	58,875	

*Derived by subtracting imports from exports (Source of basic data: FAOStat)