



T.R.
ONDOKUZ MAYIS UNIVERSITY
INSTITUTE OF GRADUATE STUDIES
DEPARTMENT OF AGRICULTURAL ECONOMICS

**ANALYSIS OF AGRICULTURAL CREDIT SYSTEM IN
COCOA PRODUCTION IN CÔTE D'IVOIRE: CASE OF
INPUT CREDIT**

Master's Thesis

Seri Zouzoua Serge Narcisse TAPE

Supervisor
Prof. Dr. Kürşat DEMİRYÜREK

SAMSUN

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ACCEPTANCE AND APPROVAL OF THE THESIS

The study entitled "ANALYSIS OF AGRICULTURAL CREDIT SYSTEM IN COCOA PRODUCTION IN CÔTE D'IVOIRE: THE CASE OF INPUT CREDIT" was prepared by **Seri Zouzoua Serge Narcisse TAPE** and supervised by **Prof Dr. Kürşat DEMİRYÜREK** was found successful and unanimously accepted by committee members as the Master thesis of the Department of Agricultural Economics, following the examination on the date 25/08/2022.

	Title Name/Surname		Signature	Final decision
Chairman	Prof. Dr. İsmet BOZ Ondokuz Mayıs University Department of Agricultural Economics			<input checked="" type="checkbox"/> Accept <input type="checkbox"/> Reject
Member:	Assoc.Prof. Dr. Mehmet AYDOĞAN Ondokuz Mayıs University Department of Agricultural Economics			<input checked="" type="checkbox"/> Accept <input type="checkbox"/> Reject
Member:	Prof. Dr. Kürşat DEMİRYÜREK Ondokuz Mayıs University Department of Agricultural Economics			<input checked="" type="checkbox"/> Accept <input type="checkbox"/> Reject

This thesis has been approved by the committee members already stated above and determined by the Institute Executive Board.

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Prof. Dr. Ali BOLAT
Head of Institute of Graduate Studies

DECLARATION OF COMPLIANCE WITH SCIENTIFIC ETHIC

I hereby declare and undertake that I complied with scientific ethics and academic rules in all stages of my Master's Thesis that I have referred to each quotation that I use directly or indirectly in the study, and that the works I have used consist of those shown in the sources, that it was written in accordance with the institute writing guide and that the situations stated in the article 3, section 9 of the Regulation for TÛBİTAK Research and Publication Ethics Board were not violated.

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Seri Zouzoua Serge Narcisse TAPE

DECLARATION OF THE THESIS STUDY ORIGINALITY REPORT

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ABSTRACT

ANALYSIS OF AGRICULTURAL CREDIT SYSTEM IN COCOA PRODUCTION IN CÔTE D'IVOIRE: CASE OF INPUT CREDIT

Seri Zouzoua Serge Narcisse TAPE
Ondokuz Mayıs University
Institute of Graduate Studies
Department of Agricultural Economics
Master, July/2022
Supervisor: Prof. Dr. Kürşat DEMİRYÜREK

Cocoa production in Côte d'Ivoire is carried out by more than 1,000,000 smallholder farmers. Data reveals that yield has remained between 0.5 – 0.6 t/ha during the last 20 years. Non-access to agricultural credit and inputs are significant constraints facing the cocoa sector. Regarding this observation, the following questions arise: which system of financing agricultural inputs in cocoa production? An analysis of the farm credit system in cocoa production is needed to answer this question. The general objective is to improve cocoa productivity from 550-600kg/ha to 1ton/ha by enabling small-scale cocoa farmers to access agricultural credit and input credit by 2025. The studied hypothesis is as follows: Cocoa farmers have minimal access to financial resources; Small farmers have difficulty accessing fertilizer to increase yields. This study uses mixed methods of comprehensive literature review with primary and secondary data collection, key Informant Interviews, and descriptive statistics to analyze data. Results showed that the formal agricultural credit system is almost non-existent, and no bank is dedicated to agricultural financing for cocoa farmers in Côte d'Ivoire. The data collected show that these banks commit only 6% of their credit portfolio to the agricultural sector. Results also show the absence of a regulatory framework favorable to agricultural financing. The financement criteria are set by the banking institution or decentralized banking system. These criteria do not give advantages to farmers. According to the formal agricultural sector financing model, banks and decentralized financial systems prefer to grant credit to cooperatives over individuals. The net income is less, and it is difficult for them to save money in the bank and receive credit. Finally, the study showed that if agricultural credit is given as input, such as fertilizer, farmers' income can be multiplied by 1.26.

Keywordsrds: Input credit, Cocoa, Côte d'Ivoire, Agricultural credit, Yield.

ÖZET

FİLDİŞİ SAHİLİ KAKAO ÜRETİMİNDE TARIMSAL KREDİ SİSTEMİNİN ANALİZİ: GİRDİ KREDİSİ ÖRNEĞİ

Seri Zouzoua Serge Narcisse TAPE
Ondokuz Mayıs Üniversitesi
Lisansüstü Eğitim Enstitüsü
Tarm Ekonomisi Anabilim Dalı
Yüksek Lisans, Temmuz/2022
Danışman: Prof. Dr. Kürşat DEMİRYÜREK

Fildişi Sahili Batı Afrika'daki bir ülkedir. Fildişi Sahili ekonomisinde kakao gayri safi yurtiçi hasılanın (GSYİH)% 15-20'sine katılmaktadır Kakao üretiminin Fildişi Sahili'ndeki üretimi 1.000.000'dan fazla küçük toprak sahibi çiftçi tarafından gerçekleştirilmektedir. Veriler, verimin son 20 yılda 0,5 – 0,6 t/ha arasında kaldığını ortaya koymaktadır. Tarımsal kredi ve girdilere erişimsizlik, kakao sektörünün karşı karşıya olduğu önemli kısıtlamalardır. Bu gözlemlerle ilgili olarak, aşağıdaki temel soru ortaya çıkmaktadır: kakao üretiminde tarımsal girdileri finanse etmek için hangi sistem gereklidir? Bu soruyu cevaplamak için kakao üretiminde tarımsal kredi sisteminin analizine ihtiyaç vardır. Genel amaç, küçük ölçekli kakao çiftçilerinin 2025 yılına kadar tarımsal nakdi kredi ve girdi kredisine erişmelerini sağlayarak kakao verimliliğini 550-600 kg/ha'dan 1 ton/ha'a çıkarmaktır. İncelenen hipotez şöyledir: Fildişi Sahili'ndeki kakao sektöründeki tarımsal kredi sistemi neredeyse yoktur. Küçük üreticiler tarım kredisi verme kriterlerini karşılayamamaktadır. Bu çalışmada ikincil veri toplama ve anahtar kişi görüşmeleri yöntemi ile kapsamlı literatür taraması için karma bir yöntem kullanılmıştır. Sonuçlar, resmi tarımsal kredi sisteminin neredeyse hiç var olmadığını ve hiçbir bankanın Fildişi Sahili'ndeki kakao çiftçileri için tarımsal finansmana adanmış olmadığını göstermektedir. Toplanan veriler, bu bankaların kredi portföylerinin sadece %6'sını tarım sektörüne ayırdıklarını göstermektedir. Tarımsal finansmana elverişli bir düzenleyici çerçevenin varlığı şu anda mevcut değildir. Mevcut finansman kriterleri, bankacılık kurumu veya merkezi olmayan bankacılık sistemi tarafından belirlenmektedir. Ancak bu kriterler çiftçilere avantaj sağlamamaktadır. Resmi tarım sektörü finansman modeline göre bankalar ve merkezi olmayan finansal sistemler kooperatiflere bireyler yerine kredi vermeyi tercih etmektedir. Bireysel çiftçilerin net gelir yetersizdir ve bankada para biriktirmeleri ve kredi almaları zordur. Son olarak, bu çalışma, gübre gibi girdilere yönelik tarımsal kredilerin verilmesi, çiftçilerin gelirlerinin %110'dan fazla artabileceğini göstermektedir.

Anahtar Sözcükler: Girdi kredisi, Kakao, Fildişi Sahili, Tarım kredisi, Verim.

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CONTENTS

ACCEPTANCE AND APPROVAL OF THE THESIS.....	i
DECLARATION OF COMPLIANCE WITH SCIENTIFIC ETHIC	ii
DECLARATION OF THE THESIS STUDY ORIGINALITY REPORT	ii
ABSTRACT.....	iii
ÖZET	iv
ACKNOWLEDGMENTS	v
CONTENTS.....	vi
SYMBOLS AND ABBREVIATIONS	viii
TABLES LEGENDS.....	ix
FIGURES LEGENDS.....	x
1. INTRODUCTION TO THE RESEARCH PROBLEMS, AIMS, CONTEXT, AND HYPOTHESIS.....	1
1.1. Context.....	1
1.2. Problem of study	2
1.3. Aims	3
1.4. Hypothesis of study.....	3
2. SOCIO-ECONOMIC CHARACTERISTICS OF CÔTE D'IVOIRE	5
2.1. Natural resources of Côte d'Ivoire	5
2.2. Demography.....	6
2.3. Environment.....	8
2.4. Economy situation of Côte d'Ivoire.....	8
2.5. International trade profile.....	8
2.6. Business environment	11
2.7. Agriculture in Côte d'ivoire.....	12
2.7.1. Produced agricultural products	12
2.7.2. Importance of agriculture in Côte d'Ivoire's Economy	12
2.7.3. Management and organization of agriculture in Côte d'Ivoire.....	14
2.8. Cocoa sector in côte d'ivoire	15
2.8.1. History of cocoa cultivation in Côte d'Ivoire	15
2.8.2. Cocoa Production, Export, and Processing in Côte d'Ivoire	16
2.8.3. Cocoa value chain in Côte d'Ivoire.....	18
2.9. Cocoa Sector Organization in Côte d'Ivoire from production to exportation	20
2.9.1. Coffee-coca council	20
2.10. Literature review	24
3. MATERIAL AND METHODOLOGY	26
3.1. Preliminary study	26
3.2. Comprehensive literature review	27
3.3. Sampling	27
3.4. Data collection	28
3.4.1. Primary data collection	28
3.4.2. Secondary data collection	28
3.5. Data analysis	28

4. RESULTS AND DISCUSSIONS.....	29
4.1. Preliminary study's.....	29
4.2. Descriptive statistic.....	29
4.3. Identity of farmers.....	30
4.4. Access to agricultural credit.....	31
4.5. History of agricultural financing in Côte d'Ivoire.....	32
4.5.1. Before independence (before 1960).....	32
4.5.2. After independence (1960-1991).....	33
4.5.3. After independence (1991 until nowadays).....	33
4.6. Agricultural credit system in Côte d'Ivoire.....	34
4.6.1. The formal agricultural credit system.....	34
4.6.2. Decentralized financial systems.....	35
4.6.3. Semi-informal credit.....	36
4.7. Input market in CCôte d'Ivoire.....	37
4.7.1. Importation of fertilizer.....	38
4.7.2. Origin of fertilizer used in Côte d'Ivoire.....	38
4.7.3. Fertilizer consumption and price in cocoa production.....	39
4.7.4. Variables charges in cocoa production.....	40
4.7.5. Revenue.....	42
4.7.6. Gross Profit.....	43
CONCLUSION AND SUGGESTIONS.....	45
REFERENCES.....	48
APPENDICES.....	51

SYMBOLS AND ABBREVIATIONS

BCC:	Bourse du Café et du Cacao
BICICI:	Banque Internationale pour le Commerce et l'Industrie de la Côte d'Ivoire
BNDA:	Banque Nationale de Développement Agricole
CCCAM:	Caisse Centrale de crédit agricole
CCI:	Crédit de Côte d'Ivoire
CGAP:	Consultative Group to Assist the Poor
CNCA:	Caisse Nationale de Crédit Agricole
ECOWAS:	Economic Community of West African States
FDPCC:	Fonds de Développement des Productions Café et Cacao
FGCCC:	le Fonds de Garantie des Coopératives Café et Cacao
FRC:	Fonds de Régulation et de Contrôle du Café et du Cacao
GDP:	Gross Domestic Product
GEPEX:	Groupement Professionnel des Exportateurs
GNI:	Gross National Index
ICCO:	International cocoa organisation
RCI:	Republic of Côte d'Ivoire
REEA:	Recensement Des Exploitants Et Exploitations Agricoles
SGBCI:	Société Générale de Banque de Côte d'Ivoire
SIB:	Société Ivoirienne de Banque
UEMOA:	West African Economic and Monetary Union
UN:	United of Nations
WB:	World Bank

TABLES LEGENDS

Table 2.1: Demography data of Côte d'Ivoire in comparison with Türkiye (World bank, 2018)	7
Table 2. 2: Environnemental view in Côte d'Ivoire in comparison with Türkiye (World bank, 2018).....	8
Table 2.3: Economy situation of Côte d'Ivoire in comparison of Türkiye (World bank, 2018)	8
Table 2.4.: Export products of Côte d'Ivoire (Trend economy).....	10
Table 2.5: Imported products of Côte d'Ivoire:: (World Integrated Trade Solution, 2019)	10
Table 2.6: Imported-exported products between Côte d'Ivoire and.....	11
Table 2.7: Business environment (World Bank, 2018).....	11
Table 2.8 : Agricultural product of Côte d'Ivoire.....	12
Table 2.9: Actors of the cocoa sector from production du exportation.....	23
Table 3.1: Preliminary study's questionnaire.....	26
Table 3.2. Variables of study.....	28
Table 3.3.Gross profit analysis variables.....	28
Table 4.1: Causes of low cocoa yield in Côte d'Ivoire.....	29
Table 4.2: Statistiques descriptives.....	30
Table 4.3: Fertilizers that are used in the countries of origin Ivory Coast (Africa fertilizer,2019)	39
Table 4.4: Evolution of PK 0 23 19 + 6.5S + 5MgO + 10CaO price from 2017 to 2022 (Source: Afrika fertilizer, 2022).....	40
Table 4.5. Variable charge in cocoa production with or without using fertilizer (author calculation).....	41
Table 4.6. Revenue with or without using fertilizer.....	42
Table 4.7. Gross profit of the cocoa farm with or without fertilizer (author calculation).....	43

FIGURES LEGENDS

Figure 2-1: Geographical and administrative map of Côte d'Ivoire (Ivory Coast) (Ducroquet and al, 2017).....	6
Figure 2.2: Population of Côte d'Ivoire by age group in 2021 (Source: countryeconomy.com)	7
Figure 2.3. Principales agricoles activities share in GDP of Côte d'Ivoire (Ducroquet, H, 2017)	13
Figure 2.4. Evolution of Primary sector in GDP of Côte d'Ivoire ((Ducroquet, H, 2017)	13
Figure 2.5: Area harvested of Cocoa (2015-2019) (FAOstat, 2019)	17
Figure 2.6: Cocoa Yields from 2015 to 2019.....	17
Figure 2.7: Cocoa production's evolution (2015-2019) (FAOSTAT, 2018)	18
Figure 2.8. : Cocoa primary processing countries (ICCO, 2018-2019)	19
Figure 2.9: Value Chain of Cocoa in Côte d'Ivoire.....	20
Figure 4.1: Age of small cocoa farmers.....	30
Figure 4.2.: Education degree of small cocoa farmers.....	31
Figure 4.3. Work experience level of small farmers.....	31
Figure 4.4: Share of the farmer who has access to agricultural credit in the study area.....	32
Figure 4.5: Shareholders of BNDA.....	33
Figure 4.6. Evolution of agricultural credit in Côte d'Ivoire.....	34
Figure 4.7. Number of SFD 2019-2021 (Source: APSFD-CI, 2021)	35
Figure 4.8. Evolution of customers number (source: APSFD-CI, 2021).....	35
Figure 4.9. Evolution of service points Number (APSFD-CI, 2021).....	36
Figure 4.10 : Cocoa subsector financing system (source : the author)	37
Figure: 4.11: Fertilizer consumption, import-export, and production in Côte d'Ivoire.....	38
Figure 4.12: Fertilizer consumption by-product (Africa fertilizer, 2015).....	39
Figure 4.13: Evolution of cocoa yield with using of fertilizer	42
Figure 4.14: Revenu evolution by using fertilizer	43

1. INTRODUCTION TO THE RESEARCH PROBLEMS, AIMS, CONTEXT, AND HYPOTHESIS

1.1. Context

Côte d'Ivoire (Ivory Coast in English) is a country located on the south coast of West Africa, with the political capital Yamoussoukro in the center of the country. In contrast, its economic capital and largest city are Abidjan. It borders Guinea to the northwest, Liberia to the west, Mali to the northwest, Burkina Faso to the northeast, Ghana to the east, and the Gulf of Guinea (Atlantic Ocean) to the South (Wikipedia, 2021). In 2017, Côte d'Ivoire represented 36% of WEST African Economic and Monetary Union's (UEMOA) Gross Domestic Product (GDP) (agriculture.gouv, 2021).

As the immense economic power of the WEST African Economic and Monetary Union and the second largest economy in the Economic Community of West African States (ECOWAS), it represents 60% of UEMOA's agricultural products exports and 33% of ECOWAS. Its economic growth remains at a sustained level; 7.7% in 2017 and 7.4% in 2018, with low inflation (World Bank, 2018). In 2020, due to the sanitary crisis of Covid-19, its growth rate decreased by 2% (Statista, 2020) but from 2021 growth rate climbed to 6.5% (Statista, 2020).

The agricultural sector sustains this growth. In 2018, the agricultural sector accounted for about 19.8% of GDP (World Bank, 2018) and 40% of the country's exports. The agricultural sector employs 46% of the workforce and supports 66% of the population (World Bank, 2019).

The main agricultural products exported are Brazil nuts (the world's largest producer), palm oil (5th world producer and 2nd African producer), natural rubber (the 7th largest producer in the world and the 1st producer in the world), and cocoa (first largest producer in the world) (agriculture. gouv, 2021). Cocoa is its main exported product. Cocoa contributes 15-20% of GDP. Côte d'Ivoire, accounting for 33% of the global production (FAOStat, 2018). However, productivity is relatively low, where pests and diseases, among other factors, limit productivity (Wessel, 2015).

Cocoa production in Côte d'Ivoire is carried out by more than 1,000,000 small farmers (World Bank, 2019). They have about 3 hectares as the farm's area. The total cocoa farm is about 2,851,084 ha, which represents 27.9% of the global area of Côte d'Ivoire (FAO, 2018).

1.2. Problem of study

Data reveals that the farm yield of small farmers has remained between 0.5 – 0.6 t/ha during the last 20 years, with a slightly decreasing trend since 2010 (Kozicka & al, 2018). To Wessel (2015), the widespread occurrence of pests and diseases, early aging of unshaded trees, no access to credit and agricultural inputs, and lack of land ownership are significant constraints facing the cocoa sector. As estimated, 40,000 tons of fertilizer are used yearly in the Cocoa sector, while 450,000 tons are needed to improve production yields and producers' incomes.

According to a Consultative Group to Assist the Poor (CGAP) study in 2016, very few smallholder farmers have access to products, namely: 3% are savings plans for the acquisition of inputs; 3% are payment plans for the purchase of inputs; 5% of small producers receive financing from financial structures or input suppliers, and 3% receive financing from exporters or cooperatives in Côte d'Ivoire.

These data show the limits of many public initiatives (public banks, dedicated funds) since the country's independence. In recent years, the Ministry of Agriculture and Rural Development through its agricultural investment plans (PNIA I and PNIA 2), the Ministry of Economy and Finance through its national financial inclusion strategy (SNIF 2019-2024), and other actors have defined the agricultural finance of substantial agricultural sub-sectors including the Cocoa, sub-sector as a priority (World Bank 2019).

According to Marius W and al (2015), the lack of access to credit and agricultural inputs are significant constraints facing the cocoa sub-sector that would affect cocoa yields. Agricultural credit aims to increase productivity as it carries out all agrarian activities (Artukoğlu, 2017). According to Mosher (1967), taken up by Djato (2001), access to credit is a mode of financing that is also an accelerator of agricultural development.

Do farmers have access to agricultural credit to the importance of fertilizer and agricultural credit? What will happen if farmers have access to credit? So, an analysis

of the agricultural credit system in cocoa production is needed to define and evaluate the strengths and weaknesses. The area studied is the district of the mountains of Côte d'Ivoire. Hence the theme: Analysis of the agricultural credit system in cocoa production in the mountain district of Côte d'Ivoire: the case of input credit.

1.3. Aims

The study's overall objective is to follow the strategic objectives of the Second Generation of National Agricultural Investment Program (PNIA II) and the National Financial Inclusion Strategy of Côte d'Ivoire 2019-2024 (SNIF, 2019-2024).

The general objective is to improve cocoa productivity from 550-600 kg/ha to 1,2t/ha by enabling small-scale cocoa farmers to access agricultural and input credit by 2025.

Increasing fertilizer and access to agricultural credit will have a socio-economic impact on farmers. Firstly, it will increase farmers' incomes and productivity, facilitating agricultural and input credit access.

This study's specific objectives are: to analyze the situation of agricultural financing before the independence of Côte d'Ivoire from nowadays, to analyze small farmers' accessibility to agricultural credit, to identify causes of inaccessibility to credit and fertilizer, and finally give some recommendations.

1.4. Hypothesis of study

The study hypothesis is as follows:

Hypothesis 1: Cocoa farmers have very limited access to financial resources.

Ho: more than 50% of small farmers do not have access to agricultural credit.

H1: more than 50% of small farmers have access to agricultural credit.

The study will compare small farmers with access to credit with those who do not have access to credit. After descriptive analysis, if more than 50% of small farmers do not have access to agricultural credit, the H0 hypothesis is accepted; if not, the study will reject H0 and accept H1.

Hypothesis 2: Small farmers have difficulty accessing fertilizer to increase yields.

This hypothesis will be controlled by doing gross profit analysis, analysis of fertilizer prices and comparing fertilizer charges and gross profit, and accepting or not following hypothesis:

H0: Farmers cannot access more than 90kg/ha of fertilizer.

H1: Farmers have access to more than 90kg/ha of fertilizer.

90kg/ha is the quantity of fertilizer necessary to increase cocoa yields up to one ton per ha, according to the specialist.

Farmer's fertilizer consumption will be compared with a reference of 90kg/ha. If fertilizer used by farmers is less than 90kg/ha, Ho will be accepted; if not, it will be rejected.

2. SOCIO-ECONOMIC CHARACTERISTICS OF CÔTE D'IVOIRE

2.1. Natural resources of Côte d'Ivoire

Côte d'Ivoire, located in the intertropical zone on the Gulf of Guinea, with an area of 322,462 km², is a country characterized by plate land. Most of the land consists of plateaus and plains (REEA, 2017). The country is limited to the south by the Atlantic Ocean (550 km), to the east by Ghana (640 km), to the north by Burkina Faso (490 km) and Mali (370 km), and to the west by Guinea for 610 km and Liberia (580 km) (RCI, 2009).

Rivers cover about 4,462 km² or 1.38% of the total area. The water's system consists of four large basins: The Comoé (1,160 km long, 78,000 km² of surface area), the Bandama River (1,050 km long and 97,000 km² of surface area) originating in Burkina Faso, The Sassandra (650 km long, 5,000 km² surface) and the Cavally (700 km long, 28,800 km² with 15,000 km² in Ivorian territory) which originate in Guinea Conakry. In addition to these large basins, Côte d'Ivoire has about ten small coastal basins (Tano, Bia, Mé, Boubo, Anéby, Niouniourou, San-Pedro, Néro, Mene, Tabou) and sub-basins of Niger (Bagoé and Baoulé) (REEA, 2017).

The country comprises four agroecological zones: the Guinean zone, the Sudanese zone, the Sudan-Guinean zone 1, and the Guinean Sudan Zone 2. It is also divided into three major ecological zones: the river and rainforest forest area covering the rest of the coastal basin, the savannah zone (dominant vegetation in the country), and the Sudan area (REEA, 2017).

The climate is predominantly warm, humid, and tempered by Atlantic currents. Depending on the season, the country generally experiences significant temperature variations between the North and the South. The average temperature is around 28°C. The rainfall regime of Côte d'Ivoire is bimodal (coastal and south-in) or unimodal (North). The central coast has a transitional rainfall system, often bimodal or unimodal, depending on rainfall conditions. There are four (4) seasons, two of which are dry and two rainy. Rainfall varies from 950 mm in the northeast to 2400 mm in the southwestern and south-eastern extremes, conducive to diversified agriculture (REEA, 2017). Figure 2.1 represent the geographical map of Côte d'Ivoire.



Figure 2-1: Geographical and administrative map of Côte d'Ivoire (Ivory Coast) (Ducroquet and al, 2017)

The geographical conditions are favorable for cocoa cultivation.

2.2. Demography

The population of Côte d'Ivoire was 29.389.150 millions in 2021 including 15.344.990 of men and 14.044.160 women (RGPH, 2021), 5.616.48 households. The population is growing by 2,6% yearly (RGPH, 2021). More than 56% of its population is young, as figure 2.2.

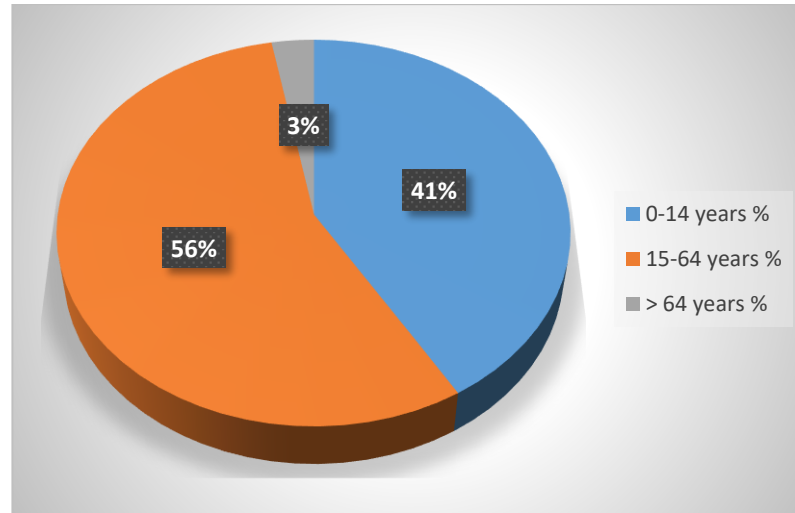


Figure 2.2: Population of Côte d'Ivoire by age group in 2021 (Source: countryeconomy.com)

In addition, poverty tends to decrease, and gross national income is rising. Life expectancy also increased from 53 years old in 2010 to 57 years old in 2018. The five-year mortality rate also reduced from 107 in 2010 to 81 in 2018.

In Côte d'Ivoire, more than 99,8% of the population enrolled in primary school in 2018. In comparison to Türkiye, Côte d'Ivoire has to work hard to fight poverty again, improve gross national income (GNI), life expectancy at birth, mortality rate under 5, and access to education.

Table 2.1: Demography data of Côte d'Ivoire in comparison with Türkiye (World bank, 2018)

	Côte d'Ivoire		Türkiye	
	2010	2018	2010	2018
Population, total (millions)	20.53	25.07	72.33	82.32
Population growth (annual %)	2.3	2.6	1.4	1.5
Population density (people per sq. km of land area)	64.6	78.8	94.0	107.0
Poverty headcount ratio at national poverty lines (% of the population)	48.9	46.3	16.1	13.9
GNI, PPP (current international \$) (billions)	51.79	100.77	1,249.72	2,275.27
Life expectancy at birth, total (years)	53	57	75	77
Fertility rate, total (births per woman)	5.1	4.6	2.2	2.1
Mortality rate, under 5 (per 1,000 live births)	107	81	17	11
School enrollment, primary (% gross)	79.7	99.8	101.3	93.2
School enrollment, secondary (% gross)	..	51	84	106

2.3. Environment

The global forest area of Côte d'Ivoire is 104,000 km² and terrestrial. In 2018 urbanization grew by 3,4%, and marine protected areas represent about 15% of the total territorial area (World Bank, 2018).

Table 2. 2: Environnemental view in Côte d'Ivoire in comparison with Türkiye (World bank, 2018)

	Côte d'Ivoire		Türkiye	
	2010	2018	2010	2018
Forest area (sq. km) (thousands)	104.0	104.0	112.0	118.2
Terrestrial and marine protected areas (% of the total territorial area)	..	14.9	..	0.2
Urban population growth (annual %)	3.2	3.4	2.2	2.2

2.4. Economy situation of Côte d'Ivoire

National currency of Côte d'Ivoire is Franc CFA (FCFA). Fixed parity of this currency exists between Euro (€). 1€ is 656FCFA

With the return of political stability and peace after a civil conflict that lasted from 2000 to 2011, Côte d'Ivoire has recorded an essential economic performance. Gross domestic product (GDP) was 43.01 billion dollars and increased by 7,4% in 2018. Côte d'Ivoire's monetary and exchange rate policies are managed at the regional level by the Central Bank of West African States (BCEAO), which maintains a fixed peg between the CFA Franc and the Euro (. Average annual inflation remained low at 0.5 in 2018). It is deficient in comparison to the yearly inflation of Türkiye.

Table 2.3: Economy situation of Côte d'Ivoire in comparison of Türkiye (World bank, 2018)

	Côte d'Ivoire		Türkiye	
	2010	2018	2010	2018
GDP (current US\$) (billions)	24.88	43.01	771.90	771.35
GDP growth (annual %)	2.0	7.4	8.5	2.8
Inflation, GDP deflator (annual %)	5.4	0.4	7.0	16.4
Agriculture, forestry, and fishing, value added (% of GDP)	25	20	9	6
Industry (including construction), value added (% of GDP)	22	25	25	29
Exports of goods and services (% of GDP)	51	30	20	30
Imports of goods and services (% of GDP)	43	29	25	31
Gross capital formation (% of GDP)	13	20	27	30
Revenue, excluding grants (% of GDP)	15.8	16.5	31.7	30.7

2.5. International trade profile

Cote d'Ivoire has a strong export orientation with a weak complexity and propensity to export manufactured goods. Cote d'Ivoire is the eighty-third largest

export economy in the world. In 2016, Cote d'Ivoire exports represented 30.8 percent of its GDP (US\$11 billion), while imports were 22.1 percent of GDP (US\$8 billion). As a result, the trade balance was positive at 8.7 percent of GDP (US\$ 3 billion). However, exports are low in complexity, reflecting the relatively low complexity of the economy (119th of 214 countries at -1.52). Its exports are dominated by unprocessed or little processed commodities (80%): Cocoa beans represent 36% of Cote d'Ivoire' exports, followed by cocoa paste (10%), petroleum products (10%), and rubber 6%). In 2019, the value of merchandise exports of Côte d'Ivoire increased moderately by 7.6 percent to reach 12.7 billion US\$.

Its merchandise imports decreased slightly by 4.4 percent to reach 10.5 billion US\$. The most significant merchandise trade balance was with Europe at 2.4 billionUS\$ (UN Comtrade, 2019).

Merchandise exports and imports in Côte d'Ivoire are diversified among partners; The top 19 partners accounted for 80 percent or more of exports, and 21 partners accounted for 80 percent or more of imports. In 2018, the value of exports of services of Côte d'Ivoire increased substantially by 18,5 percent, reaching 1,1 bln US\$. its imports of services increased moderately by 8,5 percent and reached 3,4 billion US\$.A considerable trade-in services deficit of 2,4 billion US\$ (UN Comtrade,2019). The export structure from Côte d'Ivoire in 2019 is represented in Table 2.4.

Türkiye is an important business partner of Cote d'Ivoire. In 2019. Cote d'Ivoire import value from Türkiye was estimated at 294 million of USD\$. capital goods, consumer goods, and intermediate goods represent 97% of imported products, as shown in Table 2.4.

Table 2.4.: Export products of Côte d'Ivoire (Trend economy)

Commodities	Value (billions us\$)	Share of commodity
Cocoa and cocoa preparations	4.94 billion us\$):	38%
Mineral fuels, mineral oils, and products of their distillation; bituminous substances; mineral waxes	2.13 billion	16.7%
Natural or cultured pearls, precious or semi-precious stones, precious metals, metals clad with precious metal and articles thereof; imitation jewelry; coin	1.07 billion	8.48%
Edible fruit and nuts; peel of citrus fruit or melons	1.01	7.98%
Rubber and articles thereof	0.9	7.14%
Animal or vegetable fats and oils and their cleavage	0.387	3.04%
Products prepared edible fats; animal or vegetable waxes	0.227	1.78%
Essential oils and resinoids; perfumery, cosmetic or toilet preparations	0.213	1.67%
ships, boats, and floating structures	0.181	1.43%
Ores, slag, and ash	0.171	1.34%

Table 2.5: Imported products of Côte d'Ivoire:: (World Integrated Trade Solution, 2019)

Product Group	Import (US\$ Thousand)	Import Product Share (%)
All Products	294553,64	100
Capital goods	61457,36	20,86
Consumer goods	59570,82	20,22
Intermediate goods	165335,26	56,13
Raw materials	8190,2	2,78
Animal	1069,04	0,36
Chemicals	15231,39	5,17
Food Products	13494,25	4,58
Footwear	1057,37	0,36
Fuels	24561,25	8,34
Hides and Skins	17,81	0,01
Mach and Elec	27459,2	9,32
Metals	67979,4	23,08
Minerals	86804,16	29,47
Miscellaneous	7248,87	2,46
Plastic or Rubber	8881,24	3,02
Stone and Glass	2338,06	0,79
Textiles and Clothing	7662,01	2,6
Transportation	21943,81	7,45
Vegetable	4966,8	1,69
Wood	3838,98	1,3

As exportation, exported products to Türkiye were estimated to be 160,78 million US\$. The main products shipped are raw materials such as agricultural products (Cocoa, rubber, cashew), as shown in Table 2.6.

Table 2.6: Imported-exported products between Côte d'Ivoire and Türkiye (World Integrated Trade Solution, 2019)

Product Group	Export (US\$ Thousand)	Export Product Share (%)
All Products	160782,18	100
Capital goods	70,99	0,04
Consumer goods	182,19	0,11
Intermediate goods	2452,84	1,53
Raw materials	158076,16	98,32
Food Products	137430,19	85,48
Fuels	78,73	0,05
Mach and Elec	44,55	0,03
Metals	26,5	0,02
Minerals	28,85	0,02
Miscellaneous	0,86	0
Plastic or Rubber	18912,02	11,76
Textiles and Clothing	2943,89	1,83
Transportation	29,13	0,02
Vegetable	740,62	0,46
Wood	546,85	0,34

2.6. Business environment

Cote d'Ivoire has recently been one of the ten fastest reforming countries in the world. It has improved its ranking on the World Bank's Ease of Doing Business Index (DBI) from 169th position in 2011 (out of 183 countries) to 139th position (190 countries) in 2018. Starting a business in Côte d'Ivoire is becoming accessible, as shown in Table 2.7.

Table 2.7: Business environment (World Bank, 2018)

	Côte d'Ivoire		Türkiye	
	2010	2018	2010	2018
Time required to start a business (days)	40	6	11	7
Domestic credit provided by the financial sector (% of GDP)	26.9	39.1	66.0	77.0
Tax revenue (% of GDP)	14.3	16.2	19.4	17.9
Mobile cellular subscriptions (per 100 people)	76.0	134.9	85.4	97.3
Individuals using the Internet (% of the population)	2.7	46.8	39.8	71.0
High-technology exports (% of manufactured exports)	4	7	2	2
Statistical Capacity score (Overall average)	59	70	84	77

2.7. Agriculture in Côte d'Ivoire

2.7.1. Produced agricultural products

Côte d'Ivoire is agricultural country. It has 20,300,000 hectares of arable land, which is 63% of its national territory. Many different agricultural products are cultivated for exportation and local consumption. The primary cultures are summarized in table 2.8. Despite agricultural product diversity, Côte d'Ivoire strongly depends on other countries to ensure food security. Here is the case with rice. Its local production covers only 50% of its needs. Indeed, its agricultural policy prioritizes the exportation of products such as Cocoa, coffee, palm oil, cashew, cotton, and rubber.

Table 2.8 : Agricultural product of Côte d'Ivoire

Product	Production (ton)	Export (ton)	Share in the world	world Rank
Coffee	229303 (FAOstat2017)	19.818 (2017)	1,2%	7th robusta 16th all coffee (2016)
Cocoa	1963949 (FAOSTAT 2018)	1963949 (FAOSTAT 2018)	40%	1st producer 1 mill
Cotton fiber	328.000 (2016)	327.600 (2016/2017)	0.5%	16th
Cashew nut	702000	665000 (2015)	24% (2015)	1
Oil of palm	460.000	231.000 (2016)	<1%	10th global 3rd African
Rubber	359.000 (2016)	359.000 (2016)	3% (2014)	10 th world - 1 st in Africa
Cane of sugar	180.000	19.000	1% (sugar of cane)	47th world
Banana	384.000 (2016)	364.000(2016)	nd	
Banana dessert	1.862.000 (FAOstat,2017)	20 400 (2016)	4.2% of	8th world
Plantain		25.500	nd	2 ndexporter on the EU(EuroStat
Pineapple				33 rd exporter of the EU (Eurostat)
Mango	100.000 (FAOstat,2017)	23.000 (2016)	nd	
coconut	70.000 (2016)	21.600	nd	
Rice	1.335.000 (2016)	of 24,500 (2016)	0,3%	28th world
But	as 700,000 (2016)	14.000 (2016)	<0,1%	68th
Sorghum	51.300			
Mil	52.300			
Fonio	18.800			
Yam	7.148.000 (2017)FAOstat	10.100	10%	3th global 3th in Africa
Cassava	5.367.000 (2017) FAOstat	13 200 (2016)		
Potato sweet	49.300	nd	nd	nd
Taro	76.100	nd	nd	nd

2.7.2. Importance of agriculture in Côte d'Ivoire's Economy

Côte d'Ivoire's economy is based on agriculture with significant natural potential: Agriculture such as food, agriculture for industry and exportation, livestock,

fishing and silviculture, and forest exploitation are principal activities. In 2015 food agriculture represented 10% of GDP, agriculture for industry and exportation, livestock fishing and silviculture, and forest exploitation represented 8,4%, 0,9%, 0,3%, and 0,1%, as shown by Figure 2.3.

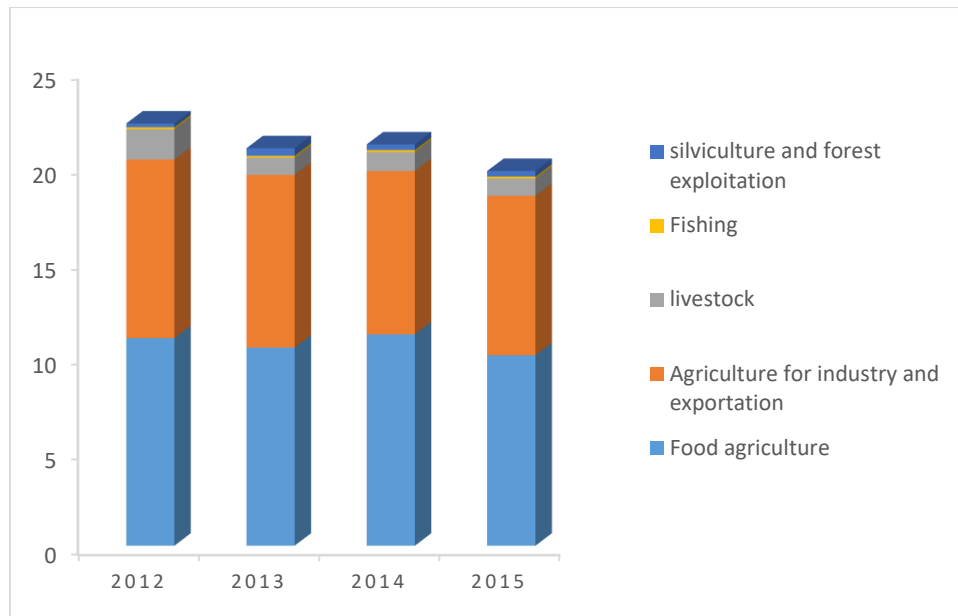


Figure 2.3. Principales agricoles activités share in GDP of Côte d'Ivoire (Ducroquet, H, 2017)

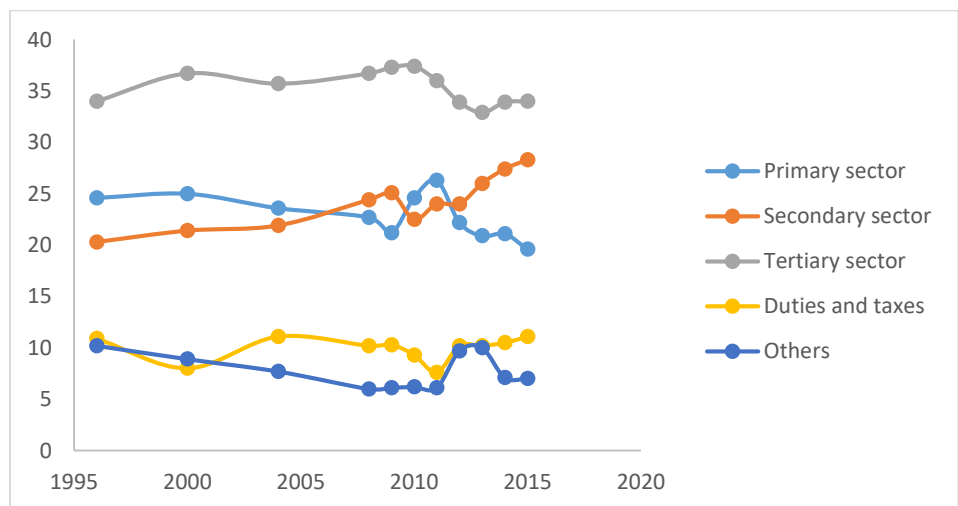


Figure 2.4. Evolution of Primary sector in GDP of Côte d'Ivoire ((Ducroquet, H, 2017)

Compared to the last 20 years, the agriculture rate in GDP is considerably decreasing. From 47 9% in 1960 agriculture rate in GDP is less than 20%. The secondary sector is becoming vital, as it is shown in figure 2.4. This trend change is

the government's request to make Côte d'Ivoire an industrial country thanks to its agriculture.

2.7.3. Management and organization of agriculture in Côte d'Ivoire

2.7.3.1. The ministries responsible for agriculture in Côte d'Ivoire

The agricultural sector in Côte d'Ivoire is managed by three ministries who are:

- The Ministry of agriculture and rural Development (MINADER);
- The Ministry of Animal and Fisheries Resources (MIRAH);
- The Ministry of Water and Forests (MINEF).

Ministries are responsible for policy development and implementation.

A coordination policy is provided by the programming or planning branch of each Ministry. The guidelines developed will be implemented in the regions and departments by the regional and departmental directorates of the ministries of guardianship. Directorates collaborate with para-state organizations, regulation authorities, training centers, research laboratories, private providers, NGOs, cooperative organizations, and producer associations.

2.7.3.2. Authorities of regulation

Regulatory authorities usually intervene when products are commercialized. Their central role is to mitigate the impact of fluctuations in international markets on farmers' incomes. There are three:

- The Café-Cacao council;
- The Cotton-Brazil nut Council;
- The regulator controls and monitors the activities of the rubber and palm oil sectors.

In addition to these regulatory authorities, we have:

- The *Office National de Développement de la Riziculture* (ONDR): is responsible for rice issues. Established in 2010 and restructured in 2012 as a public administrative institution, the ONDR has drawn up the National Rice Development Strategy and is responsible for its implementation.

- The food marketing aid office (OCPV): has a facilitating role in the marketing and distribution food products.

2.7.3.3. Para-state structures

2.7.3.4. Interprofessional Fund for Agricultural Research and Council (FIRCA)

FIRCA mobilizes resources and ensures sustainable funding for programs that provide applied research services, agricultural advice, trades training, and capacity building for professional farm organizations.

2.7.3.5. National Rural Development and Support Agency (ANADER)

Its mission is to improve the rural world's living conditions by professionalizing operators and takeover bids by designing and implementing appropriate tools and programs to ensure sustainable and controlled development. ANADER provides a wide range of services: agricultural advice, training, land development planning, rural engineering, environmental structuring and microfinance, farming surveys and statistics, production and multiplication of educational tools, feasibility studies of projects and cooperatives, monitoring evaluation and impact studies of projects, environmental management.

2.7.3.6. The national office of technical studies and development (BNETD)

It is active in agriculture, animal production, applied pedology, rural development, forestry, and rural land. She carries out technical studies of development projects and programs, sectoral studies and restructuring of agricultural sectors, and the mastery of works of rural engineering.

2.7.3.7. Private Structures and NGOs

The Federation of Development NGOs of Côte d'Ivoire (FEDOCI), created in 2012, is a fact that brings together, according to its website fedoci.ci, 2016, 886 NGOs, Associations, Cooperative Societies, and Mutual Developments throughout the Ivorian territory.

2.8. Cocoa sector in Côte d'Ivoire

Cocoa with Côte d'Ivoire is like a body and its heart. Cocoa is a mandatory income source for Côte d'Ivoire.

2.8.1. History of cocoa cultivation in Côte d'Ivoire

The scientific name *Theobroma* is native to Central and South America, specifically Mexico in the Yucatan peninsula and the Orinoco and Amazon basins.

Cocoa is grown at 20 degrees in the north and 20 degrees in the south of Ecuador. There are three main varieties: Forastero, Criollo, and Trinitario, a hybrid form between Forastero and Criollo. As for its growth, the cocoa tree can grow to 7.5 meters high and live between 25 and 40 years.

However, it matures around the age of 10. The fruit, called a pod, has a size that varies between 15 and 30 cm in length and 7 and 10 cm in width. The outer shell is marked by 5-10 furrows that harden as it matures. Each pod contains about forty seeds called addicts or beans.

After extracting the fruit, the grains are placed in heaps and covered with banana leaves so that they ferment. Then they are dried to drain them to the maximum of their moisture, sacked, and close to being exported. They are used to make cocoa butter, cocoa powder, and chocolate. The cocoa farming system relies on small family farms with outdated farming practices (ICCO, 2012). The product was introduced in Côte d'Ivoire by the French metropolis at the end of the 19th century.

The most widely used type in the world, Forestaro, is also the one grown in Côte d'Ivoire. According to the Ministry of Agriculture, cocoa cultivation in 2007 was concentrated in the following areas (Kouamé, 2012):

- "Down Sassandra" region is the largest cocoa production area in the country, with 42% of national production;
- The Southern Bandama region, with 12% of the national output;
- The Upper Sassandra region, with 9% of national production;
- The Fromager region, with 8% of national production;
- The Middle Cavally region, with 7% of the national output.

2.8.2. Cocoa Production, Export, and Processing in Côte d'Ivoire

In Côte d'Ivoire, the production of Cocoa is mainly on small farms of less than 5 hectares. In 2018 total area harvested of Cocoa was estimated at 4.770.000 ha (FAOstat) 2019, and it is constantly increasing, as shown by diagram 1. The yields per hectare are 400 to 500 kg/ha (Malan, 2009; Kouamé, 2012) and are decreasing (Figure 2.5). While the area harvested is increasing, yields are falling. To increase income, farmers prefer to practice extensive agriculture.

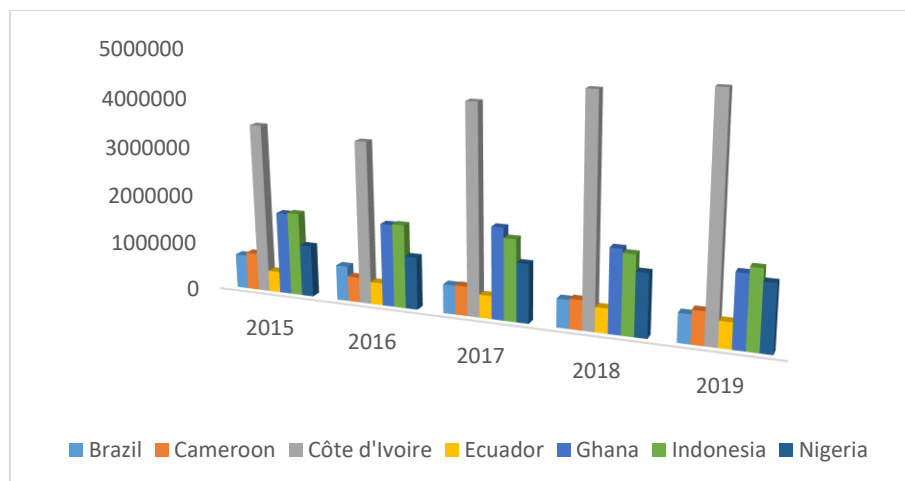


Figure 2.5: Area harvested of Cocoa (2015-2019) (FAOstat, 2019)

In Côte d'Ivoire yield is estimated at 455kg/ha. Yields are lower than yields in the experimental station (2t / ha) of the National Center for Agricultural Research. The diagram below shows the yields in the major producing countries.

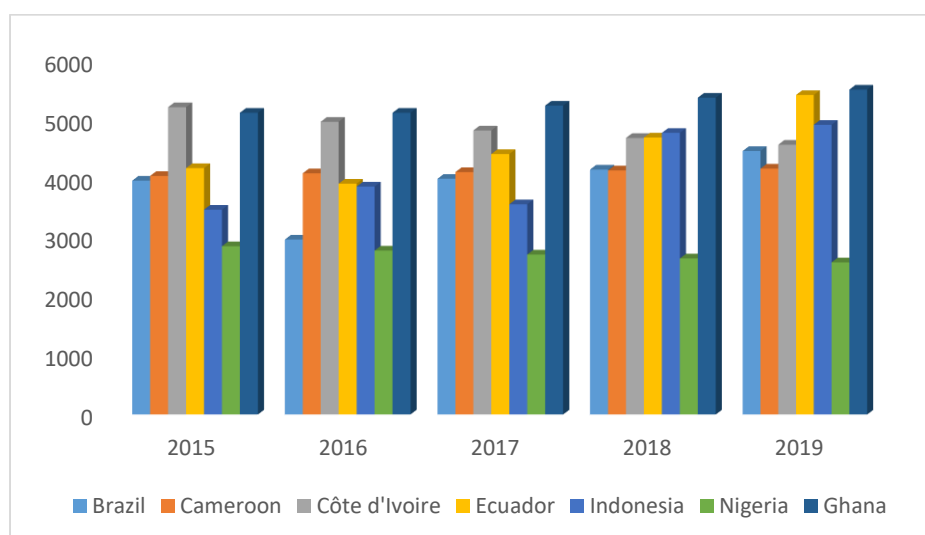


Figure 2.6: Cocoa Yields from 2015 to 2019

Côte d'Ivoire has been the world's largest cocoa exporter for more than a quarter of a century. It supplies 40% of the world's production, which represents 2,000,000 tons in 2018 (World Bank, 2019).

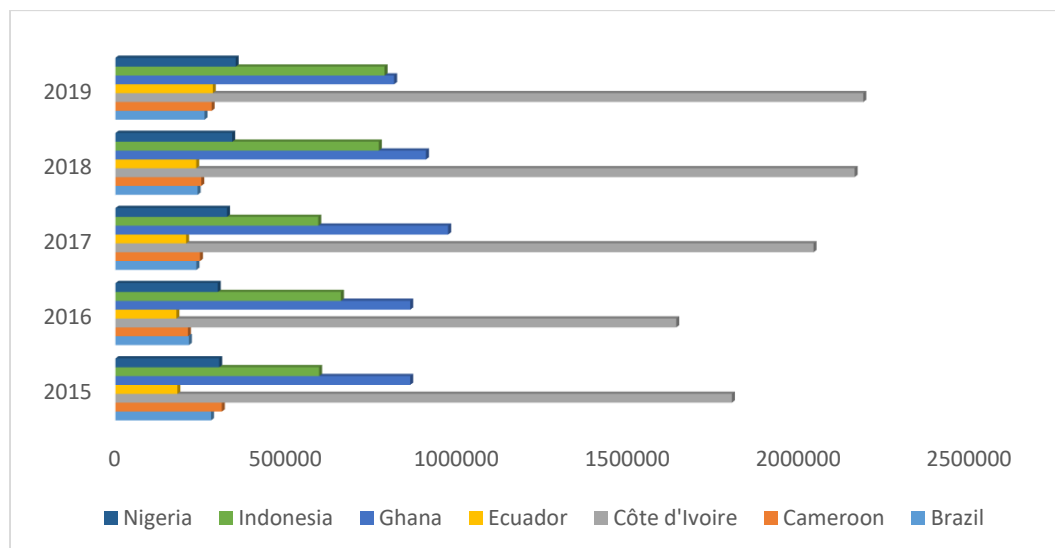


Figure 2.7: Cocoa production's evolution (2015-2019) (FAOSTAT, 2018)

This production intends to remain at 2,000,000 tons according to the government objective.

2.8.3. Cocoa value chain in Côte d'Ivoire

The cocoa value chain in Côte d'Ivoire can be divided into five parts:

2.8.3.1. Production by farmers

In Côte d'Ivoire, Cocoa is produced by more than 1.000.000 small farmers. Small farmers represent 80-85% of cocoa bean producers of the cocoa value chain, meaning they make more than 1.600.000 tons of Cocoa for the world. Unfortunately, the rate is significantly lower, and they live in very difficult conditions. More than half of farmers live under the poverty line, on less than 757 FCFA (about 1.2 dollars) per day. Farmers capture only about 7% of the total value added to the global cocoa value chain. The production operation Nursery, cocoa plant growing, cocoa pod harvesting, and cocoa bean fermenting and drying are conducted with archaic equipment, making the work even more difficult without credit.

2.8.3.2. Sourcing and exportation

The cocoa trade is carried out by several actors whose main activities are collection, transport, local marketing, and export. Farmers sell Cocoa after drying to small traders who do the assembly for large exporters. These small traders are either trackers of cooperatives or purchasing organizations. These small traders sell the Cocoa to local exporters or processors. They capture about 2% of the total value added

to the global cocoa value chain. Their activities include sourcing cocoa beans, cleaning, and selling to large cooperatives, exporters, and first manufacture companies.

2.8.3.3. Processing or first manufacturing

To increase its share in the global value chain, Côte d'Ivoire has to improve the first processing of cocoa beans. This goal has allowed Côte d'Ivoire to be the world's first mill of cocoa beans ahead of Holland, i.e., 605,000 tons crushed during the 2018-2019 campaign, representing more than 13% of global processing and 28% of its production as indicated by the diagram 2.7.

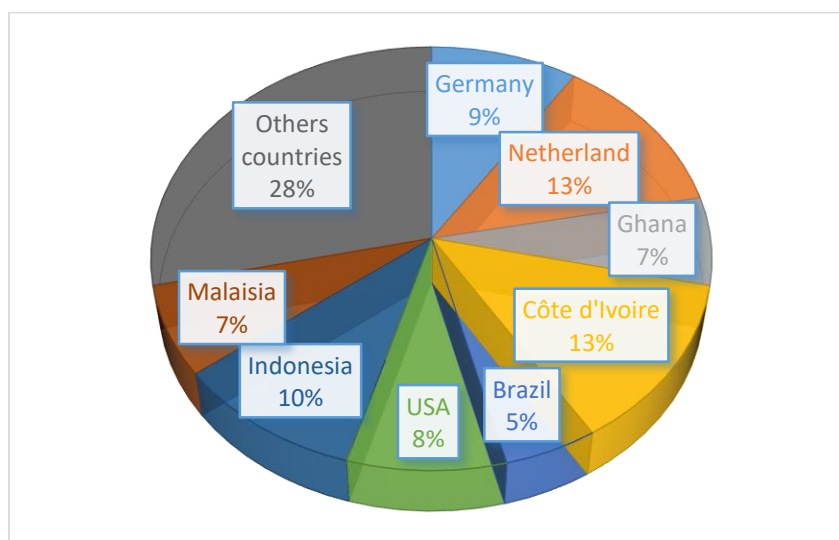


Figure 2.8. : Cocoa primary processing countries (ICCO, 2018-2019)

Its added value only increased by 2% in the sector's total value. Secondary transformation of Cocoa is made outside of the country. The value chain of Cocoa is resumed in diagram 2.8.

The blue part represents the Value chain of cocoa inside Côte d'Ivoire ●
the orange section represents the Value chain outside of Côte d'Ivoire ●

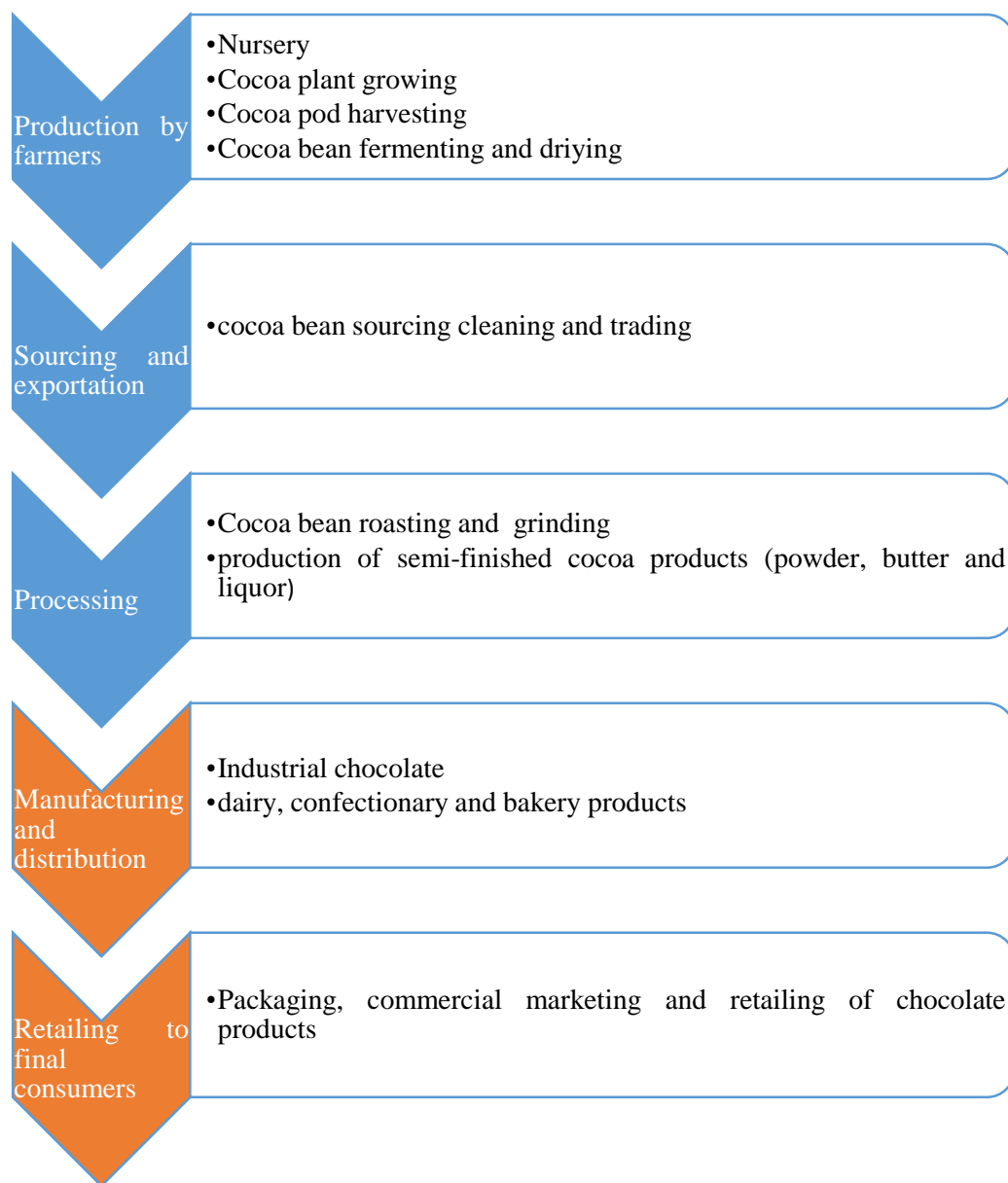


Figure 2.9: Value Chain of Cocoa in Côte d'Ivoire

2.9. Cocoa Sector Organization in Côte d'Ivoire from production to exportation

A public-private partnership carries out the development of the cocoa sector. The government intervenes under the cap of the coffee-cacao council.

2.9.1. Coffee-coca council

2.9.1.1. Creation and status of coffee-cocoa council

Coffee-Cocoa Council is The Council of Regulation, Stabilization, and Development created by ordinance No. 2011-481 of December 28, 2011, setting the rules for the marketing of coffee and Cocoa. The coffee-Cocoa Council is under the

tutelage of the Agricultural Ministry in technical terms and the Ministry of Economy and Finance in financial terms. The Coffee-Cocoa Board is administered on a parity basis between government and inter-professional affairs within a Board of Directors.

2.9.1.2. Cafe-cacao council goals

- Strengthen good governance and transparency in resource management;
- Developing a sustainable cocoa and coffee economy through production reorganization and productivity improvement;
- Securing producers' income by setting a guaranteed minimum price and improving domestic and external consumption;
- Establish a solid inter-professional position based on credible producer organizations.

2.9.1.3. Missions of the Coffee-Cocoa Council

The Coffee-Cocoa Council is responsible for:

Regulation missions

- Assist the government in negotiations of agreements; international focus on the marketing and implementation of Coffee and Cocoa;
- Manage all the activities of the Coffee-Cocoa Branch;
- Control quality of Coffee and Cocoa;
- Ensure the financial participation of the government in international coffee and cocoa organizations;
- Accredite the operators of the Coffee-cocoa Branch;
- To oversee the development of projects aimed at helping to improve the quality of products.

Stabilisation missions

- Physical stocks of coffee and cocoa Monitoring ;
- To realize the forecast of coffee and cocoa harvests ;
- Set purchase prices for coffee and cocoa producers and ensure compliance with the application of these prices ;
- Organize and monitor the internal marketing of coffee and Cocoa;
- Organize and monitor the external marketing of coffee and Cocoa;
- Manage e-mail for coffee and cocoa export sales operations ;
- Implement price stabilization mechanisms for coffee and cocoa producers ;
- manage packaging and export operations for coffee and Cocoa;

- Establish a system of compensation between the guaranteed purchase price to producers and the export selling price of coffee and Cocoa;
- produce and disseminate statistics nationally and internationally ;
- Develop and implement trade action programs;
 - **Development missions**
 - Identify and implement any measures to increase the productivity of coffee and Cocoa;
 - Bringing technological innovation and scientific research closer to producers ;
 - Helping the government to combat the worst forms of child labor in cocoa farming ;
 - Promote the improvement of the quality of production and packaging of coffee and Cocoa;
 - Promoting the industrial processing of coffee and Cocoa;
 - Promoting National Coffee and cocoa exporters ;
 - Promoting Ivorian coffee and Cocoa on the international market ;
 - Develop with the support and development structures and with the partners of the coffee and cocoa sector, agreements in the fields of Research, Extension, and agricultural advice and monitor their implementation ;
 - Organize the Strategic and health monitoring of the coffee and cocoa sector to anticipate the issues and challenges of the sector ;
- Promoting national consumption ;
- Promoting the contribution of the coffee and cocoa sector to rural development;
- Carry out any other activities within the scope of its missions and assignments unless otherwise advised by the government.

Many actors play important roles in the cocoa sector. From farmer to final consumer, a lot of actors are developing a business that creates a too long and more complex value chain. They are farmers, cooperatives, Trackers, Handlers of centers of collection, Buyers, Transporters, Exporters, Bankers, Insurers, Third-party owners, State, Dealers, Rice millers, Structures in charge of control quality, Structures responsible for the control of phytosanitary, Acconier, Charterer, Owner, Sales Agent freight, Forwarder, Loader, BCC, FRC, FDPCC, FGCCC(Table 2.9).

Table 2.9: Actors of the cocoa sector from production du exportation

Stakeholders	Description
Producers	Small planters; Devoted to the cultivation of Cocoa; Holding 620000 plantations.
Cooperative	Organization of producers (340 approved and 140,000 members); Collect and sells the products of members; provide the products for plant protection to the members.
Trackers	Crisscross the villages to gather the most products. Working for various buyers. Mastered the production areas
Handlers of centers of collection,	They were charging and discharging the trucks of the pickup from the villages.
Buyers	Persons approved by "ARCC, purchasing Cocoa. Working for various exporters,
Transporters	Persons involved in the transport of the plantations in the center of the collection
Exporters	People buying or pre-financing the products with the purchasers, the cooperatives, the producers individual
Bankers	Is the money available to exporters for the purchase of products? Finance the cooperatives and some of the buyers.
Insurers	Provide the product to the plan, interior, plan of insurance, maritime, and at the time of transport from the port of Abidjan
Third-party owner	Certifies the existence of the stock in his possession. Issues the letter of third-party custody
State	Intervenes in the sector through the directorate of promotion of rural and offers public purchase
Dealers	Pre-sells the product of the base or the products semi-finished.
Rice millers	Operators or owners of the plant packaging the product for export
Structures in charge of control quality,	Analyze the product to be exported and issue a certificate certifying its quality.
Structures responsible for the control of phytosanitary	Desinsectise the product before its boarding.
Acconier	Takes care of lots of products in the store at the point of delivery contractual
Charterer	A person is reserving the use of the ship
Owner,	The person providing ship the equipment, the food, the fuel, the captain, the crew
Sales Agent	Representative of the recipients of the ship
freight Forwarder	Commercial Agent acting for the account of the charger to boarding, the account of the receiver to landing
Loader	Responsible for loading the vessel to the boarding.
BCC	Supervised and monitoring of transactions, purchases, and export.
FRC	Control the financial situation of exporters and information relating to violations by the exporters of their contractual commitments.
FDPCC	Finance the activities of the producers of the channels.
FGCCC	Ensures the guarantee of the financing bank granted to the cooperatives

2.10. Literature review

Credit is an essential factor that increases the production and income of the farmers (Khalid Bashir and Mehmood, 2010).

Agricultural credit sources can be divided into two-part such as formal and informal (Abbas AC and al, 2017).

The relationship between agricultural credit and technical efficiency has been studied with different econometric estimation techniques depending on the underlying assumptions. Many researchers in the world were applied the propensity score matching method; other researchers (Coelli and Battese, 1996; Martey et al., 2015) using the Stochastic Production Frontier (SPF) have measured the impact of agricultural credit on productivity. Consequently, improving access to credit can increase smallholder farmers' investment choices and provide them with more effective tools to manage risks and increase farm efficiency. Another study by Masuku et al. (2015) assessed the effect of credit on technical efficiency (TE) among farmers in Swaziland. Its study's findings showed that credit positively impacted the technical efficiency of tomatoes, cabbage, and beetroot.

Similarly, the results were established recently by Duy et al. (2012) in a study to examine the impact of formal and informal credits on the rice production efficiency of households in the Mekong Delta. To investigate the role of credit in ensuring efficiency in the context of West Bengal agriculture, Laha (2013) conducted a disaggregated analysis for two mutually exclusive groups: bank customers and non-bank customers. The results showed that farmers who accessed formal credit practice cultivation more efficiently (by channeling credit in the utilization of agricultural inputs) than farmers with less access to credit. Abdallah (2016) estimated the effect of credit on the technical efficiency (TE) of maize farmers in Ghana. The researcher used a two-stage estimation procedure like the probit regression model and a stochastic frontier approach to estimate the impact of credit on the technical efficiency of Ghanaian maize farmers. The results revealed that maize farmers are producing below the frontier with average technical efficiency of 47 percent. Further, results showed that credit increased technical efficiency by 3.8 percent. In Côte d'Ivoire, few available studies (Djato, 2001) and YEO (1968) analyzed the impact of credit on rice productivity. Djato (2001) showed that farmers with access to credit have more economic efficiency than those without access to credit.

His analysis can not be generalized to the cocoa sector because of the agroecological difference between rice and Cocoa. However, his study and methodology can guide the impact of agricultural credit on other products such as Cocoa.

The debate on methodology in social science is still controversial as regards the choice of approach. The most crucial aspect of any research is how it is conducted, which means that the research method is the key to successful research. The choice of method is very determinant because it determines how analysis can be accomplished. Every researcher has the option of either the quantitative or qualitative approach or the use of multiple ways to generate and analyze different kinds of data in the same study.

3. MATERIAL AND METHODOLOGY

The study was conducted using the following steps: preliminary study, comprehensive literature review, and data collection using key informant Interviews (KIIs) (Ta, 2019). For each step used, materials and methods will be described.

3.1. Preliminary study

After defining the topic, it was necessary to prove its originality and interest. For that, a preliminary study consists of submitting a list of responses to the following question: What can cause the low cocoa yields in Côte d'Ivoire? These responses represent the leading causes of the farm's low yields found after brainstorming. A total of twelve (12) answers were proposed. Among these responses, attention has been paired to three: Low use of agricultural fertilizers, Inaccessibility to agricultural credit, and no subsidy to farmers. Each answer was noted from 1 to 5, as shown in Table 3.1.

Table 3.1: Preliminary study's questionnaire

Responds	Responses Notation (R)				
	1	2	3	4	5
Climate changes					
Lack of farms maintenance					
Low use of agricultural fertilizers					
Causes related to diseases					
Poorness of soil					
Inaccessibility to agricultural credit					
No subsidy to farmers					
High cost of agricultural inputs (fertilizers, equipment, agricultural equipment, etc.)					
Farmers supervising problems					
aging status of cocoa farms					
The advanced age of cocoa farmers					
Not interested in the sector					

The answer's importance (A_i) was calculated by using the following equation:

$$A_i = \sum_{R=1}^5 R * Nr$$

Where R represents the not given by the responder for each question and Nr means the total of the responder who offers the same response for the question.

If defined causes represent more than 75% A_i , the topic is original and interesting to the public.

3.2. Comprehensive literature review

To select quality articles, thesis, and information, google Scholar, science direct, and research gate were visited. Keywords such as "access to agricultural credit," agricultural credit in Côte d'Ivoire, analysis of the agricultural credit system, agricultural credit access of farmers," factors affecting access to agricultural credit," determinants of agricultural credit access, agricultural credit markets credit Constraints "etc. were used for searching relevant articles.

Among more than 1000 articles, some were excluded from the scope of the research focusing only on the « agricultural credit system in cocoa production »cocoa farmers' constraints of agricultural credit access. Only less than 20 articles have been selected and allowed to do a literature review and define materials and methodology.

3.3. Sampling

The niche of this study is cocoa farmers who have access to input credit or are not located in the mountain region of Côte d'Ivoire. Primary and secondary data will be collected. For collecting primary data, the sample size is defined by the following formula :

$$n = \frac{t^2 * p * (1-p)}{m^2}$$

n: sample size for survey

t: Confidence level. The confidence level of this study is 95%, so the value will be 1.96%

p: estimated proportion of the population with characteristics. This study considers 50% of farmers and 50% of non-farmer in the rural population.

m: Margin of error generally set at 5%

$$n = \frac{(1.96)^2 * 0.5 * (1-0.5)}{(0.05)^2}$$

n=384 farmers in the region of mountain

The survey will be a face-to-face interview in a group and individually. The survey will be done from 1 January 2021 to 1 February 2021.

3.4.Data collection

3.4.1. Primary data collection

Primary data collection started by defining the questionnaire. It was collected from small farmers, banking specialists, cocoa cooperatives chairman, fertilizer sellers, village chiefs, and community Chairmen. To not waste paper and fight Environment degradation again, Kobo tools were used to build a questionnaire and collect primary data (annex 2).

3.4.2. Secondary data collection

Secondary data for this paper has been collected from the Annual report on financial inclusion 2020, the ministry of agriculture and rural development website, FAOstat, ICCO website, and the Agriculture fertilizer website.

3.5. Data analysis

Data will be analyzed by using SPSS and Microsoft excel. The hypothesis will be accepted or rejected by the methods of descriptive statistics and linear correlation. Analyse will pair attention on the following variables listed in Table 3.2.

Table 3.2. Variables of study

Variable	Unit	Minimum	Maximum	Mean
Output	Kg/Acre			
Land	Acre			
Fertilizer used	Ton/acre			
Labor	Person/day/acre			
Loan	FCFA			
Age	Year			
Education Level	Year			
Experience	Year			

Gross profit and revenue analysis will be made to establish the impact of fertilizer on both variables. Variables will be calculated in Table 3.3. Tree scenarios were made : First scenario: without using fertilizer: 0kg/ha; Second scenario: using fertilizer: 250kg/ha; Third scenario: using average fertilizer: 60kg/ha.

Table 3.3. Gross profit analysis variables

Variable	Calculation	unit	0 kg/ha	60kg/ha	250kg/ha
Variables charges (VC)	$\sum input$	USD			
Revenue (R)	Op*Gmp	Usd/ha			
Gross profit (Gp)	R-VC	Usd/ha			

4. RESULTS AND DISCUSSIONS

4.1. Preliminary study's

The result of the preliminary study is dressed in Table 4.1.

Table 4.1: Causes of low cocoa yield in Côte d'Ivoire

Responses	Responses Notation (R)					Total
	1	2	3	4	5	
Climate changes	1	4	9	4	4	72
Lack of farms maintenance	1	0	4	9	8	89
Low use of agricultural fertilizers	0	6	7	3	6	75
Causes related to diseases	3	1	5	11	2	74
Poorness of soil	2	3	3	7	7	80
Inaccessibility to agricultural credit	3	2	5	6	6	76
No subsidy to farmers	0	4	7	4	7	80
High cost of agricultural inputs (fertilizers, equipment, etc.)	0	5	7	2	8	79
Farmers supervising problems	1	3	6	5	7	80
aging status of cocoa farms	1	3	4	7	7	82
The advanced age of cocoa farmers	0	10	5	6	1	64
Not interested in the sector	8	3	8	2	1	51

According to Table 4.1, lack of farms maintenance (89) is the first leading cause of cocoa farms lower following by the aging status of cocoa farms (82), Farmers supervising problems and No subsidy to farmers (80), High cost of agricultural inputs (79) and Inaccessibility to agricultural credit (76). High cost of agricultural inputs (79) and Inaccessibility to agricultural credit (76) are scored up to 75. So the topic is original and interesting to the public.

4.2. Descriptive statistic

Descriptive statistic result is given in Table 4.2. this table presents the minimum, maximum, and average of each variable. This table shows an average farmer aged about 52 with 10.3 years of experience in cocoa production, having a primary level (4.6year), working with four persons on a farm of 2.75ha. Its farm aged about 9.2 years. On the area of 2.75ha, farmers earn 1.9874 tons of Cocoa, representing 723kg/ha as yield. To produce this quantity, farmers spend around 125 USD without receiving credit.

Table 4.2: Statistiques descriptives

	Minimum	Maximum	Average
Age farmer (year)	21	70	51,81
Output (kg)	,40	7,00	1,9874
Labor (person)	1	9	3,59
Land (ha)	1,00	8,00	2,7480
Access to credit (yes/no)	0	1	,04
Fertilizer uses (USD)	40	485	125
Educational level (year)	0	10	4,63
Experience (year)	1	35	10,31
Farms age	1	41	9,20

4.3. Identity of farmers

According to the survey, more than 40% of farmers are old between 50-55 years, and more than 91% are around 40-60 year like shown in Figure 4.1. Elderly persons conduct this figure show than cocoa farming. Compared with Life expectancy at birth, a total (of 57 years old in 2018), loaning credit to farmers appears to be a risk.

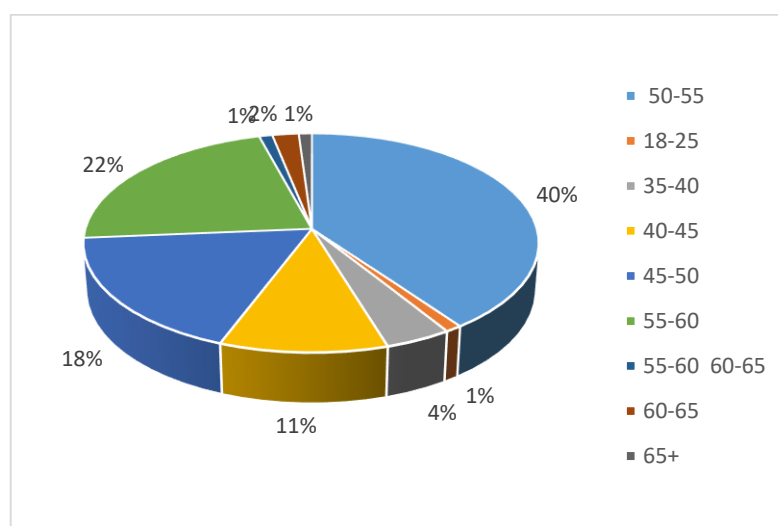


Figure 4.1: Age of small cocoa farmers

As concerning education level, small farmers' education degree is deficient, as shown by Figure 4.2. The primary school represents the high level of more than 50% of small farmers. It is essential to notice that they can't allow them to understand finance, credit systems, and investment.

It can impact their possibility of accessing credit.

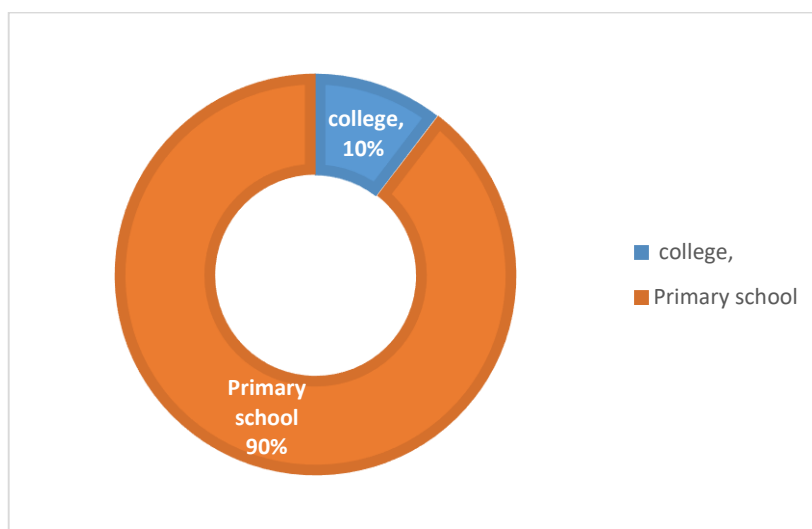


Figure 4.2.: Education degree of small cocoa farmers

Small farmers have experience in cocoa farming. Sometimes they worked with their parents after they started working for themselves. Unfortunately, due to the penibility of work, small farmers don't encourage their daughters to work as cocoa farmers. This case also increases the risk of accessibility to agricultural credit.

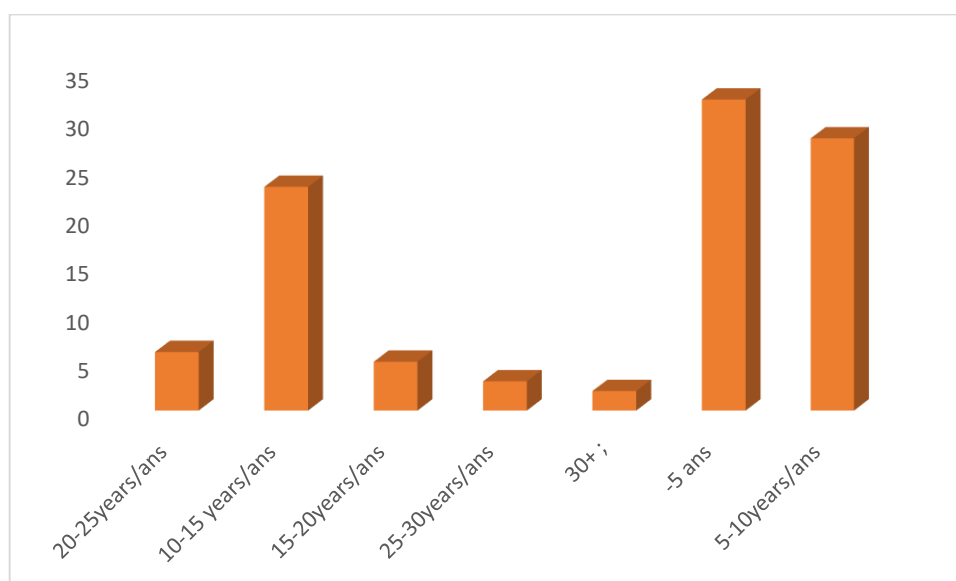


Figure 4.3. Work experience level of small farmers

4.4. Access to agricultural credit

Access to agricultural credit in cocoa production was the first problem of this study. Data reveal that only 4% of the sample have access to agricultural credit to produce Cocoa, as shown in Figure 4.4.

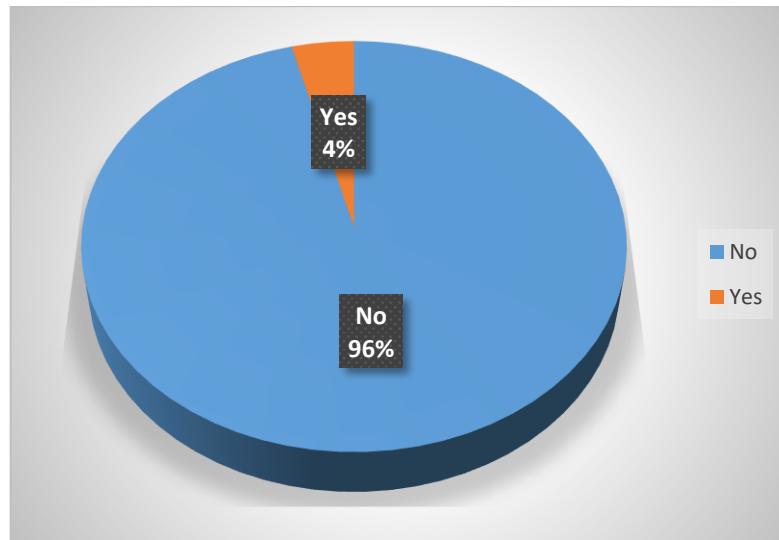


Figure 4.4: Share of the farmer who has access to agricultural credit in the study area

This percentage is very insignificant. According to hypothesis 1, farmers Cocoa farmers have very limited access to financial resources. The question is: is there an agricultural credit system in Côte d'Ivoire? If it exists, do farmers not have access to agricultural credit? It is essential to make the history of agricultural credit in Côte d'Ivoire, then provide a diagnosis of the agricultural credit system nowadays and finally give reasons for the inaccessibility of agricultural credit.

4.5. History of agricultural financing in Côte d'Ivoire

The research allowed the establishment of three different periods of agricultural credit in Côte d'Ivoire.

4.5.1. Before independence (before 1960)

Agricultural financing in Côte d'Ivoire started before independence with the creation of several financial institutions that succeeded each other:

➤ **The *Caisse centrale de credit Agricole mutuelle (CCCAM)***: created by the colonial administration in 1926, the CCCAM's objective was to finance households, and farms, the creation of rural trails, and the selling of agricultural products. His financing mode was direct credit until 1931. For reasons of arrears estimated at 47% of the outstanding loans, the CCCAM was dissolved in 1957 and replaced by the *Crédit de Côte d'Ivoire (CCI)*;

➤ **The *Crédit de Côte d'Ivoire (CCI)***: established in 1955 to replace CCCAM, CCI was a multi-purpose institution. It financed the industrial, trade, and agriculture sectors. This structure granted direct individual loans in collective loans to

cooperatives or mutual rural provident societies (SMPR) through the National Center for Cooperative and Agricultural mutuality (cncma). The share of credit given to agriculture was small due to its versatile nature. Having accumulated an unpaid rate of 36%, the Crédit de Côte d'Ivoire was dissolved and replaced by the Caisse nationale de crédit agricole (CNCA) in 1959.

➤ **The Caisse Nationale de Crédit Agricole (CNCA):** this institution only specialized in agricultural credit unpaid rate increase until 23 % in 1968 and was replaced by the creation of a real agricultural bank named “*Banque Nationale du développement Agricole (BNDA)* (Améthier, 1989).

4.5.2. After independence (1960-1991)

The National Bank for Agricultural Development (BNDA): was created in 1968 by Law 68-08 of July 06, 1968. A mixed economy company, it had a capital where the government was a majority shareholder (60.6%), as indicated in Figure (4.5).

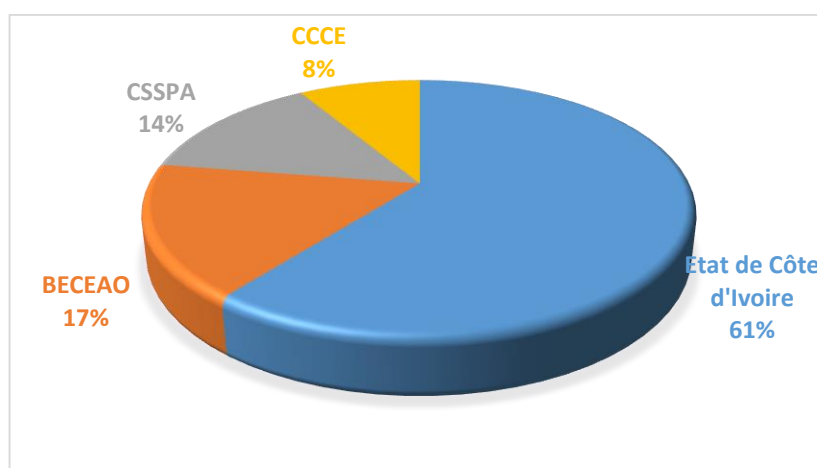


Figure 4.5: Shareholders of BNDA

This bank had a regular exercise until 1986 with a maximum recorded level of credit in 1981-1983. It was only from 1986-1987 that problems arose. With delinquencies of 64% and charges increasing uncontrollably, the bank was dissolved in 1991. Until today there is no traditional bank of agricultural credit.

4.5.3. After independence (1991 until nowadays)

Several funds existed to support agriculture and particularly the cocoa subsector. Unfortunately, these funds have proved to be powerless. These are:

The Guarantee fund for cocoa producers (Guarantee Fund for Cocoa Coffee Cooperatives) was created in 1991, but the approval of this fund was withdrawn in 2008. This fund assumed 80% of the borrowers' default risk. Initially launched in 2004 to support SMEs and the rural world, the Bank for Financing of Agriculture (BFA), an 83% state-owned banking institution, was also liquidated in 2014. It should be noted that the existence of a guarantee fund within the cooperative group (called Groupement à Vocation Cooperative (GVC) in French) created in December 1991 by the government of Côte d'Ivoire and the European Union, with a view to the liberalization of the coffee-cocoa sector.

Figure 4.6 summarise the history of agricultural credit from 1960 to 1991

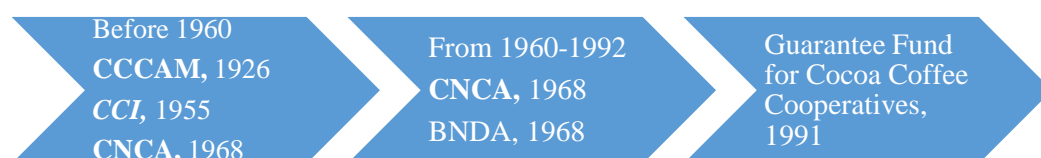


Figure 4.6. Evolution of agricultural credit in Côte d'Ivoire

History shows many efforts made by the government to assist agriculture from independence to nowadays, but the solutions are not efficient and failed. These multiple failures can explain the causes of farmers' access to agricultural credit.

4.6. Agricultural credit system in Côte d'Ivoire

4.6.1. The formal agricultural credit system

The formal agricultural credit system in Côte d'Ivoire is almost non-existent, and no bank is specialized in the financement of cocoa farmers. However, existing commercial banks provide credit to every sector. According to BCEAO, on September 30, 2021, a total of 30 banks were listed.

The data collected show that these banks dedicate only 6% of their credit portfolio to the agricultural sector. 95% of this financing is granted to cocoa processors and exporters via overdraft and Advance On Pledged Products (ASPG) and to 5% of producers through their cooperatives. The criteria of receiving credit fixed by banks can suit the farmer. Less than 5% of farmers do not have an account bank, and incomes are very low to lay up in banks as warranted. This also explains the inaccessibility of agricultural credit.

4.6.2. Decentralized financial systems

Decentralized financial Systems are defined as mutualistic institutions or credit savings cooperatives, structures, or organizations not incorporated in the mutualistic form to collect savings and/ or grant credit. They are not approved as banks or financial institutions and are subject to a special regime. The SFDs are closest to the rural population. In September 2021, Côte d'Ivoire had 47 approved decentralized financial companies, an increase of 2 SFD compared to the year 2020, as shown in diagram 4.7

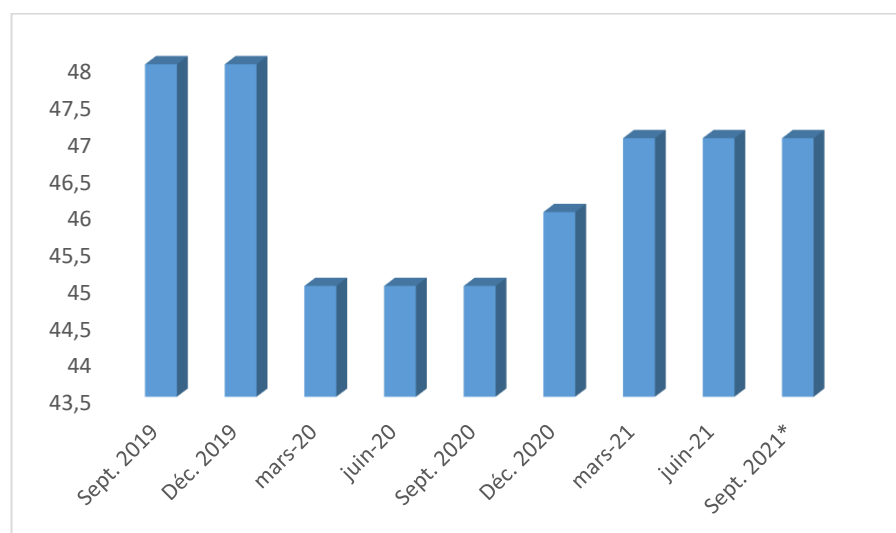


Figure 4.7. Number of SFD 2019-2021 (Source: APSFD-CI, 2021)

With 4,100,000 customers, the sector increased its customer base to more than 50% compared to 2019 and is experiencing a growth of 21.6% compared to the same year.

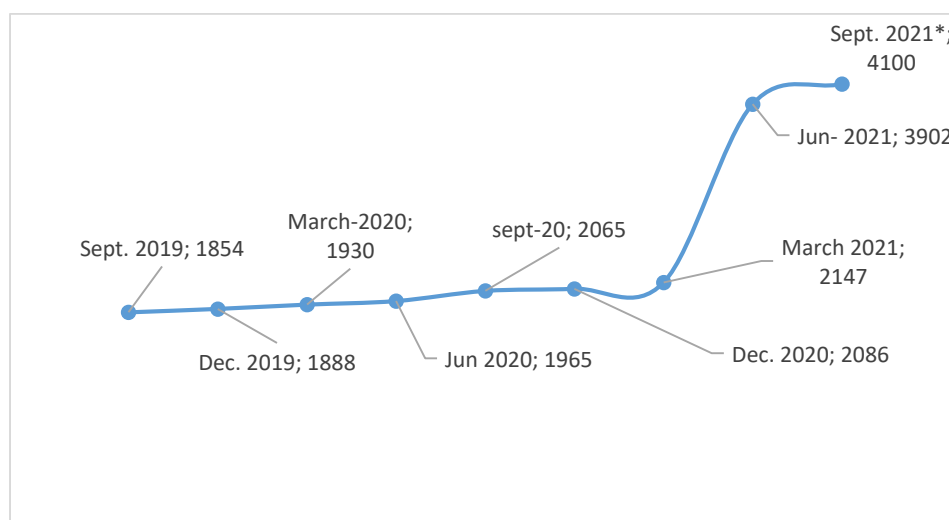


Figure 4.8. Evolution of customers number (source: APSFD-CI, 2021)

This growth is slightly correlated to the development of cocoa farmers with an account in these institutions. In addition, the homeless are getting closer and closer to the rural environment with a gradual opening of agencies, as shown in diagram 4.9.

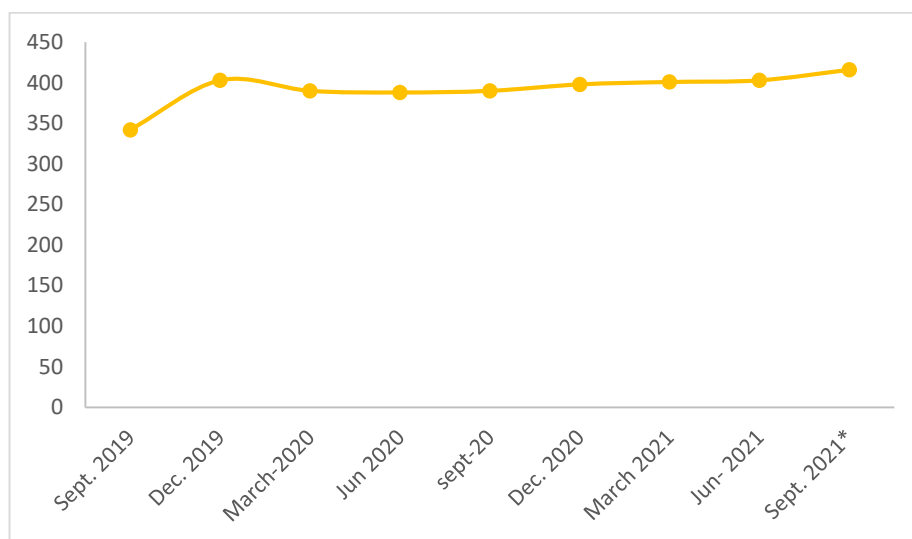


Figure 4.9. Evolution of service points Number (APSFD-CI, 2021)

Despite efforts, the SFD dedicates an average of 9.5% of its loan portfolio to agricultural farmers and cooperatives. These are mainly short-term credits (less than one year) on volumes of 1 million FCFA (\$ 1800). Less than 20% of SFDs have programs dedicated to the cocoa sector. This is the example of ADVANS-Côte d'Ivoire. ADVANS Côte d'Ivoire has partnered with cocoa exporters, input suppliers, and certified cocoa cooperatives to implement its "cocoa credit" program. The credit relates to inputs intended for producers.

The cooperatives select farmers eligible for credit and guarantee to refund. In the case of non-repayment by cooperatives, the financial risk is supported by ADVANS and the input suppliers. Advans-Côte d'Ivoire finances more than 80 cocoa cooperatives with sales contracts (covering more than 12,600 producers) for a credit portfolio of 1.6 billion FCFA. The input credit is granted to legally constituted and certified cooperatives. It is the cooperatives that ensure the guarantee of credit with the financial institute.

4.6.3. Semi-informal credit

In addition to commercial banks and SFD, The financing of producers is also carried out by agro-industrial groups, exporters, and other actors in the value chain through programs and in a framework of tripartite agreements with their cooperatives.

These financings are, in kind, for the most part, fertilizers, small equipment, or sometimes marketing credits.

The financing system of the cocoa subsector is summarized in Figure 4.10

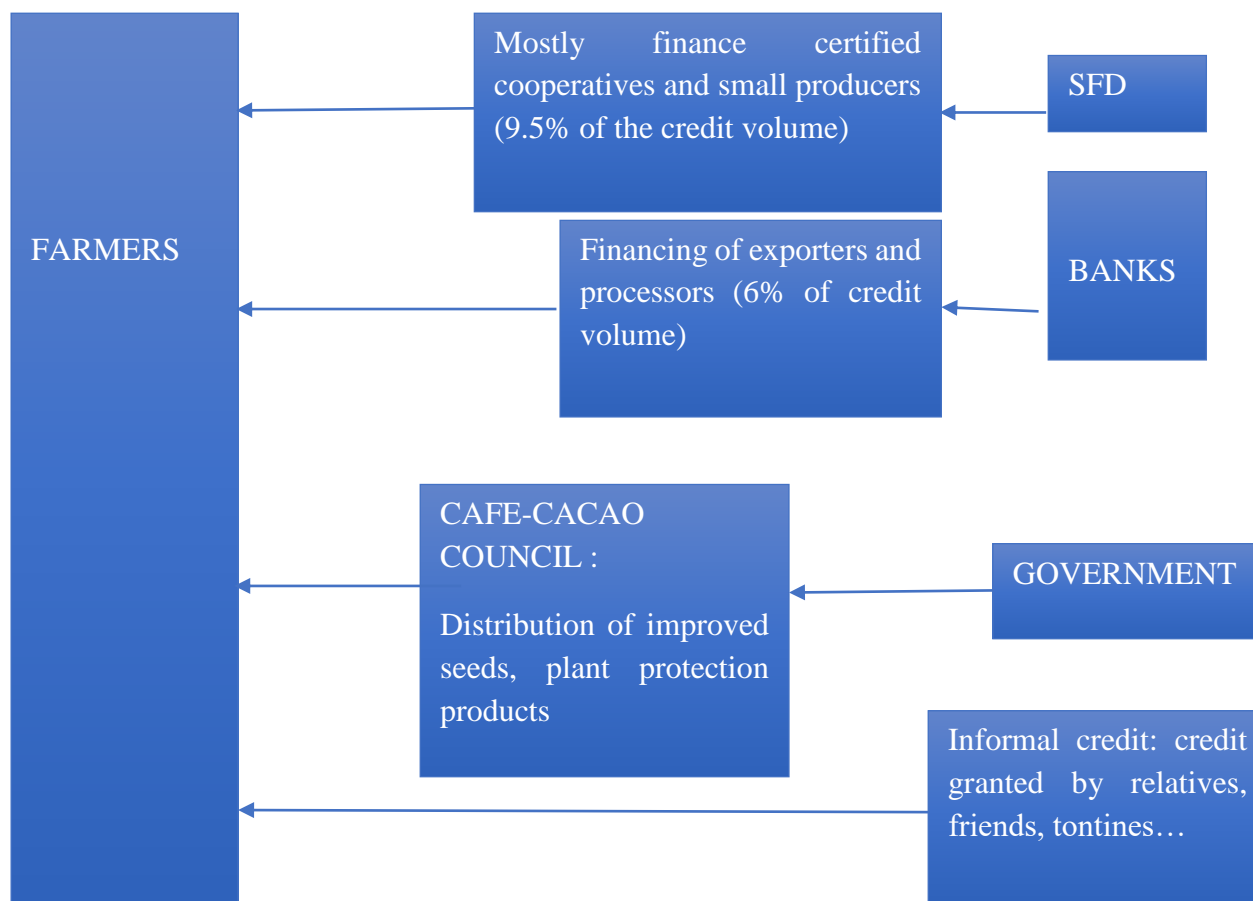


Figure 4.10 : Cocoa subsector financing system (source : the author)

At the end of this part, it is essential to maintain that access to agricultural credit by the farmer is not possible. Hypothesis 1 has been verified.

4.7. Input market in côte d'ivoire

Input represents an essential share of charges in agriculture. In cocoa production, what inputs are used? Where do they come from? What is the input market in Côte d'Ivoire? Is it accessible to small farmers? All of these questions will be answered in this part.

Although other inputs are necessary, this study's primary focus is on fertilizers because fertilizer in Cocoa production is low compared to the demand and supply of fertilizers required to improve productivity.

4.7.1. Importation of fertilizer

In Côte d'Ivoire, consumed fertilizer is mostly imported. In 2019 Country imported 443,841 tons of fertilizer or an increase of 91% from the last year (2018). But due Covid-19 crisis importation rate decreased to 10% compared to 2020.

Concerning production, it represents only 4.23% of imported fertilizer and 4.86% of apparent consumption. Apparent consumption is the quantity of fertilizer effectively used in agriculture. The difference between fertilizer produced and imported, shown in figure 4.11, proves that Côte d'Ivoire's consumption of fertilizer mainly depends on the outside.

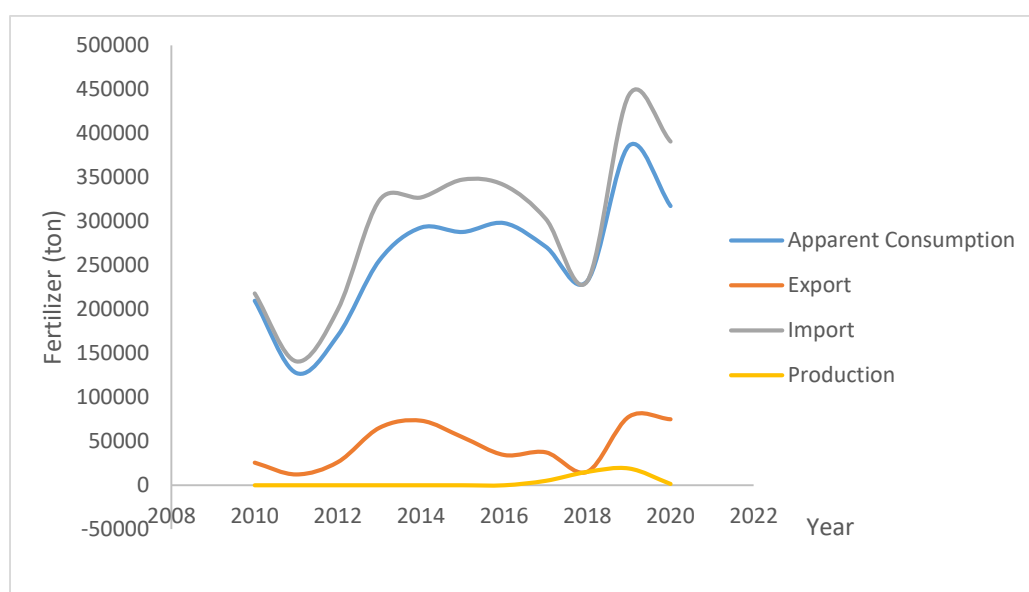
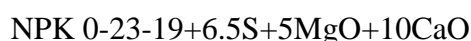


Figure: 4.11: Fertilizer consumption, import-export, and production in Côte d'Ivoire

In cocoa production, used fertilizer is composed of 0% of Nitrogen (N), 23% of phosphorus(P), 19% of potassium (K), and other micronutrients. The formula is given by $NPK\ 0-23-19+xS+yMgO+zCaO$, where s,y, and z are the quantity of S, MgO, and CaO. In the case of this study, the formula is given:



4.7.2. Origin of fertilizer used in Côte d'Ivoire

In Côte d'Ivoire, there is no primary production of fertilizer. Some companies have fertilizer blend units.

According to Table 4.3, Turkey is not Côte d'Ivoire's leading fertilizer supplier. The main suppliers are Russia, Morocco, Russia, Belgium, Lebanon, and China.

Table 4.3: Fertilizers that are used in the countries of origin Ivory Coast (Africa fertilizer,2019)

Incoming country	Belorussia	Morocco	Russia	Belgium	Lebanon	China	Other countries
Fertilizer amount)							
KCL (%)	95			4			1
TSP (%)		82			18		
Urea (%)			86			1	13
NPK (%)	7	50	1	8		1	33
DAP (%)		61	39				
ammonium sulfate (%)	20		9	26		42	2
other fertilizers		4		1		7	88

4.7.3. Fertilizer consumption and price in cocoa production

Cocoa consumption represents 16% of total fertilizer consumption, as shown in figure 4.12.

According to data from 2019, fertilizer consumption in cocoa production represents 71,014 tons of total imported fertilizers and 61,772 tons of apparent consumption.

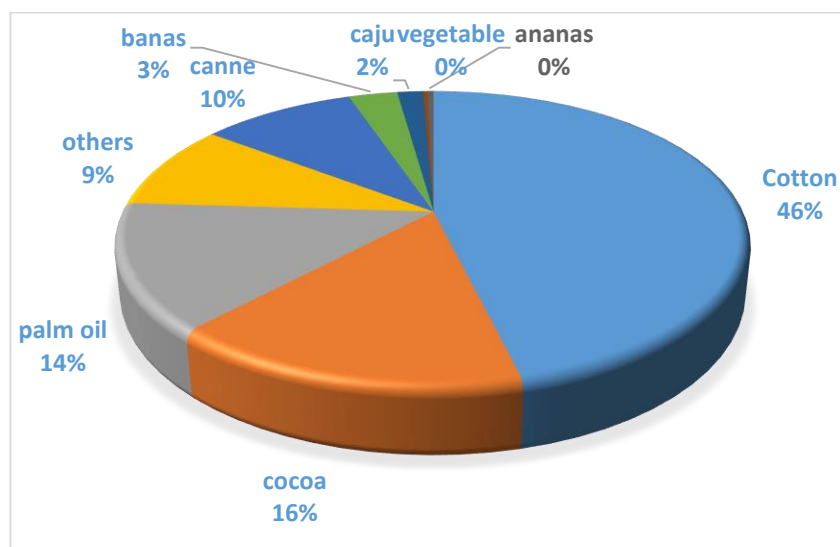


Figure 4.12: Fertilizer consumption by-product (Africa fertilizer, 2015)

This consumption is deficient. For 4.770.000 ha, the cocoa farm's apparent consumption represents 14kg/ha. An estimated 450,000 tons are needed to improve production yields and producers' incomes to 1 ton/ha. (Darie-Rousseaux et al, 2016). Only 15,78% of needs are covered. This means that farmers don't significantly access fertilizer. The cost of fertilizer can explain this.

In 2019 the price of fertilizer used in cocoa production was 486\$, and due to the consecutive crisis of Covid-19 and the Ukraine war, the price increased to 750\$ in 2022, according to table 4.4. The increase in price considerably affects farmers' access to fertilizer, their incomes, and the yields of their farms.

Table 4.4: Evolution of PK 0 23 19 + 6.5S + 5MgO + 10CaO price from 2017 to 2022 (Source: Afrika fertilizer, 2022)

Product	2017	2018	2019	2020	2021	2022
PK 0 23 19 + 6.5S + 5MgO + 10CaO (50kg) fcfa	26.33	25.7	24.3	25.1	34.6	37.5
PK 0 23 19 + 6.5S + 5MgO + 10CaO (1t) (\$)	526,6	514,7	486	501,7	691,41	750

Farmer's income will be compared with fertilizer and input costs as variable charges to analyze fertilizer's impact on yields.

4.7.4. Variables charges in cocoa production

Variables charges in cocoa production are composed of input charges and workforce charges. Both costs depend on cultural practices. In this analysis, three scenarios will be done:

First scenario: without using fertilizer;

Second scenario: using fertilizer: 250kg/ha;

Third scenario: using average fertilizer: 60kg/ha.

Variables charges by using fertilizer or not have been calculated by ha and dressed in Table 4.5.

Table 4.5. Variable charge in cocoa production with or without using fertilizer (author calculation)

	Unity		Cocoa without fertilizer		Average		Cocoa with fertilizer)	
	Unity	Unit price(\$)	Quantity	Total (\$)	Quantity	Total (\$)	Quantity	Total (\$)
Variable charges								
Insecticides	Litre	15.2	3	45.6	3	45.6	3	45.6
Fungicides	kg	1.5	30	45	30	45	30	45
Fertilizers	50kg	37.5	0	0	1.2	45	5	187.5
Bags	bag	1.8	5	9	9	16.2	15	27
Cost of input		0		99.6		135.6	53	305.1
Pruning	Daily workforce	3	10	30	10	30	10	30
Removing epiphytes	Daily workforce	3	5	15	5	15	5	15
Sanitary harvesting	Daily workforce	3	10	30	10	30	10	30
Weeding	Daily workforce	3	15	45	15	45	15	45
Fertilization	Daily workforce	3	0	0	10	30	12	36
Pulvérisation	Daily workforce	3	10	30	10	30	10	30
Harvesting	Daily workforce	3	10	30	10	30	10	30
Fermentation and drying	Daily workforce	3	10	30	10	30	10	30
Requirements +labor costs	Daily workforce	3	55	165	55	165	55	165
Workforces charges				375		405		411
Variable charges	Input charges+workforces charge			474.6		540.6		716.1

Variables charges when 250kg/ha (50kg*5) of fertilizer is used is about 716.1\$, which represents 26.2% of variable charges and increase variable costs by 50.8%. When 60kg/ha (50kg*1.2) of fertilizer is used, variables charges are around 540,6\$, fertilizer represents 8.32% of variables charges, and variables charges are increased by 13.4%. When fertilizer is used, the variable charge is multiplied by 1,5. Fertilizer is a high cost in cocoa production and in farmers' budgets. Now, what is fertilizer's impact on farmers' revenue?

4.7.5. Revenue

Revenue is the gain of a farmer after selling his production. However, when fertilizer is used, yield increases. When 250kg/ha of fertilizer is used, cocoa yield can be expanded up to 1.200 kg (1.2ton); (CCC, 2015); without fertilizer, the outcome is around 400 kg. But data collected from farmers show an average yield of about 723kg using 60kg/ha of fertilizer, as shown in figure 4.13.

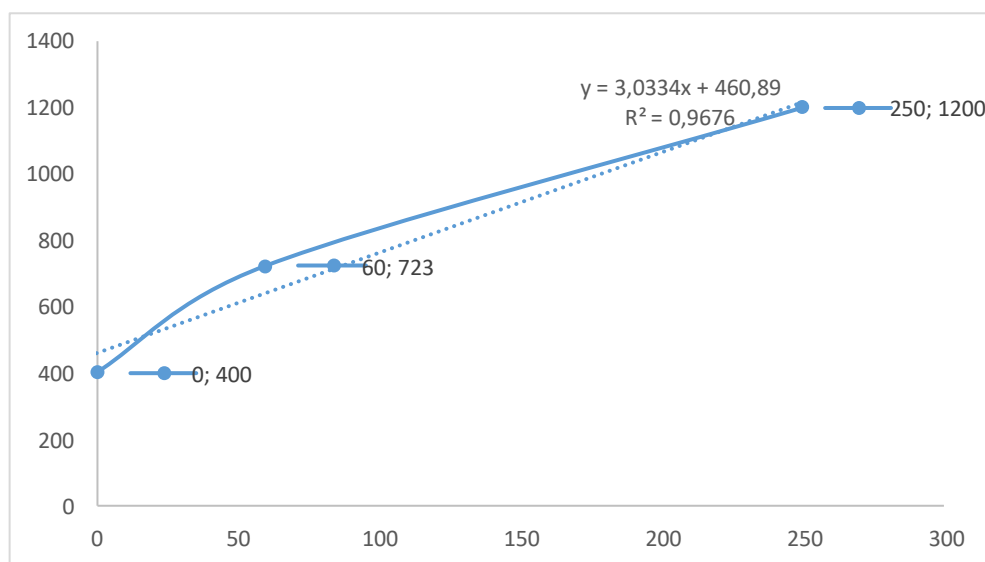


Figure 4.13: Evolution of cocoa yield with using of fertilizer

This figure shows the utility of fertilizer. Figure 4.13 show a strong correlation between fertilizer quantity and cocoa yield. When fertilizer is used, yield (Y) can be increased according to the formula $Y=3.0334X+460.89$ kg. Concerning revenue, it is represented in table 4.6. The government fixes cocoa prices every year regarding international prices. This price is called the guaranteed minimum price (GMP). GMP is 60% of the international cocoa price. For the 2021 campaign, GMP has been fixed at 1,26 \$/kg.

Table 4.6. Revenue with or without using fertilizer

	Yields (kg/ha)	GMP (\$/kg)	Revenue (\$/ha)
Yields with using fertilizer	1200	1,26	1512
Yields without using fertilizer	400	1,26	504
Average Yield	723	1,26	911

Without using fertilizer, revenue is 504 \$/ha, and with fertilizer, revenue is 1.512\$/ha. The average gross revenue is 911 \$/ha, with an average of 723kg. This significant difference in brut revenue shows that fertilizer is essential. Gross revenue is multiplied by 1.26 fertilizer, as shown in figure 4.14.

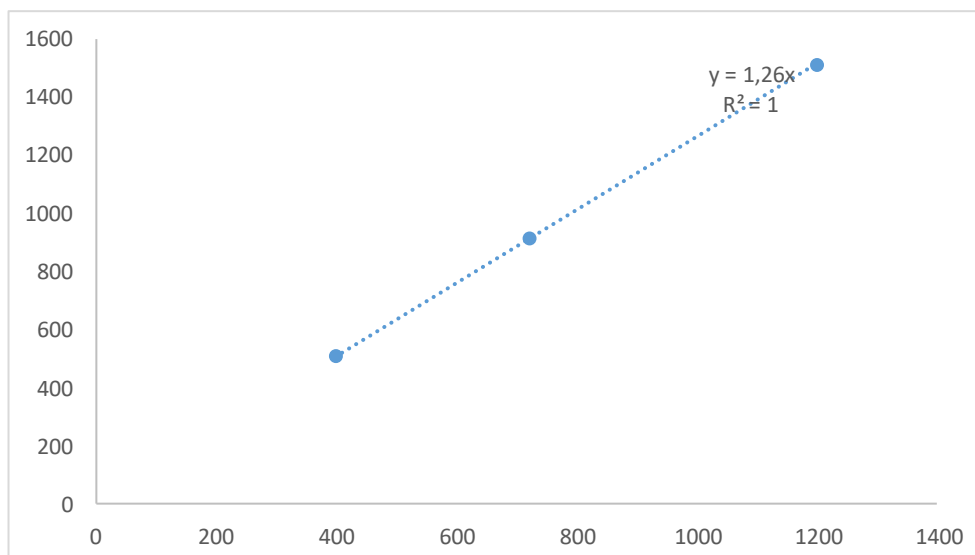


Figure 4.14: Revenu evolution by using fertilizer

4.7.6. Gross Profit

Gross profit when fertilizer is used or not is represented in table 4.7. A difference exists in Gross profit when fertilizer is applied on a cocoa farm.

Table 4.7. Gross profit of the cocoa farm with or without fertilizer (author calculation)

	Yields (kg/ha)	Variable charge (\$/ha)	Revenue (\$/ha)	Gross profit (\$/ha)
Yields with using fertilizer	1200	716.1	1512	796
Yields without using fertilizer	400	474.6	504	29,4
Average Yield	723	540.6	911	370.4

When fertilizer is applied, gross profit is about 796\$/ha. This profit represents 110% of variable charges. Regarding gross profit when fertilizer is not used, it is about 29,4 €/ha, which is 6,2% of variable charges. In the average case, the gross profit is 370.4, i.e., 44,5% of variable charges. Fertilizers increase gross profit. When farmers don't use fertilizer, their profit is meager, and they can't save any money to borrow

credit. Also, they can't finance fertilizer for the next campaign, and the lack of funds limits farmers' access to fertilizer (Balineau G, 2017).

Fertilizer use is low due to poor access and the lack of awareness, willingness, and the lack of skills of farmers to apply it correctly. Fertilizer price is increasing. The current price is above 38\$. Due to the lowest income of farmers, they can't access efficient fertilizer.

CONCLUSION AND SUGGESTIONS

The topic, which was “Analysis of the agricultural credit system in cocoa production in the mountain district of Côte d'Ivoire: the case of input credit,” is important for agricultural credit policy in Côte d'Ivoire.

This study's specific objectives were: to analyze the situation of agricultural financing before the independence of Côte d'Ivoire from nowadays, to analyze small farmers' accessibility to agricultural credit, to identify causes of inaccessibility to credit and fertilizer, and finally give some recommendations. Two hypotheses were defined: Cocoa farmers have very limited access to financial resources; Small farmers have difficulty accessing fertilizer to increase yields. In order to aim at the specific goals and verify the hypothesis, the study was conducted using the following steps: preliminary study, comprehensive literature review, and data collection using key informant Interviews (KIIs) (Ta, 2019).

At the end of this study, it emerges that the cocoa subsector is the economic lung and the lung of Côte d'Ivoire's export earnings. However, the financial and banking system harms small farmers, the engine of their production. Two hypotheses have been defined to analyze the agricultural credit system in cocoa production, and descriptive statistics have analyzed data.

Data show that average farmers aged about 52 with 10.3 years of experience in cocoa production, having a primary level (4.6year), working with four persons on a farm of 2.75ha. Its farm aged about 9.2 years. On the area of 2.75ha, farmers earn 1.9874 tons of cocoa, representing 723kg/ha as yield. To produce this quantity, farmers spend around 125 usd without receiving credit.

Few available studies (Djato, 2001) and YEO (1968) analyzed the impact of credit on rice productivity was made. Djato (2001) showed that farmers with access to credit have more economic efficiency than those without access to credit. This study showed the importance of using agricultural credit to improve productivity.

Unfortunately, farmers don't have access to agricultural credit to finance the expenses related to fertilizer. This is first because there are no efficient agricultural credit systems nowadays. The study shows less than 4% of small farmers have access to agricultural credit. Several causes are at the origin of this inaccessibility. According to the results, the causes of inaccessibility to credit are legal, institutional, and socio-economic. According to Article 2 of the legal and regulatory texts regulating banking

and financial activity in the West African monetary union fixing the usury rate, « The usury rate for banks is set at fifteen percent (15.0%) per year. For financial institutions of a banking nature, Decentralized Financial Systems, as well as other economic agents, are fixed at twenty-four percent (24.0%) per year. The absence of a regulatory framework favorable to agricultural financing is currently non-existent. Our study showed that more than 50% of producers are not members of a cooperative. When they are members, it is figuratively to benefit from certain advantages. When they do not receive these benefits, they leave the cooperative. History shows many efforts made by the government to assist agriculture from independence to nowadays, but the solutions are not efficient and failed. These multiple failures can explain the causes of farmers' access to agricultural credit.

However, financing is granted to certified cooperatives with good management. When fertilizer is used five more, the variable charge is multiplied by 1,5. Fertilizer is a high cost in cocoa production and in farmers' budgets. This is very representative of the budget of farmers. This considerable difference in brut revenue shows that fertilizer is vital. When we use fertilizer, brut, revenue is multiplied by 1,26. When fertilizer is applied, brut benefice increases up to 700 \$.

Our survey shows a level of precariousness of cocoa farmers. Indeed, cocoa farmers mainly have cocoa as their source of income. Data show that almost 58% of revenue comes from cocoa profits, and cocoa profit is less. Seeing this situation, farmers can't save money in banks, so they can't have access to credit. They have to finance their fertilizer charges if they don't have access to agricultural credit from a formal institution. But how can it be possible?

They need to diversify their income. To be in the phase of this proposition, we suggest creating a concept of fertilizer credit. Fertilizer credit will be a concept based on changing fertilizer to over agricultural product of farmers. By using Canva Model, a business model will be created. The activities of this company will be selling agricultural products over cocoa. Agricultural products will be paid to small cocoa farmers and sold in the supermarket. 30% of their income will be placed in an account. This represents a guarantee to have access to fertilizer credit. Fertilizer will be distributed by credit. And farmers will also receive advice and technical support to use fertilizer optimally. Many jobs will be created. A mobile e-commerce application will be set up to boost the marketing of products.

Finally, this study has an impact on technical, socio-economically, academic, and scientific plans. It provides a lot of information on the financing risks of the cocoa sector, methods of financing agricultural activities, and specifically input credit in cocoa production, knowledge on inputs demand, and proposes a financing plan for agricultural inputs to develop agricultural credit financing criteria favorable to the various actors. This study also aims to be a reference for the implementation of agricultural credit policies in Côte d'Ivoire and a manual for agricultural credit in farm economics and rural development.

The hypothesis was verified, and objectives were aimed; however, another study is needed to implement the proposition; also, a diagnostic study of agricultural financing in each region can be conducted. It can be a problem of another topic.

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APPENDICES

ANNEX 1: Acceptance letter



ONDOKUZ MAYIS ÜNİVERSİTESİ SOSYAL VE BEŞERİ BİLİMLER ARAŞTIRMALARI ETİK KURUL KARARLARI

KARAR TARİHİ	TOPLANTI SAYISI	KARAR SAYISI
09.07.2021	07	2021/579

KARAR NO: 2021-579
Üniversitemiz Lisansüstü Eğitim Enstitüsü öğrencisi Seri Zouzoua Serge Narcisse TAPE 'nin Prof. Dr. Kürşat DEMİRYÜREK danışmanlığında " Fildişi Sahili'nde Kakao Üretiminde Tarımsal Kredi Sisteminin Analizi: Dağ Bölgesi Örneği" isimli yüksek lisans tezine ilişkin anket, mülakat, gözlem ve dosya taraması çalışmalarını içeren 18826 sayılı dilekçesi okunarak görüşüldü.

Üniversitemiz Lisansüstü Eğitim Enstitüsü öğrencisi Seri Zouzoua Serge Narcisse TAPE 'nin Prof. Dr. Kürşat DEMİRYÜREK danışmanlığında " Fildişi Sahili'nde Kakao Üretiminde Tarımsal Kredi Sisteminin Analizi: Dağ Bölgesi Örneği" isimli yüksek lisans tezine ilişkin anket, mülakat, gözlem ve dosya taraması çalışmalarının kabulüne oy birliği ile karar verildi.

ANNEX 2: Questionnaire for farmers

1	Variables	Questions	Modality of response
	N° of questionnaire/	N° of questionnaire	Answer
2	Date	Date of survey	01/01/2021
3	Region	What is the name of this region?	Yamoussoukro Soubré ; Man ;
4	Name and Surname	Name and Surname of participant	
5	Age/Age	Age/Age	15-18 18-25 25-35 ; 35-40 ; 40-45 45-50 50-55 ; 55-60 ; 60-65 ; 65+ ;
6	Number_children	Number of children	0-4 ; 4-8 ; 8+ ;
7	Marital status	What is your marital status?	Married ; single ; divorced ; widowed ; engaged ;
8	Level of Education	What is your level of Education	Primary school; College; high school; university ;
9	Occupation	What is your occupation?	

10	Experience in Agriculture	What is your Experience in Agriculture?	-5 years ; 5-10years 10-15 years 15-20years; 20-25years; 25-30years 30+ ;
11	Experience in cocoa production	What is your Experience in Cocoa Production?	-5 years ; 5-10years; 10-15years; 15-20years 20-25years 25-30years 30+ ;
12	Agricultural activities practiced	What agricultural activities are practiced?	farming ; stock farming ; Fishing ; others;
13	Types of agricultural products practiced	What other agricultural products do you produce?	Perennial Food crops Maraichero Cereal/Cereal ; Other ;
14	Other	If other precise:	
15	Produced Maraichero	What is the type of Maraichero Produced?	Tomatoes Egg ; Peper; Okra ; Carrot Others
16	are maraichero;	What is an acre of maraichero?;	
17	Produced quantity per year	What is the quantity Produced per year?	
18	Produced for	Did you produce for?	Self consommation ; Selling/e; Self; both
19	income (fcfa)/	How much do you earn per year (fcfa)?	

20	Cereal	Which cereal do you produce?	Rice Maize Millet Others
21	acre cereal	What is acre cereal?;	
22	Produced quantity per year of cereal	What is the quantity Produced per year?	
23	Produced for cereal	Did you produce cereal?	Self consumption Selling; Self both
24	income (fcfa)cereal	How much do you earn per year (fcfa)?	
25	speculation food crop	Which food crop do you produce	Plantain Cassava ; Yam ; Taro ; Others ;
26	acre food crop	acre food crop;	
27	Quantité produite/Produced quantity per year food crop	What is the quantity produced per year	
28	Produced for food crop	Did you produce for?	Self-consumption; Selling; Les 2 /both
29	income (fcfa)food crop	How much do you earn per year (fcfa)?	
30	perennial crop	Which perennial crop do you produce?	Coffee Rubber ; cashew ; Others ;
31	perennial crop_AUTRE	if 'Others,	
32	acre perennial crop	What is an acre of the perennial crop?	
33	Produced quantity per year perennial	what is the quantity produced per year?	
34	Produced for perennial crop	Produced for?	Self-consumption/ Selling/Vendre ; Les 2/both
35	Income (fcfa)perennial crop	How much do you earn per year (fcfa)?	

36	Types of breeding	What types of breeding do you practice?	Bovine; Poultry; Porcin; Goat; Others ;
37	Perennial crop_AUTRE1	Si 'Others precise:	
38	Produced quantity per year perennial	Produced quantity per year	
39	Produced for perennial crop1	You Produced for	Self-consumption Selling; Both
40	Income (fcfa)perennial crop1	How much do you earn per year (fcfa)?	
41	A profession other than agriculture	Do you have a profession other than agriculture?	Yes ; No ;
42	Non-agricultural activity	Do you practice this profession?	Yes; No ;
43	Pratice of profession	how many times do you practice this job?	Full-time ; part-time ; by season ; occasionally ; Autres/Others ;
44	Pratice of profession_AUTRE	If Others', precise :	
45	income (fcfa)perennial non agricultural	How much do you earn per year (fcfa)?	
46	Farms old	How old is your cocoa farm?	
47	Cocoa farm area	How many ha?	
48	Labour force	How many people are working in your cocoa farm?	
49	Quantity produced/year	How many ton per year do you produced?	
50	Practised weed	Which kind of weed do you practice?	Chemical weed control ; Manual weeding ; others ;
51	Practised weed_AUTRE	others', precise :	

52	Frequency_chemical weed	How many times do you use chemical weed control?	Once per year ; /twice per year ; Three times per year ; Four times per year ; Five times per year ; Six times per year ; most six times
53	Number of times manual desherbage	How many times do you use manual weed control?	Once per year ; twice per year ; Three times per year ; Four times per year ; Five times per year ; Six times per year ; most six times;
54	Certified_farm	Is your farm shaded?	Yes ; No ;
56	Used of fertilizer	Do you use fertilizer?	Yes ; No ;
57	Type of fertilizer	Which type of fertilizer do you use?	Synthesis ; organic ; biologic, other ;
58 59	Type of fertilizer _AUTRE Form of fertilizer	If, other', precise: Which form of fertilizer do you use	Liquid ;

			Solid ; Powder ;
60	Uses of fertilizer during nurseries	Did you use fertilizer during nurseries	Yes ; No ;
61	Quantity(ton)	What is the quantity of fertilizer used?	
62	Frequency of uses	What is the frequency of uses	A day ; A week ; A Month ; A quarter; By semester ;
63	Uses of fertilizers	If not, why do you not use it?	Excessive price; accessibility, disponibility; lack of money ;
64	Use fertilizer during soil preparation	Do you use fertilizer during soil preparation before planting?	Yes; No ;
65	Quantity(ton)1	What is the quantity of fertilizer used	
66	Frequency of uses1	What is the frequency of uses	A day; week; By Month; by quarter; By semester ;
67	Utilisation de fertilisants/ Uses of fertilizers1	Si non pourquoi?/if not, why you do not use?	excessive price ; accessibility, disponibility ; lack of money ;
68	during young crops not in production	Do you use fertilizer during young crops are not in production?	Yes ; No ;
69	Quantity(ton)2	What is the quantity of fertilizer used	
70	Frequency of uses2	What is the frequency of uses	A day; By Week; By Month; by quarter; By semester ;
71	Uses of fertilizers2	if not, why do you not use it?	Excessive price; accessibility; disponibility; lack of money ;
72	During crops in production1	Do you use fertilizer during farm production?	Yes; No ;
73	Quantity(ton)3	What is the quantity of fertilizer used	
74	Frequency of uses3	What is the frequency of uses	A day; By Week; By Month; by quarter; By semester ;
75	Uses of fertilizers3	If not, why do you not use it?	Excessive price; accessibility; disponibility; lack of money ;
76	Access to input credit	Do you have access to input credit?	Yes; no ;
77	Expenditure	For which expenditure is agricultural credit used?	For seeds; For fertilizers; For equipment; For Labour; others;
78	Credit access	If you have access, how much?	
79	Come from	Is agricultural credit come from?	Government; Bank; particular; exporters; cooperatives; others ;
80	Membership of cooperative	Are your membership in a cooperative?/	Yes; No

81	If yes, name	If yes, what is the name of Cooperative?
82	Else why	Else why?
83	Difficulty_cooperative	What are the difficulties of your Cooperative?

CURRICULUM VITAE

Seri Zouzoua Serge Narcisse TAPE is an Ivorian specialist in processing agricultural products, importing agricultural products, and managing agricultural and agri-food projects. A double graduate of the prestigious Felix Houphouet Boigny National Polytechnic Institute of Yamoussoukro-Ivory Coast (INPHB-Yamoussoukro) in Agro-industrial Engineering (2018) and a professional license in Food Engineering (2015), After obtaining his diploma of Agro-industrial Engineer with honors, Seri Zouzoua Serge Narcisse TAPE benefits from a Scholarship from the Turkish government. It is admitted to Ondokuz Mayıs University in the faculty of Agriculture to do a Master's degree in Agricultural Economics (2019-2022). He holds a C1 level Turkish language certificate. He worked on behalf of the Yamoussoukro Autonomous District on a project to valorize agricultural waste into biogas, a project with a high environmental and social impact (2018). His passion for rural development allowed him to work on credit Agricole in rural areas. Seri Zouzoua Serge Narcisse TAPE speaks English and Turkish fluently and is a native speaker of French.

E-mail: 18211133@stu.omu.edu.tr

ORCID ID: 0000-0002-1820-7419