Universidade de Évora - Instituto de Investigação e Formação Avançada
Universidade de Trás-os-Montes e Alto Douro

Programa de Doutoramento em Agronegócios e Sustentabilidade

Tese de Doutoramento

Organic cocoa producers in São Tomé and Príncipe: Value chain, governance and sustainability

Ibrahim Cravid dos Prazeres

Orientador(es) | Maria Raquel Lucas
Ana Alexandra Vilela Marta Rio Costa

Évora 2025

Universidade de Évora - Instituto de Investigação e Formação Avançada
Universidade de Trás-os-Montes e Alto Douro

Programa de Doutoramento em Agronegócios e Sustentabilidade

Tese de Doutoramento

Organic cocoa producers in São Tomé and Príncipe: Value chain, governance and sustainability

Ibrahim Cravid dos Prazeres

Orientador(es) | Maria Raquel Lucas
Ana Alexandra Vilela Marta Rio Costa

Évora 2025

A tese de doutoramento foi objeto de apreciação e discussão pública pelo seguinte júri nomeado pelo Diretor do Instituto de Investigação e Formação Avançada:

Presidente	Andreia Teixeira Basílio (Universidade de Évora)
Vogais	Carlos Jorge Fonseca Da Costa (Universidade de Trás-os-Montes e Alto Douro) Elena Gonzalez Rodrigo (ESIC University - Madrid) Juan Jose Juste Carrion (Universidad de Valladolid) Maria Raquel Lucas (Universidade de Évora) (Orientador) Rui Manuel Fragoso (Universidade de Évora) Steven Helfand (University of California - Economics Department)

Évora 2025

This work was produced as original thesis for the degree of Doctor in Agribusiness and Sustainability at the University of Évora and University of Trás-os-Montes and Alto Douro

This work was supported by the national funds through the FCT - Fundação para a Ciência e a Tecnologia, I.P., under the research contract PRT/BD/152273/2021 to Ibrahim Prazeres. Additionally funding was also provided by FCT under the scope of the projects UIDB/04011/2020 (https://doi.org/10.54499/UIDB/04011/2020), UIDB/05183/2020 (https://doi.org/10.54499/UIDB/05183/2020; https://doi.org/10.54499/LA/P/0121/2020) and UIDB/04007/2020 (DOI 10.54499/UIDB/04007/2020).

Dedicatória

À minha mãe e ao meu pai,

Aos meus filhos,

Ao meu irmão e minhas irmãs,

À minha família,

Aos meus amigos e colegas

de trabalho e de curso,

Às minhas orientadoras.

Acknowledgements

I would like to express my sincere gratitude to all those who have generously offered me advice, inspiration, and encouragement, contributing to the successful completion of this important project.

First and foremost, I thank my beloved mother, Maria do Carmo Prazeres and father, Luís Prazeres, whose constant motivation and unwavering support inspired me to grow and strive for excellence in all aspects of life. I am also deeply grateful to my grandfather, Bartolomeu Afonso de Assunção Cravid, who is not with me in presence but always believed in me and was the most important person in building the pillars of my characters and values. I express my deepest gratitude as well to my family for their unwavering support, trust, and encouragement. Despite the challenges and uncertainties, they have stood by me consistently, believing in my abilities and providing unwavering encouragement.

I extend my heartfelt thanks to my amazing advisor and mentor, Professor Maria Raquel Lucas, and my co-advisor, Professor Ana Marta-Costa. Their sensitivity, trust in my potential and capabilities, patience, and unwavering support and guidance throughout this journey were invaluable. I am profoundly grateful for their patience, wisdom, and encouragement, which have continuously propelled me forward, helping me explore new ideas and overcome challenges. Their commitment to my growth as a researcher and scholar has been instrumental, and I am indebted to them for their invaluable contributions to this work. I also appreciate the professionalism and the friendship we developed along the way, which is extended to my Portuguese father, the island man, Professor Pedro Henriques, for his prestigious collaboration and support in specific tasks and to our family (Elisa, Alice and Maria do Carmo) for their friendship and encouragement in my personal and professional development. I extend my appreciation to all the professors at the University of Trás-os-Montes and Alto Douro and the University of Évora, who imparted their knowledge and expertise during my doctoral studies in Agribusiness & Sustainability programme. Their dedication to teaching and mentorship has enriched my academic journey immeasurably, and I am grateful for their encouragement and support.

I am deeply appreciative for the financial support provided by the Portuguese Foundation for Science and Technology (FCT) under the doctoral studentship project (PRT/BD/152273/2021) which has been instrumental in facilitating the completion of this research. Additionally, I

extend my recognitions to the research centres, MED & CHANGE, CEFAGE and CETRAD. Their generosity and the support provided was essential for the successful execution of this project. Without the infrastructure and resources of these renowned and excellent centers, my path would have been considerably more challenging. Thank you for your unwavering support.

I also extend my appreciation to ESIC for welcoming me through the Erasmus+ Mobility Programme and to CREDA in Barcelona. I am particularly grateful to Professor Elena Rodrigo for her exceptional support and to Professor José Maria Gil for his cooperation, guidance, and advice.

To my colleagues, classmates, and friends I've had the pleasure of meeting along this journey, your friendship, companionship, and mutual support have made this endeavour so much more enjoyable. A special acknowledgment goes to the professors, staff, and fellow researchers at the Department of Management (DGES) within the School of Social Sciences (ECS) at University of Évora, as well as those associated with the MED & CHANGE and the CEFAGE.

My sincere thanks go to all individuals who participated in this research, especially during the face-to-face interviews and survey. Furthermore, their dedication and commitment serve as a source of inspiration, reflecting the determination of the organic cocoa sector from São Tomé and Príncipe in embracing sustainability.

Lastly, I express my gratitude to the São Tomé and Príncipe Ministry of Agriculture, to the organic cocoa cooperatives and to the members who participated in this research and to all who offered contributions throughout this journey. I'm especially thankful to the organic cocoa producers for their openness in sharing invaluable insights, experiences, and expertise to the outcomes of the research. An especially thankful to Celso Garrido, the Director of Studies and Planning of the Ministry of Agricultural at the time.

Resumo

Os pequenos produtores da cadeia de valor do cacau de São Tomé e Príncipe (STP) enfrentam dilemas significativos entre manter o cultivo de cacau ou optar por outras culturas ou atividades mais produtivas e rentáveis. O objetivo central deste trabalho é avaliar o papel das estratégias de subsistência dos pequenos produtores biológicos e dos mecanismos de governação da cadeia de valor na promoção da sustentabilidade do sector do cacau biológico em São Tomé e Príncipe. Esta proposta analisa a cadeia de valor do cacau de STP através de quatro estudos interrelacionados: 1) Análise dos desafios críticos de sustentabilidade da cadeia de valor do cacau biológico, sob a perspetiva do modelo Triple Bottom Line (TBL); 2) Identificação e colmatação de lacunas de investigação, mapeando as percepções dos principais actores da cadeia de valor do cacau biológico em STP, particularmente dos pequenos produtores, relativamente à melhoria da sustentabilidade; 3) Identificação das estratégias de subsistência adotadas pelos pequenos produtores de cacau biológico e as suas influências na sustentabilidade; e 4) Avaliação do valor percebido pelos produtores relativamente à sua ligação às cooperativas de cacau biológico e dos factores socioeconómicos que moldam as suas opiniões sobre a adesão às cooperativas e a sua atitude face ao risco. Os procedimentos metodológicos incluíram um delineamento de métodos mistos, integrando ferramentas qualitativas e quantitativas, usadas em três tarefas principais: 1) Análise de dados secundários para descrever as cadeias de valor global do cacau global e a de São Tomé e Príncipe; 2) Investigação e observação de campo para identificar as estratégias de subsistência e os perfis de produtores; e 3) Entrevistas, questionários e grupos focais para avaliar as percepções de valor e os vínculos de sustentabilidade. Modelos teóricos como o probit e a modelagem de equações estruturais (SEM) baseada em variância com o algoritmo de mínimos quadrados parciais (PLS) também foram estimados. A compreensão da interação entre a governação, as estratégias de subsistência e o valor percebido oferece perspetivas relevantes e contribui para fundamentar intervenções baseadas em dados concretos que promovem a sustentabilidade global e a redução da pobreza. Foram feitas sugestões para o ajustamento das políticas nacionais e para a melhoria da governação da cadeia de valor do cacau biológico, com o objetivo de reforçar os meios de subsistência dos produtores de cacau biológico e valorizar a filiação em cooperativas.

Palavras-chave: Biológico, Cacau, Produtores, Meio de vida, Valor, Governação, Sustentabilidade.

Abstract

Small producers in São Tomé and Príncipe's (STP) cocoa value chain face significant trade-offs between cocoa cultivation and other, more productive, and profitable crops or activities. The overall aim of this research is to assess the role of small organic producers' livelihood strategies and value chain governance mechanisms in promoting the sustainability of the origanic cocoa sector in STP. This proposal addresses the STP cocoa chain through four interrelated studies: 1) Analysis of the critical sustainability challenges of the organic cocoa value chain, examined through the perspective of lens of Triple Bottom Line (TBL) scenario models; 2) Identification and bridging of research gaps in organic cocoa value chain mapping out the perceptions of the key actors in STP, particularly smallholder producers in improving the sustainability of the organic cocoa sustainability; 3) Identifation of the livelihood strategies adopted by small organic cocoa producers and their influences on sustainability; and 4) Assessment of the values perceived by producers in relation to their affiliation with organic cocoa cooperatives and the socioeconomic factors that shape their views on cooperative membership and on risk awareness. Methodological procedures included a mixed-methods design, integrating both qualitative and quantitative tools, employed across three main tasks: 1) Secondary data analysis to describe the global and STP cocoa value chains; 2) Field research to identify livelihood strategies and farmer profiles; and 3) Interviews, surveys and focus group to assess value perceptions and sustainability links. Theoretical models such as the probit model and the variance-based structural equation modelling (SEM) with the partial least squares (PLS) algorithm were also estimated. Understanding the interplay between governance, livelihood strategies and perceived value offer relevant insights and contribute to inform evidence-based interventions promoting overall sustainability and reduction of poverty. Sugestions for adjustments to national policies and improvements in the governance of the organic cocoa value chain were made, with the aim of promoting the livelihoods of organic cocoa farmers and enhancing the value of cooperative membership.

Keywords: Organic, Cocoa, Producers, Livelihood, Value, Governance, Sustainability.

Index | GENERAL

List | Figures

List | Tables

List | Abbreviations and Acronyms

ADAPPA - Action for Agricultural Development and Environmental Protection ADIL Local Initiatives Development Action

C - Cooperatives

CECAB – Cooperative for the Production and Export of Organ ic Cocoa

CECAC 11 – Cooperative for the Production and Export of Cocoa

CEV – Cooperative Emotional Value

CIAT – Centre for Agronomic and Technological Research

CM - Cooperative Membership

CSV – Cooperative Social Value

FAO – Food and Agriculture Organisation

FENAPA – National Federation of Small Farmers

GI – Government Institutions

GIAHS - Globally Important Agricultural Heritage Systems

ICCO - International Cocoa Organization

IFAD – International Fund for Agricultural Development NGO Nongovernmental Organization

LS - Livelihood strategies

OC – Organic Cocoa

OCPs – Organic Cocoa Producers

PAPAC – Smallholder Commercial Agriculture Project

PERVAL - Perceived Value Scale

PC – Private Companies

PLS-SEM – Partial Least Squares Structural Equation Modelling

RC – Research Center

SDG - Sustainable Development Goals

ST – Sociotechnicians

STP – São Tomé and Príncipe

TBL - Triple Bottom Line

UE – Universidade de Évora

WCED - World Council of Economic Development

WCF – World Cocoa Foudation

Chapter 1 | INTRODUCTION

In global agri-food value chains[1], particularly within the burgeoning chocolate sector, niche market segments command a premium for products that meet high-quality standards or offer intangible benefits through certified production practices that support human well-being, biodiversity, and environmental protection (Donovan et al., 2013).

While the global cocoa market – the core commodity of chocolate - continues to be dominated by Ivory Coast, Ghana, and Indonesia, which together account for over 60% of world production (Singh, 2025), the Cocoa Agroforestry System of São Tomé and Príncipe despite contributing less than 0.1% to global output, holds a hight-quality Amelonado cocoa as a strategic niche. It combines traditional farming with diverse crops to enhance food security, strengthen the livelihoods of farming families, preserve cultural heritage, and maintain biodiversity (FAO, 2024). Historically a leading exporter despiste the enslavement, inequality, and conflict, the country now focuses on organic certified production practices, supported by producers' resilience and commitment of the existing two cooperatives (CECAB and CECA11).

With the newest addition to the Globally Important Agricultural Heritage Systems (GIAHS) list in 2024, the Cocoa Agroforestry System of São Tomé and Príncipe integrated FAO's worlswide agricultural heritage network, which has 89 systems in 28 countries selected around the globe. It demostrates its global importance, food and livelihood security, agro-biodiversity, sustainable systems and practices, social values and culture and outstanding landscapes (FAO, 2024). Also denotes the relevance of develop research focus on enhancing the livelihoods of smallholder producers, on fostering sustainability and on value chain governance, to strength the producer's wellbeing and country's position in the global fine organic cocoa market.

[1] The term value chain, first described by Michael Porter, in 1985, is a concept which comprises the full chain of a business's activities in the creation of a product or service – from the initial reception of materials all the way through its delivery to market, and everything in between.

1.1. Problem Statement and Justification of the Study

In São Tomé and Príncipe (STP), cocoa accounts for over 80% of agricultural exports and plays a pivotal role in national development and the livelihoods of many rural families. It sustains local micro-economies, generates employement, contributes to Gross Domestic Produc (GDP), and enhances the country's international image and positioning (Prazeres, 2019).

Despite STP's strategic positioning as a high-quality organic cocoa producer, the increasing global demand for sustainability, its recognition as a Global Important Agricultural Heritage System (GIAHS), and the implementation of organic certification schemes, smallholder organic producers continue to face significant challenges. These include the economic viability of production, the impacts of climate change, and the effectiveness of current value chain structures and governance in foresting long-term sustainability for rural communities (Prazeres, 2019; Prazeres & Lucas, 2020). These ongoing issues jeopardize the sector's long-term sustainability and the improvement of smallholder livelihoods. The main challenges include:

- *Global Power Asymmetries in Value Chains*: The global cocoa market is marked by substantial power imbalances, where smallholder at the base of the chain, whose livelihoods depend on their production, have limited influence over prices and trade terms (Gibbon and Ponte, 2005; Giacometti et al., 2015; Rueda et al., 2023). Consequently, producers in STP earn low incomes despite operating in a premium organic niche. The rapid rise in global demand - driven by increasing incomes, urbanization, and the westernization of diets (Reardon et al 2014, Rueda et al., 2018) - pressures farmers to boost productivity, often pushing them toward adopting high-yielding varieties or switching to alternative crops (Rueda et al., 2023). The unequal distribution of value in global supply chains, where profits are concentrated among downstream actors such as processors, manufacturers, and retailers, is well-documented in agricultural commodities systems (Codjoe et al., 2023; Prisca, 2024) even in contexts where cocoa is key to national economic development (Squicciani & Swinnen, 2016).
- *Limited Capacity for Competition and Investment*: Like other cocoa-producing countries and governments, and often influenced by the agendas of global chocolate companies

(Fountain & Hütz-Adams 2018; van Vliet et al., 2021; Fountain & Hütz-Adams 2022), STP has prioritized production growth as its main sustainability strategy throught organic practices. However, the country's limited capacity to scale up production and invest in technology or other improvements increases its vulnerability, particularly for small producers (Rémi et al., 2024) who often exhibit poor farm management practices (Krumbiegel & Tillie, 2024). Land competition for construction or alternative crops further exacerbates the problem, leading some farmers to abandon cocoa production in pursuit of more viable opportunities (Vigneri & Kolavalli, 2018; Prazeres, 2019). Additionally, to the poverty and deforestation, climate change and pests and diseases exacerbates even more their performance (Ingram et al., 2018; Ruf et al., 2019).

- *Productive and Demographic Challenges*: Cocoa Farming in STP is heavily reliant on family labor and characterized by low yields, aging and diseased trees, and the impacts of climate change. These are compounded by a lack of interest among youth in farming (Ruf & Zadi, 1998; Kolavalli & Vigneri, 2011; Uribe-Leitz and Ruf, 2019). Together, these factors undermine productivity and profitabiity, making cocoa farming less atractive and contributing to rural exodus (Schulte et al., 2020).
- *Unclear Impact of Organic Certification*: Although STP has implemented organic certification schemes, their actual impact on producer incomes, community wellbeing and sustainability outcomes remains unclear and under-researched in other contexts (Ruerd & Fort, 2012; Opoku, 2024). Certification benefits do not consistently translate into significant or equitable improvements for smallholders due to high compliance costs, bureaucratic hurdles, premium transmission failures (Kissi & Herzig, 2024), or time constraints, limited resources, input accessibility, and insecure land and tree tenure (Krumbiegel & Tillie, 2024). Additionaly, cooperatives often fall short in delivering adequate support. While organic certification is often as a pathway to sustainability (Rueda et al., 2023), questions remain about its effectiveness in improving conditions for the most vulnerable actors in the value chain and whether participation in organic cooperatives truly leads to sustainable outcomes (Uribe-Leitz & Ruf, 2019; Schulte et al., 2020). However, certification schemes have been a widely used measuring standard over

decades in assessing quality beans for processing and responding to sustainability challenges (Carimentrand, 2020; Ollenderf et al., 2022).

- *Governance of Organic Cocoa*: Despite the central role played by the state and the organic cooperatives, other actors – particularly transnational corporations – are increasingly influencing organic cocoa production (Glin et al., 2015; Kissi & Herzig, 2024). Producers often convert from conventional to organic farming due to considerations of livelihood, finance, the environmental concerns, and of support and relationships within the value chain. However, there is growing criticism of the governance models and policy frameworks shaping the organic sector. Concerns include over-dependence on the state and external aid, conflicting interests, elite capture, lack of inclusiveness (Ruf et al., 2019) and limited transparency (Kissi & Herzig, 2024). Cooperatives are frequently unable to provide the comprehensive support that producers need (Uribe-Leitz and Ruf, 2019). Even so, cooperatives have an important role to play in promoting sustainable cocoa through training, awareness raising, provision of seedlings and fertilizers, financing the spraying of cocoa farms, optimal regulation of production and promotion of crop diversification (Prisca, 2024).

There is a clear gap in both scientific literature and policy practice regarding a deep understanding of how governance structures in the organic cocoa value chain interact with producers' livelihood strategies and their perceptions of cooperative membership. These dynamics are critical to achieving a genuine sustainability transition. Thus, examining how the cocoa value chain functions – particularly its governance mechanisms and sustainability[2] outcomes – is essencial for informing effective policies and enhancing rural livelihoods.

This study is justified by the need to fill these knowledge gap by investigating the interplay between smallholders' livelihood strategies, value chain governance, and sustainability in a niche context. It seeks to advance understanding of how the benefits of premium markets and

[2] Focuses on meeting the needs of the present without compromising the ability of future generations to meet their needs. It is composed of three dimensions: economic, social, and environmental.

certifications can be more effectively channeled to producers, thereby promoting a more equitable and sustainable organic cocoa sector in STP.

1.2. Theorethical Foundations and Background

Driven by rising global demand for cocoa, many producing countries have adopted development strategies focused on increasing productivity, enhancing value addition, expanding exports (Mithöfer et al., 2017), and ensuring sustainability through effective governance (Díaz-Montenegro, 2019). Cocoa production – predominantly carried out by smallholders – requires improvements in livelihoods that integrate productivity gains with deeper integration into value chains (Farhad, 2019). To address this complexity, the present study is anchored in three interconnected theoretical concepts: Value Chain, Governance, and Sustainability.

The concept of the value chain, as well as the analytical methodology associated with it – grounded in the French "filière" and Anglo-American "commodity chain" traditions - was initially formalized by Michael Porter (1985). It encompasses the full spectrum of activities required to create and deliver a product or service – from the acquisition of raw materials, through various stages of production, to final consumption and post-consumer disposal (Kaplinsky, 2000; Kaplinsky & Morris, 2001; DFID, 2008; Fonseca et al., 2019). In the context of agribusiness, and particularly organic cocoa, the value chain transcends the boundaries of individual firms, encompassing all actors and processes involved in the transformation of cocoa beans into final products and their delivery to consumers (Salazara et al., 2018; Teye and Nikoi, 2021, 2023).

Value chains analysis has been widely applied in developing countries (Trienekens, 2011; Ndlovu et al., 2021; Khong, 2022; Izdori et al., 2025) and serves as a central framework for public and international development agencies engaging with the private sector (Pietrobelli & Staritz, 2013; Simatupang et al., 2017). Various methodologies – both qualitative and quantitative – have been employed, though few incorporate a robust accounting framework that addresses social and environmental dimensions (Fonseca et al., 2019).

Typically, value chain analysis encompasses two main dimensions (Zamora, 2016):

i) Structural analysis: This involves mapping linkages across the chain, from input provision (seeds, fertilizers, others) to production (cultivation), processing (fermentation, drying), marketing (cooperatives, exporters), and consumption.

ii) Value creation and distribution: This focuses on how actors add utility for final consumers and how the resulting value is distributed among stakeholders.

This analysis highlights the central role of certain actors (Gereffi & Korzeniewicz, 1994; Raikes et al., 2000; Altenburg, 2006; Ba, 2016; Fonseca et al., 2019) and underpins the classification of types into producer-driven and buyer-driven chains (Gibbon & Ponte, 2005; Sturgeon, 2009; Berthet & Fusacchia, 2024). Producer-driven chains are typically capital-and-technology-intensive, dominated by transnational corporations, while buyer-driven chains are labor-intensitve and steered by powerful downstream actors such retailers and brand owners.

Actors' capacity to generate value is shaped by their capabilities (Ballou, Gilbert & Mukherjee, 2000; Díaz-Montenegro, 2019) and the structure of the value chain, which defines the opportunities and constraints for smallholder inclusion (Kaplinsky & Morris, 2001), shaped by governance mechanisms and enabling policies environments (Glin et al., 2015; Ingram et al., 2018). Very often it takes mainly an economic shape (Giel et al., 2008).

Governance within value chains refers to the mechanisms by which activities are coordinated and power disatributed among chain actors (Gereffi et al., 2005; Formentini & Taticchi, 2016; Farhad, 2019). Gereffi et al. (2005) propose five governance typologies: i) Market: Arm's-length transactions with minimal coordination (commodity markets); ii) Modular: Suppliers manufacture to detailed buyer specifications; iii) Relational: Trust-based relationships requiring mutual adaptation and learning (such as organic); iv) Captive: Small suppliers are highly dependent on dominant buyers; and v) Hierarchical: Vertical integration within a single firm.

These governance forms reflect varying degrees of coordination complexity and power asymmetry (Kissi & Herzig, 2024).

Sustainability, the third foundational concept, is intrinsically linked to both value chain and governance. The structure of the chain (who participates and how they are connected) creates the conditions for governance, while governance arrangements in turn shape sustainability outcomes - economic, social, and environmental (Martins et al., 2023).

Sustainability, as defined by the World Commission on Environment and Development (WCED, 1987), is the capacity to meet presente without compromising the ability of future generations to meet theirs. The Triple Bottom Line (TBL) framework integrates three pillars: i) economic sustainability: profitability for farmers, equitable income distribution, and resiliente market systems; ii) social sustentability:fair labor conditions, elimination of child labor, gender equity, food security, and empowerment of rural communities; and iii) environmental sustainability: responsible agricultural practices (e.g. organic farming) , biodiversity conservation, sustainable soil and water management, and reduce carbon emmisions.

Despite international initiatives (e.g. ICCO, 2022; and WCF, 2022), challenges persist. In producing countries, cocoa production faces the absence of public policies, limited infrastructure, urban expansion, and environmental degradation (Takyi, 2019; Hess, 2022). This is particularly importante in countries like STP with high socio-economic problems and poverty rates.

Previous research on cocoa value chain, including sustainability, value chain governance and livelihood strategies, has addressed:

1. Market constraints and premium price transmission (Jano, 2007);
2. Vulnerability in global commodity markets (Sotirov et al., 2022);
3. Traceability deficiencies (Dabbene et al., 2014);
4. Buyer-supplier dynamics (Sancha et al., 2016; Bush et al., 2015; Vurro et al., 2009; Gimenez & Sierra, 2013);
5. Market integration and access (Fafchamps & Hill, 2005; Barrett, 2008; Talbot, 2008);
6. Production efficiency and profitability (Gilbert, 2006; Minten, Randrianarison & Swinnen, 2009; Arshad, Bala & Abdulla, 2015; Effendy et al., 2019);

7. Certification and sustainable practices (Haynes, Cubbage, Mercer & Sills, 2012; Dragusanu, Giovannucci & Nunn, 2014; Nguyen, 2014; DeFries et al., 2017; Vermeulen & Metselaar, 2015; Aidoo & Fromm, 2015; Acierno, Alewijn, Zomer & van Ruth, 2017; Ingram, van Rijn, Waarts & Gilhuis, 2018; Thorlakson, 2018; Salazara et al., 2018; Nelson & Phillips, 2018; Francis Lwesya, 2018; Ruf et al., 2019, Andrés, Castro-Llanos & Castro-Nunez, 2019; Moreno-Miranda et al., 2019; Moreno-Miranda et al., 2020; Moreno-Miranda & Rama, 2020);
8. Consumer perceptions of sustainability (Vecchio & Annunziata, 2015; Silva et al., 2017; García-Herrero, De Menna & Vittuari, 2019; Camargo et al., 2019);
9. Environmental degradation (Sporchia et al., 2021) and deforestation (Carodenuto, 2019);
10. Public shortcomings in adressing complex livelihood realities (Lee et al., 2012; Donovan & Poole, 2013; Rapsomanikis, 2015; Nielsen et al., Mithöfer et al., 2017; Mota et al., 2019; Ghazali et al., 2022);
11. SDG aligment in cocoa supply chain (Doherty, 2018, Delabre et al., 2020, Hess, 2022).

Nevertheless, there is a critical gap in the literature concerning the intersection of value chain structure, governance, and sustainability from a holistic perspective. Few studies investigate how governance mechanisms can align smalholders' livelihood strategies with sustainability goals in the organic cocoa value chain. While issues such as corporate sustainability disclosures under the SDG Framework have been explored (Erin et al., 2022; Toukabri & Yossef, 2022; Lodhia et al., 2022), the practical alignment of these governance structures with on-the-ground realities remains underexplored.

Within the contex of STP, prior research has investigated the potential of Protected Geographical Indications (Oliveira, 2014), examined pathways to economic sustainability (Orlandi, 2011), and analyzed the dynamics of the organic cocoa value chain (Prazeres, 2019; Prazeres & Lucas, 2020). This study, however, adopts a more integrated approach, asserting that a comprehensive analysis of smalholder livelihood strategies, the perceived value of cooperative membership, and existing governance mechanisms is essential to inform effective policy and governance reforms. The

resulting evidence aims to enhance both the structure and outcomes of the organic cocoa value chain, ultimately fostering more sustainable and equitable development pathways for smalholder producers in STP.

1.3. Aims and Research Strategy

This research explores how governance mechanisms and national policies contribute to value creation for smallholder organic cocoa producers and support sustainability in STP, thereby addressing a notable gap in the existing literature.

The central research question guiding this study is: How do the governance mechanisms of the organic cocoa value chain and the livelihood strategies of smallholder producers in STP influence sustainability, and what is the perceived value of cooperative membership for these producers?

The overarching aim is to assess the role of smallholder organic producers' livelihood strategies and value chain governance mechanisms in promoting the sustainability of the organic cocoa sector in STP.

The specific objectives of this research are to:

- Analyze the main approaches and challenges involved in the transition towards sustainability and the enhancement of the cocoa value chain, using the framework of Triple Bottom Line (TBL) scenarios through an integrative literature review. Map and examine the perceptions of key actors in the organic cocoa value chain in STP, with particular emphasis on smallholder producers, regarding the challenges and opportunities for improving sustainability.
- Identify the livelihood strategies adopted by smallholder organic cocoa producers in STP and assess their influence on sustainability outcomes.
- Evaluate the value constructs that link producers to organic cocoa cooperatives, alongside the socio-economic factors that shape their views on cooperative membership and risk awareness.

- Propose recommendations for adjustments to national policies and governance mechanisms within the organic cocoa value chain that support the livelihoods of organic cocoa farmers and enhance the perceived value of cooperative membership.

This research is structured into four interconnected stages, designed to facilitate the acquisition of relevant data, foster in-depth understanding, and uncover new evidence, ultimately enabling the achievement of the research goals. This methodological approach ensures a coherent progression, whereby each stage builds upon the findings of the preceding one, thereby advancing the depth of knowledge throughout the research process. The first stage (Chapter 2) addresses the lack of a global consensus on how to achieve the transition to sustainability and enhance the cocoa value chain. This was accomplished through a bibliometric analysis and an integrative literature review focused on the foundational principles of the TBL within the context of the cocoa value chain. The objetive was to identify the primary research contexts related to this theme, including the countries involved, the methodologies employed, and their integration within TBL scenarios.

The TBL framework provides an appropriate perspective for studying the cocoa value chain, as it illuminates potential drivers of systemic change across all key actors. Furthermore, it offers a suitable terminology to frame multidisciplinary solutions and scenarios on a broader scale, as well as to identify fundamental principles for driving value chains (Movilla-Pateiro et al., 2020). In this endeavour, the structure and the guidelines for conducting literature review as proposed by Gilal, Zhang, Paul and Gilal (2018), and Hungara and Nobre (2021) were adopted.The second stage (Chapter 3) entails a comprehensive analysis of the key actors involved in the organic cocoa value chain in STP, with a particular focus on mapping the perceptions of farmers and other stakeholders regarding the enhancement of sustainability in organic cocoa production. This preliminary qualitative research aimed to understand how sustainability is perceived, assessed, and prioritised in terms of its significance, impact, and associated challenges. The investigation was supported by an institutional and bibliographic contextual analysis and employed a combination of expert interviews, focus groups and field observations.

Building on the earlier work of Prazeres (2019), this study identifies the main stakeholders in STP's organic cocoa value chain and examines the institutional landscape governing certification and related regulations. The concept of institution was adopted in a broad sense, following the interpretations of Hindriks and Guala (2015) and Dompreh et al. (2021), encompassing both formal and informal entities. This includes policies and organisations, such as cooperatives and certification bodies, which prescribe actions to ensure the sustainable production, processing, and trade of commodity crops. It also involves institutions that influence the design, adoption, and implementation of sustainability standars (Lambin and Thorlakson 2018).

Capturing the perceptions of multiple stakeholders is important, as these actors often hold different perspectives on key aspects and outcomes of sustainability initiatives. Such divergence can significantly shape sustainability transition processes, influencing the adoption, legitimacy, effectiveness, and perceived performance of sustainability standards and interventions. Understanding these perspectives is central to the transdisciplinarity approach in sustainability science (Lang et al., 2012), which has been widely applied to the study of development interventions (Ahmed et al. 2019; Karanja, Mburu and Gasparatos, 2020).

The third stage (Chapter 4) of this research explores the relationship between livelihood strategies, perceptions of sustainability, household dependency on organic cocoa, and poverty. Building on the findings of the second stage, which examined stakeholders' roles as potential agents of change in addressing sustainability challenges, this stage aims to investigate the interrelations among these factors in greater depth.

Producers were categorised according to their livelihood strategies, household structure, and degree of crop diversification. To facilitate the comparison of livelihood strategy diversity and to determine the effect of various categorical factors, an ordered probit model was employed. This econometric approach helps control for selection bias and supports a more robust analysis of the relationships under study.

Building on the knowledge accumulated in the previous stages, the final stage of this research (Chapter 5) offers an innovative assessment of the value constructs that connect organic cocoa producers to the two existing cooperatives in STP. Despite the well-documented importance of

cooperatives in promoting social inclusion, rural development, food security and agricultural sustainability (Bijman and Wijers, 2019), income generation (Verhofstadt and Maertens, 2015), poverty reduction, and the shaping of producers' livelihood strategies (Prazeres et al., 2023a), limited research has explored the specific values that underpin producers' affiliation with cooperatives and their membership experiences.

This stage incorporates findings from prior research phases with stakeholder perceptions to analyse how various dimensions influence producers' perspectives on cooperative membership. Notably, this study represents a pioneering interdisciplinary application of the PERVAL scale, originally developed from a consumer-oriented perspective, to assess the functional, emotional, monetary, and social values attributed to cooperative membership from the standpoint of producers.

By addressing a critical gap in the literature, this research makes a significant contribution to the field. Although a substantial body of work has examined organic cocoa production, few studies have investigated the value dimension underpinning producers' affiliation with cooperatives. Through the integration of the PERVAL scale into the analysis of producers' cooperative experiences, this study offers a novel and interdisciplinar contribution. It challenges established paradigms, generates new theoretical insights, and enhances both methodological approaches and practical applications in the context of sustainable organic cocoa production.

Furthermore, by overcoming limitations identified in previous studies on organic cocoa sustainability and by introducing methodological innovations rarely applied in this domain, the research holds considerable potential to advance the broader field of sustainability science. Its relevance and originality are underscored not only within the academic community but also in policymaking and industry contexts. The findings contribute to a deeper understanding of sustainability by highlighting necessary adjustments to public policies and governance mechanisms specific to the organic cocoa value chain. From a methodological standpoint, the study advances the analytical framework for assessing perceived value in cooperative membership among producers. It also adopts a transdiciplinary approach that synthesizes knowledge from multiple academic fields while engaging a broad spectrum of actors, including

stakeholders, academic researchers, public institutions, and professionals from the chocolate industry, thereby enriching the study's analytical depth and practical relevance.

1.4. Thesis Outline and Structure

This thesis is composed of six thematically interconnected chapters, the first of which introduces the study, while the final chapter presents the concluding remarks (see Table 1). Chapters 2, 3, 4 and 5 are presented in a paper-based format, each comprising a standalone research article that has been published or submitted for publication and subsequently revised to ensure alignment with the overarching thesis narrative. This structure is made possible by the integrated design of the research, whereby each article builds upon the findings and insights od the preceding ones. Following this introductory chapter, which outlines the aims, objectives and structure of the thesis, Chapters 2 through 5 adhere to the previously described four-step methodological framework.

Chapter 2 provides a bibliometrics analysis on the foundational principles of the TBL, conducted to identify the primary research contexts within the organic cocoa domain. This chapter corresponds to the research article entitled '*Sustainable Cocoa Value Chain-A review and Critical Analysis of 'Triple Bottom Line' Scenarios*' published as a book chapter by IGI Global.

Chapters 3 addresses gaps in the current mapping of organic cocoa value chain by examining the perceptions of key stakeholders in STP, with particular emphasis on smallholder producers and their role in enhancing the sustainability of organic cocoa production. This chapter is based on the research article published in the *Sustainability* journal.

Chapter 4 explores the livelihood strategies of smallholder organic cocoa farmers and examines how these strategies influence sustainability outcomes. This study was published in 2023 in the journal *Bio-based and Applied Economics*.

Chapter 5 assesses the values that link producers to organic cocoa cooperatives, as well as the socioeconomic factors that influence their perceptions of cooperative membership and risk awareness. The corresponding research article has been recently submitted for publication.

Finally, chapter 6 presents the concluding remarks, highlighting the key contributions of the thesis.

The list of references follows the conclusion. To ensure coherence and uniformity throughout the thesis, all bibliographic references are consolidated at the end of the document and formatted in accordance with APA style guidelines. Furthermore, all tables and figures have been renumbered to provide a continuous and consistent reading experience.

The Appendices are the final section of the thesis.

Table 1. Summary of Thesis' Chapters

Chapter	Title	Purpose	Methodology	Sources	Publication/Presentation
1	Introduction	Introduce the research topic and its challenges, the main goal, and specific objectives of the research.	Comprehensive Literature Review.	Peer-reviewed literature, Cocoa reports, Official Statistics, and publications.	None
2	Sustainable Organic Cocoa Value Chain: A Review and Critical Analysis of "Triple Bottom Line" Scenarios.	Performe a literature review of the cocoa value chain, under the lens of TBL scenarios.	Integrative literature review.	Peer-reviewed literature, official international industry reports and NGO publications.	Conference Paper (presentation): XXIII Seminário Luso-Espanhol de Economía Empresarial, Salamanca, 2021 Book chapter (published) In V. Martinho (Ed.). Impacts of Climate Change and Economic and Health Crises on the Agriculture and Food Sectors (pp.288-314), Chapter 15. IGI Global publications. DOI:10.4018/978-1-7998-9557-2.ch015. ISBN13: 9781799895572.
3	Organic Cocoa Value Chain Sustainability: The Perception of São Tomé and Príncipe's Stakeholders.	Propose paths to sustainable organic cocoa production in São Tomé and Príncipe by mapping stakeholder perceptions and recommending stronger cooperation among cooperatives, firms, and institutions.	The study used qualitative research semi-structured face-to-face interviews with organic cocoa stakholders across São Tomé and Príncipe.		Conference paper (presentation): In M. Costa, Nedzhad, A., & D. Lucic (Eds.), Economic and Social Development (Book of Proceedings), 68th International Scientific Conference on Economic and Social Development (pp. 204-217), 24-25 May 2021, Aveiro, Portugal. Research paper (published): *Sustainability* 2022, *14*,136. https://doi.org/10.3390/su14010136
4	Organic Cocoa Farmer's Strategies and Sustainability	Analyse the perception of sustainability among organic cocoa farmers to understand how factors influence their livelihood strategies, aiming to increase income and alleviate poverty.	The study used a quantitative approach with a survey of 810 farmers. An ordered probit model was used to analyze how different factors affect their livelihood strategies.	Included secondary data from an extensive literature review and mix primary data from a survey of 810 farmers, interviews, and focus groups.	Conference paper (presentation): *9th EAAE PhD Workshop*, University of Parma, 2022 June 22-24. Conference paper (presentation): X APDEA congress 2023 and published: *Brazilian Journal of Rural Economy and Sociology,* 61(spe), e276821 (*Revista de Economia e Sociologia Rural-RESR*). DOI: 10.1590/1806-9479.2023.276821. Conference paper (presentation): In M. Costa, T. Susak, & V. Haluga (Eds.), Economic and Social Development (Book of Proceedings), 78th International Scientific Conference on Economic and Social Development (pp. 263-274), 24-25 February 2022, University of Aveiro, Portugal. Research paper (published): *Bio-based and Applied Economics* 12(1): 37-52, 2023 | e-ISSN 2280-6e172 | DOI: 10.36253/bae-13473.
5	Perceived Value, Risk and Cooperative Membership: Engagement for Sustainable Organic Cocoa Production	Evxamine the relationships between perceived value (functional, emotional, social, and monetary) in organic cooperative membership and the multiple dimensions of risk perception (probability of occurrence, severity of impact, self-control, and risk mitigation tools)	The study dapted a version of the PERVAL model combined with PLS-SEM (Partial Least Squares Structural Equation Modelling	Insights from previous chapters. Data from a survey of 630 organic cocoa farmers.	Conference paper (presentation): IX PhD Students Meeting in Environment and Agriculture, Parma University 11-12 December 2024, Italy. Research paper (submitted for publication at *Journal of Cleaner Production*. Conference paper with complementar data (presentation): XI APDEA Congress 2025, Lisbon, Portugal.
6	Final Considerations	Summary of the research findings, highlighting contributions, and future research directions	Analytical summary and forward-looking statements	Entire thesis body of work	None

Chapter 2 | SUSTAINABLE ORGANIC COCOA VALUE CHAIN: A REVIEW AND CRITICAL ANALYSIS OF "TRIPLE BOTTOM LINE" SCENARIOS[3]

Sustainability has emerged as a factor of growing importance among society and businesses, following the imperative matter of sustainable development raised by the World Council of Economic Development (WCED, 987). Hence, many countries are pursuing it in their diverse value chains, aiming to adopt strong measures which target the growing environmental pressure and its long-term risks such as flooding, drought, political instability, social unrest, and depletion of natural resources (Giddens, 2015). Thus, this chapter performe a systematic literature review under the lens of TBL scenarios focus on cocoa value chain.

2.1 Introduction

Assessing social and environmental sustainability impacts is not new (Norman, & MacDonald, 2004; Richardson, 2004) and TBL (triple bottom line) has greatly contributed to incorporating sustainability into the business agenda (McDonough & Braungart, 2002).

Although the TBL construct is explicitly based on the integration of the social, environmental, and economic dimensions of sustainability, this concept is inconsistent in its literature. Several studies used sustainability to primarily refer to the environmental dimension (Yan, Chen & Chang, 2009). Others used the concept to refer to its social dimension (Bibri, 2008) while some used it to refer to all three (Marcus & Fremeth, 2009). Conversely, TBL places equal levels of importance on each of the three dimensions, which brings greater balance and coherence to the construct of sustainability (Elkington, 1997; Epstein, 2008; Harmon et al., 2009; Savitz & Weber, 2006).

[3] The original work of this chapter was published in: V. Martinho (Ed.). *Impacts of Climate Change and Economic and Health Crises on the Agriculture and Food Sectors* (pp.288-314), Chapter 15, Prazeres, I., Lucas, M. R., & Marta-Costa, A. (2022). Sustainable Cocoa Value Chain-A review and Critical Analysis of 'Triple Bottom Line' Scenarios. IGI Global publications. DOI: 10.4018/978-1-7998-9557-2.ch015. ISBN13: 9781799895572. The sections, pagination and tables and figures have been renumered for a unified, cohesive presentation, diverging slightly from the original published work.

Other sustainability-related studies showed an imbalance in the level of importance distributed among the three dimensions. The importance of the economic dimension was limited [64], though many studies included it when referring to sustainability (Collins, Steg & Koning, 2007).

Additionally, some authors argue that the economic, environmental, and social aspects do not suf-ficiently cover the entire concept of the TBL related-sustainability construct (Wu, Liao, Tseng & Chiu, 2016). They proposed four additional aspects, to further promote discussion on the issue: operations, resilience, long-term and stakeholders. Others (Tseng, 2017) emphasized that sustainability issues are characterized by their high complexity and uncertainty or (Isil & Hernke, 2017) contributed with a critical evaluation of the TBL paradigm. To promote the quality and success of the solutions, it is essential to integrate qualitative information, quantitative data, and social media into the TBL discussion (Wu, Zhu, Tseng, Lim & Xue, 2018). The TBL can evolve in different ways independently from the object of study (Tseng et al., 2020). In each case, balancing the TBL toward sustainability, involves viewing it as an essentially dynamic and interdependent system.

To some extent, agriculture, agribusiness, and food markets have become areas that prioritize the sus-tainable development, in many countries. Such is due to their responsibility for over 30% of greenhouse gas emissions, 70% of global water use (Pradhan, Reusser, & Kropp, 2013) and approximately 50% of available land use worldwide, being the greatest driver of the biodiversity decline (Chiarolla, 2017), accounting for 70% of the projected loss of terrestrial biodiversity (CB, 2014, 2016). This loss is placing global food security in danger by undermining the resilience of many agricultural systems to threats such as pests, pathogens, and climate change (IPBES, 2019; Recanati, Marveggio & Dotelli, 2017). The cocoa value chain sustainability is an increasing global concern, as large part of its used land is attained through deforestation, which has a large impact among the local biodiversity and social cohesion (Recanati, Marveggio, & Dotelli, 2017). Additionally, the over-aged tree stocks, the repercussions of disease and pest infestation, the political instability in West Africa, a lack of agricultural professionalism, an absence of infrastructure, low farmer income, the shortcomings of the educational and financial systems in the cocoa-growing regions and child labour exploitation and child trafficking, prove to be

sustainability problems (Matissek, Reinecke, Von Hagen & Manning, 2012; Ingram, van Rijn, Waarts & Gilhuis, 2018). Thus, the integration of the TBL dimensions in the cocoa chain represents a relevant issue for its adequate management.

Cocoa is one of the main goods in the global agricultural trade markets, occupying the third position in exports. It is a commodity that plays an important role in the food product market, and it is a vital contributor to smallholder's producer income and to their developing countries' trades, which is facing climate challenges and risks (Prazeres, Lucas & Marta-Costa, 2021). Furthermore, cocoa has an interesting value chain embedded in a complex global network that includes all the actors, from the producer, mainly located in Africa, Asia, and Americas, to the chocolate manufacturer and the consumer market, primarily done in Europe and Northern America (Recanati, Marveggio, & Dotelli, 2017). Besides, the demand for cocoa is persistently growing. In the past 50 years, the demand increased by 300% and some forecasts sustain that it has con-tinuously risen. Therefore, sustainability improvements will be even more impact full (Recanati, Marveggio, & Dotelli, 2017) and the TBL concept of Elkington (1997) can be a relevant possibility for a sustainable transition and/or improvement within the cocoa value chain (Blowfield, 2003).

This work attempts to fulfil the previously identified research gap, by performing a systematic literature review of the cocoa value chain, under the lens of TBL scenarios. TBL is an appropriate perspective to study this chain as it sheds light on the potential driver of systemic changes across all key-actors, including the increase in consumer awareness of more sustainable lifestyles and responsible consumption (Colwell, 2012). TBL is also an adequate terminology both to frame the multidisciplinary answers ands scenarios at a wider scale and identify the basic principles for driving value chains (Movilla-Pateiro et al., 2020). In this endeavour, the structure and the guidelines of a literature review (Gilal, Zhang, Paul & Gilal, 2018; Hungara & Nobre, 2021) are followed.

The chapter is structured as follows. Its opening concerns the historical overview of TBL, following other authors (Alhaddi, 2015; Rashidi, Noorizadeh, Kannan and Cullinane, 2020). Successively, the review methodology is pre-sented. It is primarily stimulated by three studies of (Gilal et al.,

2018; Kahiya, 2018; Hungara & Nobre, 2021), and to a lesser extent, by some other two studies (Paul & Benito, 2017; Paul, 2019). Following the review methodology, the bibliometric profile of the articles is exposed. Then, the selected sample is analysed in terms of publications trends and research contexts, and the methodologies and scenarios are discussed. The conclusions, to the research agenda for future studies and its emerging themes, and the set of propositions of study, are presented before the finale. The chapter ends with some key literature for additional reading which reflects the issues discussed.

2.2 Historical Overview of TBL

In 1997, Elkington (1997) coined the expression TBL, a newly sustainability-related construct. Though there are no different interpretations to the exact historical roots of TBL, being widely accepted the 1997's expansion of the term and its growth in most agrifood chains (Colwell, 2012), its antecedents may date back to over 130 years ago, from an idea denominated as spaceship earth (George, 2009).

The multidisciplinary construct of TBL gained important recognition when it provided the Brundt-land Report in 1987 (Giddens, 2015) and instigated the concept of "sustainable development". The concept is defined as the "development that meets the needs of the present generations without compromising the ability of the future generations to meet their own needs" (Giddens, 2015, p. 43). In this context TBL expresses the expansion of the environmental agenda, integrating the economic and social dimensions (Elkington, 1997), providing a framework for assessing three key-interrelated dimensions driven by sustainability, the economic dimension, the social dimension and the environmental one (Goel, 2010), to which the institutional can be added to (Waas et al., 2012). In Elkington's original definition of TBL, these dimensions or lines were profit, people, and planet (He et al., 2019) and, for some, the dimensions of TBL, can also be denominated as "the three lines/pillars" or "the three E's" (economy, equity and ecology) (Colwell, 2012). The central idea behind the three E's is that sustainability cannot be achieved unless the chain is economically feasible, environmentally dependable, and socially responsible,

allow-ing interchangeability. Meaning, if there is a shortfalling in one of the dimensions, it can be offset by “investing” in another (Colwell, 2012). Decreasing the level of negative outcomes as a solution to the environmental and societal problems of the planet should not be considered as settled and established in the Millennium Development Goals (MDGs) (Elkington, 2007).

The main research efforts in the field have three booms in publications, in 2003, 2011, and 2015, revealing a proliferation of academic studies and articles addressing the issue of sustainability by em-ploying the TBL. One of these booms is related to the redefinition of Elkington’s construct of TBL (Carter & Roge, 2008). The authors redefined the TBL as follows: “sustainability should hold economic performance, the natural environment and society at a broader level, and the intersection of social, en-vironmental and economic activities can help organizations become engaged in activities that not only positively affect the natural environment and society but that also result in long-term economic benefits and competitive advantage for the firms.” The second boom occurred after the United Nations climate change conference in Durban 2011, South Africa, aimed at developing a new agreement to limit carbon emissions. The final boom occurred after complementing TBL with four new dimensions (operations, resilience, long-term, and stakeholders) (Wu et al., 2018).

After 25 years of the legitimacy of TBL as an independent research field (Elkington, 2018), it came back to the analysis, recognising the inadequate use of the concept as an accounting tool and updated TBL to a more globally system approach. The main problem of the TBL framework, which was not evolving into practice and thus obtaining positive results, signalised the need to find other or specific conditions or characteristics that could promote its real implementation [98]. However, TBL hadn’t lost its credibility and was still considered a current approach for sustainable development (Elkington, 2018). The academia has been using the term from 1998 until today, reaching its peak in the last five years due to the proliferation of a huge body of literature on the topic, owed to worldwide environmental and societal pressures. This reputation is both capturing the interest of top journals (Zaharia & Zaharia, 2021) and increasing the number of published articles.

2.3 Methodological Procedure

The study opted for an integrative literature review due to its ability to capture the diversity and devel-opment of more than one body of literature. The multiplicity of emerging topics is addressed through a holistic conceptualisation and synthesis of the extant literature (Torraco, 2005; Hungara, A., & Nobre, 2021). This type of review generates knowledge as it culminates into a conceptual model or framework that offers new ways of thinking about the literature and a research agenda that delivers questions for future research (Torraco, 2005; Hungara, A., & Nobre, 2021). This should allow for a better understand-ing of the phenomenon, provide meaningful knowledge on the TBL construct dimensions' scenarios for further research, and enable a discussion on the implementation of the TBL in the cocoa value chain.

Initially, to conduct this integrative review, a set of specific research questions that guided the study, was developed. These questions were:

1. How can sustainability or TBL contribute to the literature on the cocoa value chain?
2. What type of sustainability or TBL scenarios for the cocoa value chain are described in the literature so far?
3. What theories have been used in parallel with sustainability or TBL in the cocoa value chain?
4. What variables have been used under sustainability or TBL scenarios?
5. What contexts have been studied within the cocoa value chain?
6. What countries have been studied regarding sustainability or under the TBL cocoa value chain literature?
7. What kind of research methods have been used?

This chapter seeks to answer these questions by linking the development and legitimacy of sus-tainability or TBL to the development of the cocoa value chain, and by demonstrating how these two concepts over-lap.

The study followed a theory-based review (Torraco, 2005). Theory-based reviews advance the literature on a specific topic by applying a given theory to a subject area or field (Paul & Criado,

2020). The review methodology used consisted different steps according to the literature (Kahiya, 2018), including, among others, the identification of the search terms and the databases to be accessed and, the definition of the eligibility criteria for and exclusion of articles (see figure 1).

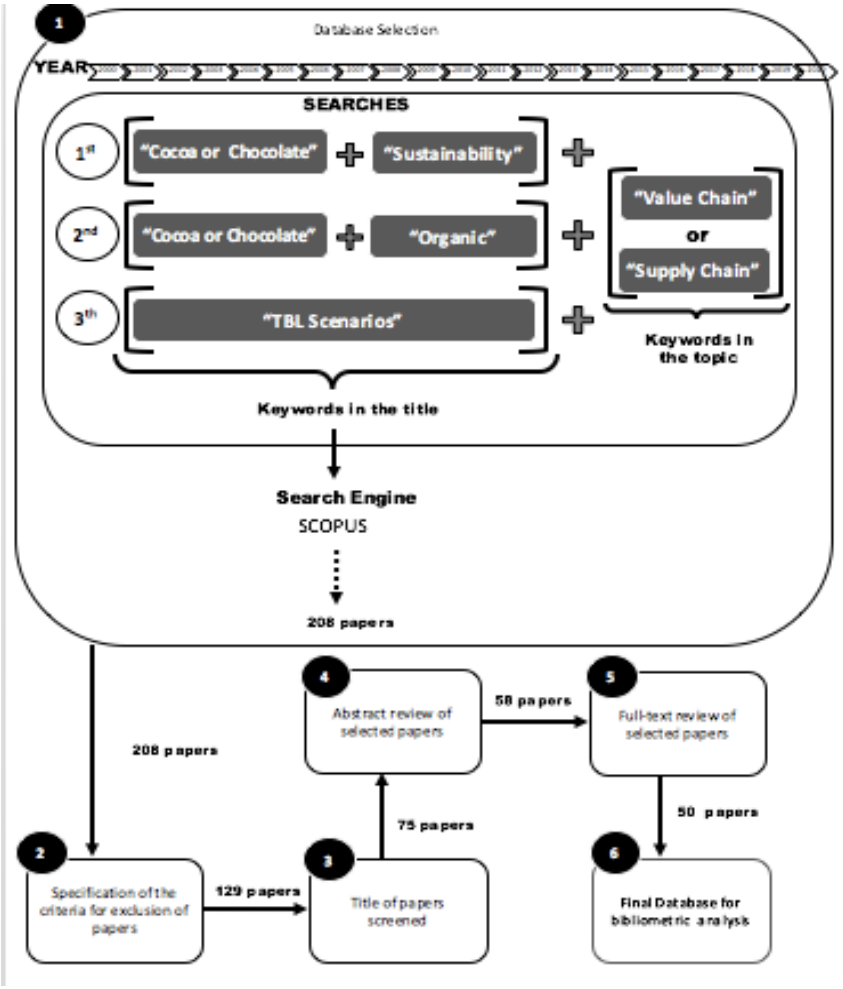

Figure 1. Review Methodology

The search terms selected were: “cocoa” or “chocolate” and “sustainability” and “organic” combined with “TBL scenarios” and “value chain” or “supply chain”. These search terms were applied through the search engine of Scopus to search for peer-reviewed journal articles. This database and process were also generally used in previous systematic reviews (e.g., Randhawa

et al., 2016; Alcayaga, et al., 2019) and in cocoa value chain reviews (e.g., Nabhani, Daryanto, Yassin and Rifin, 2015; Ros-Tonen et al., 2019; Goel et al., 20121). Because sustainability and TBL are multidisciplinary topics that cross differ-ent fields of research (e.g., sociology, economy, and environment), the Scopus database, which is broad, diverse and multidisciplinary, offering a large sample of greatly trustworthy publications, was deemed adequate. However, other reviews additionally considered the Web of Science, Emerald Insight and EBSCO databases (Correia et al., 2017).

The English, Spanish and Portuguese language and the temporal period from 2000 to September 2021, were the main criteria used in selected articles. This period was chosen because it covers all the TBL life cycle, from its origin and enclosing the three booms of related publications. This goes in line with what a systematic literature reviews must encompass, meaning, 10 years of research in the field (Paul & Criado, 2020) similarly to what occurs in other studies (Paul and Mas, 2019; Rosado-Serrano et al., 2018; Alcayaga, et al., 2019).

The search results from the Scopus database contain a set of 208 scientific articles on diverse subject areas of research interest (see figure 1). In step two, to perform a selection and exclusion of peer-reviewed journal articles, the criteria were research area of the publications ("Agricultural and Biological Sciences" "Business, Management and Accounting", "Environmental Science", "Social Sciences", "Economic, Econometrics and Finance" and "Decision Sciences") and keywords. The aim was to include out-standing articles in the selection, comprising significant cocoa or chocolate-related research applied to the cocoa value chain. Upon these results, the number of articles retained was 129 from 9 countries around the world (United Kingdom, United States, Ghana, Colombia, Germany, Indonesia, Brazil, Ecuador, and Italy). During step three, the 129 articles gathered were reduced to 75, through an exclusion by title observation of the papers dedicated to agronomic, chemical, and microbiological subjects; studies in product quality; and research that included a set of tropical products.

Following Alcayaga, et al. (2019) and Paul & Criado (2020), the targeted search of representative literature enclosed specific keywords, present not only in the title, abstract, or list of keywords, but also in the full text. Thus, the procedures of the abstract review (step four) and full-text

review (step five), allowed for the exclusion of 17 articles that did not contemplate the topics that are intended for this study. A total of 58 articles were retrieved (see figure 1). Another criterion was set for article inclusion (Kahiya, 2018). This criterion stated that, at least, one of the following conditions had to be verified:

1. Presence of an existing link between sustainability or TBL and cocoa or chocolate value chain.
2. Provide means to define or identify sustainability or TBL scenarios on cocoa or chocolate value chain.
3. Specifically mention sustainability or TBL dimensions or bottom line of sustainability (e.g., economics or environmental or social) and cocoa or chocolate value chain.
4. Provide information about an agenda for future research on sustainable cocoa or chocolate value chain.

To ensure that only relevant papers were analysed, the Tranfield et al. (2003) recommendations on the decisions relating to the inclusion/exclusion criteria were followed. These are relatively subjective and should be carried out by more than one researcher, therefore, two researchers with expertise in sustain-ability and cocoa were involved in this phase. All these criteria allowed a final database of 50 scientific articles (Table 2), wich is in line with the criteria of a sample of 40-50 in a systematic literature review (Paul & Criado, 2020).

The final sample of 50 articles did not comprise articles specifically focusing on cocoa TBL scenarios, but rather those on explicit subjects of cocoa or the sustainability of the chocolate value chain, such as, sustainability practices and standards, supply chain performance and added value, supply chain on zero-deforestation ecosystems services[4], sustainability transition pathways,

[4] Ecosystem services are the aspects of ecosystems utilised to produce human well-being. This aren't only the final services of the ecosystem, including ecosystem organization, as well as process and/or functions provided that they are consumed or utilized by humans either directly or indirectly.

circular economy[5], certification, or child labour and child trafficking on the value chain or rural/territorial development with shared value.

Table 2. Final Database

Number	Reference	Number	Reference
(1)	Abbey et al. (2016);	(26)	Krauss and Krishnan (2021)
(2)	Aboah et al. (2021)	(27)	Lafargue et al. (2022)
(3)	Adu-Acheampong et al. (2017)	(28)	Lalwani et al. (2018)
(4)	Arias and Fromm (2019)	(29)	León Bravo et al. (2022)
(5)	Asamoah and Annan (2012)	(30)	Liliana (2020)
(6)	Astrid Fenger et al. (2017)	(31)	Mabe et al. (2020)
(7)	Barrientos (2014)	(32)	McLoughlin and Meehan (2021)
(8)	Barrientos and Asenso-Okyere (2009)	(33)	Mendoza et al. (2020)
(9)	Bonuedi et al. (2021)	(34)	Middendorp et al. (2020)
(10)	Borda et al. (2021)	(35)	Mithöfer et al. (2017)
(11)	Busquet et al. (2021)	(36)	Moreno-Miranda et al. (2020)
(12)	Carodenuto and Buluran (2021)	(37)	Nabhani et al. (2015)
(13)	Castro-Nunez et al. (2020)	(38)	Narciso et al. (2020)
(14)	de Boer et al. (2019)	(39)	Nonci et al. (2019)
(15)	Díaz-Montenegro et al. (2018)	(40)	Odijie (2018)
(16)	Doherty and Meehan (2006)	(41)	Ollivier de Leth and Ros-Tonen (2022)
(17)	Dompreh et al. (2021)	(42)	Orozco-Aguilar et al. (2021)
(18)	Escobar et al. (2020)	(43)	Ruben (2017)
(19)	Estival et al. (2016)	(44)	Rueda et al. (2018)
(20)	Glavee-Geo et al. (2020)	(45)	Schroth et al. (2016)
(21)	Grumiller (2018)	(46)	Scott et al. (2015)
(22)	Haynes et al. (2012)	(47)	Sjauw-Koen-Fa et al. (2018)
(23)	Hess (2022)	(48)	Sonwa et al. (2014)
(24)	Indah et al. (2020)	(49)	van Huellen and Abubakar (2021)
(25)	Ingram et al. (2018)	(50)	Vogel et al.(2020)

[5] Circular economy is a new restorative or regenerative model which disruptly change the way the societies and business are organized. It is based on three principles, eliminate waste and pollution, circulate products and materials and, regenerate nature.

The search also permits the confirmation that there are no studies concerning TBL scenarios exclusively on the cocoa value chain and, consequently, their contribution to the literature is still commencing. Moreover, as far as known, no other systematic review has focused specifically on TBL aligned with the cocoa value chain. Thus, it wasn't possible to follow the procedure recommended by a specific author (Kahiya, 2018) and compare the final sample with the samples of other systematic reviews on the topic. Notwithstanding, it should be noted that there are much more publications on TBL in a broad sense than those strictly focusing on the cocoa value chain. Multiple research scenarios were confronted with a trade-off or win-win consideration, where the win-win scenarios were the preferred options due to the increase on multiple factors in the TBL (Trienekens, 2018).

2.4 Bibliometric Analysis

Bibliometrics is the scientific field which measures publications, authors, and citations. In this work, the bibliometric analysis focused on the number of publications and identification of publication outlets, on the number of citations, publishing trends and contexts from the article sample, as evidence of their academic value. Following Hao et al. (2019) [84, 87] a list of the distribution of articles per journal was created (see Table 3). The list, similarly, to that of Rosado-Serrano et al. (2018), covers 50 articles spread across 41 journals, whilst following the recommendations in the literature of having at least 10–20 different journals to avoid biased selection criteria (Paul & Criado, 2020). Apart from the journal Sustainability (n=3), eight other journals have the same number of publications (n=2), covering many publications in sustainability related research. The remaining journals solely have one article.

The next step was to map the occurrences of keywords clusters related to subfields of study in the sample search, using VOSviewer software, a tool for constructing and visualizing bibliometric networks. When analysing the map of the keyword's clusters (see Figure 2), it is noted that 4 clusters can be identified as representative of the sample.

Table 3. Publication Outlets

Journal	References (codes of Table 2)
Sustainability (MDPI)	(10, 22, 25)
International Journal of Agricultural Sustainability	(40, 50)
International Journal on Food System Dynamics	(4, 47)
Journal Fur Entwicklungspolitik	(8, 21)
Journal of Agribusiness in Developing and Emerging Economies	(14, 31)
Journal of Rural Studies	(1, 15)
Supply Chain Management	(29, 27)
Sustainability Science	(45, 17)
Agricultural Systems	(2)
Agriculture (MDPI)	(18)
Agroalimentaria	(30)
Agroecology and Sustainable Food Systems	(6)
Agroforestry Systems	(48)
Applied Geography	(13)
Asian Social Science	(37)
Benchmarking	(28)
Bioagro	(36)
Bulgarian Journal of Agricultural Science	(24)
Business Strategy and Development	(34)
Business Strategy and The Environment	(44)
Cahiers Agricultures	(3)
Custos e Agronegocio	(46)
Enterprise Development And Microfinance	(43)
Espacios	(19)
European Journal of Development Research	(49)
Frontiers in Sustainable Food Systems	(42)
Global Networks	(26)
International Journal of Biodiversity Science Ecosystem Services and Management	(35)
International Journal of Operations and Production Management	(32)
International Journal of Organizational Analysis	(23)
International Journal of Services and Standards	(5)
International Journal of Supply Chain Management	(39)
Journal of Agriculture and Environment For International Development	(38)
Journal of Business Ethics	(41)
Journal of Development Studies	(9)
Journal of Environmental Policy and Planning	(12)
Journal of Macromarketing	(20)
Journal of Strategic Marketing	(16)
Regional Studies	(7)
Revista de La Facultad de Agronomia	(33)
World Development	(11)

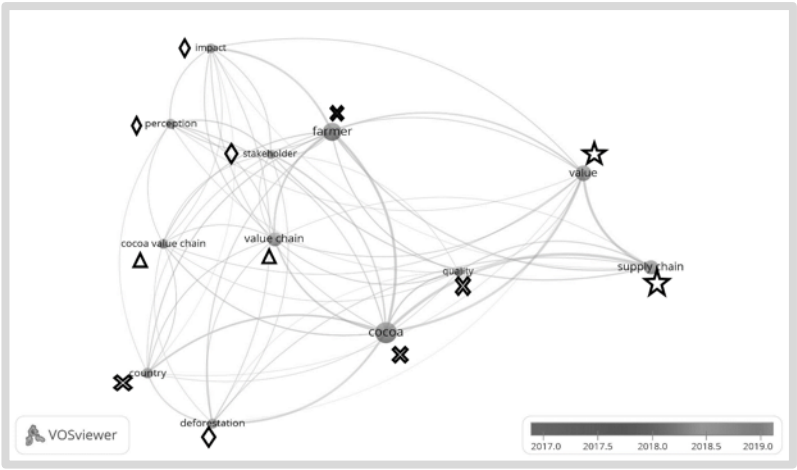

Figure 2. Keywords Clusters

The 4 clusters identified are: cluster 1 (cross), including the keywords farmer, cocoa, country, and quality; cluster 2 (star) agregating the keywords stakeholder, perception, impact and, de-forestation cluster 3 (triangle) with the keywords cocoa, and value chain; and cluster 4 (rhombus) with the supply chain and value keywords.

To assess scholarly work on the subject, Hao et al. (2019) was followed, thus analyzing the global number of citations and the partials per year of each article. The number of citations per year was used to control the age of an article. According to other authors [87] Lim et al., 2021), the study established the top 10 of the most cited articles (see Table 4).

Table 4. Citation Analysis

Rank	References (codes of Table 2)	Total Citations	Citations/Year
1	(7)	36	5,14
2	(48)	22	3,14
3	(35)	19	4,75
4	(16)	16	1,06
5	(45)	15	3,00
6	(44)	14	4,66
7	(25)	12	4,0
8	(22)	11	1,22
9	(28)	10	3,33
10	(6)	9	2,25

Barrientos (2014) is the most influential article, both in terms of the global number of citations (n=36) and citations per year (5,14). It is also noted that although Mithöfer et al. (2017) and Rueda et al. (2018) have a substantially lower number of citations (n=19 and n= 4, respectively) than Sonwa et al. (2014) (n=22), in terms of citations per year, they are ranked second and third. Sonwa et al. (2014) ranks second in terms of global citations (n=22), but the article itself, only ranked sixth in terms of average citations per year (3,14) and is less cited than the more recent articles [79], which an average citation per year of 4,0, and Lalwani et al. (2018), with an average citation per year of 3,33.

2.5 Publication Trends and Contexts

Since the research focuses on studying the cocoa chain sustainability under theTBL scenarios perspective, it began by analyzing the articles in the final sample (n=50) which specifically mention the sustainability topic in the title, abstract, and body text of the articles. According to the booms in publications mentioned [96], one of them related to Elkington's construct of TBL, the analysis was divided into three periods of time: 2000 – 2010, 2011 – 2015, and 2016 – 2021 that represent three publishing trends (see Figure 3).

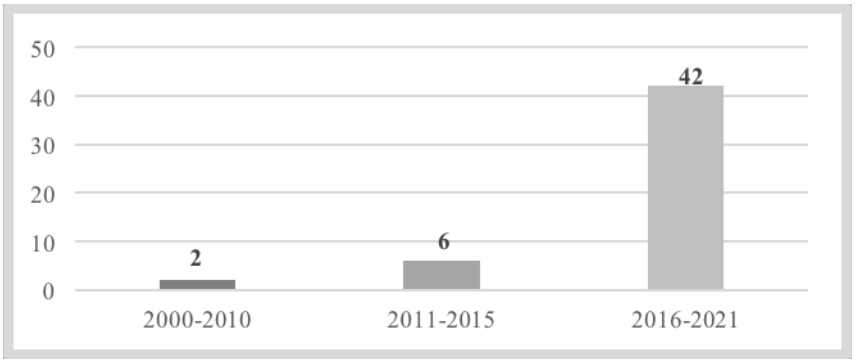

Figure 3. Publishing Trends

Only two articles were published between 2000-2010, one focusing on "competing on social resources" and the other on Ghana's cocoa value chain and its challenges. The fact that

sustainability and the TBL related topics are present at an early research stage can explained by the scarcity in literature during this period. Between 2011- 2015, the number of articles more than doubled to 6. One of these articles is related to promoting sustainable agroforestry cocoa systems in the main production countries, and its ecosystems services. Another is focused on organic and fair trade as strategies towards environmental sustainability drivers and social equity in production and trade, particularly by small-scale actors. More recently, 42 articles (12 of them related to sustainability dimensions) reached SCOPUS academic journals. These numbers demonstrate that cocoa sustainability research topics are increasingly garnering the interest of the academic and research communities. However, it could also infer that from the 2016-2021 sample, there are still many articles that do not analyse the sustainability dimensions in light with TBL as explored in this study.

The countries of study and the specific research contexts in which the research was applied are presented on Tables 5 and 6 and followed a similar design to Chen et al. (2021).

Table 5. Research Country

Country	References (codes of Table 2)
Ghana	(1, 2, 3, 5, 6, 7, 8, 12, 17, 20, 21, 23, 28, 31, 41, 47, 49).
Ecuador	(15, 29, 27, 33, 34, 36, 44)
Indonesia	(14, 24, 35, 37, 39)
West and Central Africa	(11, 25, 40, 48)
Ivory Coast	(12, 21, 28, 47)
Peru	(10, 42, 46)
Colombia	(13, 18)
Nicaragua	(26, 42)
UK (Europe)	(16, 32)
Brazil	(45)
Costa Rica	(22)
Cameroon	(50)
Honduras	(4)
Netherlands	(27)
Venezuela	(30)
São Tomé and Príncipe	(38)
Sierra Leone	(9)

Table 6. Research Context

Research context	References (codes of Table 2)
Literature Review	(37, 43)
Sustainability (iniciatives; indicators; practices; organisation; programs; policies; management)	(10, 14, 23, 25, 26, 28, 29, 32, 35, 40, 47)
Value chain dynamics, (opportunities, risks, interventions; gender; future scenarios)	(3, 5, 7, 8, 9, 21, 22, 27, 31, 46, 49)
Value chain strategies (resilience, policies, trust relationships, performance; competitive advantage; CSV and inclusive development; certification; stakolders perceptions)	(1, 2, 4, 6, 15, 16, 17, 20, 24, 30, 36, 38, 47, 50)
Deforestation, Reforestation and Tree Cover; Circular Economy; agroforestry systems and ecosystem services)	(12, 13, 33, 42, 45, 48)
Smallholder livelihoods, family farming, child labour, child trafficking and ecosystems (weakness, improvements, challenges)	(11, 18, 19, 34, 39, 44)

The observation of Tables 5 and 6 shows that most studies took place in Ghana (n=17), followed by Ecuador (n=7) and Indonesia (n=5). West and Central Africa and the Ivory Coast presented the same number of studies (n=4). UK (n=2) embodies the rare exception of countries located in Europe with contributions to the field. Notwithstanding, one of UK'studies solely mentioned the field as part of a research taking place mostly in the Europe. The studies also covered a wide range of subjects related to sustainability and the cocoa value chain (see table 6) such as: sustainability initiatives and practices (n=11), value chain dynamics (n=11), value chain strategies (n=14), deforestation (n=6) and smallholder livelihoods and family farming (n=6).

2.6 Review of Studies

This section analyzes the main perspectives on the connection between TBL and the cocoa value chain sustainability, emphasizing the research methodologies and the sustainability scenarios.

2.6.1 Research Methods

The research methods used in the studies, excluding literature review articles (Ruben, 2017; Nabhani et al., 2015), are synthetized in the Table 7. The case studies that are most widely used in the cocoa value chain sustainability research are predominant in the sample (n=12). Ensuing, the predominant are the

qualitative and the quantitative studies. Among the qualitative methods, the most popular were interviews (n=13). The methods used in three of the articles in the sample, combined field observation and interviews and one combined action research and interviews. Different interview types appeared, such as semi-structured, long, and in-depth interviews. Among other qualitative research methods considered were the focus group (n=3), content analysis (n=3) and participant observation (n=4) were three of them combining, respectivly, written background narratives, panel data and, remote sensing work. In the quantitative methods, the surveys (n=12) were the most represented, with only one article using supply fuctions estimation and other panel studies' methods. Thus, in regard to the research methods, it can be understood that most articles connecting sustainability to the cocoa value chain, use a widely qualitative approach, mostly through case studies and interviews.

Table 7. Research Methods

Research method	References (codes of Table 2)
Case studies	(4, 7, 10, 14, 21, 23, 28, 29, 35, 41, 42, 49)
Interview	(6, 16, 17, 19, 22, 24, 25, 27, 30, 31, 32, 46, 50)
Surveys	(1, 5, 9, 15, 18, 24, 29, 33, 36, 39, 44, 50)
Observation	(3, 8, 45, 50)
Content analysis	(12, 38, 40)
Focus group	(6, 18, 25)
Panel studies	(2, 13, 25)
Supply functions	(48)

2.6.2 Scenarios of TBL

Despite the absence of TBL specific scenarios in the sample, the cocoa value chain sustainability scenarios have evolved into increasingly reliable self-set voluntary commitments to address the persistent social and environmental challenges embedded in global value chains. While activities' profits continue to guide sustainability's economic dimension and value chain strategies, the onus is increasingly placed on socio-environmental awareness to pronounce measures to eliminate deforestation and other unethical practices associated with cocoa value chain operations. In this contribution, some authors analyze the novel zero-deforestation commitment that focuses mainly on the world's top cocoa producers: Côte d'Ivoire and Ghana. Others focus

on the smallholder livelihoods, the family farming, the child labour, the child trafficking, the circular economy and the ecosystems'services preservation. Some transversal scenarios agregate several value chain dynamics and actions towards sustainability in specific geographic contexts and production systems. Figure 4 synthetizes the articulation of the previously identified clusters and the research context of the sustainability scenarios.

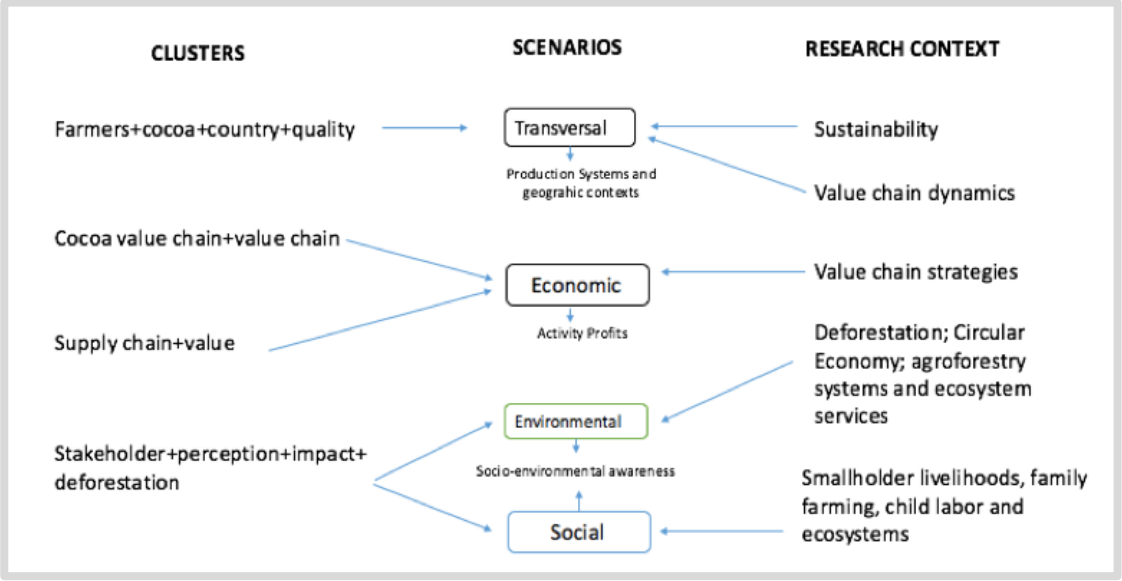

Figure 4. Clusters, Scenarios and Research Context

The fairtrade and organic certification are widely recognized in the literature, and are present in the cluster "farmers, cocoa, country and quality" (Haynes et al., 2012; Ingram et al., 2018). Organic certification focuses its attention on safe environmental and work practices, and provides a scenario that aligns relatively well with existing traditional shade grown cocoa production systems in several producer countries and geographic contexts (Dompreh et al., 2021). Though it may be most appropriate for larger cocoa growers, it may also assume important functions to small producers, ensuring that they maintain environmentally friendly cocoa systems and providing them and their customers with standardized quality assurance (Astrid Fenger et al., 2017). Even though smallholders lack the assets needed to join mainstream commodity markets, these certifications schemes have enabled them to capitalize on the

qualities of their traditional varieties and access niche markets (Rueda et al., 2018). Nonetheless, because the value chain is not gender neutral, but rather interacts with gendered processes that affect its functioning and vice-versa, it is important that economic and social upgrading and cocoa value chain sustainability is achieved if women (farmers and workers) receive greater recognition and remuneration in both the commercial and societal spheres (Barrientos, 2014). "Sustainability" and "value chain dynamics" should reflect the interaction of local, national and international drivers (Borda et al, 2021)

In the "value chain" and "supply value chain" clusters, the traditional conceptions of value follow neoclassical economics by using price and activity profits as the appropriate unit of measurement. Still, new approaches have broken this narrow definition and have not only redefined value but, more importantly, shifted the key unit of analysis from the individual cocoa firm's value chain to the wider value constellation, assuming value as 'the utility combination of benefits delivered to the market less the total costs of acquiring the delivered benefits (de Boer et al., 2019). This is a scenario where 'price', as the measure of value, is replaced with the more cognitively grounded concept of 'delivered benefits'. It means that value occurs not in sequential chains but in complex constellations. In those scenarios, there is a departure from more vertically integrated business structures, in preference for looser 'networks', which reflects advances in flexible manufacturing technologies, ease in organisational control and coordination through information technology, as well as enhanced customer knowledge and relationships, further supported by information technologies (Rueda et al., 2018). These developments should result in a more sophisticated concept of value and greater understanding of the contexts (value chain networks), in which it is created. Likewise, value creation should be related to the nature of the resources from which value is created and not fail to explore the control issues (within the value chain network) and, distribution of value to all chain links, in a more ethical, fair, and sustainable way.

In the context of "smallholder livelihoods, family farming, child labour, child trafficking and ecosystems preservation", the scenarios found in literature clearly reveal: i) that the payment for ecosystem services that can be provided by sustainable cocoa agroforestry systems depends

upon the appropriate combination of cocoa, timber and non-timber forest trees on the same land; ii) that keeping cocoa's agroforest system is an asset for the payment of environmental services, such as carbon storage and biodiversity conservation, because of the resource potential that they can generate (Sonwa et al., 2014); iii) that the good governance and social capital can facilitate wider stakeholder participation, enhancing consensus within the cocoa value chains and socio-economic development (Díaz-Montenegro et al., 2018); iv) that it is important to mitigate the continuous disappearance of natural forests, cocoa agroforests and plantations due to the increasing demand and interest for timber production and other forest-related products (Odijie, 2018). All of these problems when linked to social and environmental awareness, are part of the third cluster. In this context, a future scenario for the cocoa, according to some authors (Aboah et al., 2021) would be the maintenance of a diversity of smallholders due to their important role in the value chains. This means a more intensified regional specialization with lower costs and higher quality, and, when possible, supported in local varieties (Scott et al., 2015). This also means an identification of agroecological zones and a subsequent adequate adjustment of varieties and production systems, offering a range of different cocoa products for different palates, markets, and prices and, the adoption of good farming management practices so to improve cocoa productivity (Aboah et al., 2021). This scenario would also link cocoa production much more closely to tourism of various kinds (live-in, culinary, and environmental) and to the food/ restaurant industry, including cooking schools where cocoa can be a prominent dish ingredient.

The principal risks associated with this scenario include continued limited scale and low yields, thus, low incomes for many producers, who never reach a sufficient scale to be truly sustainable. This does not exclude an alternative large-scale scenario, with a much more expansive cocoa production development, emphasizing improved productivity to ensure future competitiveness for cocoa producers, given the relatively small volumes currently sold and the uncertainty of future demand. In this scenario, larger, more established cocoa cooperatives, of comparable scale, and private firms, would capture both production and post-harvest economies, and produce the necessary volumes to facilitate greater added-value, resultant from processing near the growing areas. A complementary component to this would involve strategic alliances

between the larger, more established, and better equipped producer cooperatives and the smaller, more recently established associations. Such arrangement would help overcome the capacity utilization difficulties which larger scale cooperatives might face while giving the associated smaller cooperatives access to the knowledge, experience, and marketing contacts.

2.7 GAPS in the Literature and TBL Propositions

An important contribution and originality of the present study relates to the application of TBL to critically analyze research on the cocoa value chain. Despite the lack of studies, TBL provides a useful framework to understand the social, economic, and environmental aspects of this chain. In this endeavor, it suggests a research agenda on the topic, entailing its emerging themes and propositions to future testing studies. Following, the main literature gaps concerning the cocoa value chain sustainability and the TBL propositions for the future, are presented.

The gathered results of this work sustain that, contrary to what was to be expected in the face of the current challenges, sustainability scenarios are inducing less stringent environmental and social commitments when compared to the economic dimension and added-value counterparts. The review also isolates key gaps in the TBL scenarios, including the lack of precision surrounding all its dimensions, and clarity of its role and relevance under the cocoa value chain geospatial context.

Despite its highten profits, the global cocoa value chain faces numerous challenges at its different links, especially at the farm production level. Cocoa is largely grown by smallholder farmers, who experience poverty, declining productivity, volatile prices, and lack of investment funding, in addition to other issues relating to human rights and the environment. Contract-farming is a value chain model that can be thought of as a future emerging trend that addresses some of the challenges faced by cocoa farmers, including disputes and inequities in the cocoa market access (Callahan, 2019). Contract-farming can offer cocoa farmers the opportunity to receive a higher price point for cocoa and can be more beneficial than some sustainability programmes. However, due to the significant gaps in the research on contract-farming, future research should adress its

potential advantages for both farmers and buyers as well as its impacts on sustainability in the longer term, even when farmers obtain a higher price point for cocoa. Likewise, the methods to mitigate environmental and social risks in contract-farming must be examined, as well as the increased risks associated with land tenure insecurity, marginalization of women and crop monoculture.

Recent literature seeks to understand the gap between international price and the farmer's price and the existence of a power asymmetry, especially on supply side. Consequently, it is important to understand how social and ethical credibility viable bases of differentiation and competitive positioning in the mainstream cocoa value chain and markets are. In this perspective, new propositions should pursuit the study of the social sustainability dimension to understand how social resources may be used to improve weelbeing and, develop a more equitable market access for cocoa growers. This can provide contributions to amenity the growing imbalance between commercially sophisticated buyers and fragmented small-scale farmers who supply them, as well as lessen their potentially adverse consequences for the sustainability.

The gradual reduction of natural forest, from which timber and non- timber products are gathered, has aroused the need to research this topic and its consequences on the sustainable integration of the natural forest in cocoa agroforestry systems. Thus, future research should aim to study the gradual reduction of natural forest and its consequences for sustainability and understand the integration of forests' species in cocoa agroforestry systems, whilst evaluating the resulting environmental services, such as carbon storage and potential biodiversity conservation.

Given the significance of good governance and social capital for sustainable development, which is recognised by organisations such as the World Bank and the United Nations, this is an important and possibly fruitful line for research. Future studies might seek to explore the impact of the social capital on governance in the cocoa value chain (and possibly emerging industries) in some developing producing countries.

2.8 Conclusion

The cocoa value chains are complex, assymetric and mainly concentrated in the tropics, particularly in Africa, which represents two thirds of world production, though Côte d'Ivoire is the main producing country. The work drew on seven specific research questions in order to address the literature on TBL scenarios and sustainability related themes. The findings, supported in the literature revision of the TBL concept and its connections to sustainability dimensions and scenarios, showed that TBL remains an open and ongoing research topic.

The bibliometrics analysis allowed for an identification of the main contexts of research dedicated to each theme, such as countries, used methods and their integration within the TBL scenarios. The articulation of these topics led to the conclusion that the pillars associated with the TBL assume differ-ent importance according to the contexts where they are analysed. The main research contexts of the selected studies are the countries located in Africa, Latin America and Asia, with more limiting structural conditions and that raise the dimension of socioeconomic problems in contemporary concerns, being environmental parameters still easily circumvented.

The iniciatives towards cocoa sustainability are hindered by the complex nature of their value chains in low economy countries where many basic social problems still dominate. Lower yields, child labour, unfair working conditions and gendered patterns are among the issues that need to be addressed to successfully manage the value chain towards sustainability in these production countries.

A critical observation of the consulted literature is that no research showed a clear strategy to end the problem of child labour or to the cease in the influx of children at borders and track down the traffickers. Even though raising awareness on child labour is relevant in order to restrain it, it does not make any meaningfull impact within the regions from which the children are trafficked. Poverty is a likely reason to why those children to work in cocoa farms. Likewise, it might not be economically feasible for global cocoa companies to implement any measures that aim at working with the governments in those countries or improving cocoa farmers' yield. In fact, we can conclude that the value chain reflects the problems existing in the geographical area where it is located.

Research on the sustainability of the cocoa value chain is very recent and qualitative approaches are dominant. These elements are also articulated with the smaller knowledge inputs that have been promoted at the level of the value chain, capable of originating greater added value upstream of the chain. This has been compensated by the increasing scrutiny on the value chain practices by consumers, media and other influential stakeholders that have increased the need to define, implement and effectively communicate sustainable practices and management strategies.

Notwithstanding the circumstances mentioned that impose improvement and development of governance practices that promote a more equitable production chain, the originality of the production systems stands out. Despite some value chain dynamics and the implementation of several initiatives, environmental impacts are more harmless and confidence in certification may be the most prominent feature.

Certified procurement in different schemes such as organic production and fair trade is considered to be an effective strategy thought there are still many loopholes in this system, which can raise other serious issues, such as corruption. In this context, certification decisions, which are made at top management level – considered at policy or strategy levels, should be accompanied by clear procedures at an operational level and should be scrutinised by a different group of stakeholders (third-party certification).

Partnerships with different associations, contract-farming and the value chain networks are measures and key performance indicators that were provided in literature. This help monitoring the progress within each link of cocoa value chain and improve the conditions of farmers. They are efficient for chocolate companies and for cocoa farmers and other stakeholders. Additionally, improvements in the TBL dimensions are advocated as a key result of these iniciatives.

In this follow-up and aiming to overcome a limitation found in the research, it is suggested a holistic approach to tackling wider sustainability issues and its interactions in the cocoa value chain. Highly complex social issues in cocoa value chain sustainability are particularly scarce in literature and its linkages should be analysed in the light of the TBL. In sum, there is still a long

way to go to expand the existing programmes and iniciatives towards cocoa value chain sustainability, under the lens of TBL scenarios.

Chapter 3 | ORGANIC COCOA VALUE CHAIN SUSTAINABILITY: THE PERCEPTION OF SÃO TOMÉ AND PRINCIPE'S STAKEHOLDERS[6]

The cocoa-farming in São Tomé and Príncipe (STM) faces several challenges due to their poor socio-economic context, the adversity impact of climate changes, the complexity, and no access to global chains and, worldwide demand pressure for higher cocoa quality and productivity. This chapter present the work with the preliminar research that investigates potential pathways for the sustainability of the organic cocoa (OC) production in STP by mapping the perceptions of producers involved in the value chain.

3.1. Introduction

Agriculture, agribusiness, and food markets are becoming prime sustainable development areas in many countries. Moreover, the cocoa value chain sustainability is increasing as a global concern due the fact that a large part of the used land is obtained through deforestation, which has a huge impact on local biodiversity and social cohesion (Recanati, Marveggio and Dotelli, 2017).

These are foremost threats to the environment, which have already taken place on a major scale in cocoa-producing countries (Wessel & Quist-Wessel, 2015). Additionally, the overage tree stocks, the repercussions of disease and pest infestation, the political instability in West Africa, the lack of agricultural professionalism, the absence of infrastructure, the low income of farmers, the shortcomings of the educational and financial systems, and child labor exploitation in cocoa-growing regions are further concerns (Matissek, et al., 2012; Ingram et al., 2018). Thus, the

[6] The original work of this chapter was published in: Prazeres, I., Lucas, M. R., Marta-Costa (2022). Organic Cocoa Value Chain Sustainability: The Perception of São Tomé and Príncipe's Stakeholders. *Sustainability*, 14, 136. DOI: 10.3390/su14010136. The sections, pagination and tables and figures have been renumered for a unified, cohesive presentation, diverging slightly from the original published work.

sustainability dimensions represent a relevant issue for the management and decision making in the cocoa value chain.

Cocoa is one of the main goods in the world´s agricultural trade markets, occupying the third position in exports (Blare and Useche, 2013; Díaz-Montenegro, 2019). Its production is primarily concentrated in the tropics (Africa), which concentrates two-thirds of world production and where Côte d'Ivoire is the main producing country with around 40% of the world production (Voora, Bermúdez and Larrea, 2019). In STP, this agricultural commodity plays an important role in the country´s exports and is a vital contributor to smallholder producers' income, although it is facing climate challenges and several other risks (Prazeres et al., 2021). In this country, the cocoa value chain is very fractional at the producer level, where approximately 70% of organic producers develop their activity in plots smaller than 2 hectares (Prazeres, 2019; Prazeres and Lucas, 2020). In 2018, the number of organic cocoa producers was approximately 3300 (Prazeres, 2019) and cocoa, which occupied about 80% of the agricultural area, represented 90% of the country's export earnings (ANEME, 2018). In addition to its contribution to gross domestic product, through heavy weight in exports in the agricultural sector, the cocoa culture guarantees the livelihood of many families as it creates jobs, develops local microeconomies, and provides a positive international image of the country (Prazeres, 2019). Similar to other cocoa-producing countries, (1) the value chain is interestingly embedded in a complex global network, from the producer to the manufacturing of cocoa into chocolate and the final consumers (Recanati, Marveggio & Dotelli, 2017), and their persistently growing demand; (2) the chain is still missing high-quality planting materials to improve the quality of cocoa and initiatives to increase productivity and farmer profit (Geitzenauer, Mathé, Sonfack, & Vogel, 2018); and (3) there are some uncoordinated interventions from public organizations, private entities, and exporters, such as farmer trainings, organic certification schemes, and dissemination of good agricultural practices, and the value chain remains unprofitable and unsustainable, especially for cocoa producers (Vogel et al., 2020).

Given the socioeconomic and environmental relevance of organic cocoa in STP, the perceptions of smallholder farmers and other related stakeholders of their own sustainability are needed for

three main reasons. First, farmers' conservationist behavior (and the concomitant ecological outcomes) is influenced by farmers' attitudes and perceptions of natural resources and the environment (Dolisca et al., 2009). Second, farmers' perceptions of the attributes of conservation programs are correlated with program adoption (Tosakana et al., 2010; Greiner and Gregg, 2011; Liu, Bruins, and Heberling, 2018), and third, compliance with agro-environmental programs (regulations) is connected to farmers' awareness of program rules and enforcement practices (Winter and May 2001; Ansah et al, 2020; Dompreh, Asare and Gasparatos, 2021). Furthermore, the actual state of the sustainability of the organic cocoa value chain also matters because it can have an impact on the agro-ecological system, the social and environmental context of producing communities, the economic viability of cocoa, and farmer well-being, as well as the viability of the consumer market, which directly relates to consumer trust in the organic production and consecutive willingness to pay a premium price for such.

This work aims to analyze and map out the perceptions of the key actors of value chains for cocoa, particularly farmers and other stakeholders involved in improving the sustainability of the production of organic cocoa in STP towards sustainability. It is an exploratory and qualitative research that tries to understand how sustainability is perceived and assessed in terms of its importance, impacts, and challenges. The following sections will describe the methodology used, the generated results, and the discussion with respect to former studies. Future research directions are highlighted in the last section.

3.1. Materials and Methods

3.1.1 Research Approach and Theoretical Framework

The methodology employs a combination of institutional and bibliographic analysis (Stage 1) with expert interviews, focus groups, and field observation (Stage 2). The first, supported in the work of Prazeres (2019), allowed for the identification of the main stakeholders in STP's organic cocoa value chain and the connections between them and the institutional landscapes of certification among other regulations. The definition of institution was considered in a broad sense, as

suggested by Hindriks and Guala (2015) and Dompreh et al. (2021). It includes policies and organizations, such as cooperatives and certification bodies, that prescribe several actions to be taken to ensure the sustainable production, processing, and trade of commodity crops. It also includes other formal and informal institutions that can interact with many of the processes encompassed in sustainability standard during its design, adoption, and implementation (Lambin and Thorlakson 2018).

In Stage 2, the main drivers, impacts, and challenges related to sustainability were identified through a qualitative analysis of interviews with farmers and their associations, cooperative representatives, certification bodies and experts, and a representative of the main stakeholders involved in organic cocoa production. The main rationale for eliciting the perceptions of multiple stakeholders is that they can hold different perspectives on key aspects and outcomes of sustainability processes in the organic cocoa value chain. These different perceptions might affect sustainability transition processes and their adoption, legitimacy, performance, sustainability levels, and standards. Understanding the perspectives of different stakeholders is a key element of transdisciplinarity in sustainability science (Lang et al., 2012), which has been widely used to study different development interventions (Ahmed et al. 2019; Karanja, Mburu and Gasparatos, 2020).

3.1.2 Data Collection and Analysis

While the primary data were collected following an exploratory research approach, the secondary data resulted from an extensive literature review. In Stage 1, the value chain structure identified in the previous work of Prazeres (2019) was upgraded through field observation and information provided by stakeholders and other pertinent readings of internal official documents associated with the organic cocoa value chain. The documents were collected from relevant organizations (Ministry of Agriculture and some of their directions and agencies, Centre for Agronomic and Technological Research (CIAT), cooperatives, and associations) and other stakeholders, such as distributors and exporters. This information was consolidated in a schematic diagram that summarizes the main relations between stakeholders.

In Stage 2, the exploratory primary data collection started with the selection of the organic cocoa stakeholders' interviewees. Then, the qualitative interviews were conducted during 3 months of research (January–March 2021). Aiming at capturing the breadth and totality of individual perspectives on the drivers, impacts, and barriers of sustainability, these interviews were executed with the use of a semistructured interview guide. This interview guide was organized into six topics related to the organization origin and the respondent role in the enterprise; the structure of the STP organic cocoa value chain and its relationship with the sustainability concept and dimensions; and barriers, drivers, impacts, and pathways to the future of this value chain. However, the interviews mostly included open-ended questions to allow respondents to elaborate freely on their answers, to probe new areas of interest mentioned by the interviewees, and to guarantee the exploratory character of the study. Most questions were identical for all respondents, allowing for some level of consistent perception elicitation between the participants.

The study used the international criteria of sustainability (FAO, 2014; ICCO, 2007): (1) economic sustainability (high economic productivity, high product quality, limited price volatility, strong investments platforms, and market diversification); (2) social sustainability (improved livelihoods of poor farming households, equal distribution of the added value, equal rights for women, and eradicated child labor); and (3) environmental sustainability (resilient and sustainable food production systems, use of good agricultural practices, maintenance of the ecosystem, and biodiversity conservation).

The individual respondents were directly involved in the organic cocoa value chain. The selection criteria of the individual interviewees were (a) centrality and individual and/or organization relevance to the organic cocoa value chain, (b) representation of a wide and legitimate set of individual perspectives, and (c) answer clarity and comprehensiveness. As the intention of the study was to elicit the totality of the different perceptions of the sustainability concept and the drivers, impacts, and barriers of sustainability, the number of interviewees solely ended when no original perspectives could be obtained.

Overall, 25 respondents were interviewed. Six were female and 19 male, with the ages ranging from 30 to 59 years, and the average age was 43. Sixty percent held an academic degree, and the others attended secondary school. In particular, they were interviewed individuals reflecting a wide variety of stakeholders who play a role in STP's organic cocoa value chain and work experience between 1 and 8 years, with an average of 3 years. They included governmental institutions (*n* = 4), private companies (*n* = 3), nongovernmental organizations (NGOs; *n* = 1), researchers (*n* = 2), certification bodies (*n* = 2), cooperatives (*n* = 4), distributors and exporters (DE = 4), and sociotechnicians (*n* = 5). This last group are cooperative technicians, who provide training and technical support to producers and substitute state-owned extension services (Prazeres et al, 2021). Being from different organizations and contexts, the selected individual stakeholders reflect different interests, roles, and knowledge of sustainability. To triangulate whether the selected individual stakeholders were the most appropriate, the respondents we asked during the interviews to indicate experts whom they perceived to be key players in the organic cocoa value chain in STP. This allowed the research to have a reality check concerning the most relevant individual stakeholders. All the interviews were conducted face-to-face and were audio-recorded after securing the consent of each respondent. Nonetheless, two interviews were complemented through telephone and WhatsApp.

Apart from the interviews, with the aim of capturing specifically the collective perspective of the cocoa farmers, the study conducted 10 focus groups until July of 2021 with 10 farmer participants from the two organic cocoa cooperatives. The anonymity of the participants was preserved, and prior to the group discussions, all the participants received a short concept note with background information detailing the motivation and aim of the study. They also received a consent form, which informed them of their rights and the ethical guidelines that the study adhered to the European Parliament and the European Council (2016). The organic cocoa farmers' selection (maximum of 20 per group and per meeting) was based on purposive sampling whereby the representatives of the cooperatives, associations, and communities were sought out based on their level of knowledge of the participants. This took place in the districts of Lembá, Lobata, Me-Zochi, and Cantagalo, where community farmers have converted all conventional cocoa

production into organic production and where, inside their associations and cooperatives, they are trying to achieve greater value and thus greater profitability to the producers.

They included 120 producers from the Cooperative for the Production and Export of Organic Cocoa (CECAB) and 80 from the Cooperative for the Production and Export of Cocoa (CECAC11), and only 66 were female. The participants' ages were between 26 and 71 years old, with an average age of 44 years old among CECAB members and 49 among CECAC11 members. Their marital status was mainly single, and work experience in the organic cocoa value chain was between 1 and 21 years, with an average of 12 years. Ninety percent attended primary school, and only 6% attended secondary school. Those from CECAC11 were trained in grafting and pruning, and those from CECAB in organic cocoa.

These focus groups were guided (structured into six topics, such as the interview guide), although they did not follow a strict order of questions, allowing the participants to have a free discussion. This method allowed for the collection of diverse producer perspectives concerning the sustainability concept and the drivers, impacts, and barriers of the sustainability of the organic cocoa value chain. Afterwards, the results generated from these 10 focus groups were compared with the results from the individual interviews. Lastly, field observation took place during the entire period of empirical data collection.

Concerning the data analysis, the interviews and focus group information outputs were transcribed verbatim, and the transcripts were used to undertake content analysis using NVivo software. Concerning the issue of saturation of interview numbers (Terry, Hayfield, Clarke and Braun, 2017) the whole material (field observation notes, interviews, and focus group information) was assessed to be sufficient for such pilot study. An inductive approach was followed to draw out the themes and categories from the data focused on general perceptions. The themes and keywords used for the content analysis were supplied by the reviewed literature on the sustainability drivers, barriers, and impact on the cocoa value chain. Table 8 sums up the methodology used in the research.

Table 8. Research Process

Methodology	Involved stakeholders/sources	Targeted focus
Extensive literature review	Internet and bibliographic search and review of project reports, peer-reviewed publications and unpublished academic thesis/dissertations	To gather secondary data that have been used as baseline for the study.
Open qualitative interviews	Government Institutions (GI), Cooperatives (C), Certification Bodies (CB), Private Companies (PC), Non-Government Organizations (NGO), Research Centre (RC), Sociotechnicians (ST)	To capture individual perspectives about sustainability concept and on the sustainability drivers, impacts and barriers.
Focus group discussions	Organic Cocoa Producers (OCP)	To gather joint/collective perspectives of organic cocoa farmers of the meaning of the sustainability concept and of the drivers, impacts and barriers and of sustainability, and compare them with the views of the individual actors who were interviewed during the open qualitative interviews.
Field observation	Observing and listening within the local producer context	To triangulate all other methods with additional information.

A code of themes was developed based on interview and focus group contents to identify similarities, differences, and trends among the interviews. Themes were then organized and put into a visual diagram (Figure 5) that supports the organization, management, and interpretation of gathered data.

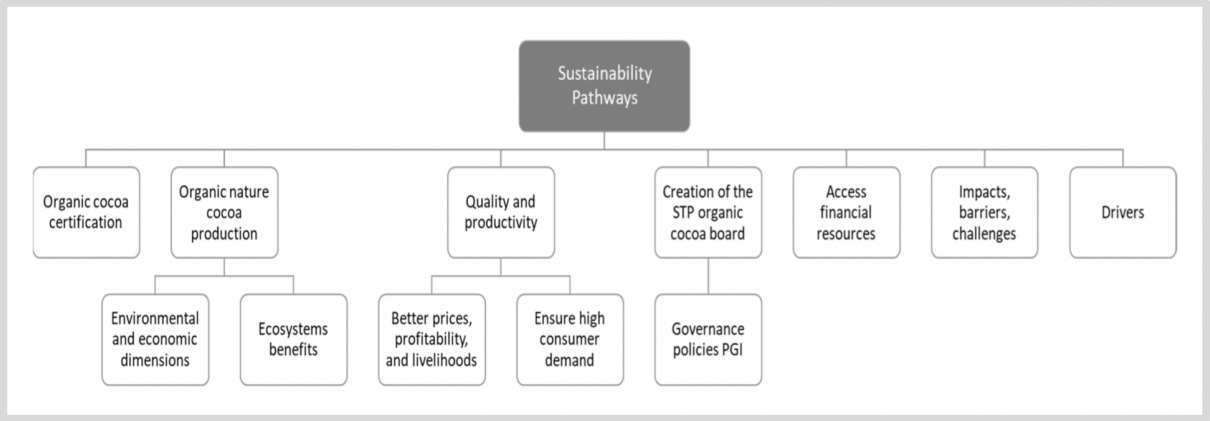

Figure 5. Themes Coded in the Interviews and Focus Groups regarding Sustainability Pathways

Table 9 synthetizes the key elements of sustainability perceptions gathered during the empirical work, which are detailed in the following subsections.

Table 9. Key Elements of Sustainability Perceptions Gathered on the Empirical Work

Dimension	Concept and Current State	Drivers	Impacts and Barriers
Economic	Organic production Consumer demand Asymmetric value chain Cocoa prices Certification Traceability Quality standards	Price stability Premium price Buyers' dependency Market Commercialization Costs Financial support	Income sources Financial and operational Marketing Costs Innovation Cocoa beans' quality international demand
Social	Certification Value chain governance Profit Livelihoods	Governance Training Empowerment Farming Practices Livelihoods Extension services Gender issues Child labor Equity	Farmers' well-being Health Institutional capacity technical knowledge Governmental policies Governance Bureaucracy
Environmental	Certification Organic production Organic features Ecosystem services	Soil fertility Biodiversity Cocoa plants' quality Ecosystems' preservation	Environmental pollution Preservation of water sources Deforestation Biodiversity Land tenure Shade trees

3.2. Results

3.2.1 Institutional Landscape of Organic Cocoa Value Chain

Taking into account the work of Prazeres (2019) and the upgrade developed with information collected by field observation, interviews, and the focus group, this section shows the current organic cocoa value chain structure for STP. It comprises multiple stakeholders involving, among others, the producers, two cooperatives (CECAB and CECAC11), and the private sector (independent producers and companies (Satocão and Diogo Vaz), chocolate industry manufacturers and processors and traders, certification bodies, traders (distributors and exporters), and consumers) operating at the international, national, and local levels (Figure 6). Their involvements are not isolated, but they are connected in multiple ways. The government and civil society belong to the external environment of the organic cocoa value chain. Despite its large size, the international cocoa market is very concentrated, with few players representing a significant fraction of the market (Prazeres, 2019).

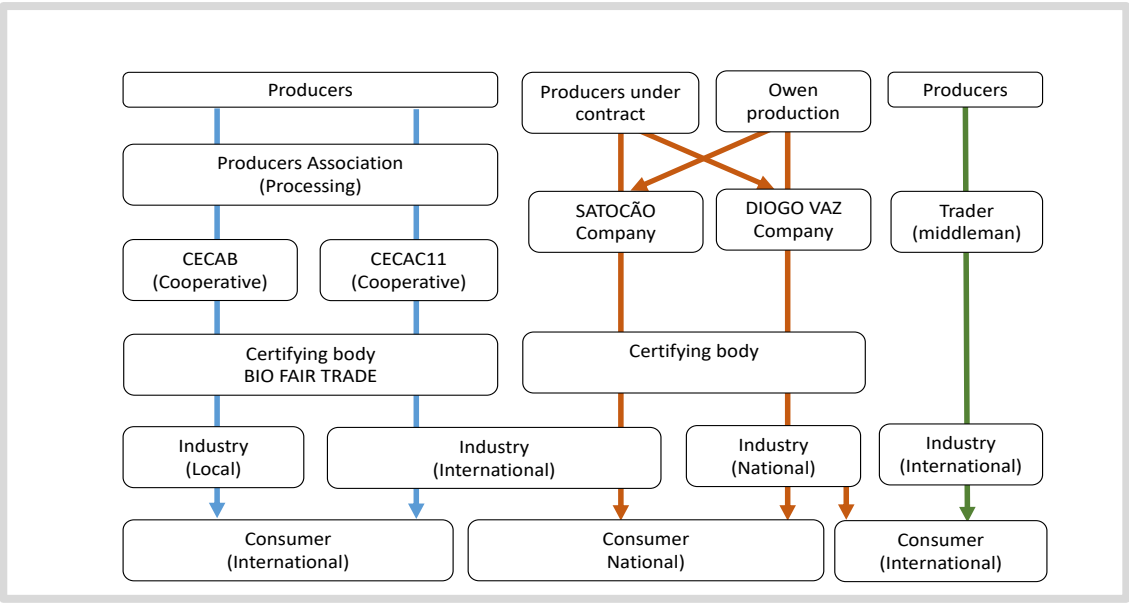

Figure 6. Organic Cocoa Value Chain in STP Context

Each one of the cooperatives brings together several associations, organized by geographical areas, which receive the cocoa seed from their farmers (Prazeres, 2019). According to this author, farmers' training and motivation strategies, so to guarantee production with the levels and quality required by the market, is carried out by the cooperatives, which provide training to the member-technicians. These, later called "socio-technicians" provide training and technical support to their producers, being paid for this task and replacing the role of the state-owned extension services. One of the cooperatives (CECAB) is building a chocolate factory. Its manufacturing will begin shortly and will be destined for national and international markets. This new factory can be a solution to combine certification and a contract system. This way, the organic cocoa value chain can perform more effectively, shortening the marketing chain and increasing farmers' income value as suggested in the literature (Ginting et al., 2019; Jones & Gibbon, 2011).

The configuration of organic cocoa value chain connections is under "pressure/demand" from international buyers (international/multinational companies and chocolate industry traders) and consumers concerned about sustainability which change behaviour and attitudes, adopting more responsible consumption patterns. There is a rather stark difference between this context and the reason way the producers in STP end up adopting sustainable practices. The smallholders are

integrated in two cooperatives which produce practically all organic cocoa in STP. The organic cocoa certification is done by independent private bodies and the decision making to adopt these schemes and standards rests on cooperatives. This decisions are: a) usually influenced by stakeholders, such as the chocolate-manufacturing-industry traders or representatives and other partners in the market; and b) induced by market evolution signals, price expectations and growing sales, and market share. In the case of the independent smallholders of organic cocoa, no integrated in the cooperatives, that want to get certificated, generally they search and make direct contacts with the certification agencies, as well as stablished networks and market connections to market the cocoa beans. All the decisions-making processes rest with these producers.

The government agencies and institutions, which support the organic cocoa production in diverse ways, are associated with the Ministry of Agriculture. Through different funds and projects (International Fund for Agricultural Development (IFAD) and Smallholder Commercial Agriculture Project (PAPAC)), they financially support both cooperatives and their actions. The CIAT supports production though genetic improvement, selection of cocoa plants, and quality control of cocoa beans prior to exports. The civil society organizations and nongovernmental organizations that support the organic cocoa value chain and the cooperatives are Action for Agricultural Development and Environmental Protection (ADAPPA), ADIL (Local Initiatives Development Action) Zatona, and National Federation of Small Farmers (FENAPA). They play a major role in implementing certification, through advocacy, farmer training, and sometimes research and information on funding access programs. Finally, other external important players in the organic cocoa value chain include (a) financial institutions (banks and others), (b) third-party certifying bodies that audit certified producers to confirm compliance with standards, and (c) independent research organizations, such as universities, particularly the University of Évora, which have developed a substantial amount of research in the cocoa value chain.

3.2.2 Perceptions Towards the Concept and the Current Sustainability State

Mostly due to the use of open questions in the interviews, focus group discussions, and field observation, it can be exposed that STP's organic cocoa value chain has positive characteristics overall. All the individuals interviewed (public and nonpublic organizations, certification bodies, experts, cooperative representatives, sociotechnicians, and farmers) perceive the sustainability concept to be important for future generations. They see organic cocoa certification as a positive step towards improving the current sustainability state. Government representatives agree that the organic nature of cocoa production makes the value chain ecologically and economically sustainable. Moreover, some agro-ecological areas in STP, with specific soils and climatic conditions, produce high-quality organic cocoa with unique organoleptic features. Moreover, cooperative representatives (C1, C2) highlight the ecosystems' benefits (ecosystem services) within the regions of cocoa production. However, when asking respondents about the overall current sustainability of the organic cocoa value chain, all agreed that an improvement is needed in all the dimensions.

"It is not in a bad situation but must be improved. I desire that it be improved."

(C2—Open qualitative interview)

The reasons presented for sustainability improvement are diverse. CB1, for instance, maintains that high consumer demand in organic cocoa sustainability standards is essential for the improvement of the current situation. Contrastingly, for NGO1, the reason laid on the social dimension of sustainability is generally or very often forgotten. For CB2, the problem is the type of organic cocoa value chain governance. ST1 and the PC2 agree that global cocoa prices are determinants of their current sustainability status.

"International cocoa prices are the problem. They determine the weak current state of organic cocoa sustainability in ST."

(ST1, PC2—Open qualitative interview)

When asking stakeholders through the open interviews which pathway suggested to be the most suitable for STP to achieve higher sustainability standards, the participants diverged in their

choices. Likewise, the focus group revealed that the choices designated by the respondents varied significantly. No participant, during an individual interview or a focus group discussion, maintained the organic cocoa value chain in its current state. For farmers, CB1 and CB2, certification was the pathway that was further highlighted as a driver of sustainability. Their justification relied on the fact that certification is the easiest way to access a specific and profitable niche market, ensuring returns to farmers. In addition, it ensures the quality of organic cocoa beans and increases the traceability of the value chain. The high costs of certification and concerns regarding low premium prices paid by buyers were some of the greatest disadvantages perceived by the respondents, particularly by the cooperatives (C1, C2). The private-driven pathway was chosen by PC (PC1, PC3), which was considered by government representatives to be having privileged access to financial resources. In addition, certification bodies (CB1, CB2) and ST (ST1, ST3, ST4, ST5) defend that an increase in production volumes and productivity could be directly linked to a joint effort between private entities and cooperatives. From the sociotechnician's perspective, this could lead to improvements on the economic and social dimensions of sustainability through greater profit and better livelihoods. However, the individualistic behavior of private actors and the existence of value chain asymmetric power were perceived to be great barriers, revealed due to the open-ended questions of the interviews and the focus groups.

Governmental institutions and cooperative representatives were undoubtedly in favor of a pathway driven by the public sector, more specifically through the cooperatives (GI1, GI3, GI4, C1, C2). All the participants of the stakeholders' group in the study maintained that price stabilization mechanisms are the driver that can increase the quality of organic cocoa and reduce the negative impact of volatility and international price fluctuations. Public funds to support cooperatives were perceived by the respondents belonging to the cooperatives and research centers to be insufficient to develop the value chain (C1, C2, RC1). The existence of corruption is weakening the sustainable improvement of the organic cocoa value chain, as revealed in the focus group interviews with the organic cocoa farmers. This matter was also maintained by the representatives of the private sector (PC1, PC3), the nongovernment organization (NGO1), the certification bodies (CB1, CB2), and the distributors and exporters (DE1, DE3, DE4).

It is worth mentioning that due to the large prominence of organic cocoa in STP's economy, a designated agency should exist (e.g., STP Organic Cocoa Board), which would have custody of the policy development and management of cocoa sustainability- related interventions and policies (CB1, CB2, PC1, PC2, PC3, DE2). This would include the improvement of the beans' quality standards, the purchase terms and prices of organic cocoa, and the registration and overseeing of it all. In this respect, the creation of a protected geographical indication (PGI), as Prazeres (2019) and Prazeres and Lucas (2020) suggested, is viewed by PC3, DE4, and ST5 as a way to protect organic cocoa-specific beans and promote their unique characteristics, which are linked to their geographical origin as well as traditional know-how. A PGI's recognition of organic cocoa can be granted to its specific link to the place where it is made (STP). This recognition enables consumers to trust and distinguish quality products while helping STP producers and their cooperatives better market their products. Additionally, this legal figure (PGI) mentioned by the research center representative (RC1), which is linked to a quality policy, would contribute to an increase in the income of cocoa farmers and the reduction of poverty in rural areas.

3.2.3 Perceptions of Sustainability Drivers

The respondents suggested very diverse factors, which were interrelated as drivers of the sustainability levels of smallholders' organic cocoa. These factors are related to (a) price stability and nondependency on a few buyers (OCPs, C1, C2, ST1, ST4); (b) market access and stability (OCPs, ST1, ST2, CB1); (c) strong farmers' associations and cooperatives with high bargaining power (GI2, NGO1, ST3, C2); (d) containment/diminishing of environmental problems, such as losses of soil fertility and biodiversity (CB1, CB2); (e) training and other initiatives to improve farming practices, production, and productivity (RC1, PC2, ST2, C1); (f) increase in genetic selection and the quality of organic cocoa plants (RC1, C1, C2, OCPs); (g) diminishing gaps between sustainable standards and practices and cocoa value chain governance; (h) changes made in the organic cocoa fermentation, transformation, and commercialization processes (RC1, C1, PC1, PC2, PC3); and (i) other expectations of positive impacts. Thus, there are three major groups of factors driving organic cocoa value chain sustainability, one related to the market, the

other connected to the smallholder livelihoods, and the third linked to ecosystems and environmental preservation.

Concerning the market (access, stability, prices, consumer demand, market linkages, and changes), for approximately one-half of the producers (OCPs), the marketing chain is long and ineffective and oriented towards the export market, which remains the benchmark for determining organic cocoa prices. For others, achieving premium pricing is one of the most important drivers of sustainability improvement among cocoa smallholders. This is because these smallholders perceive premium prices as a good reward for their work and invested time and resources.

The premium price of organic cocoa as the main driver of smallholders' engagement in sustainability practices is acceptable and understandable. Premium price will be an extra payment to compensate/incentivize organic cocoa smallholders who ensure sustainable production. Although the price of both conventional and organic cocoa beans is defined by the world market, the direct payment of a premium price for organic cocoa to the farmers, through associations or cooperatives accounts, will be a driver for better adoption and improvement of sustainable practices. The lack of premium prices paid directly to the producer as a reward for his good work towards sustainability is potentially due to the governance of the global cocoa value chain, especially in the further downstream links (CB1, CB2, PC2, ST3). It is concentrated in a few agents, creating asymmetric power relations, which block the distribution and transmission of upstream value to small producers.

National consumption of chocolate is low and perceived by the OCPs in the focus group to be an expensive tourist product. On the other hand, the international consumer is geographically distant from production, which results in difficult linkages and involvement with the country and the production practices. The reduction of these gaps can allow for an improvement in sustainable practices, such as the organic mode of production and cultural practices in land use and other resources, as well as organic cocoa value chain governance (ST2, CB1, CB2, NGO1). According to the vision presented in these interviews, international consumer pressure can play a critical role in the improvement of sustainability and the adoption of organic certification on a

broad scale. This is due to the influence of an increase in consumer awareness, demand for sustainability, and increase in the purchase of sustainable products belonging to smallholder productions.

Concerning smallholder livelihoods, the soil is one of the most important resources. Therefore, there was a common agreement among the participants across the 10 focus groups that a good soil can support cocoa sustainability growth and increased crop yield, which translates into increased household income and better living standards (OCPs). The majority of OCPs also believe that the sustainability of their farms is dependent on the provision of subsidies and aids. This is because cash availability is the main challenge they face, and it is invariably required to adopt enhanced sustainability practices. It should be noted that one of the most prominent drivers of sustainable production mentioned by the OCPs and cooperatives (C1, C2) concerns access to extension services/capacity building and agricultural resources. Both are done by sociotechnicians and cooperatives and are particularly relevant to changing and/or adopting new practices towards sustainability, those that can mitigate climate change risks and support soil fertility. This is particularly important to most OCPs who have little training and extension to support sustainable production practices and knowledge on how to tackle cocoa plant diseases and pest infestation (RC1, C1, CB2, PC2). The high cost of organic fertilizers, even though there is no upfront payment, places large financial burden on smallholders (OCPs, NGO1, PC1, C1, ST2, ST5) and further erodes their overall income (C1, C2, GI2). Fortunately, they have the cooperatives' collateral to purchase inputs on credit or access loans (C1, C2, ST4). By joining the cooperative, smallholders usually benefit from better access to organic cocoa inputs in many ways. Cooperatives and their farmers' associations can serve as collateral for accessing inputs on credit and service this debt after harvest (C1, C2, ST1, ST2, ST3, ST4, ST5). Some governmental institutions and related agencies and programs purchase inputs and distribute them to cocoa farmers according to their farm requirement (GI2, OCPs). A few smallholders directly use their own money to buy agricultural inputs (OCPs), and others access loans or financial programs from COMPRAN (a project to support marketing, agricultural productivity, and nutrition) or other subsidized credit bank programs to buy input.

COMPRAN, started in June 2020, is a project cofinanced by the government of STP and IFAD. Despite the existence of different pathways to organic cocoa producers' empow- erment, the facilitation of empowerment processes should be mentioned as a smallholder's great need (C1, PC3). Simultaneously, perceptions reveal that there are multiple avenues to empower organic smallholders in financial, social, and gender terms (CB1, ST5, NGO1, PC2, DE3). Some organic smallholders mentioned that they were trained on issues pertaining to gender and child labor (OCPs).

Finally, the study regarded a group of drivers concerned with environmental and ecosystem preservation. Environmental sustainability is viewed as a major factor in connection to organic cocoa. This production mode is considered an important starting point to improving the organic cocoa value chain's sustainability (C1, C2, G1, PC2, PC3, RC1, DE2, ST1, ST5). However, some participants in the study defend the need to reorient organic cocoa farmers' perceptions to improve the visibility of the overall benefits of sustainable organic cocoa production (CB2). More cooperation between the public and private sectors is mentioned by some participants (CB2, RC1, NGO1) as a way to get better environmental preservation, avoid deforestation, and integrate more trees in the organic cocoa ecosystem (CB1, ST2). A representative of a government institution (GI2) stated that one crucial pathway for the achievement of environmental sustainability is the integration of the young generation in different levels of the organic cocoa value chain (from production to processing). The justification is that young people are more responsive to the future of the planet. For another representative (GI4), this is also a way to achieve the social dimension of sustainability. However:

"Only producers well trained and well paid can produce very good sustainable organic cocoa."

(RC2, CB2, DE1—Open qualitative interview)

3.2.4 Perceptions on Sustainability Impacts and Barriers

The perceived impacts underlying the sustainability impacts as reflected in the interviews and focus group are positive and negative. The positive impacts are mostly perceived as being related

to the reduced environmental pollution and preservation of water sources (ST2, CB1, CB2, GI1, GI3, RC1), the possibility of having productivity gains due to greater capacity building access (GI2, C2), the decrease in deforestation and biodiversity loss (RC1, NGO1), the income gains (OPC, C1, ST3), and the improvement in farmer well-being and health, diminishing the associated burdens (PC2, CB1, ST1, C1).

Concerning the negative impacts, the individuals interviewed, and the focus group suggested several financial, operational, marketing, capacity (organic cocoa farmers' low education and lack of technical know-how), and institutional issues as the main barriers of the chain. Low education level often constrains effective smallholder training, which seeks to implement better innovative practices (GI1, ST4, DE2). The financial barrier is the most mentioned barrier because cost increase is perceived to be linked to sustainability's improvement (OCPs, C1, C2, GI2, PC3). Both smallholders and large private companies perceive the high cost of sustainability improvement in the organic cocoa value chain (PC1, PC2, PC3, C1, ST4, ST5, DE3, DE4). It is considered closely related to the changes that should be made in some operations to internalize the innovative sustainability processes, requiring specialized staff recruitment and significant financial commitments that are beyond the financial capacity of private companies and cooperatives (ST2, ST4, C1, C2, PC3). Even in the cooperatives, where organic cocoa farmers are organizing into groups as a means of reducing costs, these are still perceived to be prohibitive (C1, C2, ST1, ST3, GI3, GI4). For some OCPs and PC (1 and 2), ensuring the sustainability of the cocoa value chain requires support and consistency in governmental policies and banking support programs, as well an increase in the farmers' bargaining position by strengthening farmer cooperatives and associations and support from them.

The operational barriers to sustainability improvement mentioned tend to be concentrated around heavy bureaucracy, lack of organic cocoa value chain governance, lack of farmer knowledge, and corruption (PC2, ST3, NGO1, DE1). In more detail, the cooperatives pointed out the extensive documentation of organic cocoa production principles, guidelines, and criteria (C1, C2, ST3, ST5). The bureaucracy when dealing with national authorities is sustained by the certification bodies (CB1, CB2). Finally, the proliferation of different organic certification schemes

(with different processes, guidelines, criteria, and principles) tends to confuse many smallholders in their implementation (C1, ST3, PC3).

An organic cocoa production mode and its certification require extensive recordkeeping (e.g., cocoa farm activities, auditing), which is supported by the farmer cooperatives. To do that, there is a need for a specialized highly technical staff, and the existing staff often lacks capacity for this, and the same will occur in the future sustainability management (C1, C2, ST1, ST2).

Marketing barriers include lack of payment of premium prices by consumers and unknown market demand for sustainable cocoa products. In this case, some organic cocoa products can end up being sold as conventional products in global markets, despite their quality and the added effort/cost of the organic production mode (PC1, PC3, ST4).

Finally, diverse policy factor constraints are perceived to be barriers to sustainability improvement. These encompass inconsistent government policies, lack of clarity over land tenure, and mostly importantly, lack of a comprehensive national policy for the cocoa sector. Even though cocoa organic production is being led by the cooperatives and supported by government institutions, agencies, and programs, government policies and measures are not consistent throughout the years and are often affected by the existing government of the day (PC2, PC3, CB1, CB2). This poses barriers to the advanced planning of organic cocoa activities and the effective implementation of sustainability requirements related to pyrotechnical treatments (PC3, DE3). Such inconsistencies also affect the cooperatives and other stakeholders (producers' associations and sociotechnicians) who are tasked to support smallholders (ST1, ST3). Apart from the barriers posed by prevailing land tenure rules, which always belong to the state, tree tenure can also be controversial (OCPs, ST1). Assuming that organic cocoa farmers are encouraged to incorporate shade trees in their farms, all the autocratic processes related to this and to the further exploitation of planted trees disincentivize the integration of these trees (PC1, PC3, ST5).

Finally, the major barrier concerns the lack of a comprehensive national policy for the promotion and sustainable development of the organic cocoa value chain (ST3, PC4, NOG1, RC1, DE4). This partially invalidates the widespread improvement of a sustainability agenda (CB1, CB2). Strengthening cocoa farmer cooperatives to collaborate more deeply with industry and research

institutions and improving the implementation of the cocoa organic farming system to fulfill the international community's demand for healthy organic products are recommended by the certification bodies' representatives (CB1, CB2) and traders (DE1, DE3).

3.3. Discussion

The findings of this work expose disparities in the perceptions obtained from the stakeholders contacted according to their experiences within the scope of the role they play in their respective link of the value chain. However, the sustainability pathway implies collaborative work between multiple stakeholders involved in a holistic perspective, aiming for the development of an inclusive strategy that can create benefit for all the players of the organic cocoa value chain (Doherty and Kittipanya-Ngam, 2021).

As this exploratory study has shown, numerous often interrelated factors can be perceived as influencers of the sustainability of the organic cocoa value chain. This encompasses stakeholders from different levels, including the governance of the organic cocoa value chain. There was a common agreement among the stakeholders engaged in the study that organic cocoa is set to expand in the future due to not only increasing demand for chocolate but also STP's government project and plan for its increase (e.g., Sarmento, 2021) This perspective is also echoed in recent reports (MRW, 2021) and the academic literature (Seufert and Ramankutty, 2017; Leksono et al., 2021; Ouattara et al., 2021; Bandanaa et al., 2021; Adiyah et al., 2021), although the potential of organic cocoa as a solution to agricultural sustainability challenges is unclear (Bandanaa et al., 2021).

The discussions centered around sustainability perceptions and how to achieve growth in their three dimensions with a range of contributions emerging from the discussions and interviews. Vogel et al. (2020) highlighted that an analysis of transition pathways without an assessment of the overall stakeholder contribution to sustainability outcomes provides an incomplete picture of the underlying challenges that need to be addressed. Additionally, for Adiyah et al. (2021), the adoption of good sustainability practices is dependent on the economic status of cocoa farmers.

The study also highlights the relationship between farmers' training and changes in their adopted practices and how these practices can mitigate climate change; support soil fertility (Adiyah et al., 2021), productivity, and profitability; and avoid land degradation (Bandanaa et al., 2021). Farmers' training provides better knowledge on pest control (Leksono et al., 2021) and other sustainability issues, such as greenhouse gases, profitability, and gender equity (Bandanaa et al., 2021) or deforestation (Recanati, Marveggio & Dotelli, 2017; Orozco-Aguilar et al., 2021).

Most stakeholders also identify market-related factors (premium prices, consumer demand, market access, and social difference within the cocoa value chain) as, simultaneously, the main constraints and drivers among smallholders, their cooperatives, and private companies. These results are in line with previous research (Mithöfer, 2017; Leksono et al., 2021; Teye and Nikoi, 2021), which showed that cocoa farmers in Indonesia, Cameroon, and Peru perceive the marketing chain to be long and ineffective and oriented towards the international market. These factors determine domestic organic cocoa prices and expressed concerns about low pricing, price volatility, difficulty in accessing the market, small-scale production, low productivity, and lack of partnerships.

The sustainability improvement in the organic cocoa value chain is perceived to be associated with positive economic, social, and environmental impacts, such as income generation, farm productivity gains, and reduced deforestation and pollution. This is in line with a study by Ingram et al. (2018) in West Africa. Nevertheless, the organic cocoa value chain is perceived to be facing multiple financial, institutional, marketing, capacity, and operational barriers to achieve this sustainability improvement. Moreover, equity in governance and power dynamics within the organic cocoa value chain would be necessary to ensure the widespread improvement of the sustainability dimensions, which would be translated into positive sustainability outcomes. Additionally, a study by Lalwani et al. (2018) highlighted the importance of reducing social differences and asymmetries of power within the cocoa value chain.

The stakeholders' suggestion of strengthening the cooperatives' relationships with the industry and research institutions to improve the organic cocoa value chain's sustainability and fulfill international demand for healthy organic products is in line with other studies (Leksono et al.,

2021). However, ensuring the sustainability of the cocoa value chain requires support and consistency in government policies and banking support programs as well as better performance of smallholder cocoa farmers. Thus, it is necessary to increase the bargaining position of organic cocoa farmers by strengthening their cooperatives and associations and communicating cocoa benefits to society (Arfah, 2019).

In all dimensions of organic cocoa production, the measures that reduce land degradation, improve market access and profitability, enhance social integration through gender equity and accountability are the main driving forces to ensure the sustainability performance of a farming system. This commitment to sustainability matters, and in STP's context, it should be deeply encouraged to improve sustainability and ensure balance in all its dimensions, conforming with a study by Bandanaa et al. (2021). Despite the efforts made by the CECAB and CECAC11 cooperatives, their associations, extension divisions, government departments, and agencies of agriculture, more actions should be encouraged to improve and balance all the sustainability dimensions.

Several sustainability challenges related to the organic cocoa value chain have been identified both in the literature (Teye and Nikoi, 2021; Grabs and Carodenuto, 2021), and in this study. These mainly relate to the economic dimension of sustainability (governance and powers and interactions of various stakeholders along the value chain), but also, and less, to the environmental (Castro-Nunez et al., 2020) and social (Lalwani et al., 2018) dimensions.

Relevant emerging topics arose throughout the study, which were repeated by various respondents during the interviews, focus group discussion, and field observation. Such topics include identifying the livelihood strategies of small cocoa producers; determining market diversification; understanding how organic cocoa chain governance mechanisms, structures, and policies improve sustainability and add value to farmers; and analyzing the value added as well as the relationships between the value components and sustainability. This means producing alternatives to organic cocoa beans for exportation and diversification at the production level to expand crop types, adding value and further sources of income to smallholder farmers. This is one crucial aspect for the economic and social dimensions of sustainability in the future. The

sustainable development of a national organic cocoa processing industry and market was also mentioned and perceived to be promising. This is in progress in one of the cooperatives, which aims to transform organic cocoa beans into diversified products within internal boundaries, retaining the added value in STP. The need to attract and integrate younger generations to the organic cocoa value chain is another emergent topic. This can be done through education, land tenure, financial access, and further interventions, incentives, and initiatives.

3.4. Conclusions

This study contributed to the sustainability transition research by eliciting the perspectives of the main stakeholders engaged in the organic cocoa value chain in STP to explore and evaluate future directions and challenges towards a more sustainable value chain.

Mapping the stakeholders' perceptions is a step towards going further in the organic cocoa value chain research, particularly in issues such as livelihood strategies of organic cocoa farming households, prevention or mitigation of the perceived negative impacts, and governance improvement. All these were pointed out by the participants in the study, who were involved directly or indirectly in the organic cocoa value chain. Additionally, in the development of transition pathways to improve sustainability in STP's organic cocoa value chain, it is useful to emphasize the role and contribution of different actors to define and develop those transition pathways. The assessment of stakeholders' perceptions strengthens the analysis by providing insights into the drivers and barriers to the transition towards sustainability and how policymakers, cooperative managers, and other actors can promote and support a deeper and more inclusive sustainability transition process.

The stakeholders have common and different perceptions and agendas on the drivers, impacts, challenges, and pathways to sustainability improvement. There was a broad consensus among all the participants on the most likely pathway, that is, not a complete process shifts but rather a continuance of the dominant organic mode of cocoa production with a gradual shift towards a higher sustainability level, through improvements in all value chain steps and processes. Most of

the participants also identified market-related factors (premium prices, consumer demand, and market access) as, simultaneously, the main constraints and drivers among smallholders, their cooperatives, and private companies.

The findings are supported by the literature, which highlights the power of stakeholders as change agents and as individuals who are resilient to most sustainability challenges in the chain. By reflecting the diversity of stakeholders' foci, despite being exploratory, the results are useful to find a path towards more sustainability in the organic cocoa value chain, as a broader sustainability perspective is needed. There is a lack of a holistic approach to tackle all the sustainability dimensions—economic, social, and environmental in the cocoa value chain (Prazeres, Lucas & Marta-Costa, 2022b). We therefore conclude that there is still a long way to go to fully expand on the existing sustainability levels of the organic cocoa value chain.

Chapter 4 | ORGANIC COCOA FARMER'S STRATEGIES AND SUSTAINABILITY[7]

São Tomé and Príncipe (STP) is one of the world's smallest organic cocoa exporting countries, whose product has a positive socio-cultural and economic impact. Small producers who ensure it, are associated into two cooperatives that experience several difficulties and dilemmas including climate changes and poverty. Diversification of livelihood strategies could lead to wellbeing, poverty, and climate mitigation. This chapter presents the study did to analyse producers' perception of sustainability related to the organic cocoa production in STP and to explain the influence of different factors on their livelihood strategies (LS).

4.1 Introduction

There is a consensus about the sensitivity of agriculture to climate neutrality (Tol, 2018; Piedra-Bonilla *et al*., 2020) and the importance of sustainability to achieve its goals and to meet consumer expectations and farms' profits (Menozzi *et al.*, 2015).

However, while the environmental and economic dimensions of sustainability have been theorized more robustly (Hovardas, 2021; Purvis *et al*., 2019), the social dimension, which is context specific and inherently subjective (Boyer *et al*., 2016), has lacked comprehensive approaches, notably in rural areas (Gaviglio *et al*., 2016). According to Rasmussen *et al*. (2017), only 25% of the scientific articles dedicated to sustainability in agricultural production consider the social dimension, and the most used indicators in this field are related to the farm labour, quality of life and wellbeing, and the relationship with the human community (Marta-Costa *et al*., 2022).

[7] The original work of this chapter was published in : Prazeres, I., Lucas, M. R., Marta-Costa, & Henriques, P.D. (2023). Organic Cocoa Farmer's Strategies and Sustainability. *Bio-based and Applied Economics,* 12(1), 37-52. DOI:10.36253/bae-13473. The sections, pagination and tables and figures have been renumered for a unified, cohesive presentation, diverging slightly from the original published work.

The lack of an approach to social sustainability in studies on developing countries, where poverty is the most serious problem, could compromise the performance of the two other pillars (Prazeres *et al.*, 2022a), since the relationships among the three dimensions is generally assumed to be compatible and mutually supportive (Boström, 2012; Chopin *et al*., 2021).

There are several studies in the literature that reveal the problems and challenges faced by smallholder farmers affecting the production system. These problems come because of isolation, small farm size, low levels of technology, innovation, and productivity due to farming systems under traditional practices (Prazeres *et al*., 2021; Díaz-Montenegro *et al*., 2018), climate changes (Piedra-Bonilla *et al*., 2020) and a failure to attract young people and ensure farm succession and/or rejuvenation (Anyidoho *et al.*, 2012; Henning *et al*., 2022). Additionally, these farmers are constrained by limited financial, natural, health and educational resources, scarce governance and/or organisational support, and pressure to use land with alternative crops or activities, which are more profitable (Prazeres & Lucas, 2020; Prazeres *et al*., 2021). Additionally, they must adapt to severe crop losses due to disease and, very often, they need to consider other activities when making the choices on their livelihood strategies (Tittonell, 2014; Valbuena *et al*., 2015; Walelign, 2016; Walelign & Jiao, 2017). Thus, the sustainability social pillar makes the search for livelihoods a priority to reduce poverty and increase the farms' wellbeing.

In São Tomé and Principe (STP), agriculture comprises a third of the active population and cocoa activity contributes to over 90% of the national exports, standing out from other export products such as coffee, coconut, flowers, pepper, and other spices. In addition to the high amount of cocoa as exported goods (Signoret, 2019) and its contribution to the GDP (21%), organic cocoa production (OCP) leads the international country image and guarantees the livelihood of many poor families, by creating jobs and developing local economies (Prazeres, 2019). Approximately three thousand and three hundred organic small producers are integrated into the existing two cooperatives (CECAB and CECAC11). There are also organic private companies with their own production, from which Satocao and Diogo Vaz are the most relevant, the latter having its own chocolate factory and shops (Prazeres, 2019).

The sustainability of OCP in STP matters considering its impact on the agro-ecological system, the social and environmental context of the producing communities, the economic viability of the activity, and the farmer wellbeing, as well as, the viability of the consumer market, which directly relates to consumer trust in the OCP and consecutive willingness to pay a premium for such (Prazeres, 2019).

This work attempted to explore the nexus between livelihood strategies and sustainability perception, households' organic cocoa dependency, and poverty. The livelihood strategies formed the basis for categorising producers based on households' structure and crop diversification.

The chapter was organised into five sections. The following section presents background information on sustainability, poverty, and livelihood strategies. The third section describes the empirical strategy and econometric specification, while the fourth section exposes and discusses the findings. The final section is dedicated to the conclusions and policy and its practical implications.

4.2 Background

Sustainable development has become a global pursuit to the agricultural sector due to increasing greenhouse gas emissions and depletion of natural resources needed for agricultural activities (Bekun *et al*., 2019; Sarkodie & Strezov, 2019; FAO, 2014). These challenges are furthered by the social and economic pressures that arise in a globally competitive environment (Iocola *et al*., 2018; Ramos, 2019; Santos *et al*., 2019; Vasileiou & Morris, 2006; Velten *et al*., 2015), such as rising input prices, labour supply instability, relationships with the end-product market and food safety concerns, which further evidence the need to implement sustainable practices (Christ & Burritt, 2013).

Elkington (1994)'s Triple Bottom Line theory is often regarded as the most well-known and comprehensive theoretical model used in the sustainable development approach (Hayati, 2017). This theory argues that People, Planet and Profit are imperative principles of sustainability and

promotes the idea that sustainable development occurs when organisations demonstrate responsibility towards environmental health, social equity, and economic viability (Hayati, 2017; Iyer & Reczek, 2017).

The geographic context takes particular importance in the sustainability paradigm, for which locally configured institutional and biophysical processes shape the criteria and scope of the analyses. Therefore, livelihood strategies need to be seen considering the extent of the resources' constraints and their availability, which support communities in achieving livelihood objectives (Chilombo & van der Horst, 2021). For instance, the poverty evidenced in rural areas of low- and middle-income countries, that hinders individual and community capacities to meet basic needs, stands out as a multidimensional global challenge to sustainable development (Alemie *et al*., 2022). In these areas, about 90% of the people depend on agriculture for their livelihoods (IFAD, 2011; FAO, 2014; Roser, 2015; Mphande, 2016 in Alemie *et al*., 2022), making it urgent to seek strategies that promote the sustainability of agroecological systems and support improvements in the social and environmental context of producing communities (Prazeres *et al*., 2019).

The concept of sustainable livelihood appeared in the 1980s (Chambers & Conway, 1991), and remerged in Chilombo and Van der Horst (2021) and has become a classic paradigm for the study of household livelihoods (Kuang *et al*., 2020). It is focused on coping strategies intertwined with livelihood activities that are linked to the exploitation of land-based resources in rural communities (Kuang *et al*., 2020).

Several studies have been conducted on the livelihood strategies that affect the interaction of sustainable dimensions, specifically in the African context and the agricultural sector. Alemie *et al*. (2022) identified complex interdependencies between livelihoods and the regulatory supply and cultural ecosystem services, which create bottlenecks to effectively 'block' poverty in Ethiopia, where 85% of the population are subsistence farmers dependent on local ecosystem services.

The research by Berhanu *et al*. (2022) found that an asset-based social policy improves the wellbeing of poor and vulnerable subgroups and Chilombo and van der Horst (2021) define assets in terms of human, natural, physical, social, and financial capital and capabilities.

The capital assets in conjunction with the activity variables and the outcomes, constitute the three closely connected components in which several studies focused on smallholder farmers are concentrated (Ellis, 2000; Winters *et al*., 2009; Nielsen *et al*., 2013; Walelign & Jiao, 2017). Empowerment and community involvement play an important role in this context (Arroyo, 2013).

The achieved livelihood strategies' outcomes increase income, multidimensional wellbeing and a more sustainable use of natural resources (Babulo *et al*., 2008).

However, no single livelihood strategy provided both optimal economic advantages and ecological sustainability (Ghazale *et al*., 2022). Even when the households' choices induced similar livelihood activities, the time or capital used on the diverse livelihood activities may be different (Walelign & Jiao, 2017).

Still in this sustainable perspective, Deng *et al*. (2020) forward three determinants of livelihood sustainability – livelihood basis, livelihood acceleration and livelihood environment linked with "starting force", "driving force" and "supporting force," respectively, which support different levels of livelihood performance and dynamic processes of livelihood sustainability.

The livelihood strategies are changing over time (Walelign *et al*., 2017) originating the livelihood transition or mobility (Zhang *et al*., 2019). According to Zhang *et al*. (2019), the assessment of the factors that affect this transition has strong implications on poverty reducing policies and achieving livelihood sustainability in the long run.

Since livelihood is composed and conditioned by many factors, including ecology, economy, society, and institution (Zhao, 2017), sustainable livelihood development is affected by the combined action of many elements (Deng *et al*., 2020).

The farmers' decisions on agricultural production that are based on the livelihood assets, also support families in coping with livelihood vulnerability and risks (Fang *et al*., 2014; Liu *et al*., 2018; Jalón *et al*., 2018; and Kuang *et al*., 2020).

To deal with natural threats and market risks, farmers try to adjust crop diversity, water and fertiliser management as well as agricultural financial and agrotechnical support (Kuang *et al.*, 2020).

4.3. Methods

Seemingly, cocoa production connects smallholder farmers and their families or representatives in producer countries, to a global value chain and markets, driven by a strong, consistent and increasing demand for chocolate. The global chocolate market size was estimated at USD 113,16 billion in 2021 and is anticipated to grow at a compound annual growth rate (CAGR) of 3,7% from 2022 to 2030 (GVR, 2021). The main characteristics of this worldwide value chain are the asymmetric power relations with increasing control by a few (5) corporations which make the big decisions (Diaz-Montenegro *et al*., 2018). There is a great geographic distance between highly atomized producers and the consumption markets, and cocoa producers are ignorant on consumer's preferences and their choices (Prazeres, 2019). Additionally, there is price volatility and dependency, albeit no solid connection, on five big companies which control the market and the cocoa supply worldwide. Consequently, an asymmetric distribution of value occurs, with cocoa producers receiving only 5% of the price paid by the final consumer, while marketing and industry activities seize 25% and sales of retail chocolate capture 70% of the profits (Fountain & Huetz-Adams, 2020; Squicciarini & Swinnen, 2016; Abdulsamad *et al*., 2015). This situation is responsible for several of the problems and challenges faced by producers, one of which is poverty. Livelihood strategies are responses to farmer's decisions to face these problems, which are influenced by several factors, such as crop diversification, resources allocation (Rahman, 2016), climate changes (Rahman, 2016; Mu *et al*., 2018), soil fertility, biodiversity loss, real estate pressure through land use (Prazeres, 2019), and trust on farmers' organisations and their bargaining power (Prazeres *et al*., 2021).

In STP, where agriculture comprises a third of the active population, there are two models of cocoa production: conventional with a total yield production of 2,488 tons in 2017, which is very dependent on the prices of the New York Stock Exchange, and the certified production method

(total yield production of 1,065 tons in 2017) as organic or organic plus fair trade (EU, 2021). It is expected that external economic factors, such as market prices and support as well as internal factors such as physical, social, human, or natural capital, could influence producer's decisions to choose cocoa or other crops. Prazeres *et al*. (2022b) identified three livelihood strategies of OCP in STP (organic cocoa mono-crop livelihood strategy, diversified livelihood strategy with two crops - organic cocoa and banana or other and, pluriactivity livelihood strategy combining organic cocoa with three or more crops). These livelihood strategies are mainly related to the allocation of capital assets and income variables. Families with a low proportion of allocated land had higher income diversification strategies and vice versa. The study also showed that understanding how cocoa producers seek different approaches, could help envisage livelihood strategies as a way of increasing income and producers' wellbeing, as well as alleviate poverty. Also, increases in livelihood can be used by producers for consumption, commercialization, or conversion into livelihood assets (Zhang *et al*., 2022).

4.3.1 Statistical Model

The diversity of livelihood strategies can be compared and the effect of different categories of factor variation can be found without the problem of selection bias. Hence, the causal relationship among those factors will be controlled following general models presented in the literature (Dusen *et al*., 2005; Benin *et al*., 2004; Piedra-Bonilla *et al*., 2020), in which livelihood strategies election is affected by factors that could be gathered as social, economic and agroecological. Thus, an ordered probit model was estimated in which the variable to be studied was the livelihood strategies, measured on a scale of three points (*LS1=Monocrop, LS2=Bi-crop, LS3=Multicrop*). This model can be represented as follows:

$$LS_i^* = x_i'\beta + \varepsilon_i,\ \varepsilon_i \sim \mathrm{NID}(0,1) \quad (1)$$
$$LS_i = 1 \text{ if } LS_i^* \leq \gamma_1$$
$$LS_i = 2 \text{ if } \gamma_1 < LS_i^* \leq \gamma_2$$
$$LS_i = 3 \text{ if } LS_i^* \geq \gamma^2$$

in which LS_i represented the livelihood strategy *i* and, γ_1 e γ_2 were parameters to be estimated in conjunction with β. The estimation of the model was based on the maximum probability of occurrence and the interpretation of the coefficient was done in terms of the latent variable or in terms of the effects on the respective probability. For example, $\beta_j>0$ meant that the latent variable LS^*_I increase if x_{ij} increases.

Thus, the probability of *LS3* (*Multi-crop*) increased while the probability of *LS1*(*Monocrop*) decreased. The effect on the intermediate category was however ambiguous as its $P\ (LS_i=2 \mid x_i)$ could increase or decrease.

4.3.2 Data Collection

The survey presented in Appendix A was conducted from June to December 2021 on a sample set of 810 farmers involved in the OCP in STP through cooperatives. The selection criteria were both, the cooperative proposals, and the availability of the producer to cooperate with the research. Compliance with the General Data Protection Regulation was assured throughout. The participants were informed about the use of the information, their rights, and their responses were anonymized.

All the contacted OCP producers were members of one of the two cooperatives (CECAB created in 2004, operational from 2005 and autonomous since 2012, and CECAC11 created in 2011), which represent the main interface between farmers and the chocolate industry or their representatives or signed a contract with one of the two private companies. Both cooperatives are funded by the Fund for the Development of Agriculture (IFAD) and the Project to Support Commercial Agriculture (PAPAC) and they are supported by various non-governmental organizations as well as the Center for Agricultural and Technological Research (CIAT). Each of the cooperatives brings together different associations organized by geographic zones, which receive the cocoa seed from farmers on two distinct periods (August-September and February-March). The training of the farmers and motivation strategies to guarantee the levels and quality of organic cocoa production are carried out by the cooperatives, which also train technicians from

the associations that form them and to which the producers belong, these technicians, in turn, then train the farmers. An important role is played by the so-called “sociotechnicians”, who are producers with good performance in the cocoa culture and who monitor other farmers and are remunerated for this task. These socio-technicians end up replacing the role of the extension services that the state was responsible for ensuring. In addition to strictly agricultural work, the cooperatives develop other actions, such as socio- recreational activities in the communities, inviting specialists who contribute to raising awareness among farmers on various topics (domestic violence, gender equality, alcohol consumption, diseases), financing small social works in the communities and providing support to the neediest (medicines, eyeglasses, coffins). The registration of all information is done manually at the level of the associations and the computerization is done by each cooperative.

The study area included the most significant OCP districts and rural communities in STP, namely all the districts in the country, apart from Caué, Pagué and Santo António – districts in the Principe Island – because they were not OCP certified members of the cooperatives. As shown in Figure 7, the survey was conducted in different steps, starting with 25 preliminary qualitative interviews with 4 cooperatives representatives and other stakeholders (4 distributors and/ or exporters, 2 certification bodies, 3 private companies, 5 sociotechnicians, 2 researchers, 4 government agencies) and the establishment of 10 focus groups of 20 participants (farmers), so to specifically capture the individual and collective perception of the sustainability concept and its main drivers and challenges.

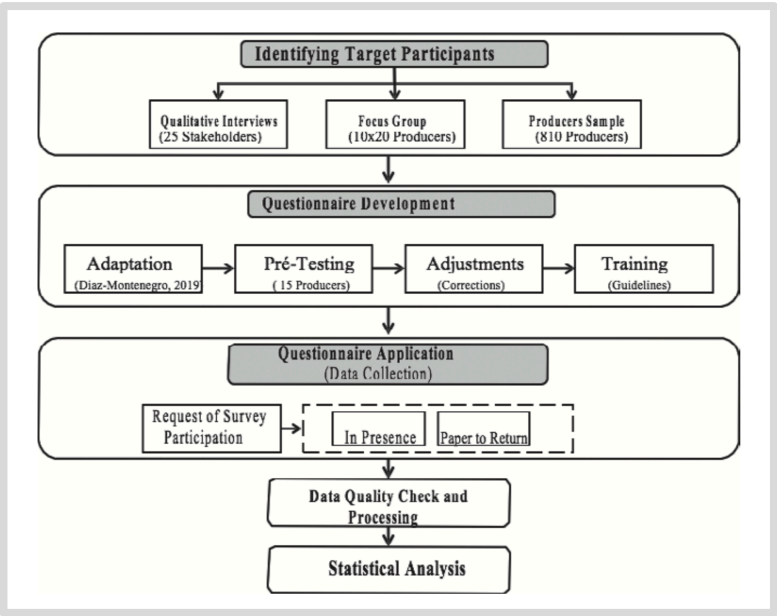

Figure 7. Analysis Design

Then, a questionnaire based on the livelihoods adapted from Diaz-Montenegro (2019) was applied to the organic cocoa producers, structured in three main sections. The first was dedicated to the characterisation of the household and the farm and incorporated five topics related to: Human capital (16 questions on the characterisation of the family and its relation to the farm), Natural capital (16 questions on used land and produced crops), Physical capital (4 groups of questions about machinery, equipment and support infrastructures), Financial capital (6 questions about financing sources), and Social capital (12 questions on partnerships and cooperation and enjoyed benefits). The second session was devoted to Risk perception and attitude and considered the probability of occurrence, their impact severity and degree of control of 19 events identified from both the literature and the country context. This group also included two questions dedicated to the management and tool preferences for risk management, comprising 12 options taken from the literature and the analysis context, and an open question where other options could be considered, namely for the future. The perceived value of joining an OCP cooperative was considered as the last section by including 12 options for assessing the benefit and cost of working with the cooperative. The reduced version of the PERVAL scale (Walsh, Shiu & Hassan, 2014) was explored in this context. This reduced version included 12 items

(either observed or manifested variables or indicators, structured from ordinal variables with 7 Likert-type response categories, in which 1 meant the highest degree of disagreement and 7 the highest degree of agreement) related to four constructs (or dimensions, latent variables or factors) that underlie the abstract and multidimensional concept of Value: Functional Value, Emotional Value, Social Value and Monetary Value.

In the beginning of the questionnaire, a request of participation was highlighted alongside an explanation of the study's purpose and the guidelines to fulfil the questionnaire, so to prepare and commit the participants to the survey. Participants could fill the questionnaire in two ways: direct interview in person or through a paper questionnaire due to return and collect two days after. A total of 838 questionnaires were completed, 180 by paper and the remaining face-to-face. After the removal of 28 incomplete questionnaires, the final sample consisted of 810 respondents.

4.3.3 Sample Characteristics

Figure 8 summarises some of the statistics of surveyed smallholders, by livelihood strategies. Table B1, in Appendix B, presents the description of all the characteristics of the sample set, which was almost equally distributed between the two cooperatives.

Most of the participants of the sample were male, while 33% of the farmers were females and 52,2% belonged to CECAB. The livelihood strategies identified were differentiated by the number and proportion of farmers engaged in growing organic cocoa (with or without other crop combinations), and their ways of allocating resources (14,2% concerned the proportion of farmers who engaged solely in organic cocoa growing, in mono-crop livelihood strategy LS1, 63,5% were involved in a diversified livelihood strategy (LS2) with two crops (organic cocoa and banana), and, 22,2% were engaged in a multi-crop livelihood strategy (LS3), which were combined three or more crops and livelihood activities.

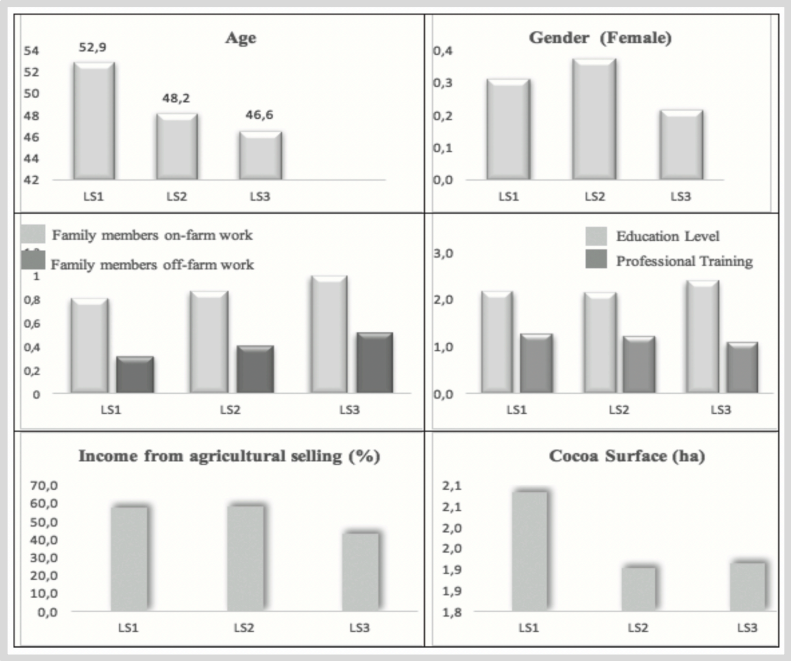

Figure 8. Summary of Characteristics of the Respondents

The OCP area for the sample was on average 1,95 hectares, with the highest surface value of 12,5 hectares and the lowest value of 0,5 hectares. The average household size varied from 3,6 members in monocrop to 4,8 in multicrop and 4,2 in bicrop livelihood strategies.

4.4. Results and Discussion

The estimation of equation (1) using an ordered probit model yielded the results shown in Table 10.

The statistical results related the dependent variable livelihood strategy (*LS1=Monocrop, LS2=Bicrop, LS3=Multicrop*) with the explanatory variables. The explanatory variables were grouped in human, financial and economic, natural, physical, and social capital as well as in risk perception and management and perceived value.

Regarding human capital explanatory variables, the level of education and perception of social classes influence the livelihood strategies. Farmers of the monocrop strategy have higher level of education than multicrop farmers. In fact, the greater the level of education, the lower the

probability of belonging to multicrops and the greater the probability of belonging monocrop strategy. As other studies sustained (Balogh, 2021, Reimers and Klasen, 2011; Hernández-Núñez et l., 2022), probably this is because a higher level of education leads to decisions involving greater productive efficiency, being mono-crop suitable for these choices because it is more efficient than multicrop. In the specific STP context, Sequeira et al. (2022) concluded that improvements into production systems lead to increased family income and help to cross poverty line.

In contrast to education level, the livelihood strategy has a positive relation to social class perception. Farmers of the multicrop strategy have a perception of belonging to higher social class than farmers of the monocrop strategy.

This does not seem compatible with the study of Irfany et al. (2020) where social class does not influence livelihood strategies. However, the result obtained could be related to the fact that an increased social class perception allows for a belief of being under better economic conditions which is in turn beneficial to the production of organic cocoa in multicrop (LS3).

Although not significant, there is a higher probability for monocrop strategy to have female and younger farmers and a lower number of on farm family members while family size, professional training courses and number of off-farm family members are higher for multicrop livelihood strategy. Despite OCP being the main activity in the three LS, farmers also engage in different income generating activities, such as off-farm employment. The explanation for that could be related to the fact that which enables them to build better assets, increase economic sustainability and could start becoming integrated production systems (Gebru et al., 2018). Additionally, off-farm self-employment is one of the variables that significantly improves welfare but has lower probability of existing in monocrop (Irfany et al., 2020). However, in the existing results concerning off-farm the employment, the greater the number of off-farm work members, the greater the probability of selected LS3 (multi-crop) and the lower the probability of having LS1 (monocrop).

Table 10. Results of the Probit Model for Livelihood Strategies

	Coefficient	Standard error	z	p-value
Human Capital				
Gender (F)	-0,236	0,184	-1,286	0,198
Age	-0,007	0,007	-1,106	0,269
Family size	0,054	0,045	1,201	0,230
Education level (EL)	-0,616	0,179	-3,447	0,001***
Number of professional training courses	0,026	0,125	0,206	0,837
Members on-farm work	-0,026	0,117	-0,224	0,823
Members off-farm work	0,228	0,147	1,549	0,121
Perception of social class (SC)	0,674	0,130	5,182	<0,0001****
Financial and Economic Capital				
Income from agricultural selling	0,007	0,004	1,600	0,110
Income from subsidies (human development and others) and remittances from emigrants	-0,082	0,360	-0,229	0,819
Insurances and loans (IL)	0,929	0,239	3,891	<0,0001****
Natural Capital				
Cocoa area	0,266	0,212	1,256	0,209
Cocoa production	0,000	0,000	-0,280	0,779
Banana area	-0,200	0,195	-1,026	0,305
Banana production	0,000	0,000	1,629	0,103
Physical Capital				
Access to potable water	-0,346	0,189	-1,824	0,068*
Access to electricity	-0,217	0,561	-0,387	0,699
Access to harvest storage (HS)	1,708	0,651	2,621	0,009***
Access to transportation	-0,732	0,373	-1,960	0,050**
Access to roads	-0,292	0,187	-1,555	0,120
Access to landline	0,316	0,399	0,792	0,428
Access to mobile phone (MF)	1,791	0,396	4,520	<0,0001***
Access to internet	0,470	0,207	2,272	0,023**
Access to TV and radio	0,694	0,380	1,825	0,068*
Access to health center HC)	-2,426	0,548	-4,428	<0,0001***
Access to schools	-0,445	0,258	-1,723	0,085*
Access to extension services (ES)	-0,895	0,291	-3,077	0,002***
Social Capital				
Belong to CECAB	-0,490	0,217	-2,260	0,024**
Satisfaction with cooperatives	0,530	0,248	2,131	0,033**
Trust level in neighbours	0,033	0,125	0,261	0,794
Trust level in civil organizations	0,119	0,148	0,804	0,421
Trust level in agricultural organizations	-0,031	0,101	-0,312	0,755
Trust level in district council	-0,797	0,622	-1,280	0,201
Trust level in local council	1,243	0,614	2,024	0,043**
Trust level in cooperatives (TC)	-0,875	0,243	-3,603	0,000***
Trust level in government	-0,240	0,259	-0,929	0,353
Risk Perception and Management				
Perception of the likelihood of risks occurring (LR)	0,499	0,161	3,094	0,002***
Perception of risk impact severity	-0,507	0,221	-2,297	0,022**
Perception of the degree of self-control of the impact	-0,084	0,259	-0,323	0,747
Perception of the importance of risk management tools	-0,165	0,140	-1,181	0,238

In the case of on-farm work, the greater the number of on-farm work members, the lower probability of selected LS3 (polyculture) and greater the probability of having LS1 (monocrop).

This is because monocrop depend mainly on familiar work than external work. Despite external work income being a significant source of income (Bjornlund et al. 2019; Pritchard et al. 2019), it is associated with greater risks and thus, has a negative impact on the well-being of households (Nielsen et al. 2013; Bjornlund et al. 2019).

Concerning economic and financial capital, the results obtained for insurances and loans show that the probability of multicrop livelihood strategies having insurance and loans is higher than de mono-crop strategies as well as the proportion of income from agricultural sources. In general terms, these results are compatible with those found in Irfany et al. (2020)'s study, which displayed those cocoa producers, predominantly males, depended on loans, even though only a few have accessed formal loans. To Ankrah et al. (2023), reducing loan interest rates can foster financial inclusion. In STP, loan interest rates are very high and the OCP have difficulty to access formal banks. This is very important because other significant determinants of livelihood practices were, for instance, access to formal credit for self-employment, among others. Also, Kuang et al. (2020) exposed that farmers' social, financial, and human assets can mitigate their livelihood risks in agricultural pro- duction, while their social, natural, and physical assets have positive effects on the adoption of the strategies. However, natural, and physical assets have the opposite effects in livelihood risks such as the human and financial assets have relatively weak influences in the adaptation strategies (Kuang et al., 2020).

The livelihood strategies are not related with natural capital explanatory variables, namely, area and production of cocoa and banana. These results were also in line with those found in Andres *et al.* (2016), particularly when dynamic agroforestry systems are introduced on a small scale. For the authors, through mimicking natural forests, these systems offer multiple benefits such as soil fertility enhancement, reduction of pests and disease pressure, erosion control, and revenue diversification. Very often, the diversification is induced by income-generating activities to smooth income, accumulate wealth and reduce exposure to risk (Sun et al., 2019).

Physical capital explanatory variables show in a clear way that access to potable water, transportation, health centers, schools and extension services are higher for monocrop farmers than for multicrop farmers while access to harvest storage, mobile phone, internet and TV and

radio are higher for multi-crop farmers. Mono-crop farms have better access to state dependent infrastructures, possibly due to the location of agricultural enterprises, while multi-crop farms have better access to services that depend on individual decisions and consumption. According to Viana et al. (2022), development programs implemented in STP to improve infrastructure and agricultural production, made a positive contribution to the wellbeing of rural households. Similar results found Trigueiros et al. (2023) emphasizing the importance of this investments programs to improve socio-economic development and households' sustainability. The perception of the importance of these public policies are more valued by male than female (Viana et al., 2022).

Regarding risk perception and management of events that affect agricultural production and family income, the results show that livelihood strategies are different for the perception of events occurring, being this perception higher for multicrop than for monocrop farmers and, for severity of events, the mono-crop livelihood strategy have higher severity perception than multi-crop farmers. Thereby, adverse events are less perceived by monocrop which value more the severity of impact. It should mention, specifically in STP insular context where climate changes consequences are become severe, that public policies are essential tools to mitigate risk events and impacts.

Concerning the four dimensions of the perceived value of joining a cooperative, the emotional (CEV) and the social values (CSV) of joining a cooperative, the greater the perceived value, the greater the probability of electing LS3 (multicrop) and the lower the probabil- ity of having LS1 (monocrop). In the case of the functional value the opposite is observed. From a production standpoint, similarly to the results obtained by Moreno-Miranda et al. (2020) in Ecuador, the price paid for product certification is debatable and not perceived as valuable.

On the linkage between livelihood strategy and the sustainability at farm level, in addition to the difference between monocrop vs. multicrop, it was possible to add other elements. The economic dimension of sustainability, measured by land area and number of income sources, revealed that bicrop and multicrop have similar areas (3,7 ha) but greater than monocrop (2,1 ha) while the number of sources of income are higher for multicrop (4,2) than for mono and

bicrop (2,2). Globally, multicrop exhibited higher economic sustainability than mono and bicrop livelihood strategies.

The social dimension of sustainability measured by the number of basic services accessed, number of professional training courses and level of trust in institutions, displayed that: mono (8,8) and bicrop (8,4) have greater access to a higher number of basic services than multicrop (6,7); the number of professional training courses were decreasing from mono (1,3) and bi (1,2) to multicrop (1,1); and the level of trust in institutions was also decreasing from mono (2,6) and bi (2,5) to multicrop (2,3). Overall, the monocrop livelihood strategy was more robust in terms of social sustainability.

Finally, the environmental dimension of sustainability, measured by the number of crops and productivity levels, disclosed that: as expected multicrop (3,6) has an average number of crops higher than bicrop (2) and monocrop (1) strategies; and Cocoa productivity for multicrop (706 Kg/ha) is higher than bicrop (614 Kg/ ha) and monocrop (479 Kg/ha) while banana productivity for multicrop (918 Kg/ha) is higher than bicrop (435 Kg/ha). Thus, the multicrop livelihood strategy is, more environmentally sustainable than mono and bicrop livelihood strategies.

Multicrop is the most sustainable livelihood system. There is acceptance that certified OCP have a positive sustainability effect (Blockeel et al., 2023) as well as crop diversity, because of increasing sources of food and income, reducing the risk of adverse events and their impact and having a positive effect on biodiversity.

4.5. Conclusions

Organic cocoa production is one of the most valued crops in STP and world-wide. The country follows ancient ancestral-style production practices, in which most of the production is in the hands of small-scale producers primarily associated with two cooperatives, which face significant obstacles regarding their sustainability.

Small scale cocoa production in STP is organized in different livelihood strategies, mono, bi e multicrop that have similarities and differences among them and represent distinctive

production systems. These three strategies have been developed as means of survival of rural households, with dependency of organic cocoa production and, in many cases, incomes still below the poverty line. This is due to the low level of production obtained, which does not allow a better position in the market, and the poor access to technical support.

Rural cocoa households have been sustained by cocoa cooperatives governance and sociotechicians' support. Cooperative goals are toward inducing and advising farmers to avoid monocrop to achieve greater (bio)diversity and ecosystem services, wellbeing, and economic access. These provide enhanced levels of sustainability, climate neutrality transition and market shock prevention which are expected to increase in frequency and intensity.

This research shows that globally, multicrop livelihood strategy have the highest economic sustainability, monocrop livelihood system was more robust in terms of social sustainability and multicrop livelihood strategy was the most environmentally sustainable. Thus, the multicrop livelihood strategy is the most sustainable livelihood system.

The bicrop and multicrop livelihood strategies, have the potential to offset environmental and economic risks and consequently improve sustainability and wellbeing. Such pathway is relevant for a country like STP which depends economically on its OCP to maximize short-term productivity and profitability. Nonetheless, cocoa monocrop has been associated with soil erosion and degradation, biodiversity loss, as well as increased susceptibility to climate change impacts, pests and diseases.

The multicrop livelihood system is the more resilient strategy because it holds diversified sources of income and seems more realistic in terms of management, strategies and in the face of risks. Nonetheless, it is less autonomous because it further depends on outside linkages (e.g., off farm labour and cooperatives support).

Monocrop farmers are more autonomous because they hold higher levels of education and experience, as well as greater access to technical support, therefore, in the absence of risk events, they can be more successful. On the other hand, in risk events, they suffer greater consequences, thus, they have a better grasp of the impact of events when dealing with severe

risks. That is, when the risks are low, monocrops respond well, when the risks are higher, a multicrop approach may be more suitable.

The results of this study devise crucial policy implications for designing adaptations to organic cocoa national policy, which would involve, for example, better technical assistance, credit, and investment in the development of diversified practices and cocoa plants' selection, which respond to poverty and climate variability. They can be used to recommend governance measures to lead livelihood strategies to a higher sustainability level in all dimensions and the adoption of climate change adaptations. For instance, the roles of research, knowledge transfers and extension programs in promoting more resilient and sustainable livelihood strategies are vital to promulgating best practices and the ecosystems' preservation. Hence, it is crucial to progress in research, development, and innovation (R&D&I) and gather the essential knowledge to be able to move current OCP livelihood strategies to new cleaner circular business models.

Finally, in terms of practical implications, the research demonstrated several factors with potential to improve organic cocoa livelihoods, but also obstacles, especially in terms of formal credit access, infrastructures scarcity, actions to deal with risk events and trust in institutions and governance practices. These may deter poorer smallholders from diversifying their income sources and improve their social wellbeing. The engagement of producers in social programs and policies that facilitate access to formal finance, could encourage small business livelihood strategies and improve transparency and trust in organic cocoa-dependent communities.

Chapter 5 | PERCEIVED VALUE, RISK AND COOPERATIVE MEMBERSHIP: ENGAGEMENT FOR SUSTAINABLE ORGANIC COCOA PRODUCTION[8]

Organic cocoa production in São Tomé and Príncipe is predominantly carried out by smallholder farmers, who face growing sustainability challenges due to climate variability, market volatility, and limited institutional support. A bigger key dilemma is faced by these farmers, whether to adopt high-yielding crops for immediate profit or to maintain traditional organic cocoa varieties that underpin the Globally Important Agricultural Heritage Systems (GIAHS). In this context, cooperatives play a central role in supporting sustainable practices and collective risk management. This chapter present the work that investigates how smallholders perceive the value of cooperative membership (CM) and how these values relate to their perception and ability to manage risks.

5.1 Introduction

Cocoa production is undergoing profound transformations globally, driven by increased demand associated with urbanization, rising incomes, and changing dietary preferences (Reardon et al., 2014; Rueda & Lambin, 2014). However, the supply side of the cocoa value chain remains dominated by smallholder farmers, many of whom operate under precarious socio-environmental conditions, particularly in the Global South (Bai et al., 2022).

In response, policy strategies and development initiatives have emphasized productivity enhancements to achieve sustainability and competitiveness (Fountain & Hütz-Adams, 2018). Yet, this emphasis often promotes intensification models that conflict with traditional agroforestry systems. These tensions are particularly pronounced in São Tomé and Príncipe,

[8] Prazeres, I., Lucas, M. R., Marta-Costa, Henriques, P.D., and Grilo, L. (2025). Perceived Value, Risk and Cooperative Membership: Engagement for Sustainable Organic Cocoa Production. Paper submitted at Journal of Cleaner Production.

where cocoa cultivation is central to rural livelihoods and national exports. Despite accounting for less than 0.1% of global cocoa output, STP's production—based on the Amelonado variety (Singh, 2025), and organic agroforestry systems—has recently gained international recognition through its designation as a Globally Important Agricultural Heritage System (GIAHS) by the FAO (2024).

STP's cocoa sector is structured around two main organic cooperatives—CECAB and CECAQ-11—which affiliate over 90% of cocoa farmers and act as pivotal institutions in supporting technical assistance, certification, credit access, and market integration (Prazeres, 2019; Prazeres and Lucas, 2020; Prazeres et al., 2022). These cooperatives embody a collective action approach to overcoming market failures, enhancing adaptive capacity, and promoting inclusive sustainability (Castaing, 2021; Prazeres et al., 2023a, 2023c). However, little is known about how smallholder farmers perceive the value of CM beyond its functional or economic outcomes.

Existing studies have focused primarily on productivity, income, or market access as indicators of cooperative performance (Munch et al., 2021; Wrede, 2023). While useful, such metrics often neglect the multidimensional and subjective aspects of farmer motivation, particularly in contexts where decision-making is shaped by social norms, identity, and risk perceptions. Understanding how farmers value cooperative participation—and how this perceived value relates to their risk management behaviour—is decisive to designing more effective governance models for sustainable agriculture.

This study, guided by three primary research objectives, addresses this gap by adapting the PERVAL model (Sweeney & Soutar, 2001) to an agricultural production context. Originally developed for consumer studies, PERVAL allows for the analysis of perceived value across four dimensions: functional, emotional, social, and monetary. While widely applied in marketing research, its use in smallholder agriculture remains rare.

This study aimed to identify the PERVAL dimension with the greatest influence on perceived CV, analyse the relationship between perceived value and key dimensions of risk perception (probability, severity, and self-control), and investigate the extent to which perceived value affects the adoption of risk management tools.

The research contributes to that gap by investigating how these value dimensions shape farmer participation in organic cooperatives and relate to their perceptions of risk—namely, the probability of risk occurrence, the severity of impacts, the degree of self-control, and the use of risk management tools.

The paper proceeds as follows: Section 2 reviews the literature; Section 3 details the methodology; Section 4 presents the empirical results; Section 5 concludes with implications and future directions.

5.2 Literature Review

5.2.1 Cooperatives, Rural Sustainability and Organic Agriculture

Agricultural cooperatives have long been recognized as critical institutional mechanisms for improving rural livelihoods, especially in regions where smallholders face systemic challenges related to market access, credit constraints, and governance failures (Fischer & Qaim, 2012; Vandercasteelen et al., 2018; Gebrehiwot et al., 2024). The United Nations' recognition of 2012 as the International Year of Cooperatives underscored their potential to promote inclusive development, reduce rural poverty, and enhance environmental stewardship (UN, 2012).

Defined as autonomous associations formed to meet members' economic, social, and cultural needs through jointly owned and democratically controlled enterprises (ICA, 2016), cooperatives in agriculture are particularly relevant in fragile contexts. They contribute to sustainability by mitigating market failures, improving bargaining power, and supporting collective investment in infrastructure, training, and value-added activities (Kalogiannidis et al., 2024; Verhofstadt & Maertens, 2015; Bijman & Iliopoulos, 2014). Governance structures grounded in the principles of user-benefit, user-control, and user-ownership (Hanisch & Opperskalski, 2010; Gemechu et al., 2025) reinforce trust, internal accountability, and social cohesion (Geffersa, 2024; Francesconi et al., 2015). Despite their contribution to increased membership's income or productivity, remains heterogeneous, considering farm size or regional dynamics (Zou & Wang, 2022), cooperatives

are key actors in market coordination, technical training, and access to certification and credit (Francesconi & Wouterse, 2015; Krumbiegel & Tillie, 2024).

In the context of organic cocoa, cooperatives such as CECAB and CECAQ-11 in São Tomé and Príncipe are central to coordinating certification processes, providing technical assistance, and facilitating international market integration (Prazeres, 2019). However, the sustainability of these models is not guaranteed. Evidence suggests that overreliance on top-down donor agendas or external actors can undermine local legitimacy and farmer agency (Uribe-Leitz & Ruf, 2019). Additionally, challenges such as limited managerial capacity, weak internal governance, and persistent gender inequalities may limit the transformative potential of cooperatives (Löhr et al., 2021).

Despite these limitations, cooperatives remain among the most promising structures for transitioning towards more sustainable and inclusive agricultural systems, especially in value chains characterized by ecological sensitivity and socio-economic vulnerability, such as organic cocoa.

5.2.2 Farmers' Perceptions of Value and Motivations for CM

An increasing body of literature has explored the factors motivating smallholder participation in cooperatives. While functional incentives such as access to credit, higher prices, training, or certification remain central (Fischer & Qaim, 2012; Francesconi & Wouterse, 2015; Bymolt et al., 2018), recent studies emphasize that farmers also seek emotional, relational, and identity-based benefits through CM (Markelova et al., 2009; Raynolds, 2009).

These non-material motivations are particularly salient in regions where trust, social capital, and communal norms shape economic behavior. Farmers may value cooperatives not only for transactional benefits but also for social recognition, group belonging, and alignment with ethical or environmental values (Markelova et al., 2009; Raynolds, 2009; Sebhatu et al., 2021; Jaacks et al., 2025). Emotional drivers—such as pride in organic farming, commitment to biodiversity, and belief in collective resilience—often sustain participation beyond financial incentives, particularly

under conditions of market uncertainty or limited state support (Jaacks et al., 2025; Ingram et al., 2018). In the context of organic cocoa, certification is often viewed as a pathway to price premiums, though evidence of its effectiveness remains mixed (Nelson et al., 2013; Löhr et al., 2021).

Another critical dimension is the perceived quality of cooperative governance. Members' trust and engagement are shaped by perceptions of transparency, inclusiveness, and fairness in decision-making (Francesconi & Ruben, 2012; Mojo et al., 2015; Bachke, 2019). Where leadership is perceived as elitist, or closely aligned with external stakeholders, member satisfaction tends to decline, potentially weakening cooperative performance (Uribe-Leitz & Ruf, 2019).

Despite this growing literature, important gaps remain. Many studies fail to capture how diverse motivations intersect with risk perceptions or how subjective experiences influence long-term commitment. There is limited integration of multidimensional value constructs—particularly in low-income contexts where farmers face structural vulnerabilities and must balance short-term survival with long-term sustainability (Ortega et al., 2019; Fenger et al., 2017).

5.2.3. The PERVAL Model and Its Application to Organic Cocoa

The PERVAL model (Sweeney & Soutar, 2001) was developed to assess consumer-perceived value across four interrelated dimensions: functional, emotional, social, and monetary. While extensively applied in marketing and consumer research, its use in agricultural or producer contexts remains limited. Nevertheless, the model holds promise for understanding how producers evaluate participation in collective organizations such as cooperatives. It can be used as an all or adapted to a shortened 12-item version as suggested by Walsh et al. (2014).

In this context, functional value may refer to the practical utility of CM—e.g., access to training, technical assistance, or inputs. Emotional value can reflect feelings of purpose, motivation, or pride associated with organic production or community recognition. Social value may stem from peer approval, inclusion, or reputational gains within the community, while monetary value refers to perceived fairness in price, returns on investment, or economic stability.

Applying the PERVAL model to agricultural producers, particularly in the Global South, allows for a more nuanced analysis of how farmers perceive value beyond narrow economic metrics. It also enables exploration of how these perceived values influence behaviors such as risk management, adoption of sustainable practices, and commitment to collective institutions. This perspective is particularly relevant in STP, where cocoa production is embedded in a complex interplay of tradition, vulnerability, and collective governance.

By adapting the PERVAL model to a cooperative setting, this study aims to uncover how different value perceptions influence farmer behavior and decision-making, particularly in relation to risk governance. This approach contributes to filling a critical gap in the literature on smallholder sustainability, cooperative resilience, and participatory governance frameworks in fragile agroecological systems.

5.3 Methodology

5.3.1 Research Design

This study employed a cross-sectional, explanatory research design to explore how organic cocoa producers in São Tomé and Príncipe perceive the value of CM and how this perception relates to risk governance. The analysis is grounded in the adaptation of the PERVAL model (Sweeney & Soutar, 2001), which identifies four core dimensions of perceived value: functional, emotional, social, and monetary.

Building on previous qualitative fieldwork and insights from cooperative leaders, a set of research hypotheses was developed to assess the relationships among CV dimensions and their associations with risk perception indicators. This approach enables a multidimensional and farmer-centered assessment of cooperative participation and sustainability-related behaviors. The research hypothesis were the following:

- **H1**: Which is the PERVAL dimension most strongly influences perceived CV? Despite the other variables such as emotional, social, and monetary, has the functional variable the

greater interaction with them, being a proxy of the CV? It means that producers see their participation in cooperatives for the functional value it plays in their activities:

- **H1A:** Functional dimension has a positive and significant effect in emotional.
- **H1B:** Functional dimension has a positive and significant effect in social.
- **H1C:** Functional dimension has a positive and significant effect in monetary.

- **H2:** How perceived CV is associated with risk perception (probability, severity impact and self-control)?
  - **H2A**: The perceived CV has a significant association with producers' perception of probability of occurrence (PO) by market and governance risks. This hypothesis reflects moderately findings where agricultural decisions and practical feasibility (e.g., cooperative market collective action and production support) enhance perceived value to belong it and shaped not only profitability but also social relations, identity and moral commitments (e.g., Li and Zhang, 2023).
  - **H2B**: The perceived CV has a significant association with producers' perception of severity of impact (SI) by market and governance risks. This hypothesis reflects partly findings where the governance and administrative culture and trust has a key influence on cooperative performance and managing risks impacts (Österberg and Nilsson, 2009; Higuchi et al., 2020).
  - **H2C**: The perceived CV has a significant association with producers' perception of self-control (SC) by market and governance risks. This hypothesis reflects partially findings where dominance of cooperatives signals provision of value to members and management of risk markets (Munch et al., 2021).
- **H3:** How perceived CV is associated with risk management tools (MT)?
  - **H3A:** The perceived CV has a significant association with risk management tools.

Apart from Díaz-Montenegro et al. (2025) who partially addressed this topic by linking risk management strategies to risk aversion, there is no literature supporting H3. However, higher

levels of risk aversion among farmers do not necessary lead to the adoption of proactive or preventive risk management strategies.

In synthesis, there are no studies in the literature whose findings fully inform each of the proposed hypothesis. Limited knowledge exists regarding the perceived value of CM and the various dimensions of risk perception, including likelihood of occurrence, severity of impact, self-control, and the use of risk management tools.

5.3.2 Survey construction and Data Collection

Data were collected through structured, face-to-face interviews with a non-probabilistic sample of 630 certified organic cocoa farmers—representing approximately 12.2% of the total cocoa producer population in São Tomé and Príncipe. Respondents were affiliated with the country's two main cooperatives: CECAB and CECAQ-11.

The survey instrument was adapted from Diaz-Montenegro (2019) and Walsh et al. (2014), incorporating a shortened 12-item PERVAL scale tailored to the agricultural context. Additional constructs were included to measure risk perception along four axes: probability of occurrence, severity of impact, self-control, and risk management tools. All items were measured using a 7-point Likert scale (1 = strongly disagree; 7 = strongly agree).

The demographic profile of respondents revealed that 64.3% were male, and 61.7% were aged between 40 and 60 years. Approximately 79.2% of participants had completed primary school, and the majority reported medium income levels (Table 11). These characteristics reflect the typical smallholder profile in STP's organic cocoa sector.

The final instrument demonstrated strong psychometric properties (Table 12). Factor loadings for all constructs exceeded the acceptable threshold of 0.7 (except for one item in the functional value dimension, which was dropped due to poor performance). This ensured internal consistency and construct validity for the PLS-SEM analysis.

Table 11. Composition and Representativeness of the Sample

Attributes	Type	Percentage of Respondents
Gender	Male	64.3
	Female	35.7
Age	18-39	23.8
	40-60	61.7
	>60	14.4
Education Level	No formal education	3.2
	Primary School	79.2
	High School	17.3
	Bachelor's degree, master's degree or higher	0.3
Income Level	Low	12.4
	Medium	75.4
	High	12.2

5.3.3 PLS-SEM Approach

To evaluate the structural relationships between the PERVAL dimensions and risk-related constructs, Partial Least Squares Structural Equation Modelling (PLS-SEM), introduced by Wold (1982) and developed further by Henseler et al. (2009), was employed using SmartPLS 4.0 software. This method was selected over Covariance-Based SEM (CB-SEM) due to its suitability for exploratory models, smaller sample sizes, and its focus on maximizing explained variance rather than model fit indices (Sarstedt et al., 2021; Szakos et al., 2021).

The PLS-SEM approach followed a three-stage process:

1. Assessment of the measurement model, including reliability (Cronbach's alpha and composite reliability) and validity (average variance extracted – AVE);
2. Evaluation of the structural model, including path coefficients, p-values, and coefficients of determination (R^2);
3. Hypothesis testing, based on bootstrapping with 5,000 subsamples to assess significance levels.

Table 12. Items of Measurement and their Reliability for Normative Model

Latent Constructs	Item codes	Measurement items	Factor loadings
Emotional	E1	The work with the cooperative is one of my favourites	0.933
	E2	The work with the cooperative inspires me to keep going	0.798
	E3	The work with the cooperative makes me feel good	0.717
Social	S1	The work with the cooperative makes me feel accepted by other people	0.910
	S2	The work with the cooperative improves how other people see me	0.883
	S3	The work with the cooperative gives other people a good impression of me	0.921
Functional	F1	The work (connection) with the cooperative is as agreed	Dropped
	F2	The work with the cooperative was well conceived	0.919
	F3	The working model I have with the cooperative is acceptable	0.772
Monetary	PP1	What I get is worth what I give (time and effort)	0.760
	PP2	Working with the cooperative increases the benefits obtained over the costs	0.861
	PP3	The work with the cooperative is good when comparing the costs, I must bear	0.866
Probability of Occurrence	P60	Excessive reduction in the marketing prices of its agricultural products	0.778
	P61	Excessive increase in agricultural input costs	0.682
	Q66	Deterioration of roads and paths for transporting your products	0.880
	P68	Registration of National Cocoa Support Policies	0.908
	P71	Respect of contractual conditions by companies (Ingenio Valdez, exporters, etc.)	0.880
Severity of Impact	P83	Cancellation of agricultural aid programs by the government (kits, insurance, training, etc.)	0.761
	P90	Respect for contractual conditions by companies (Satocau, Diogo Vaz, exporters, Cooperative Cecab, etc.)	0.810
	P91	Mixtures between national cocoa and CCN-51 at the time of sale	0.893
	P93	Personal problems that negatively impact the plot of land	0.757
	Q88	Lack of guidance on what types of crops to plant	0.874
Self-Control	P98	Excessive reduction in the marketing prices of its agricultural products	0.758
	P102	Cancellation of agricultural aid programs by the government (kits, insurance, training, etc.)	0.961
	P104	Deterioration of roads and paths for transporting your products	0.832
	P105	Rise of intermediaries, who earn the most profit	0.778
	P107	Lack of guidance on what types of crops to plant	0.955
	P109	Respect of the contractual conditions by the companies (Ingenio Valdez, exporters, etc.)	0.911
	P112	Personal issues that negatively impact the farm	0.665
Management Tools	P114	Keeping money saved for hard times	0.945
	P123	Stop buying things that aren't for the farm	0.945

All constructs presented composite reliability scores above 0.84 and AVE values above 0.62, indicating strong convergent validity. The model explained a substantial proportion of the variance in emotional ($R^2 = 0.54$), social ($R^2 = 0.51$), and monetary value ($R^2 = 0.34$), while risk-

related constructs (probability, severity, self-control, management tools) showed lower explained variance ($R^2 < 0.10$), suggesting the presence of additional latent influences.

The PLS-SEM analysis thus enabled the identification of the most salient perceived value drivers and their implications for risk governance in cooperative-based organic cocoa system.

5.4 Results and Discussion

5.4.1 Model Estimation and Structural Results

The PLS-SEM model developed for this study aimed to evaluate the influence of the perceived functional value of CM on other value dimensions—emotional, social, and monetary—and its relationship with risk perception and management among organic cocoa producers in São Tomé and Príncipe.

Figure 9 presents the structural model, with functional value as the exogenous latent construct, predicting six endogenous variables: emotional value, social value, monetary value, risk perception (probability of occurrence and severity of impact and self-control) and risk management tools. The measurement model demonstrated strong reliability, with Cronbach's alpha ranging from 0.629 to 0.912, and Composite Reliability values all above 0.84. The Average Variance Extracted (AVE) for each construct exceeded the 0.50 threshold, confirming convergent validity (Table 13). In Figure 9 latent constructs are circles and their observable items rectangles. The arrows between the latent constructs represent the hypothesized relationships (paths). The numbers on the arrows are the path coefficients (beta), and the values in parentheses are the p-values. The values inside the circles are the R^2 for the endogenous constructs. R^2 values (PO: 0.054; E: 0.542; SI: 0.045; S: 0.508 3232; SC: 0.033; PP: 0.337, and MT: 0.060) indicate the proportion of the variance of an endogenous construct that is explained by its predictors. E (Emotional) and S (Social) have higher R^2s (0.542 and 0.508, respectively), which suggests that their predictors (namely Functional) explain a substantial amount of their variance. PP (Monetary) has a moderate R^2 (0.337) and PO, SI, SC, and MT have lower R^2 (between 0.033 and

0.060), indicating that their predictors explain a small portion of their variance, and there may be other factors not included in the model that influence them.

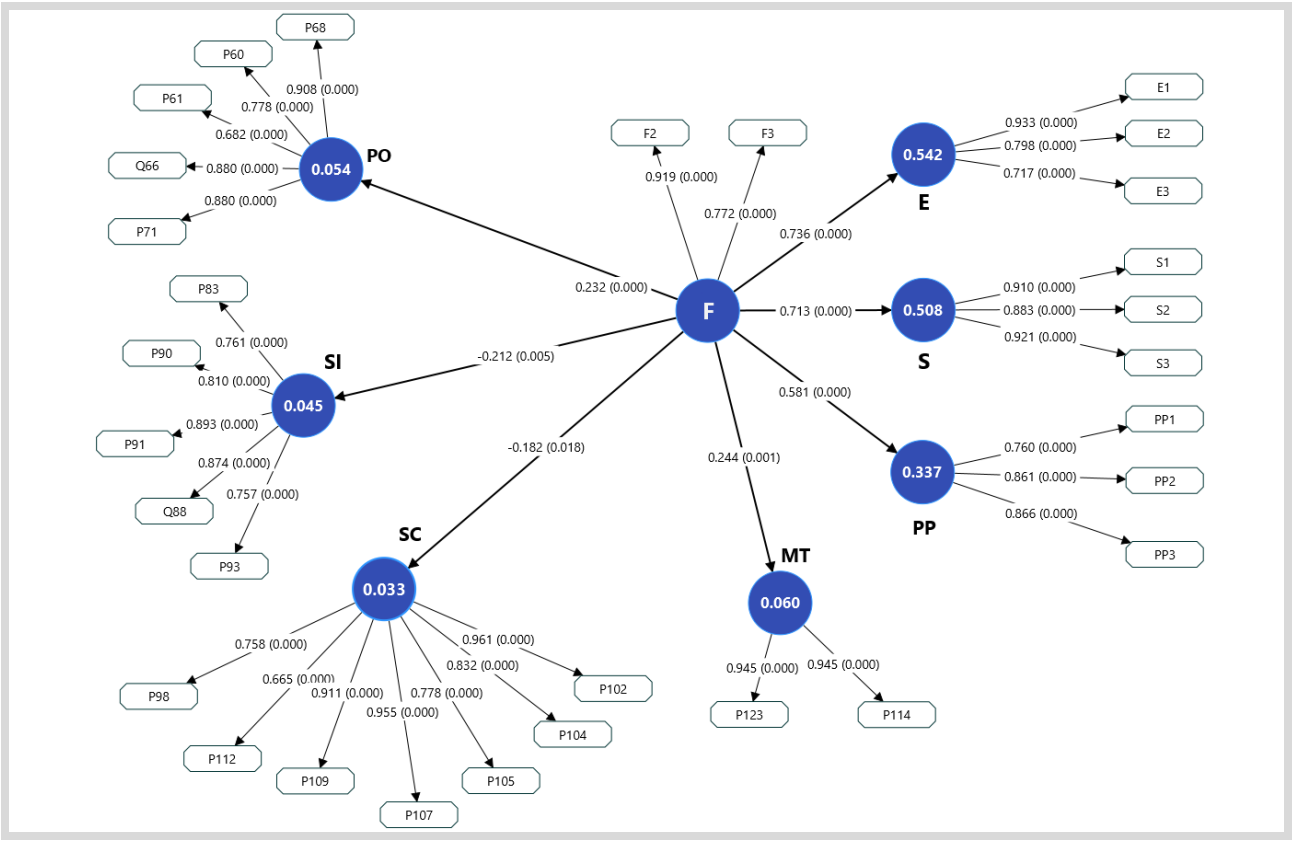

Figure 9. Reflective PLS-SEM Model of PERVAL CM

Table 13. Construct Reliability and Validity

Latent Constructs	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Emotional (E)	0.762	0.921	0.859	0.673
Social (S)	0.629	0.725	0.836	0.720
Monetary (PP)	0.890	0.897	0.931	0.819
Functional (F)	0.880	0.880	0.943	0.893
Probability of occurrence (PO)	0.778	0.805	0.869	0.690
Severity of Impact (SI)	0.890	0.926	0.916	0.688
Self-Control (SC)	0.912	0.958	0.929	0.629
Management tools (MT)	0.879	0.912	0.911	0.674

The table 14 presents the path coefficients, standard deviation, and p-values for each hypothesized relationship between the constructs. In response to RQ1, the path coefficients reveal significant impacts.

Table 14. Path effects of attitudinal components on cooperatives variables using PLS-SEM

Hypothesis	Sample Mean (M)	2.5%	97.5%	Standard deviation (STDEV)	*p-values*
Funcional -> Emotional (E)	0.738	0.614	0.812	0.049	0.000
Functional -> Social (S)	0.714	0.553	0.812	0.064	0.000
Functional -> Monetary (M)	0.583	0.424	0.688	0.065	0.000
Functional -> Probability of occurrence (PO)	0.242	0.112	0.343	0.061	0.000
Functional -> Severity of Impact (SI)	-0.223	-0.346	-0.076	0.076	0.005
Functional -> Self-control (SC)	-0.203	-0.281	0.194	0.076	0.018
Functional -> Management tools (MT)	0.244	0.086	0.382	0.076	0.001

The structural results revealed that functional value was a strong and significant predictor of:

- Emotional value ($\beta = 0.738$, $p < 0.001$), strongly supported H1A: There is a very strong, positive relationship between Functional and Emotional. The more functional the work with the cooperative is perceived, the more positive the emotional response of individuals.
- Social value ($\beta = 0.714$, $p < 0.001$) strongly supported H1B: There is a very strong positive relationship between Functional and Social indicating that the functionality of working with the cooperative improves individuals' cooperative social perception and acceptance.
- Monetary value ($\beta = 0.583$, $p < 0.001$) strongly supported H1C: There is a very strong positive relationship between Functional and Monetary. This is intuitive, suggesting that more functional work with the cooperative translates into greater perceived monetary benefits.

These results advocate that perceived functional support—such as reliable governance, technical assistance, and access to resources—substantially enhances both affective and instrumental dimensions of CM and can be considered the CV.

Functional value/CV has statistically significant relationship with risk perception:

- Perceived probability of risk occurrence (β = 0.242, p < 0.001), which strongly supported H2A. This suggests that the perception of functionality increases the perceived probability of certain events or outcomes (positive or negative, depending on the context) occurring.
- Perceived severity of risk impact (β = –0.223, p = 0.005), which supported hypothesis H2B.
- Self-control in risk management (β = –0.203, p = 0.018) which supported hypothesis H2C.

In these last two hypothesis the negative and statistically significant relationship means that, greater perception value (expressed by functionality dimension) may lead to a perception of lower SI and SC. In SI it is perhaps because functionality relationship with cooperative reduces issues that would otherwise result in negative impact and suggests that functionality alone does not translate into greater perceived positive impact. In self-control the negative value may indicate that functionality may lead to a reduced need for self-control, suggesting that, as the functional perception of working with the cooperative increases, self-control tends to decrease, or vice versa. Probably the relationship with the cooperative gives a feeling of protection against the vicissitudes of nature reducing the cocoa producers need for self-control.

These mixed effects suggest that while functional value contributes to awareness and preparedness, it may also reduce perceived individual autonomy in managing risks. But this deserves further exploration in future studies to understand the direction of this relationship.

Regarding the last hypothesis H3

- Adoption of risk management tools (β = 0.244, p = 0.001), which supported hypothesis H3A. This suggests that the perception of the functionality of working with the cooperative is associated with greater use or appreciation of management tools.

5.4.2 Discussion

The findings confirm the centrality of functional value in shaping how smallholder farmers perceive the benefits of CM. Functional value—comprising governance efficiency, production support, and access to certification and markets—acts as the foundation for broader emotional, social, and monetary benefits (CV). This are consistent with previous studies emphasizing the instrumental role of cooperatives in delivering services and reducing transaction costs (Fischer & Qaim, 2012; Francesconi & Wouterse, 2015).

These results also reinforce the idea that CM is valued not merely for transactional reasons, but as a broader enabler of social identity, economic inclusion, and emotional attachment in contexts of agrarian vulnerability. Overall, it suggests that the perceived functionality of working with the cooperative plays a crucial role in shaping various individuals' attitudes and perceptions, highlighting the importance of a well-designed and effective work model for the cooperative's success and member satisfaction. The low R^2 values for some constructs (PO, SI, SC, MT) indicate that, although functional is a significant predictor, other factors may play a more prominent role in explaining the variance in these constructs. Dachs et al. (2025) suggest improving knowledge access and address knowledge gaps to promote widespread adoption of sustainable farming practices in the cocoa production sector and beyond.

The strong emotional and social impacts observed trough the robust and statistically significant relationships between functional value and the emotional ($\beta = 0.738$), social ($\beta = 0.714$), and monetary ($\beta = 0.583$) dimensions, suggest that farmers perceive cooperatives primarily as institutional platforms that deliver both tangible and symbolic benefits. These last benefits are relevant for the agrarian communities studied in which symbolic values related to family, social history, customary land rules and spirituality, still play an important role in daily life. It means that CV and participation goes beyond economic rationality at it is associated with social recognition, belonging, and personal satisfaction—dimensions that are particularly important in community and rural contexts (Raynolds, 2009; Jaacks et al., 2025). These findings are consistent with previous literature showing that access to technical support, reliable marketing channels, and shared governance mechanisms increases member satisfaction and loyalty (Francesconi &

Ruben, 2012; Munch et al., 2021; Francesconi & Wouterse, 2022) and support the notion that non-material values significantly reinforce farmer engagement in sustainability-oriented institutions.

Beyond the functional driver of CM, the sociodemographic characteristics of the sample provide essential context to interpret the structural relationships observed. Most surveyed producers were male (64.3%) and aged between 40 and 60 years (61.7%), with most having completed only primary education (79.2%). This demographic profile reflects a segment of the farming population deeply embedded in traditional agricultural practices and with limited access to advanced training or formalized risk management frameworks. These constraints likely elevate the perceived importance of functional cooperative support—such as access to technical assistance and secure market channels—which helps to mitigate structural limitations. This functional emphasis has important implications for the design of sustainability interventions: when cooperatives operate effectively and predictably, they serve as critical levers for scaling sustainable practices, reducing transaction costs, and enhancing producers' market integration and resilience. These results support policy recommendations that investing in internal cooperative governance and operational capacity can have multiplicative effects on value co-creation, but also redistribution value in organic agricultural systems.

Regarding risk governance, the model provides novel insights. The positive associated with CV and the perceived likelihood of probability of occurrence of market and governance risks (β = 0.242), it is negatively associated with perceived severity impact (β = –0.223) and level of self-control (β = –0.203). These findings suggest that higher perceived functionality may increase awareness of external threats, but also reduce producers' perceived severity impacts and autonomy in managing those threats. One explanation is that lower education levels may contribute to the negative association observed between functional value and perceived self-control (β = –0.203). For organic producers with minimal formal education, institutional support from the cooperative is not only highly valued but may be seen as indispensable for coping with production and market uncertainties. The prevalence of middle-aged producers—who are more likely to have experienced repeated shocks over time—may further reinforce reliance on

collective institutions, potentially limiting their engagement with individual-level risk strategies. These findings underscore the importance of tailoring cooperative governance and training interventions to promote autonomy and decision-making capabilities, particularly among underserved demographic segments.

The negative link between CV and perceived severity of impact could reflect increased optimism or reliance on collective mechanisms that dilute the perception of personal vulnerability. This calls for more nuanced governance models that balance collective support with individual empowerment. This dynamic may reflect a form of institutional dependence, where strong reliance on cooperative structures discourages individual-level risk coping strategies. While this could indicate trust in collective mechanisms, it also points to potential vulnerability traps, where producers become less equipped or willing to act independently in times of disruption—an issue echoed in recent studies on collective action fatigue and paternalistic cooperative governance (Uribe-Leitz & Ruf, 2019; Higuchi et al., 2020).

The positive relationship between CV and risk management tools ($\beta = 0.244$) suggests that collective action—as mediated through cooperatives—enhances farmers' capacity to prepare for and respond to external shocks and indirectly foster behavioral resilience. Members who trust the cooperative system are more likely to engage in precautionary financial practices (e.g., savings, expense control), which are essential for absorbing shocks and maintaining production stability. This aligns with literature highlighting the role of collective platforms in promoting financial literacy, savings behavior, and future-oriented planning (Cele, 2022; Donkor & Hejkrlik, 2021), and the widely recognition of cooperatives in promoting agricultural sustainability, poverty reduction, and inclusive rural development (Bijman & Wijers, 2019; Rueda et al., 2023).

However, the negative association with self-control raises questions about the potential dependency effect created by cooperative support systems. While cooperatives can buffer risks, they may unintentionally reduce farmers' perceived agency, autonomy, or initiative in risk response—a dynamic observed in other contexts of donor-led or centralized governance (Uribe-Leitz & Ruf, 2019; Higuchi et al., 2020). Such findings urge caution in interpreting perceived value solely as a positive indicator. High functionality must be balanced with member empowerment,

transparency, and participatory governance to avoid reinforcing asymmetric power relations or disincentivizing adaptive capacity at the household level. Agricultural cooperatives in Africa depends on whether their leaders and managers will be able to anticipate the organizational problems that may arise over time and take the necessary precautions to ensure that member farmers remain focused and united *(*Francesconi et al., 2015).

Finally, the relatively low R^2 values for risk-related constructs (ranging from 0.033 to 0.060) suggest that other factors—such as gender, experience, or exposure to external shocks—may mediate these relationships. Previous studies showed that individual characteristics, knowledge, education, and experience influencing risk perception and management (Bin-Husayn, 2025). Particularly education level plays a significant role in shaping both risk perception and impact severity ratings. Individuals with at least a secondary school education exhibit a heightened perception of risk compared to those led by individuals with only primary education or less. (Díaz-Montenegro et al., 2025). Further research incorporating moderating or mediating variables would help clarify the pathways through which perceived value translates into risk behavior.

Overall, this study contributes to the literature by extending the PERVAL framework to a producer-oriented context, specifically focusing on CM; by integrating perceived value and risk governance into a unified analytical model; and by shedding light on the complex trade-offs between support, member satisfaction, and autonomy within sustainable cooperative systems. The sociodemographic composition of the sample enriches the interpretation of the PLS-SEM results, highlighting the need for context-sensitive governance models that simultaneously deliver technical value and foster member empowerment. This is especially relevant in ecologically vulnerable and economically dependent territories such as São Tomé and Príncipe, where inclusive and adaptive cooperative structures are critical to sustainability transitions.

The findings hold practical relevance for cooperative managers, policymakers, and NGOs engaged in inclusive value chain development. Designing governance structures that are both technically functional and socially empowering is key to promoting resilient, equitable, and

sustainable agroforestry systems. The Figure 10 shows the results implications for organic cocoa policy, governance, and sustainability.

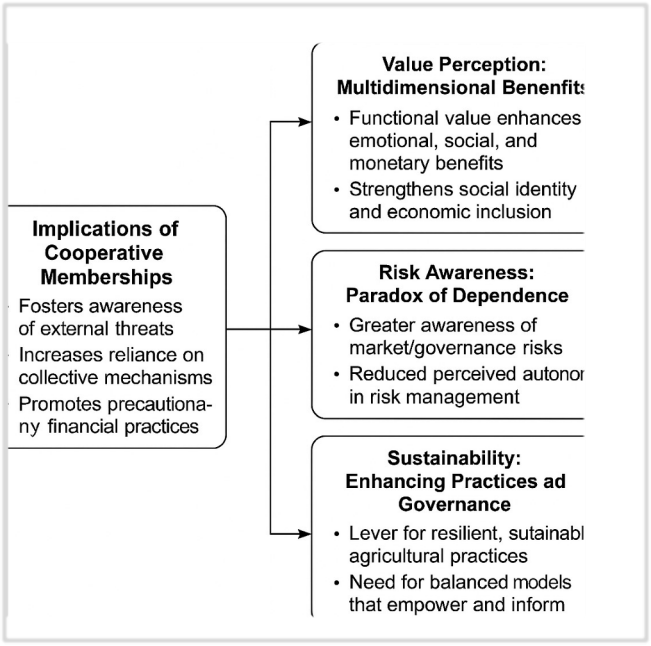

Figure 10. Results implications to cooperative governance, policy, and sustainability

Practically, the findings support the view that strengthening organic cooperative functionality—through transparent governance, efficient service delivery, and inclusive decision-making—can enhance sustainability outcomes across economic, social, and institutional domains. However, they also underscore the need to design cooperative models that foster autonomy, knowledge-sharing, and distributed risk management capacity, especially in ecologically vulnerable and economically dependent territories such as Sao Tome and Principe.

5.5 Concluding Remarks

This study explored how smallholder organic cocoa producers in São Tomé and Príncipe perceive the value of CM, and how such perceptions influence their understanding and management of production and market-related risks. By adapting the PERVAL model to a producer context and

applying PLS-SEM to a sample of 630 cooperative members, the analysis offers new insights into the relationships between functional support, perceive CV, and risk governance.

Findings demonstrate that functional value—associated with technical assistance, governance, and market access—is the most significant driver of perceived CV and benefits. It not only enhances emotional, social, and monetary value perceptions but also positively correlates with the use of risk management tools. These results affirm the critical role that well-functioning cooperatives play in building resilience, trust, and collective action in smallholder food systems, which is particularly relevant for national and international stakeholders engaged in organic cocoa development policy.

However, the negative associations between CV (functional value) and perceived self-control suggest that strong institutional support may generate a sense of dependence or diminished personal agency in risk responses. This highlights the importance of balancing external support with strategies that empower individual decision-making and autonomy—particularly in contexts characterized by ecological fragility and institutional constraints.

While São Tomé and Príncipe holds niche advantages in the global cocoa market—through its high-quality Amelonado variety and GIAHS designation—organic certification and export capacity alone are not sufficient for sustainable development. Policy should focus on strengthening the institutional infrastructure of organic cooperatives, integrating risk mitigation tools (e.g., extension services, early warning systems, micro-insurance), ensuring inclusive market access mechanisms, particularly for women and youth, and embedding sustainability criteria in procurement contracts with chocolate processors and exporters. Such interventions must be co-designed with local actors to respect traditional knowledge, minimize dependency, and align with producers' lived experiences. At the organic cocoa system level, the study confirms that cooperatives can be instrumental in promoting sustainability transitions in organic value chains—but only when governance, value perception, and risk management are aligned. High perceived functional value can motivate collective action and improve livelihood stability; however, sustainability depends on fostering autonomous decision-making, environmental stewardship, and shared benefit distribution across the value chain. As climate change, price

volatility, and global competition intensify, organic cocoa sustainability will increasingly depend on how cooperatives evolve—not just as economic actors, but as social institutions capable of navigating complexity and adapting to change.

The study contributes to the growing literature on sustainability governance in smallholder agriculture by offering an integrated, farmer-centered framework for assessing value perception and risk behavior. It reinforces the need for cooperative governance models that are not only operationally effective but also socially inclusive and psychologically empowering, promoting sustainability levels.

Limitations include the cross-sectional design, which does not capture temporal dynamics, and the exclusion of contextual moderators such as gender, experience, or land tenure. Future research should employ longitudinal approaches and mixed methods to assess how perceived value evolves over time and how it interacts with broader socio-environmental transitions. Comparative studies across cooperatives or regions may also reveal divergent governance logics and institutional effectiveness.

Final mention to fostering that resilient organic cocoa value chain in São Tomé and Príncipe—and in similar small island or developing contexts—requires more than market integration or certification. It demands inclusive cooperative governance, tailored risk management, and attention to farmers' lived experiences and values, as essential components of sustainable transformation and transition.

Chapter 6 | FINAL CONSIDERATIONS

In this final chapter, the first subsection presents the main conclusions of the thesis and in the second the limitations and suggestions for future research on the subjects studied are expressed. In this final chapter, the first subsection presents the main conclusions of the thesis and the second the theoretical and practical contributions according to the study objectives defined. Limitations and suggestions for future research on the subjects studied are expressed in the third subsection.

6.1 Conclusions

This thesis embarked on a comprehensive and interdisciplinary investigation into the complex challenges and opportunities associated with promoting sustainability within the organic cocoa value chain in STP. Through a multi-layered analytical approach, each chapter contributed to a nuanced understanding of the structural, social, economic, and environmental dynamics at play.

Chapter 2 established the theoretical foundation by critically reviewing the literature on sustainable organic cocoa through the lens of the TBL. The review revealed a lack of global consensus on strategies for transitioning cocoa production toward sustainability. Althought the TBL framework offers a valuable conceptual tool, its three pillars – economic, social, and environmental - are often prioritized differently depending on context, stakeholder interests, and power dynamics. Persistent issues such as low productivity, child labor, gender inequality, and environmental degradation remain central challenges. The chapter concluded with a call for further empirical research to bridge the gap between theoretical models and their practical implementation, highlighting the need for adaptative and context-sensitive applications of the TBL framework.

Chapter 3 shifted the focus to the empirical analysis of stakeholder perceptions within the STP organic cocoa sector. Through a mixed-methods approach, it revealed a diverse range of views

on the meaning, drivers, and barriers to sustainability. While a shared commitment to sustainability was evidente, significant divergences emerged regarding its prioritization. Market-related factors, such as access to premium pricing, stable markets, and consumer demand, were identified as key enablers, alongside the empowerment of marginalized smallholders. The chapter further emphasized the need for inclusive governance and youth engagement to ensure long-term sustainability. These findings underscore the importance of fostering multi-stakeholder dialogue and collaborative frameworks to align perspectives and promote shared goals.

Chapter 4 adopted a farmer-centered perspective, examining livelihood strategies through an ordered probit model to assess how different forms of capital – human, financial, physical, natural, and social – affect diversification decisions and sustainability outcomes. The analysis confirmed that livelihood strategies are shaped by a combination of agroecological conditions, economic constraints, and risk perceptions. Aligning with existing literature (e.g. Dusen et al., 2005; Benin et al., 2004; Piedra-Bonilla et al., 2020) the findings demonstrated that supporting farmers through access to technical training, affordable credit, and diversified farming systems enhances both economic viability and environmental sustainability. The chapter advocates for a shift beyond productivity-centric approaches toward more holistic interventions that strengthen farmer agency and well-being.

Chapter 5 employs an adapted version of the PERVAL model—originally developed within consumer research—to evaluate the functional, emotional, social, and monetary dimensions of perceived value among 630 organic cocoa producers. Utilizing Partial Least Squares Structural Equation Modelling (PLS-SEM), the study examines the relationships between perceived value in organic cooperative membership and multiple dimensions of risk perception, namely: probability of occurrence, severity of impact, perceived self-efficacy in risk management, and access to external risk mitigation tools. Data were collected through structured surveys using Likert-scale items. The findings yield policy-relevant insights for enhancing cooperative models and strengthening risk governance mechanisms in organic cocoa value chains, particularly in fragile island contexts such as São Tomé and Príncipe and other emerging economies in Africa. Among

the four value dimensions, functional value—linked to access to resources, technical assistance, and participatory governance—exerts the most substantial positive influence on the emotional, social, and monetary dimensions of perceived value. This suggests that functional value may serve as a key driver of perceived benefits associated with cooperative membership. Moreover, perceived cooperative value is positively correlated with access to risk mitigation tools. However, it appears to be inversely associated with farmers' sense of autonomy in managing risks independently, revealing a potential trade-off between collective support and individual agency. These findings advance the understanding of farmer-centered value creation and its implications for cooperative governance, sustainability strategies, and the inclusive development of agroforestry value chains. This is particularly relevant in São Tomé and Príncipe, where organic cocoa production is largely carried out by smallholder farmers. These producers face increasing sustainability challenges driven by climate variability, market volatility, and limited institutional support. A critical dilemma facing these farmers lies in the strategic choice between adopting high-yielding cocoa varieties for short-term economic gain or preserving traditional organic cocoa systems that underpin the country's designation as a Globally Important Agricultural Heritage System (GIAHS).

Overall, this research provides compelling evidence that achieving sustainability in STP's organic cocoa value chain is na inherently complex and multidimensional endeavor that requires a holistic, contexto-sensitive, and participatory approach. In line with recente studies (e.g. Heredia et al., 2024), the findings highlight the need for integrated policy actions and governance mechanisms capable of addressing the interlinked social, economic, and environmental dimensios of cocoa production. Four key pillars emerge as critical for a sustainable transition: i) **Context-specificity**: Tailoring sustainability strategies to STP's unique socio-economic and ecological conditions; **ii) Multi-stakeholder collaboration**: Promoting inclusive dialogue and equitable partnerships across the value chain; iii) **Farmer empowerment**: toStrengthening smallholders's access to knowledge, resources, and decision-making power; and iv) **Policy coherence**: Ensuring alignment sectoral policies (agriculture, trade, environment, social development) to foster an enabling environment for sustainability.

The insights generated by this thesis offer practical implications for policymakers, development practitioners, and industry actors. They support the design of more effective and equitable policies, governance structures, and business models tailored to the needs of the organic cocoa sector in STP. The study also contributes to the broader academic discourse on sustainable agriculture, value chain governance, and rural development, offering lessons applicable to other smallholder-based commodity sectors in the Global South.

6.2 Theoretical and Practical Contributions

This thesis makes significant contributions across theoretical, scientific, practical, and political domains, offering a comprehensive and contextually grounded understanding of sustainability in the organic cocoa value chain of STP.

The research advances theoretical understanding in three principal areas:

- **Triple Bottom Line (TBL) Framework:** This study refines and contextualizes the TBL framework by applying it to a real-word case in a developing economy. It demonstrates the inherent tension and trade-offs among the economic, social, and environmental dimensions of sustainability and emphasizes the need for context-specific prioritization based on local realities, stakeholder interests, and structural power asymmetries.**Value Chain Governance and Sustainability:** The research contributes to the literature on sustainable value chain governance by emphasizing the importance of coordination mechanisms, power relations, and stakeholder interactions in shaping sustainability outcomes. It underscores that governance is not neutral but embedded in socio-political dynamics that influence the distribution of benefits and responsibilities along the chain.
- **Livelihood Strategies and Sustainability:** The study conceptualizes the dynamic relationship between smallholder farmers' livelihood strategies and sustainability. It demonstrates how decisions regarding farm diversification are influenced by access to various forms of capital (human, financial, social, physical, and natural), as well as by risk

perception ans sctrutural constraints, thereby bridging livelihood theory with sustainability transitions in agriculture.

From a methodological standpoint, this thesis employs a mixed-methods approach that effectively captures the complexity and multidimensional nature of sustainability. The integration of qualitative methods (interviews, focus groups, field observations) with quantitative techniques (surveys, probit modeling, and structural equation modeling) provides robust empirical insights and enables triangulation of findings. This approach constributes to the methodological literature by offering a replicable framework for conducting interdisciplinary research in smallholder agricultural systems. The study also provides novel empirical evidence specific to STP—a country underrepresented in the literature—thereby addressing a critical geographical gap in global research on sustainable cocoa.

The findings of this study offer actionable insights for policy, practice, and development initiatives:

- **Policy and Governance:** The findings support evidence-based policymaking by identifying critical governance gaps ans proposing recomendations for institutional reforms that enhance transparency, inclusivity, and accountability in the cocoa sector;
- **Sustainable Farming Practices:** The study informs the promotion og agroecological practices, improved market access for smallholders, and strengthening of cooperative structures, thereby enhancing sustainability and equity in production systems;
- **Livelihood Improvement:** By identifying the key factors influencing livelihood strategies, the research supports initiatives aimed at improving farmers' income stability, economic resilience, and long-term well-being of cocoa-producing communities; and,
- **Value Chain Development:** The study offers guidance on enhancing value creation and equitable distribution within the cocoa value chain, benefiting farmers, processors, and exporters.

Beyond academia and practive, the thesis also contributes to political discourse and policy advocacy:

- Raising **Awareness**: The study increases visibility of the sustainability challenges in the organic cocoa sector, engaging policymakers, NGOs, and international development agencies;
- Fostering **Dialogue**: It promotes multi-stakeholder collaboration by encouraging participatory approaches to governance, including the active involvement of farmer organizations, cooperatives, public institutions, and private actors;
- Supporting **Policy Advocacy**: The research advocates for reforms that promote sustainability, farmer empowerment, and social equity within the value chain; and,
- **Alignment with National Development Goals**: By supporting sustainable agriculture, poverty reduction, economic growth, and environmental conservation, the findings align with and contribute to national and international development agendas, including the Sustainable Development Goals (SDG).

Concerning the Implications for Key Stakeholders, the following points are particularly relevant.

For Organic Cocoa Farmers:

- Livelihood Diversification: Encourages intercropping and other diversification strategies to improve to improve income security and food sovereignty;
- Access to Resources: Highlights the need for better access to credit, technical assistance, extension services, and market information;
- Empowerment and Participation: Reinforces the importance of collective action and stronger farmer organizations to enhance bargaining power and participation in value chain decision-making;
- Sustainable Farming Practices: Supports the adoption of agroecological methods, organic techniques, and climate-smart agriculture; and,

- Risk Management: Suggests risk mitigation tools such as crop insurance, access to climate data, and integrated pest management.

For Cooperatives and Governance Structures:

- Organizational Capacity: Recommends investments in governance, leadership training, and internal transparency;
- Coordination and Communication: Stresses the importance of improved collaboration among all value chain actors;
- Fair Value Distribution: Calls for mechanisms that ensure equitable pricing and benefit-sharing;
- Sustainability Standards: Supports traceability, certification, and enforcement of environmental and labor standards; and
  - Inclusive Platforms: Promotes participatory policymaking through multi-stakeholder platforms for shared decision-making and policy formulation.

For Policymakers:

- Integrated Policy Frameworks: Advocates for coherence between cocoa policies and broader development strategies, including climate adaptation and poverty alleviation;
- Enabling Environment:Recommends strengthening institutional frameworks, infrastructure, access to finance, and land tenure security;
- Public Support for Sustainable Agriculture: Encourages targeted subsidies, investment in research and development, and extension services for organiz producers;
- Market Access and Fair Trade: Proposes trade policies that reduce barriers and promote equitable access to premium markets; and
- Social Safeguards: Highlights the urgency of addressing child labor, gender inequality, and land rights protection.

In sum, this thesis provides substantial contributions to the theoretical, empirical, practical, and political understanding of sustainability transitions in smallholder agriculture systems. It enriches academic discourse, offers grounded policy guidance, and supports a transformative vision for a sustainable, equitable, and resilient organic cocoa sector in STP.

6.3 Limitations and Future Research Directions

Despite the thesis strengths, several scientific and methodological limitations of this study should be acknowledged:

i) Limited Generalizability: Given its context-specific focus STP, the findings may not be directly transferable to other regions with different socio-economic, environmental, or political conditions. Nonetheless, the methodological framework employed may serve as a model for similar analyses in other contexts; ii) Potential Sampling Bias: During data collection, 28 incomplete questionnaires were excluded from the final dataset. This may have introduced a degree of selection bias, potentially affecting the representativeness and validity of the sample; iii) Reliance on Self-Reported Data: Much of the data is based on interviews and survey responses, which are inherently subjective. Self-reported information is susceptible to recall bias (inaccurate memory of past events) and social desirability bias (the tendency of respondents to provide answers they believe are more acceptable or favorable), which may influence the accuracy of responses; iv) Cross-Sectional Design: The study relies on a cross-sectional research design, capturing data at a single point in time. This limits the ability to assess causality or observe changes in livelihood strategies, governance, or sustainability outcomes over time; and v) Risk of Researcher Bias: The qualitative componentes, particularly interviews and focus groups discussions are subject to the researcher's interpretation. While steps were taken to ensure transparency and objectivity (e.g., coding protocols and peer validation), the potential for bias in thematic analysis cannot be fully eliminated.

This study identifies several key areas for future research that could further advance knowledge and inform policy and practice in the organic cocoa value chain, particularly in the context of STP.

These areas reflect gaps in the existing literature and respond to emerging challenges and trends in sustainability, governance, and rural livelihoods:

- Contract Farming Models and Impacts: Given the increasing interest in contract farming as a mechanism to stabilize supply chains and improve farmer access to markets, future research should critically assess the implications of such arrangements in the organic cocoa sector. Studies should explore both the benefits (e.g., income stability, access to inputs, and technical support) and potential drawbacks (e.g., power imbalances, dependency, and environmental externalities) of contract farming for smallholder farmers and buyers. Additionally, longitudinal research could assess the long-term impacts of contract farming on sustainability, rural equity, and farmers' autonomy. Research should also address how to design more inclusive and risk-sensitive contract models that incorporate environmental safeguards and social protections.
- Operationalizing the TBL in Cocoa Value Chains: This study points to the need for more nuanced and context-specific applications of the Triple Bottom Line (economic, social, and environmental dimensions) in cocoa value chains. Future research should aim to develop clearer sustainability indicators that reflect the realities of smallholder cocoa farming in tropical contexts. This could include comparative case studies, scenario analysis, or participatory methods to co-design sustainability frameworks with local stakeholders. Research should also examine the synergies and trade-offs between TBL components and assess how different governance structures influence sustainability outcomes over time.
- Farmer Perceptions, Motivations, and Behavioral Change: Understanding how producers perceive sustainability programs, conservation efforts, certification schemes, and related regulations is critical to the success of any intervention. Future research should investigate the cognitive, cultural, and socio-economic factors that influence farmers' decision-making and behavior toward sustainable practices. This includes exploring the roles of trust, local knowledge, risk perception, and community dynamics in shaping adoption rates. Behavioral economics, social psychology, and participatory action

research may provide valuable insights into the design of more effective and locally grounded sustainability initiatives.

- Policy Instruments and Governance Innovation: There is a pressing need to investigate how public policies and governance mechanisms can be better aligned to support smallholder resilience, environmental conservation, and sustainable livelihoods. Future studies should analyze the effectiveness of different institutional arrangements, regulatory frameworks, and multi-stakeholder platforms in promoting inclusive value chain development. Special attention should be paid to the role of research institutions, knowledge transfer systems, and agricultural extension services in bridging the gap between policy and practice. Research should also examine how global sustainability agendas—such as the SDGs—can be localized and operationalized in national cocoa strategies.
- Climate Change Adaptation and Ecosystem-Based Approaches: As climate change increasingly threatens cocoa-producing regions, further research is needed on adaptive strategies and ecosystem-based management practices. Studies could assess the potential of agroforestry, climate-resilient cocoa varieties, soil restoration, and water conservation techniques. Moreover, the integration of traditional ecological knowledge and modern scientific insights could be explored to enhance resilience and sustainability within cocoa-growing communities.

REFERENCES

Abbey, P., Tomlinson, P.R., and Branston, J.R. (2016). Perceptions of governance and social capital in Ghana's cocoa industry. *J. Rural Studies*, 44, 153-163. https://doi.org/10.1016/j.jrurstud.2016.01.015

Abdulsamad, A., Frederick, S., Guinn, A., and Gereffi, G. (2015). Pro-Poor Development and Power Asymmetries in Global Value Chains. Center on Globalization, Governance & Competitiveness, Duke University, United States. https://doi.org/10.13140/RG.2.2.32872.88323

Aboah, J., Wilson, M.M.J., Bicknell, K., and Rich, K.M. (2021). Ex-ante impact of on-farm diversification and forward integration on agricultural value chain resilience: A system dynamics approach. *Agricultural Systems*, 189, 103043. https://doi.org/10.1016/j.agsy.2020.103043

Acierno, V., Alewijn, M., Zomer, P., and van Ruth, S. M. (2017). Making cocoa origin traceable: Fingerprints of chocolates using Flow Infusion - Electro Spray Ionization - Mass Spectrometry. *Food Control*, 81, 245-252. https://doi.org/10.1016/j.foodcont.2017.10.002.

Adu-Acheampong, R., Jiggins, J., Quartey, E.T., Karikari, N. M., Jonfia-Essien, W., Quarshie, E., Osei-Fosu, P., Amuzu, M., Afari-Mintah, C., Ofori-Frimpong, K., Owusu-Manu, M., Eku, N., Sakyi-Dawson, O., Quarmine, W., and Acquah, F.O. (2017). An innovation platform for institutional change in Ghana's cocoa sector. *Cahiers Agricultures*, 26(3). https://doi.org/10.1051/cagri/2017016

Adiyah, F., Fuchs, M., Michéli, E., Dawoe, E., and Kovács, E. (2021). Cocoa farmers' perceptions of soil organic carbon effects on fertility, management and climate change in the Ashanti region of Ghana. *African Journal of Agricultural Research*, *17*, 714–725. https://doi.org/10.5897/AJAR2020.15320

Ahmed, A., Campion, B., and Gasparatos, A. (2019). Towards a classification of the drivers of jatropha collapse in Ghana elicited from the perceptions of multiple stakeholders. *Sustainability Science*, *14,* 315-339. DOI: 10.1007/s11625-018-0568-z.

Ahmed, M.H., Mesfin, H.M. (2017). The impact of agricultural cooperatives membership on the wellbeing of smallholder farmers: empirical evidence from eastern Ethiopia. *Agricultural and Food Economics,* 5, 6. https://doi.org/10.1186/s40100-017-0075-z

Aidoo, R., and Fromm, I. (2015). Willingness to Adopt Certifications and Sustainable Production Methods among Small-Scale Cocoa Farmers in the Ashanti Region of Ghana. *Journal of Sustainable Development*, 8 (1), 33-43. DOI: http://dx.doi.org/10.5539/jsd.v8n1p33

Alcayaga, A., Hansen, E.G., and Wiener, M. (2019). Towards a Framework of Smart-Circular Systems: An Integrative Literature Review. *J. Cleaner Production*, 221: 622-634. https://doi.org/10.1016/j.jclepro.2019.02.085

Alemie, T. C., Buytaert, W., Clark, J., Tilahun, S. A., and Steenhuis, T. S. (2022). Barriers to implement- ing poverty alleviation through livelihood strate- gies: A participatory analysis of farming commu- nities in Ethiopia's upper Blue Nile basin. *Environ- mental Science and Policy*, 136, 453-466. https://doi. org/10.1016/j.envsci.2022.07.002

Alhaddi, H. (2015). Triple Bottom Line and Sustainability: A Literature Review. *Business and Management Studies*, 1(2), 6-10. http://dx.doi.org/10.11114/bms.v1i2.752

Altenburg, T. (2006). Donor Approaches to Supporting Pro-Poor Value Chains. German Development Institute. Report prepared for the Donor Committee for Enterprise Development Working Group on Linkages and Value Chains. Retrieve from:

https://www.fao.org/sustainable-food-value-chains/library/details/fr/c/265792/ (accessed 23/02/2023)

Andres, C., Comoé, H., Beerli, A., Schneider, M., Rist, S., and Jacobi, J. (2016). Cocoa in Monoculture and Dynamic Agroforestry. Lichtfouse, E. (ed). *Sustainable Agriculture Reviews*, 19, Springer, Cham. https://doi.org/10.1007/978-3-319-26777-7_3

Anyidoho, N. A., Leavy, J. and Asenso-Okyere, K. (2012). Perceptions and Aspirations: A Case Study of Young People in Ghana's Cocoa Sector. *IDS Bulletin* 43(6). https://doi.org/10.1111/j.1759-5436.2012.00376.x

Ankrah, D. A., Anum, R., Anaglo, J. N. and Boateng, S. D. (2023). Influence of sustainable livelihood capital on climate variability adaptation strategies. *Environmental and Sustainability Indicators*, 18, 100233. htt- ps://doi.org/10.1016/j.indic.2023.100233

Alvarez, G., Pilbeam, P., and Wilding, P. (2010). Nestlé Nespresso AAA sustainable quality program: an investigation into the governance dynamics in a multi-stakeholder supply chain network. Supply Chain Management: *An International Journal*, 15(2), 165-182. DOI: 10.1108/13598541011028769

Alvarez, M.E.P., Barcena, M.M., and Gonzalez, F.A. (2016). A review of sustainable machining engineering: optimization process through triple bottom line. *Manufacturing Science and Engineering, Transactions/ASME*, 138(10): 16. Retrieve from: https://scispace.com/pdf/a-review-of-sustainable-machining-engineering-optimization-2kb36opqus.pdf (accessed 6/1/2020)

ANEME - Associação Nacional das Empresas Metalúrgicas e Eletromecânicas (2018). *Estudo de Levantamento e Caracterização das Empresas Industriais de São Tomé e Príncipe. Estudo São Tomé e Príncipe*. ANEME: Portugal, 2018, 1-252. Retrieved from: https://www.aneme.pt/site/wp-content/uploads/2018/09/Estudo_S%C3%A3o-Tom%C3%A9-e-Pr%C3%ADncipe-2018_VF-CORRIGIDA.pdf.

Andrés, C., Castro-Llanos, F. and Castro-Nunez, A. (2019). Colombian cacao, forests and peace initiative. Estudio de línea base de la cadena del cacao en ColombiaOportunidades y limitaciones para el desarrollo de la cadena, la conservación y restauración de bosques yla construcción de paz. Centro Internacional de Agricultura Tropical (CIAT), Cali, Colombia. Retrieve from: https://hdl.handle.net/10568/102209 (access 6/1/2020)

Ansah, E.O., Kaplowitz, M.D., Lupi, F. and Kerr, J. (2020). Smallholder participation and procedural compliance with sustainable cocoa certification programs. *Agroecology and Sustainable Food Systems*, *44(1)*, 54-87. DOI: 10.1080/21683565.2019.1579776.

Arfah, S.Y.C. (2019). Strategy for cocoa agribusiness development in Central Sulawesi. *J. Agroland*, *26*, 179–188.

Arias, R.C., and Fromm, I. (2019). From cocoa producers to chocolatiers? Developing an entrepreneurial model for small-scale producers in Honduras. *Int. J. Food System Dynamics*, 10(1), 38-54. https://doi.org/10.18461/ijfsd.v10i1.03

Arroyo, L. (2013). Organized self-help housing as an ena- bling shelter & development strategy: Lessons from current practice, institutional approaches, and pro- jects in developing countries. Licenciate thesis, Lund University. Lund, Sweden.

Arshad, F. M., Bala, B. K. and Abdulla, I. (2015). Modelling boom and busto f cocoa production sytems in Malaysia. *Ecological Modelling,* 309-310, 10-24, 22-32. DOI: https://doi.org/10.1016/j.ecolmodel.2015.03.020

Asamoah, D., and Annan, J. (2012). Analysis of Ghana's cocoa value chain towards services and standards for stakeholders. *Int. J. Services and Standards*, 8(2), 116-132. https://doi.org/10.1504/IJSS.2012.049423

Astrid Fenger, N., Skovmand Bosselmann, A., Asare, R., and de Neergaard, A. (2017). The impact of certification on the natural and financial capitals of Ghanaian cocoa farmers. *Agroecology*

and Sustainable Food Systems, 41(2), 143-166. https://doi.org/10.1080/21683565.2016.1258606

Ba, M. S. (2016). Strategic Agricultural Commodity Value Chains in Africa for Increased Food: The Regional Approach for Food Security. *Agricultural Sciences*, 7(9). DOI: 10.4236/as.2016.79055

Babulo, B., Muys, B., Nega, F., Tollens, E., Nyssen, J., Deckers, J., and Mathijs, E. (2008). Household liveli- hood strategies and forest dependence in the high- lands of Tigray, Northern Ethiopia. *Agricultural Systems*, 98 (2), 147-155. https://doi.org/10.1016/j.agsy.2008.06.001

Bachke, M. E. (2019). Do farmers' organizations enhance the welfare of smallholders? Findings from the Mozambican national agricultural survey. Food Policy, 89, 101792. https://doi.org/10.1016/j.foodpol.2019.101792

Bai, C., Matthew Quayson, M., and Sarkis, J. (2022). Analysis of Blockchain's enablers for improving sustainable supply chain transparency in Africa cocoa industry. Journal of Cleaner Production, 358,131896. https://doi.org/10.1016/j.jclepro.2022.131896

Bijman, J., and Wijers, G. (2019). Exploring the inclusiveness of producer cooperatives. Current Opinion in Environmental Sustainability 41,74-79. DOI:10.1016/j.cosust.2019.11.005

Bijman, J., and Iliopoulos, C. 2014. Farmers' cooperatives in the EU: policies, strategies, and organization. Annals of Public Cooperative Economics, 85(4), 497–508. https://doi.org/10.1111/apce.12048

Ballou, R.H., Gilbert, S.M., and Mukherjee, A. (2000). New Managerial Challenges from Supply Chain Opportunities. *Ind. Mark. Manag*. 29 (1), 7–18. https://doi.org/10.1016/S0019-8501(99)00107-8

Balogh, A. (2021). The rise and fall of monoculture farm- ing. Horizon – The EU Research & Innovative Maga- zine. Available at: https://ec.europa.eu/research-and-innovation/en/horizon-magazine/rise-and-fall-mono- culture-farming (accessed 13 October 2022).

Bandanaa, J., Asante, I.K., Egyir, I.S., Schader, C., Annang, T.Y., Blockeel, J., Kadzere, I., and Heidenreich, A. (2021). Sustainability performance of organic and conventional cocoa farming systems in Atwima Mponua District of Ghana. *Environ. Sustain. Indic.*, *11*, 100121.

Banerjee, S.B. (2003). Who sustains whose development? Sustainable development and the reinvention of nature. *Organization Studies*, 24(1), 143–180. https://doi.org/10.1177/0170840603024001341

Barrett, C. (2008). Smallholder market participation: Concepts and evidence from eastern and Southern Africa. *Food Policy* 33 (4), 299-317. DOI: 10.1016/j.foodpol.2007.10.005

Barrientos, S. (2014). Gendered global production networks: Analysis of cocoa-chocolate sourcing. *Regional Studies*, 48(5), 791-803. https://doi.org/10.1080/00343404.2013.878799

Barrientos, S., and Asenso-Okyere, K. (2009). Cocoa value chain: Challenges facing Ghana in a changing global confectionary market. *J. Fur Entwicklungspolitik*, 25(2), 88-107. https://doi.org/10.20446/JEP-2414-3197-25-2-88

Bekun, F. V., Alola, A. A., and Sarkodie, S. A. (2019). Toward a sustainable environment: nexus between CO2 emissions, resource rent, renewable and non- renewable energy in 16-EU countries. *The Science of Total Environment*, 657, 1023–1029. https://doi.org/10.1016/j.scitotenv.2018.12.104

Belanger, J., and Pilling, D. (Eds.) (2019). *The State of the World's Biodiversity for Food and Agriculture*. Rome: FAO.

Benin, S., Smale, M., Pender, J., Gebremedhin, B., and Ehui, S. (2004). The economic determinants of cere- al crop diversity on farms in the Ethiopian high- lands. *Agric. Econ*. 31

(2-3), 197-208. https://doi. org/10.1111/j.1574-0862.2004.tb00257.x

Berhanu, G., Woldemikael, S. M. and Beyene, E. G. (2022). The interrelationships of sustainable livelihood capital assets deprivations and asset based social pol- icy interventions: The case of Addis Ababa informal settlement areas, Ethiopia. *Research in Globalization* 4, 100081. https://doi.org/10.1016/j.jclepro.2020.120252

Berthet, E., and Fusacchia, I. (2024). Navigating the Complexity: The Sustainability Challenges in Global Value Chains. *Annual Review of Resource Economics*, 16(1). DOI:10.1146/annurev-resource-101623-102101

Bibri, M. (2008). *Corporate sustainability/CSR communications and value creation: A marketing approach*. [Unpublished master's thesis]. Blekinge Institute of Technology, School of Management, University of Karlshamn, Sueden. Retrieve from:https://www.diva-portal.org/smash/get/diva2:831498/FULLTEXT01.pdf (acces 6/1/2020)

Bijman, J. and Wijers, G. (2019). Exploring the inclusiveness of producer cooperatives. *Current Opinion in Environmental Sustainability* 41,74-79. DOI:10.1016/j.cosust.2019.11.005

Bin-Husayn, A. R., Abdullah, M., and Rimmel, G. (2025). The relationship between risk perception and risk management: a systematic literature review. Journal of Risk Research. https://doi.org/10.1080/13669877.2024.2447258

Bjornlund, H., Zuo, A., Wheeler, S., Parry, K., Pittock, J., Mdemu, M. and Moyo, M. (2019). The dynamics of the relationship between household decision-making and farm household income in small-scale irriga- tion schemes in southern Africa. *Agricultural Water Management,* 213, 135–145. https://doi.org/10.1016/j. agwat.2018.10.002

Blare, T. and Useche, P. (2013). Competing objectives of smallholder producers in developing countries: examining cacao production in Northern Ecuador. *Environmental Economics*, *4(1),* 71-79. Retrieve from: https://www.businessperspectives.org/images/pdf/applications/publishing/templates/article/assets/5035/ee_2013_01_Useche.pdf (acces 6/1/2020)

Blockeel, J., Schader, C., Heidenreich, A., Grovermann, C., Kadzere, I., Egyir, I. S., Muriuki, A., Bandanaa, J., Tanga, C. M., Clottey, J., Ndungu, J. and Stolze, M. (2023). Do organic farming initiatives in Sub-Saha- ran Africa improve the sustainability of smallholder farmers? Evidence from five case studies in Ghana and Kenya. *Journal of Rural Studies*, 98, 34-58. https://doi.org/10.1016/j.jrurstud.2023.01.010

Blowfield, M. (2003). Ethical supply chains in the cocoa, coffee and tea industries. *Greener Management International*, 43, 15-24. http://dx.doi.org/10.9774/GLEAF.3062.2003.au.00004

Bonuedi, I.S.A.A.C., Gerber, N., and Kornher, L. (2021). Intervening in cash crop value chains for improved nutrition: Evidence from rural Sierra Leone. *The Journal of Development Studies*, 58(1), 38-54.https://doi.org/10.1080/00220388.2021.1945043

Borda, A., Morales, O., Teegen, H., Rees, G.H., and Gonzalez-Perez, M.A. (2021). Addressing sustainable rural development with shared value: A Peruvian model from the cacao industry. *Sustainability*, 13(14), 8028. https://doi.org/10.3390/su13148028

Boström, M. (2012). A Missing Pillar? Challenges in the- orizing and practicing social sustainability. *Sustain- ability: Science, Practice, and Policy* 8(1), 3-14. https:// doi.org/10.1080/15487733.2012.11908080

Boyer, R. H. W., Peterson, N. D., Arora, P. and Caldwell, K. (2016). Five approaches to social sustainability and an integrated way forward. *Sustainability*, 8(9): 878. https://doi.org/10.3390/su8090878

Bush, R. S., Oosterveer, P., Bailey, M., and Mol, P. J. A. (2015). Sustainability governance of chains and networks: a review and outlook. *Journal of Cleaner Production*, 107(3): 8-19. DOI: 10.1016/j.jclepro.2014.10.019

Busquet, M., Bosma, N., and Hummels, H. (2021). A multidimensional perspective on child labor in the value chain: The case of the cocoa value chain in West Africa. *World Development*, 146. https://doi.org/ 10.1016/j.worlddev.2021.105601

Bymolt, R., Laven, A, and Tyszler, M. (2018). Demystifying the Cocoa Sector in Ghana and Côte d'Ivoire. The Royal Tropical Institute (KIT). Retrieved from: https://www.kit.nl/wp-content/uploads/2020/05/Demystifying-complete-file.pdf Accessed 21 December 2024.

Callahan, L. (2019). Contract-Farming in Cocoa Value Chains in Africa: Possibilities and Challenges. In Z. Yihdego et al. (eds.), *Ethiopian Yearbook of International Law 2018*, Ethiopian Yearbook of International Law, Springer.

Camargo, M.C., Hogarth, N.J., Pacheco, P., Nhantumbo, and Kanninen, M. (2019). Greening the dark side of chocolate: A qualitative assessment to inform sustainable supply chains. *Environmental Conservation*, 46, Special Issue 1 (Thematic Section: Forests in Flux), 9–16. https://doi.org/10.1017/S0376892918000243.

Carimentrand, A. (2020). Cacao: Etat des lieux sur la déforestation et les standards de durabilité. Rapport d'étude du Cirad. Commanditaire: CST Forêts de l'AFD, Abidjan, Côte d'Ivoire. Rapport d'étude du Cirad. Commanditaire: CST Forêts de l'AFD, Abidjan, Côte d'Ivoire. Retrieve from: https://agritrop.cirad.fr/596409/ (accessed 2170972023).

Carodenuto, S., & Buluran, M. (2021). The effect of supply chain position on zero-deforestation commitments: Evidence from the cocoa industry. *JournaL of Environmental Policy and Planning*, 23(3), 1-16. https://doi.org/10.1080/1523908X.2021.1910020

Carodenuto, S. (2019). Governance of zero deforestation cocoa in West Africa: new forms of public-private interaction. *Environmental Policy and Governance*, 29(1), 55-66. https://doi.org/10.1002/eet.1841

Castaing, P. (2021). Joint liability and adaptation to climate change: evidence from Burkinabe cooperatives, *European Review of Agricultural Economics*, 48(3): 502–537. https://doi.org/10.1093/eurrag/jbaa020

Castro-Nunez, A., Charry, A., Castro-Llanos, F., Sylvester, J., and Bax, V. (2020). Reducing deforestation through value chain interventions in countries emerging from conflict: The case of the Colombian cocoa sector. *Applied Geography*, 123, 102280. https://doi.org/10.1016/j.apgeog.2020.102280

Cavagnaro, E., and Curiel, G. (2012). *The Three Levels of Sustainability* (1st ed.). Routledge.

Carter, C. R., & Rogers, D. S. (2008). A framework of sustainable supply chain management: moving toward new theory, *International Journal of Physical Distribution & Logistics Management,* 38(5), 360-387. https://doi.org/10.1108/09600030810882816

CBD - Convention on Biological Diversity (2014). Global Biodiversity Outlook 4. (Secretariat of the Convention on Biological Diversity, Montreal). Retrieve from:https://www.cbd.int/gbo4 (access 21/2/2020)

CBD - Convention on Biological Diversity (2016). Decision XIII/28. Indicators for the Strategic Plan for Biodiversity 2011–2020 and the Aichi Biodiversity Targets. Retrieve from: https://www.cbd.int/doc/decisions/cop-13/cop-13-dec-28-en.pdf (access 21/2/2020)

Cele, L. (2022). Youth perceptions of, and willingness to join Irish dairy cooperatives and their governance. Journal of Co-operative Organization and Management, 10(2): 100180, https://doi.org/10.1016/j.jcom.2022.100180.

Chambers, R. and Conway, G. R. (1991). Sustainable rural livelihoods: Practical concepts for the 21st cen- tury. Brighton, Institute of Development Studies. IDS Discussion Paper No. 296. Available at: https:// www.ids.ac.uk/download.php?file=files/Dp296.pdf (Accessed 13 October 2022).

Chiarolla, C. (2017). Agriculture and biodiversity conservation. In E. Morgera and J. Razzaque. Cheltenham (Eds), *Biodiversity and Nature protection law.* Edward Elgar Publishing, UK.

Chilombo, A., and van der Horst, D. (2021). Livelihoods and coping strategies of local communities on pre- vious customary land in limbo of commercial agri- cultural development: Lessons from the farm block program in Zambia. *Land Use Policy* 104, 105385. https://doi.org/10.1016/j.landusepol.2021.105385

Chopin, P., Mubaya, C. P., Descheemaeker, K. and Göran Bergkvist, G. (2021). Avenues for improving farming sustainability assessment with upgraded tools, sus- tainability framing and indicators. A review. *Agronomy for Sustainable Development* 41(19). https://doi. org/10.1007/s13593-021-00674-3

Christ, K. L. and Burritt, R. L. (2013). Critical environ- mental concerns in wine production: an integrative review. *Journal of Cleaner Production*, 53, 223-242. https://doi.org/10.1016/j.jclepro.2013.04.007

Codjoe, F.N.Y., Soullier, G., Mathé, S., Asante, F.A. and Bawakyillenuo, S. (2023). Governance of organizational innovations in the cocoa value chain in Ghana. *Acta Horticulturae,*1380, 83-90. International Society for Horticultural Science (ISHS), Leuven, Belgium. https://doi.org/10.17660/ActaHortic.2023.1380.10

Collins, C., Steg, L., & Koning, M. (2007). Customers' values, beliefs on sustainable corporate performance, and buying behavior. *Psychology and Marketing*, 24(6), 555-577. http://dx.doi.org/10.1002/mar.20173

Colwell, K. (2012). Is it still green: The impacts of corporate takeovers on business sustainability? [Unpublished doctoral dissertation]. Retrieve from: http://dx.doi.org/10.13140/RG.2.1.1550.3120 (access 2/2/2020)

Correia, E., Carvalho, H., Azevedo, S.G., and Govindan, K. (2017). Maturity Models in Supply Chain Sustainability: A Systematic Literature Review. *Sustainability*, 9 (1)*, 64.* https://doi.org/10.3390/su9010064

Dabbene, F., Gay, P. and Tortia, C. (2014). Traceability issues in food supply chain management: a review. *Biosystems Engineering*, 120, 65-80. https://doi.org/10.1016/J.BIOSYSTEMSENG.2013.09.006

Dachs, I., Rülke, J., and Franz, M. (2025). Bringing a circular economy perspective into global production networks: Cocoa pod husk-based compost production in Ghana. Journal of Cleaner Production, 519, 145955. https://doi.org/10.1016/j.jclepro.2025.145955

de Boer, D., Limpens, G., Rifin, A., and Kusnadi, N. (2019). Inclusive productive value chains, an overview of Indonesia's cocoa industry. *J. Agribusiness in Developing and Emerging Economies*, 9(5), 439-456. https://doi.org/10.1108/JADEE-09-2018-0131

DeFries, R. S., Fanzo, J., Mondal, P., Remans, R. and Woo, S. A. (2017). Is voluntary certification of tropical agricultural commoditiesachieving sustainability goals for small-scale producers? A review of the evidence. *Environmental Researcg Letters*, 12. DOI: https://iopscience.iop.org/article/10.1088/1748-9326/aa625e/pdf

Delabre, I., Rodriguez, L.O., Smallwood, J.M., Scharlemann, J.P., Alcamo, J., Antonarakis, A.S., Rowhani, P., Hazell, R.J., Aksnes, D.L., Balvanera, P., Lundquist, C.J., Gresham, C., Alexander, A.E., and Stenseth, N.C. (2021). Actions on sustainable food production and consumption for the post-2020 global biodiversity Framework. *Science Advances*, 7 (12), eabc8259. doi: 10.1126/sciadv.abc8259.

Deng, Q., Li, E. and Zhang, P. (2020). Livelihood sus- tainability and dynamic mechanisms of rural house- holds out of poverty: An empirical analysis of Hua County, Henan Province, China. *Habitat Interna- tional*, 99, 102160. https://doi.org/10.1016/j.habita- tint.2020.102160

DFID (2008). Making Value Chains Work Better for the Poor: A Toolbook for Practitioners of Value Chain Analysis, Version 3. Edited by Tim Purcell, Stephen Gniel, and Rudy van Gent. Making Markets Work Better for the Poor (M4P) Project, UK Department for International Development (DFID). Agricultural Development International: Phnom Penh, Cambodia.

Retrieve from: https://openknowledge.fao.org/server/api/core/bitstreams/a9f1ffe7-a216-47b9-b6a4-6b7217b1b6e9/content (accessed 6/11/2021).

Díaz-Montenegro, J., Minchala-Santander, R., Faytong- Haro, M. (2025). Risk Perception and Management Strategies Among Ecuadorian Cocoa Farmers: A Comprehensive Analysis of Attitudes and Decisions. *Agriculture* 2025, *15*, 843. https://doi.org/10.3390/agriculture15080843

Díaz-Montenegro, J. (2019). Livelihood strategies and risk behavior of cacao producers in Ecuador: Effects of national policies to support cacao farmers and specialty cacao landraces. Doctoral Thesis. PhD Program: Sustainability. Universitat Politècnica de Catalunya Institut de Sostenibilitat, Barcelona. Retrieve from: https://upcommons.upc.edu/bitstream/handle/2117/170436/TJDM1de1.pdf (access 5/20/2020)

Díaz-Montenegro, J., Varela, E., and Gil, J. M. (2018). Livelihood strategies of cacao producers in Ecuador: Effects of national policies to support cacao farmers and specialty cacao landraces. *JournaL of Rural Studies*, 63, 141-156. https://doi.org/10.1016/j.jrurstud.2018.08.004

Doherty, B., and Kittipanya-Ngam, P. (2021). The role of social enterprise hybrid business models in inclusive value chain development. *Sustainability*, *13*, 499. https://doi.org/10.3390/su13020499

Doherty, B. (2018). *Gender equality and women's empowerment through fair trade social enterprise: case of divine chocolate and Kuapa Kokoo.* Entrepreneurship and the Sustainable Development Goals. Emerald Publishing, Bingley.

Doherty, B., and Meehan, J. (2006). Competing on social resources: The case of the day chocolate company in the UK confectionery sector. *Jourmnal of Strategic Marketing*, 14(4), 299-313. https://doi.org/10.1080/09652540600947847

Dolisca, F., McDaniel, J.M., Shannon, D., and Jolly, C.M. (2009). A multilevel analysis of the determinants of forest conservation behavior among farmers in Haiti. *Society & Natural Resources*, 22 (5), 433-447. DOI: 10.1080/08941920802064448.

Dompreh, E.B., Asare, R., and Gasparatos, A. (2021). Stakeholder perceptions about the drivers, impacts and barriers of certification in the Ghanaian cocoa and oil palm sectors. *Sustainability Science*, 1, 22. https://doi.org/10.1007/s11625-021-01027-5

Donkor, E., Hejkrlik, J. (2021). Does commitment to cooperatives affect the economic benefits of smallholder farmers? Evidence from rice cooperatives in the Western province of Zambia. Agrekon, 60(4): 408–423. https://doi.org/10.1080/03031853.2021.1957692

Donovan, J., and Poole, N. (2013). Asset building in response to value chain development: lessons from taro producers in Nicaragua. *International Journal of Agricultural Sustainability*, 11(1), 23–37. https://doi.org/10.1080/14735903.2012.673076

Donovan, J., and Stoian, D., Fisk, J., & Muldoon, M. F. (2013). Success in pro-poor value chain development linked to asset endowments: This and other lessons from the 5Capitals tool. In R. Sheck, J. Donovan, & D. Stoian, (Eds.) (1ed.), *Assessing Impacts of Value Chain Development on Poverty. A Case-Study Companion to the 5 Capitals Tool*. Tropical Agricultural Research and Higher Education Center (CATIE), 104-114. World Agroforestry Centre Centre (ICRAF), Bioversity International, Technical Series Technical Report no. 396, Rural Enterprise Development Collection no. 8. Turrialba, Costa Rica: CATIE; ICRAF. Retrieve from: https://worldagroforestry.org/sites/default/files/5Capitals%20case%20study%20companion%202013.pdf (accessed 6/11/2021).

Dragusanu, R., Giovannucci, D. and Nunn, N. (2014). The Economics of Fair Trade. *Journal of Economic Perspectives*, 28 (3), 217–236. https://pubs.aeaweb.org/doi/pdfplus/10.1257/jep.28.3.217

Dusen, Van, M. E. and Taylor, J. E. (2005). Missing mar- kets and crop diversity: evidence from Mexico. *Environmental Development Economics*, 10(4): 513-531. Retrieve from: http://www.jstor.org/stable/44379248 (acessed 21703/2021)

Effendy, D., Pratama M.F., Rauf, R.A., Antara M., Basir-Cyio, M. and Mahfudz (2019). Factors influencing the efficiency of cocoa farms: A study to increase income in rural Indonesia. *PLoS ONE*n 14(4), e0214569. https://doi.org/10.1371/journal.pone.0214569.

Ellis, F. (2000). The determinants of rural liveli- hood diversification i n developing countries. *Journal of Agricultural Economics*, 51(2), 289-302. https://doi. org/10.1111/j.1477-9552.2000.tb01229.x.

Elkington, J. (2018). 25 years ago I coined the phrase "triple bottom line." Here's why it's time to rethink it. *Harvard Business Review*. Retrieve from: https://hbr.org/2018/06/25-years-ago-i-coined-the-phrase-triple-bottom-line-heres-why-im-giving-up-on-it (access 21/01/2020)

Elkington, J. (2007). Partnerships from cannibals with forks: The triple bottom line of 21st-century business. *Environmental Quality Management*, 8(1), 37-51. https://doi.org/10.1002/tqem.3310080106

Elkington, J. (1997). *Cannibals with Forks. The triple bottom line of 21st century business*. Mankato, MN: Capstone, Oxford.

Elkington, J. (1994). Towards the sustainable corporation: Win-win-win business strategies for sustainable development. *California Management Review*, 36(2): 90-100. https://doi.org/10.2307/41165746.

Elzubair, A. E. M., Sanjak, E., Ahmed, Dafa-Alla M.D., and Darr, D. 2024. An overview of the development of agricultural cooperatives in Sudan over decades with special emphasis on Gum Arabic Producers' Associations (GAPAs). Journal of Co-operative Organization and Management, 12(1), 100217. https://doi.org/10.1016/j.jcom.2023.100217

Epstein, M. (2008). *Making sustainability work: Best practices in managing and measuring corporate social, environmental, and economic impacts*. 2nd Ed., San Francisco: Greenleaf. Retrieve from: https://www.bkconnection.com/static/Making_Sustainability_Work_2nd_EXCERPT.pdf (access 21/01/2020)

Erin, O.A., Bamigboye, O.A. and Oyewo, B. (2022). Sustainable development goals (SDG) reporting: an analysis of disclosure. *Journal of Accounting in Emerging Economies*, 12(5), 761-789. https://doi.org/10.1108/JAEE-02-2020-0037

Escobar, S., Santander, M., Useche, P., Contreras, C., and Rodríguez, J. (2020). Aligning strategic objectives with research and development activities in a soft commodity sector: A technological plan for Colombian cocoa producers. *Agriculture*, 10(5), 141. https://doi.org/10.3390/agriculture10050141

Estival, K.G.S., Corrêa, S.R.S., Mariani, M.A.P., and Benini, E.G. (2016). Analysis of the participation of the producers in the farming of settlements and rural communities in the south of Bahia, Brazil, in the chain of value of cocoa (chocolate). *Espacios*, 37(17).Retrieve from: https://www.researchgate.net/publication/316996782_Analysis_of_the_participation_of_the_producers_in_the_farming_of_settlements_and_rural_communities_in_the_South_of_Bahia_Brazil_in_the_chain_of_value_of_cocoa_Chocolate (access 21/01/2020)

EU - European Commission (2021). Análise da cadeia de valor do cacau em São Tomé e Príncipe. Value Chain Analysis for Development, 18. Available at: https:// europa.eu/capacity4dev/value-chain-analysis-for- development-vca4d-/wiki/218-sao-tome-e-principe- cocoa (Accessed 13 October 2022).

Eyhorn, F., Ramakrishnan, M., and Mäder, P. 2007. The viability of cotton-based organic farming systems in India. International Journal of Agricultural Sustainability, 5(1), 25-38. https://doi.org/10.1080/14735903.2007.9684811

Fafchamps, M. and Hill, R. (2005). Selling at the Farmgate or Travelling to Market. *American Journal of Agricultural Economics*, 87(3), 717-734. https://doi.org/10.1111/j.1467-8276.2005.00758.x

Fang, Y. P., Fan, J., Shen, M. Y. and Song, M. Q. (2014). Sensitivity of livelihood strategy to livelihood capital in mountain areas: empirical analysis based on differ- ent settlements in the upper reaches of the Minjiang River, China. *Ecol. Indicat*. 38, 225–235. https://doi.org/10.1007/s11205-018-2037-6

FAO-Food and Agriculture Organisation (2024). Sao Tome and Principe among three new sites recognized as Globally Important Agricultural Heritage Systems (GIAHS). FAO Regional Office for Africa. Retrived from: https://www.fao.org/africa/news-stories/news-detail/sao-tome-and-principe-among-three-new-sites-recognized-as-globally-important-agricultural-heritage-systems-(giahs)/en (Accessed 13 October 2024).

FAO-Food and Agriculture Organisation (2014). Developing Sustainable Food Value Chains: Guiding Principles. FAO: Rome, Italy, 1-89. Available at: https://www.fao.org/3/i3953e/i3953e.pdf (Accessed 13 October 2022).

FAOSTAT (2020). Food and Agriculture Organization Corporate Statistical Database. 2019. Retrieved from http://www.fao.org/faostat/en/#data/QC (accessed 21/01/21)

Farhad, N. (2019). Supply chain governance for social sustainability: A study of the ready-made garment industry in Bangladesh. Linköping Studies in Science and Technology, Dissertation No. 2004. Linköping Linköping University, Sweden. Retrieve from: https://liu.diva-portal.org/smash/get/diva2:1342949/FULLTEXT01.pdf (accessed 21/01/21)

Fenger, N. A., Bosselmann, A.S., Asare, R., and Neergaard, A. (2017). The impact of certification on the natural and financial capitals of Ghanaian cocoa farmers. Agroecology and Sustainable Food Systems, 41 (2), 143-166. http://dx.doi.org/10.1080/21683565.2016.1258606

Ferraz, L.Z.T., Rezende, A.J., Lima, J.P.R., Todeva. E. (2018). Perception of Value Co-creation Actions in Agricultural Cooperatives. BAR, Braz. Adm. Rev. 15 (3), e180005. https://doi.org/10.1590/1807-7692bar2018180005

Fischer, E. and Qaim, M. (2012). Linking smallholders to markets: determinants and impacts of farmer collective action in Kenya. World Development, 40 (6), 1255-1268. https://doi.org/10.1016/j.worlddev.2011.11.018

Fonseca, C. M. B., Coelho, J. C., Soares, F. B., and Correia, A. M. N. G. (2019). Value Chain Analysis: Overview and Context for Development. *Direct Research Journal of Agriculture and Food Science*, 7 (12), 356-361. DOI: https://doi.org/10.26765/DRJAFS13808532

Formentini, M., and Taticchi, P. (2016). Corporate sustainability approaches and governance mechanisms in sustainable supply chain management. *Journal of Cleaner Production*, 112(3), 1920–1933. https://doi.org/10.1016/j.jclepro.2014.12.072

Fountain, A. C., and Hütz-Adams, F. (2022). Cocoa Barometer 2022. Retrive from: https://cocoabarometer.org/wp-content/uploads/2022/12/Cocoa-Barometer-2022.pdf (accessed 3 January 2024).

Fountain, A. C. and Huetz-Adams, F. (2020). Cocoa Barometer 2020. USA Edition. Retrieve from:: https://www.voicenetwork.eu/wp-content/uploads/2020/12/2020-Cocoa-Barometer.pdf (accessed 13 October 2022).

Fountain, A. C., and Hütz-Adams, F. (2018). Cocoa Barometer 2018. Retrive from: https://voicenetwork.cc/wp-content/uploads/2019/07/2018-Cocoa-Barometer.pdf (accessed 21/01/21)

Francesconi, G. N., and Wouterse, F. (2022). The potential of land shareholding cooperatives for inclusive agribusiness development in Africa. Annals of Public and Cooperative Economics, Wiley Blackwell, 93(1), 161-176. https://doi.org/10.1111/apce.12314

Francesconi, G. N., and Wouterse, F. (2015). The health of farmer-based Organisations in Ghana: Organisational diagnostics and governance implications. Journal of Development Studies, 51 (3), 262-273. https://doi.org/10.1080/00220388.2014.957275

Francesconi, N., Cook, M. & Livingston K. (2015). A Policy Note on Agricultural Cooperatives in Africa. International Center for Tropical Agriculture. 3. https://cgspace.cgiar.org/bitstream/handle/10568/69554/Gender_and_FTA_value_chain_in_LAM_2015_(2).pdf?sequence=1 Accessed 21 June 2025

Francesconi, G. N., and Ruben, R. (2012). The hidden impact of cooperative membership on quality management: A case study from the dairy belt of Addis Ababa. Journal of Entrepreneurial and Organizational Diversity, *1*(1), 85-103. https://ssrn.com/abstract=2194296

Francis Lwesya, F. (2018). Towards Organic Agriculture: Assessing the Dynamics of Production and Exporting of Organic Cocoa in Tanzania. Academic Journal of Economic Studies, 4 (3), 25–31. https://ideas.repec.org/a/khe/scajes/v4y2018i3p25-31.html.

Frimpong-Manso, J., Tham-Agyekum, E.K., Boansi, D., Ankuyi, F., Antwi, E., Bakang, J.-E.A., Tawiah, Nimoh, F. (2023). Measuring perceptions and the drivers of membership commitment of cocoa farmers' cooperative societies in Atwima Mponua district, Ghana. Agricultural Socio-Economics Journal, 23(1), 111-120. http://dx.doi.org/10.21776/ub.agrise.2023.023.1.14

García-Herrero, L., De Menna, F., and Vittuari, M. (2019). Sustainability concerns and practices in the chocolate life cycle: Integrating consumers' perceptions and experts' knowledge. Sustainable Production and Consumption 20: 117–127. https://www.sciencedirect.com/science/article/pii/S2352550919300582.

Gaviglio, A., Bertocchi, M., Marescotti, M. E., Demartini, E. and Pirani, A. (2016). The social pillar of sus- tainability: a quantitative approach at the farm level. *Agricultural and Food Economics*, *4*(1). https://doi. org/10.1186/s40100-016-0059-4

Gebrehiwot, N. T., Gezahegn, T.W., Abbay, A.G., Entehabu, T.G., Beyene, A.T., Tesfay, A.H., and Sebhatu, K.T. (2024). Does membership in seed producer cooperatives improve smallholders' teff productivity? A comparative analysis in North Ethiopia. Annals of Public Cooperative Economics, 95(4), 1121-1137. https://doi.org/10.1111/apce.12466

Gebru, G. W., Ichoku, H. E. and Phil-Eze, P. O. (2018). Determinants of livelihood diversification strategies in Eastern Tigray Region of Ethiopia. *Agriculture & Food Security*, 7(62). https://doi. org/10.1186/s40066- 018-0214-0

Geffersa, A. G. (2024). Agricultural cooperative membership and welfare of maize farmers in Ethiopia: Insights from panel data analysis. Annals of Public and Cooperative Economics, 95(4), 1223-1250. https://doi.org/10.1111/apce.12481

Geitzenauer, M., Mathé, S., Sonfack, M., and Vogel, C. (2018). *Report on the Exporters Workshop in Douala the 31st January 2018 on the topic: "The role of the exporters within the cocoa value chain in Cameroon"*.

Gemechu, A., Jaleta, M., Zemedu, L., and Beyene, F. (2025). Impact of seed producer cooperatives membership on technical efficiency: Evidence from tef farmers in the central highlands of Ethiopia. Journal of Agriculture and Food Research, 22, 101997. https://doi.org/10.1016/j.jafr.2025.101997.

George, H. (2009). Progress and poverty. Cambridge: Cambridge University Press. (Original work published in 1879). Retrieve from:

https://assets.cambridge.org/97811080/03612/frontmatter/9781108003612_frontmatter.pdf (access 6/04/2019)

Gereffi, G., Humphrey, J. and Sturgeon, T. (2005). The governance of global value chains. *Review of International Political Economy*, 12(1), 78–104. https://doi.org/10.1080/09692290500049805

Gereffi, G., and Korzeniewicz, M. (eds.) (1994). *Commodity Chains and Global Capitalism*. Westport, Connecticut. Praeger.

Gezahegn, T. W., Passel, S. V., Berhanu, T., D'Haese, M., and Maertens, M. 2019. Big is efficient: Evidence from agricultural cooperatives in Ethiopia. Agricultural Economics, 50(5), 555-566. https://doi.org/10.1111/agec.12509

Ghazali, S., Zibaei, M., and Keshavarz, M. (2022). The effectiveness of livelihood management strategies in mitigating drought impacts and improving livability of pastoralist households. International *Journal of Disaster Risk Reduction*, 77, 103063. https://doi.org/10.1016/j.ijdrr.2022.103063

Giacometti, J., Jolić, S. M., and Josić, D. (2015). Cocoa Processing and Impact on Composition. In Victor R. Preedy (Eds) *Processing and Impact on Active Components in Food*, Chapter 73, Section 8, 605-612. Elsevier eBooks, Academic Press, First Edition. DOI:10.1016/B978-0-12-404699-3.00073-1

Gibbon, P., and Ponte, S. (2005). *Trading down: Africa, value chains and the global economy*. Temple University Press, 261 p., Philadelphia. http://www.diis.dk/node/2855

Giddens, A. (2015) The politics of climate change. *Policy and Politics*, 43(2), 155–162. 2015. https://doi.org/10.1332/030557315X14290856538163

Giel, T., Hagelaar, G., Laven, A., and Vellema, S. (2008). Chain governance, sector policies and economic sustainability in cocoa. Markets, Chains and Sustainable Development Strategy and Policy Paper, no.12. Stichting DLO: Wageningen. Retriceve from: http://www.boci.wur.nl/UK/Publications/

Gilal, F.G., Zhang, J., Paul, J., and Gilal, N.G. (2018). The role of self-determination theory in marketing science: An integrative review and agenda for marketing research. *European Management Journal,* 37(1), 29-44. http://dx.doi.org/10.1016/j.emj.2018.10.004

Gilbert, C. (2006). Value Chain Analysis and Market Power in Commodity Processing with Application to the Cocoa and Coffee Sectors. Universita'Degli Studi di Trento – Diparmento di Economica Discussion Paper No. 5. Retrieve from: https://core.ac.uk/download/pdf/6262879.pdf (access 6/11/2019)

Gimenes, R.M.T., Tapia, D.V., Binotto, E., and Gimenes, F.M.P. (2016). Cooperative Educational Training, Participation and Satisfaction: A Case Study in Agricultural Cooperatives. *International Journal of Emerging Research in Management &Technology*, 5(6): 42-54. Retrieve from: https://www.researchgate.net/publication/327824763_COOPERATIVE_EDUCATIONAL_TRAINING_PARTICIPATION_AND_SATISFACTION_A_CASE_STUDY_IN_AGRICULTURAL_COOPERATIVES (access 6/11/2019)

Gimenez, C., and Sierra, V. (2013). Sustainable Supply Chains: Governance Mechanisms to Greening Suppliers. *Journal of Business Ethics*, 116(1),189–203. https://doi.org/10.1007/s10551-012-1458-4

Ginting, W.A., Ambarawati, I.G.A.A., and Dewi, I.A.L. (2019). The role of UTZ certified program on increasing production and income of cocoa farmers in Jembrana Regency, Bali Province. *Agrisocionomics*, *3*, 68–76.

Glavee-Geo, R., Burki, U., and Buvik, A. (2020). Building trustworthy relationships with smallholder (small-scale) agro-commodity suppliers: Insights from the ghana cocoa

industry. *Journal of Macromarketing*, 40(1), 110-127.https://doi.org/10.1177/0276146719900370

Goel, P. (2010). Triple bottomline reporting: An analytical approach for corporate sustainability. *Journal of Finance, Accounting, and Management,* 1(1), 27-42. https://doi.org/10.11114/bms.v1i2.752

Goel, A., Ganesh, L.S., and Kaur, A. (2021). Sustainability assessment of construction practices in India using inductive content analysis of research literature. *Int. J. Construction Man*agement, 21(8), 802-817. https://doi.org/10.1080/15623599.2019.1583851

Grabs, J., and Carodenuto, S.L. (2021). Traders as sustainability governance actors in global food supply chains: A research agenda. *Business Strategy Environment*, *30*, 1314–1332. https://doi.org/10.1002/bse.2686

Greiner, R. and Gregg, D. (2011). Farmers' intrinsic motivations, barriers to the adoption of conservation practices and effectiveness of policy instruments: Empirical evidence from northern Australia. *Land Use Policy*, *28 (1)*, 257-265. DOI:10.1016/j.landusepol.2010.06.006.

Grumiller, J. (2018). Upgrading potentials and challenges in commodity-based value chains: The Ivorian and Ghanaian cocoa processing sectors. *Journal Fur Entwicklungspolitik*, 34(3-4), 15-45. https://doi.org/10.20446/JEP-2414-3197-34-3-15

GVR (2021). Chocolate Market Size, Share & Trends Analysis 2022-2030. Report GVR-4-68038-221-1. Available at: https://www.grandviewresearch.com/ industry-analysis/chocolate-market/request/rs1 (Accessed 13 October 2022).

Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., Ray, S. (2022). *Partial Least Squares Structural Equation Modeling (PLS-SEM) Using R*. Cham: Springer.

Hao, J., Bijman, J., Heijman, W., and Gao, M. (2024). The effect of trust and social pressure on member commitment in agricultural cooperatives – Evidence from China. Annals of Public and Cooperative Economics, 95(3), 919-944. https://doi.org/10.1111/apce.12467

Hao, A.W., Paul, J., Trott, S., Guo, C., and Wu, H.H. (2019). Two decades of research on nation branding: A review and future research agenda. *Int. Marketing Review*, 38(1), 46–69. https://doi.org/10.1108/IMR-01-2019-0028

Hahn, T., Figge, F., Pinkse, J., and Preuss, L. (2010). Trade-offs in corporate sustainability: You can't have your cake and eat it. *Business Strategy & Environment*, 19(4), 217–229. https://doi.org/10.1002/bse.674

Harmon, J., Bucy, F., Nickbarg, S. Rao, G., and Wirtenber, J. (2017). Developing a sustainability strategy. In Wirtenberg, J., Russell, W., & Lipsky, D. (Eds.) (2017). The Sustainable Enterprise Fieldbook (eBook), capter 3, 89-115/p.320. New York: Greenleaf Publishing. eBook ISBN9781351279963. https://doi.org/10.4324/9781351279963

Hayati, D. (2017). *A Literature Review on Frameworks and Methods for Measuring and Monitoring Sustain- able Agriculture*. Technical Report n.22. Global Strategy Technical Report. Rome.

Haynes, J., Cubbage, F., Mercer, E. and Sills, E. (2012). The Search for Value and Meaning in the Cocoa Supply Chain in Costa Rica. *Sustainability* 4(7), 1466-1487. https://doi.org/10.3390/su4071466

He, Q., Gallear, D., Ghobadian, A., and Ramanathan, R. (2019). Managing knowledge in supply chains: a catalyst to triple bottom line sustainability. *Production Planning & Control*, 30 (5-6), 448-463. https://doi.org/10.1080/09537287.2018.1501814

Henning, J. I. F., Matthews, N., August, M. and Primrose, M. (2022). Youths' Perceptions and Aspiration towards Participating in the Agricultural Sector: A South African Case Study. *Social Sciences*11(5), 215. https://doi.org/10.3390/socsci11050215

Henseler, J., Ringle, C.M., and Sinkovics, R.R. (2009). The Use of Partial Least Squares Path Modeling in International Marketing, 277–319. https://doi.org/10.1108/S1474-7979(2009)0000020014.

Heredia, R. M., Blanco-Gutiérrez, I., Esteve, P., Puhl, L., and Morales-Opazo, C. (2024). Assessment of sustainability in cocoa farms in Ecuador: application of a multidimensional indicator-based framework. *International Journal of Agricultural Sustainability*, *22*(1). https://doi.org/10.1080/14735903.2024.2379863

Hernández-Núñez, H. E., Gutiérrez-Montes, I., Bernal- Núñez, A. P., Gutiérrez-García, G. A., Suárez, J. C., Csanoves, F. and Flora, C. B. (2022*).* Cacao cultivation as a livelihood strategy: contributions to the well-being of Colombian rural households. *Agri- culture & Human Values*, 39, 201–216. https://doi. org/10.1007/s10460-021-10240-y

Hess, J.P. (2022). A multi-level analysis of sustainability practices in Ghana: examining the timber, cocoa, and gold mining industries. *International Journal of Organizational Analysis*, 30(3), 760-777. https://doi.org/10.1108/IJOA-01-2020-2011

Higuchi, A., Coq-Huelva, D., Arias-Gutierrez, R., and Alfalla-Luque, R. 2020. Farmer satisfaction and cocoa cooperative performance: evidence from Tocache, Peru, International Food and Agribusiness Management Review, 1-18. https://doi.org/10.1080/23311975.2020.1746171

Hindriks, F., and Guala, F. (2015). Institutions, rules, and equilibria: a unified theory. *Journal of Institutional Economics*, *11(3)*, 459-480. DOI: 10.1017/S174413744000496.

Hovardas, T. (2021). Social sustainability as social learn- ing: Insights from multi-stakeholder environmental governance. *Sustainability, 13*(14), 1–207744. https:// doi.org/10.3390/su13147744

Hungara, A., and Nobre, H. (2021). A consumer culture theory perspective of the marketplace: An integrative review and agenda for research. *Int. J. Consumer Studies*, 45(4), 805–823. https://doi.org/10.1111/ijcs.12670

ICA – International Cooperative Alliance (2016). What is a Co-operative? Retrieved from: http://ica.coop/en/what-co-operative. Accessed 21/01/25.

ICCO (2007). *Sustainable Cocoa Economy: Comprehensive and Participatory Approach*; ICCO: Kuala Lumpur, Malaysia, 1–10.

ICCO (2022). The International Cocoa Organization. Retrieve from: www.icco.org (accessed 03/08/2024)

Ingram, F. van Rijn, F., Waarts, Y., Dekkers, M., Vos, B. de, Koster, T., Tanoh, R., and Galo, A. (2018). Towards Sustainable Cocoa in Côte d'Ivoire. The Impacts and Contribution of UTZ Certification Combined with Services Provided by Companies. Wageningen Economic Research, Report 2018-041, Wageningen. https://doi.org/10.18174/450223

Iocola, I., Campanelli, G., Diacono, M., Leteo, F., Mon- temurro, F., Persiani, A. and Canali, S. (2018). Sustainability Assessment of Organic Vegetables. Pro- duction Using a Qualitative Multi-Attribute Model. *Sustainability*, 10(10), 3820. https://doi.org/10.3390/ su10103820

Indah, P.N., Setiawan, R.F., Hendrarini, H., Yektingsih, E., and Sunarsono, R.J. (2021). Agriculture supply chain performance and added value of cocoa: A study in kare village, Indonesia. *Bulgarian J. Agricultural Science*, 27(3), 487-497. Retrieve from: https://www.cabidigitallibrary.org/doi/pdf/10.5555/20210387127 (accessed 03/08/2022)

Ingram, V., van Rijn, F., Waarts, Y., and Gilhuis, H. (2018). The Impacts of Cocoa Sustainability Initiatives in West Africa. *Sustainability* 10, 42-49. https://doi.org/10.3390/su10114249

IPBES (2019). Global assessment report on biodiversity and ecosystem services (IPBES). Retrieve from: https://files.ipbes.net/ipbes-web-prod-public-files/webform/impact_tracking_database/46408/2019%20IPBES%20Biodiversity%20and%20Ecosystem%20Services%20report%20Final.pdf (accessed 04/06/2021)

Irfany, M. I., McMahon, P. J., Toribio, J. Phan-Thien, K. Y., Rifai, M. A., Yusdiyanto, S., Vinning, G., Guest, D., Walton, M. and Nuryartono, N. (2020). Deter- minants of diversification by cocoa smallholders in Sulawesi. *International Journal of Social Economics*, 47(10), 1243-1263. https://doi.org/10.1108/IJSE-02- 2020-0106

Isil, O., and Hernke, M.T. (2017). The Triple Bottom Line: A Critical Review from a Transdisciplinary Perspective. *Business Strategy & Environment*, 26(8), 1235–1251. http://dx.doi.org/10.1002/bse.1982

Iyer, E. S., and Reczek, R. W. (2017). The Intersection of Sustainability, Marketing, and Public Policy: Intro- duction to the Special Section on Sustainability. *Jour- nal of Public Policy & Marketing*, *36*(2), 246-254. htt- ps://doi.org/10.1509/jppm.36.250

Izdori, F.J., Mkwambisi, D., Karuaihe, S.T. and Papargyropoulou, E. (2025). Multi-stakeholder collaboration framework for post-harvest loss reduction: the case of tomato value chain in Iringa and Morogoro regional in Tanzania. *Agricultural Economics,* 13(6). https://doi.org/10.1186/s40100-025-00351-z

Jaacks, L., Singh, N., Veluguri, D., Connors, K., Sooraj, A., Kalra, A., and Awasthi, A. (2025). Association of membership in a farmer producer organization with crop diversity, household income, diet diversity, and women's empowerment in Uttar Pradesh, India. PLOS ONE, 20. DOI: 10.1371/journal.pone.0319704

Jalón, S. G., Iglesias, A., and Neumann, M. B. (2018). Responses of sub-Saharan smallholders to climate change: strategies and drivers of adaptation. *Environ. Sci. Pol*., 90, 38–45. https://doi.org/10.1016/j.envs- ci.2018.09.013

Jano, P. (2007). Quality Incentives and the Development of High-value Agrifood Markets: Ecuador's Cacao Marketing Chain. Agricultural and Applied Economics. Virginia Polytechnic Institute. Retrieved from http://scholar.lib.vt.edu/theses/available/etd-06082007-131653/unrestricted/2007_07_17_PJanoMasterThesis.pdf (accessed 6/04/2020)

Jones, S., and Gibbon, P. (2011). Developing agricultural markets in Sub-Saharan Africa: Organic cocoa in rural Uganda. *J. Dev. Stud.*, 47, 1595–1618. https://doi.org/10.1080/00220388.2011.579107

Kahiya, E.T. (2018). Five decades of research on export barriers: Review and future directions. *Int. Business Review*, 27(6), 1172– 1188.http://dx.doi.org/10.1016/j.ibusrev.2018.04.008

Kalogiannidis, S., Karafolas, S., and Chatzitheodoridis, F. (2024). The Key Role of Cooperatives in Sustainable Agriculture and Agrifood Security: Evidence from Greece. Sustainability, 16, 7202. https://doi.org/10.3390/su16167202

Kaplinsky, R, (2000). Globalization and Unequalization: What can be learned from value chain analysis? The Journal of Development Studies, 37 (2), 117-146. DOI: 10.1080/713600071.

Kaplinsky, R., and Morris, M. (2001). A Handbook for Value Chain Research. Working Paper Prepared for the IDRC. Institute for Development Studies, Brighton, UK. Retrieve from: https://www.fao.org/fileadmin/user_upload/fisheries/docs/Value_Chain_Handbool.pdf (accessed 6/04/2020)

Karanja, A., Mburu, F., and Gasparatos, A. (2020). A multi-stakeholder perception analysis about the adoption, impacts and priority areas in the Kenyan clean cooking sector. *Sustainability Science*, *15*, 333-351. https://doi.org/10.1007/s11625-019-00742-4

Khong, T. D. (2022). Vertical and Horizontal Coordination in Developing Countries' Agriculture: Evidence from Vietnam and Implications. *Asian Journal of Agriculture and Rural Development*, Asian Economic and Social Society (AESS), vol. 12(01). DOI: 10.22004/ag.econ.342353

Kissi, E.A., and Herzig, C. (2024). The implications of governance factors for economic and social upgrading in Ghana's cocoa value chain. *Agricultural and Food Economics, 12(1)*. https://doi.org/10.1186/s40100-024-00295-w

Krauss, J.E., and Krishnan, A. (2021). Global decisions versus local realities: Sustainability standards, priorities and upgrading dynamics in agricultural global production networks. *Global Networks*, 22(1), 55-62.https://doi.org/10.1111/glob.12325

Krumbiegel, K., and Tillie, P. (2024). Sustainable practices in cocoa production. The role of certification schemes and farmer cooperatives. *Ecological Economics*, 222, 108211. https://doi.org/10.1016/j.ecolecon.2024.108211

Kuang, F., Jin, J., He, R., Ning, J. and Wan, X. (2020). Farmers' livelihood risks, livelihood assets and adap- tation strategies in Rugao City, China. *Journal of Environmental Management*, 264, 110463. https://doi. org/10.1016/j.jenvman.2020.110463

Lafargue, P., Rogerson, M., Parry, G.C., and Allainguillaume, J. (2022). Broken chocolate: Biomarkers as a method for delivering cocoa supply chain visibility. *Supply Chain Management*, 27(6), 729-741. https://doi.org/10.1108/SCM-11-2020-0583

Lambin, E.F., and Thorlakson, T. (2018). Sustainability standards: interactions between private actors, civil society, and governments. *Annual Review of Environment and Resources*, *43(1)*, 369-393. DOI: 10.1146/annurev-environ-102017-025931.

Lalwani, S.K., Nunes, B., Chicksand, D., and Boojihawon, D.K. (2018). Benchmarking self-declared social sustainability initiatives in cocoa sourcing. *Benchmarking*: *An International Journal,* 25(9), 3986-4008. https://doi.org/10.1108/BIJ-07-2017-0186

Lang, D.J., Wiek. A., Bergmann, M., Stauffacher, M., Martens, P., Moll, P., Swilling, M., and Thomas, C.J. (2012). Transdisciplinary research in sustainability science: practice, principles, and challenges. *Sustainability Science*, *7*, 25-43. DOI: 10.1007/ s11625- 011-0149-x.

León Bravo, V., Jaramillo Villacrés, M., and Silva, M.E. (2022). Analysing competing logics towards sustainable supplier management. *Supply Chain Management*, 27(7), 49-63. https://doi.org/10.1108/SCM-07-2020-0354

Lee, J., Gereffi, G., and Beauvais, J. (2012). Global value chains and agrifood standards: Challenges and possibilities for smallholders in developing countries. PNAS - Proceedings of the National Academy of Sciences 109 (31), 12326–12331. https://doi.org/10.1073/pnas.0913714108

Leksono, A.S., Mustafa, I., Gama, Z.P., Afandhi, A., and Airina, A. (2021). Organic cocoa farming in Indonesia: Constraints and development strategies. *Organic Agriculture*, *11*, 445–455. https://doi.org/10.1007/s13165-021-00351-5

Li, H., and Zhang, R. (2023). How Does Perceived Value Affect Cooperative Initiatives in Agricultural Organizations: Evidence from 247 Agri-Industrialized Unions. Sustainability, 15(8): 6914. https://doi.org/10.3390/su15086914

Liliana, Q.R.M. (2020). The cocoa agri-food chain in Venezuela: Towards territorial development. *Agroalimentaria*, 26(51), 213-238. https://doi.org/10.22004/ag.econ.196764

Lim, W.M., Yap, S.F., and Makkar, M. (2021). Home sharing in marketing and tourism at a tipping point: What do we know, how do we know, and where should we be heading? *J. Business Research*, 122, 534– 566. https://doi.org/10.1016/j.jbusres.2020.08.051

Liu, Z., Chen, Q. and Xie, H. (2018). Comprehensive evaluation of farm household livelihood assets in a western mountainous area of China: a case study in Zunyi City. *J. Resour. Ecol.* 9(2), 154–163. https://doi. org/10.5814/j.issn.1674-764x.2018.02.005

Lodhia, S., Kaur, A. and Kuruppu, S.C. (2022). The disclosure of sustainable development goals (SDGs) by the top 50 Australian companies: substantive or symbolic legitimation?. *Meditari Accountancy Research,* 31(6), 1578-1605. https://doi.org/10.1108/MEDAR-05-2021-1297

Löhr, K., Aruqaj, B., Baumert, D. , Bonatti, M., Brüntrup, M., Bunn, C., Castro-Nunez, A., Chavez-Miguel, G., Del Rio, M. L., Hachmann,S., Morales Muñoz, H.C., Ollendorf, F., Rodriguez, T., Rudloff, B., Schorling, J., Schuffenhauer, A., Schulte, I., Sieber, S., Tadesse, S., Ulrichs, C.,

Vogel, C., and Weinhardt, M. (2021). Social cohesion as the missing link between natural resource management and peacebuilding: lessons from cocoa production in Côte d'Ivoire and Colombia. Sustainability, 13, 13002. https://doi.org/10.3390/su132313002

Loviscek, V. (2021). Triple Bottom Line toward a Holistic Framework for Sustainability: A Systematic Review. *J. Contemporary Administration,* 25(3), e-200017. 10.1590/1982-7849rac2021200017.en

Mabe, F.N., Danso-Abbeam, G., Azumah, S.B., Amoh Boateng, N., Mensah, K.B., and Boateng, E. (2020). Drivers of youth in cocoa value chain activities in Ghana. *Journal of Agribusiness in Developing and Emerging Economies*, 11(4), 366-378. https://doi.org/10.1108/JADEE-10-2019-0177

Markelova, H., Meinzen-Dick, R., Hellin, J., and Dorhn, S. (2009). Collective action for smallholder market access. Food Policy, 34 (10),1-7. https://doi.org/10.1016/j.foodpol.2008.10.001

Marta-Costa, A., Trigo, A., Costa, J. M. and Fragoso, R. (2022). Standards and indicators to assess sustainability: the relevance of metrics and inventories. In Costa, J.M., Costa, S. Catarino, S., Escalona, J.M. and Comuzzo, P. (eds). *Sustainable Viticulture and Win- emaking Practices*. London. Elsevier Editions. https:// doi.org/10.1016/B978-0-323-85150-3.00022-0

Marcus, A., and Fremeth, A. (2009). Green management matters regardless. *The Academy Management Perspectives*, 23(3), 17-26. http://dx.doi.org/10.5465/AMP.2009.43479261

Martins, F.P., Batalhão, A.C.S., Ahokas, M., Liboni Amui, L.B. and Cezarino, L.O. (2023). Rethinking sustainability in cocoa supply chain in light of SDG disclosure. *Sustainability Accounting, Management and Policy Journal*, 14(7) 258-286. https://doi.org/10.1108/SAMPJ-03-2022-0132

Matissek, R., Reinecke, J., Von Hagen, O., Manning, S. (2012). Sustainability in the Cocoa Sector-Review, Challenges and Approaches. 2012. Retrieve from: Moderne Ernaehrung Heute, Official Journal of the Food Chemistry Institute of the Association of the German Confectionery Industry, 1-27. Retrieve from SSRN: https://ssrn.com/abstract=2042037 (acces 08/01/2020).

McLoughlin, K., and Meehan, J. (2021). The institutional logic of the sustainable organisation: The case of a chocolate supply network. *International Journal of Operations and Production Management*, 41(3), 251-274. https://doi.org/10.1108/IJOPM-11-2020-0773

McDonough, W., and Braungart, M. (2002). Design for the triple top line: new tools for sustainable commerce. *Corporate Environmental Strategy* 9(3), 251– 258. http://dx.doi.org/10.1016/S1066-7938(02)00069-6

Mendoza, M.L.B., Cedeño, M.R., and Cossío, N.S. (2020). Prospective of the circular economy in the agri-food chain of fine organic aromatic cocoa in the province of manabi. *Revista De La Facultad De Agronomia*, 37(1), 95-110. http://dx.doi.org/10.18845/te.v17i1.6475

Menozzi, D., Fioravanzi, M. and Donati, M. (2015). Farmer's motivation to adopt sustainable agricultural practices. *Bio-based and Applied Economics* 4(2), 125- 147. https://doi.org/10.13128/BAE-14776

Medlin, W. K. (1975). Problems in planning rural education for agricultural and nutrition development: a review of relevant findings from communications research. IIEP Seminar on "The planning problems in rural education" of International Institute for Educational Planning, UNESCO, Paris

Middendorp, R.S., Boever, O., Rueda, X., and Lambin, E.F. (2020). Improving smallholder livelihoods and ecosystems through direct trade relations: High-quality cocoa producers in Ecuador. *Business Strategy and Development*, 3(2), 165-184. https://doi.org/10.1002/bsd2.86

Minten, B., Randrianarison, L., and Swinnen, J. (2009). Global retail chains and poor farmers: Evidence from Madagascar. *World Development* 37 (11), 1728–1741. https://doi.org/10.1016/j.worlddev.2008.08.024

Mithöfer, D., Roshetko, J. M., Donovan, J. A., Nathalie, E., Robiglio, V., Wau, D., Sonwa, D. J., and Blare, T. (2017). Unpacking 'sustainable' cocoa: do sustainability standards, development projects and policies address producer concerns in Indonesia, Cameroon and Peru? *International Journal of Biodiversity Science, Ecosystem Services & Management*, 13 (1), 444-469. https://doi.org/10.1080/21513732.2018.1432691.

Mojo, D., Fischer, C., and Degefa, T. (2017). The determinants and economic impacts of membership in coffee farmer cooperatives: recent evidence from rural Ethiopia. Journal of Rural Studiues, 50, 84-94. https://doi.org/10.1016/j.jrurstud.2016.12.010

Mojo, D., Fischer, C., and Degefa, T. (2015). Social and environmental impacts of agricultural cooperatives: evidence from Ethiopia. International Journal of Sustainable Development World Ecology, 22 (5), 388-400. https://doi.org/10.1080/13504509.2015.1052860

Moreno-Miranda, C., Molina, I., Miranda, Z., Moreno, R., and Moreno, P. (2020). The cocoa value chain in Ecuador: Proposal of strategies to support sustainability. *Bioagro*, 32(3), 205-214. Retrieved from: https://revistas.uclave.org/index.php/bioagro/article/view/2788 (acces 08/01/2021).

Moreno-Miranda, C., Palacios, H. and Rama, D. (2020). Small-holders perception of sustainability and chain coordination: evidence from Arriba PDO Cocoa in Western Ecuador. B*io-Based and Applied Economics*, 8(3), 279-295. https://doi.org/10.13128/bae-9448

Moreno-Miranda, C., Jordán, J., Moreno, R., Moreno, P., and Solis, J. (2019). Protected Designation of Origin and Sustainability Characterization: The Case of PDO Cocoa Arriba. *Agriculture*, 9(10), 229. https://doi.org/10.3390/agriculture9100229.

Morfi, C., Ollila, P., Nilsson, J., Feng, L., and Karantininis, K. (2015). Motivation Behind Members' Loyalty to Agricultural Cooperatives. In: Windsperger, J., Cliquet, G., Ehrmann, T., Hendrikse, G. (eds) Interfirm Networks. Springer, Cham. https://doi.org/10.1007/978-3-319-10184-2_9.

Mori, M., and Cavaliere, V. (2024). Voice Behaviours within Cooperatives. The Importance of the Relational Aspects of Leadership and Integrative Mechanisms for Loyalty, VOLUNTAS: International Journal of Voluntary and Nonprofit Organizations, 35, 916-929. https://doi.org/10.1007/s11266-024-00658-3

Mota, M.M., El Makhloufi, A. and Scala, P. (2019). On the logistics of cocoa supply chain in Côte d'Ivoire: simulation-based analysis. *Computers and Industrial Engineering*, 137, 106034. http://dx.doi.org/10.1016/j.cie.2019.106034

Movilla-Pateiro, L., Mahou-Lago, X.M., Doval, M.I., and Simal-Gandara, J. (2020). Toward a sustainable metric and indicators for the goal of sustainability in agriculturaland food production. *Critical Reviews in Food Science and Nutrition*, 61(7), 1108-1129. http://dx.doi.org/10.1080/10408398.2020.1754161

MRW—Market Reports World (2021). Organic Cocoa Industry Size, Share 2021. Global Future Growth, Regional Trend, Leading Players Updates, Industry Demand, Current and Future Plans by Forecast to 2022. Press Release Distributed by The Express Wire. Retrieve from: https://www.marketreportsworld.com/enquiry/request-sample/10899698 (access on 23/09/2021).

Mu, J. E., McCarl, B. A., Sleeter, B., Abatzoglou, J. T. and Zhang, H. (2018). Adaptation with climate uncer- tainty: an examination of agricultural land use in the United States. *Land Use Pol*. 77 (C), 392-401. https:// doi.org/10.1016/j.landusepol.2018.05.057

Munch, D. M., Schmit, T. M., and Severson, R. M. (2021). Assessing the value of cooperative membership: A case of dairy marketing in the United States. *Journal of Cooperative*

Organization and Management, *9*(1): 100129. https://dx.doi.org/10.1016/j.jcom.2021.1001292024

Nabhani, I., Daryanto, A., Yassin, M., and Rifin, A. (2015). Can Indonesia cocoa farmers get benefit on global value chain inclusion? A Literature Review. *Asian Social Science*, 11 (18), 288-294. http://doi.org/10.5539/ass.v11n18p288

Narciso, A., Barzini, S.A., and Di Nuzzo, A. (2020). Discovering Neverland: São Tomé e Príncipe and the development of the agricultural heritage of a multi-ethnic population. *Journal of Agriculture and Environment for International Development*, 114(2), 63-84. https://doi.org/10.12895/jaeid.20202.1376

Ndlovu, P.N., Thamaga-Chitja, J.M., and Ojo, T.O. (2021). Factors influencing the level of vegetable value chain participation and implications on smallholder farmers in Swayimane KwaZulu-Natal. *Land Use Policy*, 109, 105611. https://doi.org/10.1016/j.landusepol.2021.105611

Nedanov, A., Zutinic, D. (2018). A Correspondence Analysis of Motivational Factors for Joining Agricultural Cooperatives in Croatia. New Medit, 3: 79-82. DOI: 10.30682/nm1803g

Nelson, V., Kwasi, Opoku, K., Martin, A., Bugri, J., and Posthumus, H. (2013). Assessing the poverty impact of sustainability standards: Fairtrade in Ghanaian cocoa. *London: DfID UK*. https://doi.org/10.13140/2.1.3879.0721

Nonci, N., Nonci, N., Halim, H., and Muliani. (2019). Role of supply chain in cocoa blue print model performance in national development program. *International Journal of Supply Chain Managemet*, 8(6), 198-210. https://doi.org/10.59160/ijscm.v8i6.4138

Norman, W., and MacDonald, C. (2004). Getting to the bottom of 'triple bottom line'. *Business Ethics Quarterly,* 14(02), 243– 262. http://dx.doi.org/10.5840/beq20041421

Norman, W., and MacDonald, C. (2004). Getting to the bottom of 'triple bottom line'. *Business Ethics Quarterly,* 14(02), 243– 262. 2004. http://dx.doi.org/10.2307/3857909

Nelson, V., and Phillips, D. (2018). Sector, Landscape or Rural Transformations? Exploring the Limits and Potential of Agricultural Sustainability Initiatives through a Cocoa Case Study. *Business Strategy and the Environment*, 27, 252–262. https://doi.org/10.1002/bse.2014

Nguyen, Ly T. (2014). Cocoa Value Chain Analysis. A Case Study of Ben Tre & Tien Giang Provinces in Vietnam. BA em Arts, Kalamazoo College. Retrieve from: https://cache.kzoo.edu/bitstream/handle/10920/29328/Ly-NguyenSIP.pdf?sequence=3&isAllowed=y (access 6/1/2020)

Nielsen, Ø. J., Rayamajhi, S., Uberhuaga, P., Meilby, H., and Smith-Hall, C. (2013). Quantifying rural livelihood strategies in developing countries using an activity choice approach. *Agricultural Economics*, 44(1), 57–71. https://doi.org/10.1111/j.1574-0862.2012.00632.x

Odijie, M.E. (2018). Sustainability winners and losers in business-biased cocoa sustainability programmes in West Africa. *International Journal of Agriculture. Sustainability*, 16(2), 214-227. https://doi.org/10.1080/14735903.2018.1445408

Oliveira, A. (2014). Certificação do Cacau de São Tomé como Indicação Geográfica. Dissertação de Mestrado em Qualidade e Segurança Alimentar. Instituto Politécnico de Bragança.

Ollivier de Leth, D., and Ros-Tonen, M.A.F. (2022). Creating shared value through an inclusive development lens: A case study of a CSV strategy in Ghana's cocoa sector. *Journal of Business Ethics*, 178, 339-354.https://doi.org/10.1007/s10551-021-04808-1

Ollendorf, F., Sieber, S., and Löhr, K. (2022). Societal dynamics of sustainability certification in Ghanaian cocoa producing communities: Assessing social cohesion effects and their implications for collective action. *Agroecology and Sustainable Food Systems*, 47(2), 212–238. https://doi.org/10.1080/21683565.2022.2138671

Opoku, C. H. (2024). The Role of Certificates and Labels for Cocoa in the Face of Climate Change: A Scientific Review. *American Journal of Climate Change*, 13, 281-313. https://doi.org/10.4236/ajcc.2024.132015

Orlandi, F. (2011). Cadeia de Valores do Cacau em São Tomé e Príncipe. Dissertação de Mestrado em Engenharia Alimentar. Instituto Superior de Agronomia, Universidade Técnica de Lisboa. Retrieved from: https://www.repository.utl.pt/handle/10400.5/4172 (access 6/11/2019).

Orozco-Aguilar, L., López-Sampson, A., Leandro-Muñoz, M.E., Robiglio, V., Reyes, M., Bordeaux, M., Sepúlveda, N., and Somarriba, E. (2021). Elucidating pathways and discourses linking cocoa cultivation to deforestation, reforestation, and tree cover change in Nicaragua and Peru. *Frontiers in Sustainable Food Systems*, 5. https://doi.org/10.3389/fsufs.2021.635779

Ortega, D. L., Bro, A. S., Clay, D. C., Lopez, M. C., Tuyisenge, E., Church, R. A., and Bizoza, A. R. (2019). Cooperative membership and coffee productivity in Rwanda's specialty coffee sector. Food Security, 11(4), 967-979. http://dx.doi.org/10.1007/s12571-019-00952-9

Österberg, P., and Nilsson, J. (2009). Members' Perception of Their Participation in the Governance of Cooperatives: The Key to Trust and Commitment in Agricultural Cooperatives. Agribusiness, 25(2), 181-197. https://doi.org/10.1002/agr.20200

Ouattara, L.Y., Kouassi, E.K.A., Soro, D., Soro, Y., Yao, K.B., Adouby, K., Drogui, A.P., Tyagi, D.R., and Aina, P.M. (2021). Cocoa pod husks as potential sources of renewable high-value-added products: A review of current valorizations and future prospects. *BioResources*, *16 (1)*, 1988–2020.10.15376/biores.16.1.Ouattara

Paul, J. (2019). Marketing in emerging markets: A review, theoretical synthesis and extension. *International Journal of Emerging Markets*, 15(3), 446– 468 http://dx.doi.org/10.1108/IJOEM-04-2017-0130

Paul, J., and Benito, G.R.G. (2017). A review of research on outward foreign direct investment from emerging countries, including China: What do we know, how do we know and where should we be heading? *Asia Pacific Business Review*, 24(1), 90–115. http://dx.doi.org/10.1080/13602381.2017.1357316

Paul, J., and Criado, A.R. (2020). The art of writing literature review: What do we know and what do we need to know? *International Business Review*, 29(4), 101717. https://doi.org/10.1016/j.ibusrev.2020.101717

Paul, J. and Mas, E. (2019). Toward a 7-P framework for international marketing. *Journal of Strategic Marketing*, 28, 1-21. https://doi.org/10.1080/0965254X.2019.1569111

Piedra-Bonilla, E. B., Cunha, D. A. and Braga, M. J. (2020). Climate variability and crop diversification in Brazil: An ordered probit analysis. *Journal of Cleaner Production* 256, 120252. https://doi.org/10.1016/j. jclepro.2020.120252

Pietrobelli, C., and Starritz, C. (2013). Challenges for Global Value Chain Interventions in Latin America. Inter-American Development Bank. Technical note, IBD-TN-548. Retrieve from: https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=03c11df0e67c61be638a54c3d6a13b6a4d421f57 (accessed 16/11/2019)

Pimenta-Alonso, A. M., Prazeres, I, Lucas, M. R. (2024). Proposal for the creation of a Cluster to boost sustainable economic developement in Sao Tome through Organic Cocoa Cultivation. *Transformations in Business & Economics (TIBE),* 23, 2(62): 219-248. http://www.transformations.knf.vu.lt/62/article/prop. Accessed 12 January 2025.

Porter, M. E. (1985). *The Competitive Advantage: Creating and Sustaining Superior Performance.* NY Free Press. 557 p. Retrieve from:https://resource.1st.ir/PortalImageDb/ScientificContent/182225f9-188a-4f24-ad2a-05b1d8944668/Competitive%20Advantage.pdf (accessed 16/11/2019).

Pradhan, P., Reusser, D.E., and Kropp, J.P. (2013). Embodied greenhouse gas emissions in diets. *PLoS One* 8(5), e62228. https://doi.org/10.1371/journal.pone.0062228

Prazeres, I., Lucas, M. R., Marta-Costa, A., and Henriques, P. (2023a). Organic cocoa farmer's strategies and sustainability. *Bio-based and Applied Economics*, 12(1), 37-52. DOI: 10.36253/bae-13473

Prazeres, I., Lucas, M.R., Marta-Costa, A.,Henriques, P.D. (2023b). The livelihood strategies and risk perception of organic cocoa producers: an empirical analysis to Sao Tome and Principe. XVII EAAE Congress "Agri-food systems in a changing world: connecting science and society". Aug 29 - Sep 1, Rennes, France.

Prazeres, I., Lucas, M.R., Marta-Costa, A., Henriques, P.D. (2023c). Comportamento face ao risco e estratégias de subsistência dos produtores de cacau biológico em São Tomé e Príncipe. *Brazilian Journal of Rural Economy and Sociology,* 61(spe), e276821 (*Revista de Economia e Sociologia Rural-RESR*). https://doi.org/10.1590/1806-9479.2023.276821

Prazeres, I., Lucas, M.R., Marta-Costa, A., Henriques, P.D., and Grilo, L. M. (2025). The Perceived Value of Cooperative Membership in Organic Cocoa Production: PLSc-SEM Approach. Book of Abstracts, JOCLAD 2025 – XXXII MEETING OF THE PORTUGUESE ASSOCIATION FOR CLASSIFICATION AND DATA ANALYSIS, 3-5 April, Porto, Portugal.

Prazeres, I., Lucas, M. R., Marta-Costa, A. 2022. Geographical Indications as an Added Value Strategy for São Tomé and Príncipe' Organic Cocoa. *Strategies in Accounting and Management* 3(3), 1-2. SIAM. 000561. 2022. ISSN: 2770-6648.

Prazeres, I., Lucas, M. R., and Marta-Costa, A. (2022a). Organic Cocoa Value Chain Sustainability: The Perception of São Tomé and Príncipe's Stakeholders. *Sustainability*, 14(1), 136. https://doi.org/10.3390/ su14010136.

Prazeres, I., Lucas, M. R., and Marta-Costa, A. (2022b). Sustainable Cocoa Value Chain-A review and Critical Analysis of 'Triple Bottom Line' Scenarios. In V. Martinho (Ed.). *Impacts of Climate Change and Economic and Health Crises on the Agriculture and Food Sectors* (pp.288-314), Chapter 15, IGI Global publications. DOI: 10.4018/978-1-7998-9557-2.ch015. ISBN13: 9781799895572.

Prazeres, I., Lucas, M. R., and Marta-Costa, A. (2021). Cocoa Markets and Value Chains: Dynamics and Challenges For São Tome and Principe Organic Smallholders. *International Journal of Innovation and Economic Development*, 7(2), 64-77. https://doi.org/10.18775/ijied.1849-7551-7020.2015.72.2005

Prazeres, I. C., and Lucas, M. R. (2020). Repensar a cadeia de valor do cacau biológico de São Tomé e Príncipe. Revista de Ciências Agrárias, 43 (spe1). https://doi.org/10.19084/rca.19045

Prazeres, I. C. (2019). Estratégia de Marketing e Criação de Valor do Cacau Biológico de São Tomé e Príncipe no Mercado Internacional. Master in Management, specialization in Marketing. School of Sopcial Sciences, Department of Mangement, Universidade de Évora. Retrieve from: http://hdl.handle.net/10174/25358 (accessed 6/11/2019).

Prisca, A. S. A. (2024). A Review on Sustainability in Cocoa and Chocolate Processing: A Focus on West Africa. *African Journal of Agriculture and Food Science,* 7(4), 143-153. DOI: 10.52589/AJAFS-HRJBZXAI

Pritchard, B., Rammohan, A., and Vicol, M. (2019). The importance of non-farm livelihoods for household food security and dietary diversity in rural Myan- mar. *Journal of Rural Studies*, 67, 89–100. https://doi. org/10.1016/j.jrurstud.2019.02.017

Purvis, B., Mao, Y., and Robinson, D. (2019). Three pillars of sustainability: in search of conceptual origins. *Sustainability Science,* 14, 681–695. https://doi.org/10.1007/s11625-018-0627-5.

Raikes, P., Jensen, M.F., and Ponte, S. (2000). Global commodity chain analysis and the French filiére approach: comparison and critique. *Economy and Society*, 29 (3), 390-417. DOI: 10.1080/03085140050084589.

Rahman, S. (2016). Impacts of climate change, agroecol- ogy and socio-economic factors on agricultural land use diversity in Bangladesh (1948e2008). *Land Use Pol*icy, 50, 169-178. Retrieve from: 10.1016/j.landusepol.2015.09.010 and https://pearl.plymouth.ac.uk/gees-research (accessed 6/11/2019)

Ramos, T. B. (2019). Sustainability Assessment: Exploring the Frontiers and Paradigms of Indicator Approach- es. *Sustainability*, 11(3), 824. https://doi.org/10.3390/ su11030824

Randhawa, K., Wilden, R., and Hohberger, J. (2016). A bibliometric review of open innovation: Setting a research agenda. *Journal of Product Innovation Management*, 33(6), 750–772. https://doi.org/10.1111/jpim.12312

Rapsomanikis, G. (2015). The economic lives of smallholder farmers. An analysis based on household data from nine countries. Rome. FAO.

Rashidi, K., Noorizadeh, A., Kannan, D., and Cullinane, K. (2020). Applying the triple bottom line in sustainable supplier selection: A meta-review of the state-of-the-art. *Journal of Cleaner Production,* 269, 122001. http://dx.doi.org/10.1016/j.jclepro.2020.122001

Rasmussen, L.V., Bierbaum, R., Oldekop, J.A and Agrawal, A. (2017). Bridging the practitioner-researcher divide: Indicators to track environmental, eco- nomic, and sociocultural sustainability of agricul- tural commodity production. *Global Environmental Change*, *42*, 33-46. https://doi.org/10.1016/j.gloenv- cha.2016.12.001

Raynolds, L. T. (2009). Mainstreaming fair trade coffee: From partnership to traceability. World Development, 37(6), 1083–1093. https://doi.org/10.1016/j.worlddev.2008.10.001

Reardon, T., Tschirley, D., Dolislager, M., Snyder, J., Hu, C., and White, S. (2014). Urbanization, Diet Change, and Transformation of Food Supply Chains in Asia. Michigan: Global Center for Food Systems Innovation. Retrieve from: https://www.fao.org/fileadmin/templates/ags/docs/MUFN/DOCUMENTS/MUS_Reardon_2014.pdf (accessed 13 October 2022).

Recanati, F., Marveggio, D., and Dotelli, G. (2017). From beans to bar: A life cycle assessment towards sustainable chocolate supplychain. *Science the Total Environment*, 613614, 1013–1023. http://dx.doi.org/10.1016/j.scitotenv.2017.09.187

Reimers, M., and Klasen, S. (2011). Revisiting the role of education for agricultural productivity. IAI Discussion Papers No. 214. Georg-August-Universität Göttingen, Ibero-America Institute for Economic Research (IAI), Göttingen. Available at: https://www.econstor.eu/bitstream/10419/57305/1/675949491.pdf (accessed 13 October 2022).

Rémi, L., Milhorance, C., Le Coq, J-F., and Soullier, G. (2024). Agricultural value chain transformations and policy instruments: The case of the rice value chains in Ghana and Côte d'Ivoire. Conference Paper, International Association of Agricultural Economists (IAAE) > 2024 Conference, August 2-7, 2024, New Delhi, India. DOI:10.22004/ag.econ.344392

Richardson J. (2004). Accounting for sustainability: measuring quantities or enhancing qualities? In A. Henriques & J. Richardson (eds), *The Triple Bottom Line: Does it All Add Up*, Chapter, 34-44. Routledge: London-UK. https://doi.org/10.4324/9781849773348

Ricketts, K. D., Turvey, C. G., and Gómez, M. I. (2014). Value chain approaches to development: Smallholder farmer perceptions of risk and benefits across three cocoa chains in Ghana. *Journal of Agribusiness in Developing and Emerging Economies*, 4(1), 2-22. https://doi.org/10.1108/JADEE-10-2012-0025

Rombeallo, I. P., Jamil, M. H., and Rukmana, D. (2024). Factors affecting farmers' decision to join coffee producer cooperatives to improve their welfare. *Agricultural and Resource*

Economics: International Scientific E-Journal, *10*(4), 235–263. https://doi.org/10.51599/are.2024.10.04.10

Ros-Tonen, M.A., Bitzer, V., Laven, A., Ollivier de Leth, D., Van Leynseele, Y., and Vos, A. (2019). Conceptualizing inclusiveness of smallholder value chain integration. *Current Opinion in Environmental Sustainability*, 41, 10–17.https://doi.org/10.1016/j.cosust.2019.08.006

Rosado-Serrano, A., Paul, J., and Dikova, D. (2018). International fran-chising: A literature review and research agenda. *Journal of Business Research*, 85, 238–257. https://doi.org/10.1016/j.jbusres.2017.12.049

Ruben, R. (2017). Impact assessment of commodity standards: Towards inclusive value chains. *Enterprise Development and Microfinance*, 28(1-2), 82-97. https://doi.org/10.3362/1755-1986.16-00020

Ruerd, R., and Fort, R. (2012). The Impact of Fair Trade Certification for Coffee Farmers in Peru. *World Development*, 40(3), 570-582. https://doi.org/10.1016/j.worlddev.2011.07.030

Rueda, X., and Lambin, E. F. (2014). Linking Globalization to Local Land Uses: How Eco-Consumers and Gourmands are Changing the Colombian Coffe Landscapes. World Development, 41, 286-301. https://doi.org/10.1016/j.worlddev.2012.05.018.

Rueda, X., Paz, A., Gibbs-Plessl, T., Leon, R., Moyano, B., and Lambin, E.F. (2018). Smallholders at a crossroad: Intensify or fall behind? Exploring alternative livelihood strategies in a globalized world. *Business Strategy & Environment*, 27(2), 215-229. https://doi.org/10.1002/bse.2011

Rueda, X., Middendorp, R., and Puerto, S. (2023). The role of collective action in the cacao sector in enhancing sustainability, market upgrading and agro-biodiversity conservation. *Environmental Research Letters,* 18(7), 075001. https://doi.org/10.1088/1748-9326/acd949

Roche G., and Dulcire M. 2007. Setting up an organic cocoa sector in Sao Tomé. In: AIEA2 International Conference "Knowledge, Sustainability and Bio-Resources in the further Development of Agri-food Systems", within the XLV SOBER Congress in Brazil, Londrina, Brazil, July 22nd-27th, 11 p. https://agritrop.cirad.fr/542087/1/document_542087.pdf Accessed 21 December 2024.

Ruf, F., Leitz, E. U., Gboko, K. C., and Carimemtrand, A. (2019). Des certifications inutiles? Les relations asymétriques entre coopératives, labels et cacaoculteurs en Côte d'Ivoire. *Revue Internationale des études di développement,* 4(240), 31-61. https://www.cairn.info/revue-internationale-des-etudes-du-developpement-2019-4-page-31.htm#

Salazara, O. V., Ramos-Martín, J., and Lomasc, P. L. (2018). Livelihood sustainability assessment of coffee and cocoa producers in the Amazon region of Ecuador using household types. *Journal of Rural Studies* 62,1-9. https://doi.org/10.1016/j.jrurstud.2018.06.004

Sancha, C., Gimenez, C., and Sierra, V. (2016). Achieving a socially responsible supply chain through assessment and collaboration. *Journal of Cleaner Production*. 112(3), 1934- 1947. DOI:10.1016/j.jclepro.2015.04.137

Santos, M., Galindro, A., Santos, C., Marta-Costa, A., and Martinho, V. (2019). Sustainability evolution of North and Alentejo vineyard regions. *Revista Portuguesa de Estudos Regionais*, 50, 49-63.

Sarkodie, S.A., and Strezov, V. (2019). Economic, social and governance adaptation readiness for mitigation of climate change vulnerability: evidence from 192 countries. *Sci. Total Environ*., 656, 150–164. https:// doi.org/10.1016/j.scitotenv.2018.11.349.

Sarmento, F. (2021). *São Tomé e Príncipe na Construção de um Pacto Nacional para a Agroecologia*, 1st ed.; Associação para a Cooperação e Desenvolvimento (ACTUAR), Ação para o Desenvolvimento Agropecuário e a Proteção do Ambiente (ADAPPA), Instituto

Marquês de Vlae Flor (IMVF), Lisboa, Portugal, 1–45. Retrieve from: https://issuu.com/imvf/docs/agroecologiastp_net (accessed 6/11/2022).

Sarstedt, M., Ringle, C.M., Hair, J.F. (2021). Partial least squares structural equation modeling. In: Handbook of Market Research. Springer International Publishing, pp. 1–47. https://doi.org/10.1007/978-3-319-05542-8_15-2.

Savitz, A., and Weber, K. (2006). The triple bottom line: How today's best-run organizations are achieving economic, social and environmental success -and how you can too. San Francisco: Jossey Bass.

Schroth, G., Garcia, E., Griscom, B.W., Teixeira, W.G., and Barros, L.P. (2016). Commodity production as restoration driver in the Brazilian amazon? Pasture re-agro-forestation with cocoa (*theobroma cacao*) in southern pará. *Sustainability Science*, 11(2), 277-293. https://doi.org/10.1007/s11625-015-0330-8

Schulte, I., Landholm, D.M., Bakhtary, H., Czaplicki Cabezas, S., Siantidis, S., Manirajah, S.M., and Streck, C. (2020). Supporting Smallholder Farmers for a Sustainable Cocoa Sector: Exploring the Motivations and Role of Farmers in the Effective Implementation of Supply Chain Sustainability in Ghana and Côte d'Ivoire. Meridian Institute, Washington, DC. Retrieve from: https://climatefocus.com/wp-content/uploads/2022/06/Supporting-Smallholder-Farmers-for-a-Sustainable-Cocoa-Sector-June-2020.pdf (accessed 6/11/2021).

Scott, G.J., Donovan, J., and Higuchi, A. (2015). Costs, quality, and competition in the cocoa value chain in Peru: An exploratory assessment. *Custos e Agronegocio*, 11(4), 324-358. Retrieve from: http://www.custoseagronegocioonline.com.br/numero4v11/14%20cocoa.pdf (accessed 6/11/2021).

Sebhatu, K. T., Gezahegn, T. W., Berhanu, T., Maertens, M., Van Passel, S., and D'Haese, M. (2021). Exploring variability across cooperatives: economic performance of agricultural cooperatives in northern Ethiopia. *International Food and Agribusiness Management Review*, *24*(3), 397-420. https://doi.org/10.22434/IFAMR2019.0215

Seufert, V., and Ramankutty, N. (2017). Many shades of gray the context-dependent performance of organic agriculture. *Sci. Adv.*, *3*, e1602638. DOI: 10.1126/sciadv.1602638

Signoret, J. E. (2019). Country Economic Memorandum for Sao Tome and Principe - Background Note 3 - Where has Trade Growth Come from in São Tomé and Príncipe. https://doi.org/10.1596/32138

Silva, A. R. A., Bioto, A. S., Efraim, P., and Queiroz, G. C. (2017). Impact of sustainability labeling in the perception of sensory quality and purchase intention of chocolate consumers. *Journal of Cleaner Production*, 141, 11-21. http://dx.doi.org/10.1016/j.jclepro.2016.09.024.

Simatupang, T. M., Piboonrungroj, P., and William, S. J. (2017). The emergence of value chain thinking. *International Journal of Value Chain Management,* 8(1). https://doi.org/10.1504/IJVCM.2017.082685

Singh, S. (2025). Cocoa Market Report 2025 (Global Edition). Report ID: CMR351539, 250 p., 8th Edition. Retrieve from: https://www.cognitivemarketresearch.com/cocoa-market-report?campaign_source=google_ads&campaign_name=CMR_EU_DSA01&gad_source=1&gad_campaignid=22119250923&gclid=Cj0KCQjwiqbBBhCAARIsAJSfZkZZZw2Z0F9vWtEjQd44Dk66KyPxcUfPjiUMkSEFPLYl9IKP6RmXNFcaAmuTEALw_wcB#tab_toc (accessed 15/05/2025)

Sjauw-Koen-Fa, A.R., Omta, S.W.F., and Blok, V. (2018). Constructing a multinationals' inclusive sourcing indicator for impacting farmer business models: Application in cocoa cases. *Int. J. Food System Dynamics*, 9(3), 207-225. https://doi.org/10.18461/ijfsd.v9i3.931

Squicciarini, M. P., and Swinnen, J. (2016). The econom- ics of chocolate. New York. Oxford University Press. Sun, R., Mi, J., Cao, S. and Gong, X. (2019). Classify- ing livelihood strategies

adopting the activity choice approach in rural China. *Sustainabilit*y, 11(11), 3019. https://doi.org/10.3390/su11113019

Sonwa, D.J., Weise, S.F., Schroth, G., Janssens, M.J.J., and Howard-Yana Shapiro (2014). Plant diversity management in cocoa agroforestry systems in west and central Africa-effects of markets and household needs. *Agroforestry Systems*, 88(6), 1021-1034. https://doi.org/10.1007/s10457-014-9714-5

Sotirov, M., Azevedo-Ramos, C., Rattis, L. and Berning, L. (2022). Policy options to regulate timber and agricultural supply-chains for legality and sustainability: the case of the EU and Brazil. *Forest Policy and Economics*, 144(2), 102818. http://dx.doi.org/10.1016/j.forpol.2022.102818

Squicciani, M. P., and Swinnen, J. (2016). *The Economics of Chocolate*. Oxford: Oxford University Press.

Sporchia, F., Taherzadeh, O. and Caro, D. (2021). Stimulating environmental degradation: a global study of resource use in cocoa, coffee, tea, and tobacco supply chains. *Current Research in Environmental Sustainability*, 3, 100029. http://dx.doi.org/10.1016/j.crsust.2021.100029

Sturgeon, T.J. (2009). From Commodity Chains to Value Chains: Interdisciplinary Theory Building in an Age of Globalization, in Jennifer Bair (ed). Frontiers of Commodity Chain Research. Stanford University Press, Stanford, California.

Sun, R., Mi, J. and Cao, S. (2019). Classifying Livelihood Strategies Adopting the Activity Choice Approach in Rural China. *Sustainability,* 11(11):3019. https://doi.org/10.3390/su11113019

Sura, D., Demelash, M., and Tsegaye, T. (2024). Determinants of smallholder wheat farmers' participation in cluster farming in Lemu-Bilbilo and Hetosa Districts of Arsi Zone, Ethiopia. Discover Agriculture, 2, 93. https://doi.org/10.1007/s44279-024-00111-5

Sweeney, J.C., and Soutar, G.N. (2001). Consumer Perceived Value: The Development of a Multiple Item Scale. *Journal of Retailing*, 77, 203-220. http://dx.doi.org/10.1016/S0022-4359(01)00041-0

Szakos, D., Szábo-Bodi, B., Kasza, G. (2021). Consumer awareness campaign to reduce household food waste based on structural equation behavior modeling in Hungary. Environ. Sci. Pollut. Control Ser. 28 (19), 24580–24589. https://doi.org/10.1007/s11356-020-09047-x.

Takyi, S. A., Amponsah, O., Inkoom, D. K. B., and Azunre, G. A. (2019). Sustaining Ghana's cocoa sector through environmentally smart agricultural practices: an assessment of the environmental impacts of cocoa production in Ghana. *Africa Review*, *11*(2), 172-189. https://doi.org/10.1080/09744053.2019.1635416

Talbot, J. (2008). Tropical Commodity Chains, Forward Integration Strategies and International Inequality: Coffee, Cocoa and Tea. *Review of International Political Economy,* 9 (4), 701-734. https://doi.org/10.1080/0969229022000021862

Talbot, J. (2002). Tropical Commodity Chains, Forward Integration Strategies and International Inequality: Coffee, Cocoa and Tea. *Review of International Political Economy,* 9(4): 701-734. https://doi. org/10.1080/0969229022000021862

Terry, G., Hayfield, N., Clarke, V., and Braun, V. (2017). Thematic Analysis. In *The SAGE Handbook of Qualitative Research in Psychology*, 2nd Ed., Willig, C., Rogers, W.S., Eds.; SAGE Publications: London, UK, 17–37.

Teye, J.K., and Nikoi, E. (2021). The Political Economy of the Cocoa Value Chain in Ghana; APRA Working Paper 53; Future Agricultures Consortium: Brighton, UK, 1–42. Retrieve from: https://doi.org/10.19088/APRA.2021.007 (access 6/11/2021).

Teye, J. K., and Nikoi, E. (2023). Political Settlements and the Management of Cocoa Value Chain in Ghana. *Journal of Asian and African Studies*, *58*(6), 846-863.

https://doi.org/10.1177/00219096221079326

The European Parliament and The European Council (2016). Directive (EU) 2016/680 of the European Parliament and of the Council of 27 April 2016, on the Protection of Natural Persons with Regard to the Processing of Personal. *Off. J. Eur. Union* 2016, *119*, 89–131.

Thorlakson, T. (2018). A move beyond sustainability certification: The evolution of the chocolate industry's sustainable sourcing practices. *Business Strategy and the Environment*, 27, 1653–1665. https://doi.org/10.1002/bse.2230

Tittonell, P. (2014). Livelihood strategies, resilience and trans- formability in African agroecosystems. *Agricultural Systems,* 126, 3–14. https://doi.org/10.1016/j.agsy.2013.10.010

Tol, R. S. (2018). The economic impacts of climate change. *Rev. Environ. Econ. Pol*., 12(1): 4-25. https:// doi.org/10.1093/reep/rex027

Torraco, R.J. (2005). Writing integrative literature reviews: Guidelines and exemples. *HR Develop. Review*, 4 (3), 356-367. https://doi.org/10.1177/1534484305278283

Tosakana, N., van Tassell, L., Wulfhorst, J., Boll, J., Mahler, R., Brooks, E. and Kane, S. (2010). Determinants of the adoption of conservation practices by farmers in the Northwest Wheat and Range Region. *Journal of Soil and Water Conservation*, *65*, 404-412. DOI: 10.2489/jswc.65.6.404.

Toukabri, M. and Youssef, M.A.M. (2022). Climate change disclosure and sustainable development goals (SDGs) of the 2030 agenda: the moderating role of corporate governance. *Journal of Information, Communication and Ethics in Society*, 21(1), 30-62. https://dx.doi.org/10.1108/jices-02-2022-0016

Tranfield, D., Denyer, D., and Smart, P. (2003). Towards a methodology for developing evidence-informed management knowledge by means of systematic review. *Brit. J. Management*, 14(3), 207–222. https://doi.org/10.1111/1467-8551.00375

Trienekens, J.H. (2018). A search for sustainability in cocoa supply chain business models [Unpublished Bachelor thesis dissertation]. Wageningen University, Netherlands. Retrieve from:https://edepot.wur.nl/455081 (access 6/11/2021).

Trienekens, J.H. (2011). Agricultural value chains in developing countries: A framework for analysis. *International Food and Agribusiness Management Review*, 14, 51-82. DOI: 10.22004/ag.econ.103987.

Trigueiros, A., Prazeres, I., Ceita, E., Henriques, P. and Lucas, M. R. (2023). Investimentos e Desenvolvimento Agrícola em São Tomé e Príncipe. X Congresso da APDEA e IV ESADR "Territórios, Agriculturas e Agroalimentar: desafios globais e riscos no século XXI", 14-16 setembro 2022, ESAC, Coimbra (Portugal).

Tseng, M.L. (2017). Using social media and qualitative and quantitative information scales to benchmark corporate sustainability. *Jourtnal of Cleaner Production* 142:727–738. http://dx.doi.org/10.1016/j.jclepro.2016.05.062

Tseng, M.L., Chang, C.H., Lin, C.W.R., Wu, K.J., Chen, Q, Xia, L, and Xue, B. (2020). Future trends and guidance for the triple bottom line and sustainability: a data driven bibliometric analysis. *Environmental Science and Pollution Research***,** 27, 33543–33567.https://link.springer.com/article/10.1007/s11356-020-09284-0

UN-United Nations. 2012. The resolution A/RES/64/136 - Proclamation of 2012 as International Year of Cooperatives. Retrieved from: https://social.un.org/coopsyear/about-iyc.html Accessed 1 February 2024.

Uribe-Leitz, E., and Ruf, F. (2019). Cocoa certification in West Africa: The need for change. In: Schmidt, M., Giovannucci, D., Palekhov, D., Hansmann, B. (Eds.), (2019), *Sustainable Global Value Chains*, Cham, Switzerland. . https://doi.org/10.1007/978-3-319-14877-9_24

Valbuena, D., Groot, J. C. J., Mukalama, J., Gérard, B., and Tittonell, P. (2015). Improving rural livelihoods as a "moving target": trajectories of change in small- holder farming systems of Western Kenya. *Reg Environ Change* 15: 1395–1407. https://doi.org/10.1007/ s10113-014-0702-0

van Huellen, S., and Abubakar, F.M. (2021). Potential for upgrading in financialised agri-food chains: The case of Ghanaian cocoa. *The European Journal of Development Research*, 33(2), 227-252. https://doi.org/10.1057/s41287-020-00351-3

van Vliet, J.A., Slingerland, M.A., Waarts, Y.R. and Giller, K.E. (2021). A Living Income for Cocoa Producers in Côte d'Ivoire and Ghana? *Frontiers in Sustainable Food Systems*, 5,732831. https://doi.org/10.3389/fsufs.2021.732831

Vandercasteelen, J., Beyene, S. T., Minten, B., and Swinnen, J. (2018). Cities and agricultural transformation in africa: evidence from Ethiopia. World Development, 105, 383-399. https://doi.org/10.1016/j.worlddev.2017.10.032

Vasileiou, K. and Morris, J. (2006). The Sustainability of the Supply Chain for Fresh Potatoes in Britain. *Supply Chain Management: An International Journal*, 11, 317-327. https://doi.org/ 10.1108/13598540610671761

Vecchio, R., and Annunziata, A. (2015). Willingness-to-pay for sustainability-labelled chocolate: an experimental auction approach. *Journal of Cleaner Production* 86, 335–342. http://dx.doi.org/10.1016/j.jclepro.2014.08.006.

Velten, S., Leventon, J., Jager, N. and Newig, J. (2015). What Is Sustainable Agriculture? A Systematic Review. *Sustainability*, 7(6), 7833-7865. https://doi. org/10.3390/su7067833

Verhofstadt, E. and Maertens, M. (2015). Can Agricultural Cooperatives Reduce Poverty? Heterogeneous Impact of Cooperative Membership on Farmers' Welfare in Rwanda. Applied Economic Perspectives and Policy 37(1), 86-106. DOI: 10.1093/aepp/ppu021

Vermeulen, W. J.V., and Metselaar, J. A. (2015). Improving sustainability in global supply chains with private certification standarts: testing na approach for assessing their performance and impact potential. International Journal of Business and Globalisation, 14(2). Retrieve from: http://www.inderscience.com/offer.php?id= (accessed 6/11/2023).

Viana, C. M., Freire, D., Abrantes, P., Rocha, J. and Pereira, P. (2022). Agricultural land systems importance for supporting food security and sustainable development goals: A systematic review. *Science of The Total Environment*, 806 (3), 150718. https://doi.org/10.1016/j.scitotenv.2021.150718.

Vigneri, S., and Kolavalli, S. (2018). Growth through Pricing Policy: the case of cocoa in Ghana. Food and Agriculture Organization of the United Nations Rome. ISBN 978-92-5-130104 -3. Retrieve from: https://www.researchgate.net/publication/322987451_Growth_through_Pricing_Policy_the_case_of_cocoa_in_Ghana (accessed 6/01/2023).

Vogel, C., Mathé, S., Geitzenauer, M., Ndah, H.T., Sieber, S., Bonatti, M., and Lana, M. (2020). Stakeholders' perceptions on sustainability transition pathways of the cocoa value chain towards improved livelihood of small-scale farming households in Cameroon. *International Journal of Agricultural Sustainability*, 18(1), 55-69. https://doi.org/10.1080/14735903.2019.1696156

Voora, V., Bermúdez, S., and Larrea, C. (2019). *Global Market Report: Cocoa*. Sustainable Commodities Marketplace Series 2019. IISD-The International Institute for Sustainable Development. Retrieved from: https://www.iisd.org/system/files/publications/ssi-global-market-report-cocoa.pdf (access 6/1/2020)

Vurro, C., Russo, A., and Perrini, F. (2009). Shaping sustainable value chains: network determinants of supply chain governance models. *Journal of Business Ethics*, 90(4): 607-621. https://doi.org/10.1007/s10551-010-0595-x

Waas, T., Hugé, J., Verbruggen, A., and Wright, T. (2011). Sustainable Development: A Bird's Eye View. Sustainability, 3(10): 1637–1661. https://doi.org/10.3390/su3101637

WCED (1987). Our Common Future. Brundtland Report, Volume 4. Oxford University Press. Retrieve from: https://digitallibrary.un.org/record/139811?v=pdf#files (access 6/1/2020)

Wessel, M., and Quist-Wessel, F.F. (2015). Cocoa production in West Africa, a review and analysis of recent developments. *NJAS: Wageningen Journal of Life Sciences*, 74-75(1), 1-7. https://doi.org/10.1016/j.njas.2015.09.001

Walelign, S. Z. (2016). Livelihood strategies, environmen- tal dependency and rural poverty: the case of two villages in rural Mozambique. *Environment Development and Sustainability* 18(2), 593-613. https://doi. org/10.1007/s10668-015-9658-6

Walelign, S. Z., and Jiao, X. (2017). Dynamics of rural livelihoods and environmental reliance: empirical evidence from Nepal. *Forest Policy Economics*, 83(C), 199-2019. https://doi.org/10.1016/j.forpol.2017.04.008

Walsh, G., Shiu, E., and Hassan, L. M. (2014). Replicat- ing, validating, and reducing the length of the con- sumer perceived value scale. *Journal of Business Research*, 67(3), 260-267. https://doi.org/10.1016/j. jbusres.2013.05.012

WCED - World Commission on Environment and Development. (1987). *Our common future*, *17*(1), 1-91.

WCF – World Cocoa Foudation (2022). Collaboration for sustainable grouwth. Retrieve from: https://worldcocoafoundation.org/ (access 6/1/2024)

Winter, S.C., and May, P.J. (2001). Motivation for Compliance with Environmental Regulations. *Journal of Policy Analysis and Management* , *20*, 675-698. DOI:10.1002/pam.1023.

Winters, P., Davis, B., Carletto, G., Covarrubias, K., Quiñones, E.J., Zezza, A., and Stamoulis, K. (2009). Assets, activities and rural income generation: evi- dence from a multi-country analysis. *World Development*, 37 (9), 1435–1452. https://doi.org/10.1016/j. worlddev.2009.01.010.

Wold, H. (1982). Soft modeling: the basic design and some extensions. Syst. Under Indirect Observat. Part II, 1–54.

Woods, D. (1999). The politics of organising the countryside: rural cooperatives in Côte d'Ivoire. Journal of Modern African Studies, 37 (3), 489-506. https://doi.org/10.1017/S0022278X99003122

Wrede, M. (2023). Social Benefits of Cooperatives - An Economic Perspective. *Zeitschrift für das gesamte Genossenschaftswesen*, 73(4), 232-238. DOI: 10.1515/zfgg-2023-0018

Wu, K.J., Liao, C.J., Tseng, M.L., and Chiu, K.S. (2016). Multi-attribute approach to sustainable supply chain management under uncertainty. *Ind Manag Data Syst* 116(4), 777–800. http://dx.doi.org/10.1108/IMDS-08-2015-0327

Wu, K.J., Zhu Y., Tseng, M.L., Lim, M.K., and Xue, B. (2018). Developing a hierarchical structure of the co-benefits of the triple bottom line under uncertainty. *J. Cleaner Production*, 195: 908–918. http://dx.doi.org/10.1016/j.jclepro.2018.05.264

Yan, W., Chen, C., and Chang, W. (2009) An investigation into sustainable product constructualization using a design knowledge hierarchy and Hopfield network. *Comp. Indust. Engineering*, 56(4), 617-626. http://dx.doi.org/10.1016/j.cie.2008.10.015

Zaharia R.M., and Zaharia R. (2021). Triple Bottom Line. In: Crowther D., Seifi S. (eds) (2021). *The Palgrave Handbook of Corporate Social Responsibility*, 75-101. Palgrave Macmillan, SCham. https://doi.org/10.1007/978-3-030-42465-7_2

Zhang, L., Song, J., Hua, X., Li, X., Ma, D. and Ding, M. (2022). Smallholder rice farming practices across livelihood strategies: A case study of the Poyang Lake Plain, China. *Journal of Rural Studies*, 89, 199-207. https://doi.org/10.1016/j.jrurstud.2021.12.001

Zhao, X. (2017). Sustainable livelihoods research from the perspective of geography: The present status, questions and priority areas. *Geographical Research*, 36(10), 1859–1872. https://doi.org/10.11821/ dlyj201710004

Zamora, E. A. (2016). Value Chain Analysis: A Brief Review. *Asian Journal of Innovation and Policy*, 5.002, 116-128. http//dx.doi.org/10.7545/ajip.2016.5.2.116

Zou, Y., and Wang, Q. (2022). Impacts of farmer cooperative membership on household income and inequality: Evidence from a household survey in China. Agricultural Economics, 10(17). https://doi.org/10.1186/s40100-022-00222-x

Appendix A | Survey

As part of my PhD in **Agribusiness and Sustainability** at the Universities of Évora and Trás-os-Montes e Alto Douro, I am developing a study on "***Organic cocoa producers in São Tomé and Príncipe (STP): Value chain, governance, and sustainability***." To this end, I request your participation in completing the following questionnaire, which will take approximately 45 minutes. The data collected in this study will be used exclusively for academic and scientific purposes. Participation in this research is voluntary; therefore, you may decline or discontinue completing the questionnaire at any time. The data collected will be treated anonymously and confidentially. If you require any clarification regarding this study, please contact researcher Ibrahim Prazeres at ibrahim.prazeres@uevora.pt. Having read the information about the study, I declare that I give my free and informed consent to respond to the questionnaire for this study.

____/____/2021

□ I agree to participate

□ I decline to participate

Thank you for your collaboration!

Cocoa Producers' Questionnaire

*The following questionnaire was designed for an investigation on **Organic Cocoa Producers in São Tomé and Príncipe (STP): Value Chain, Governance and Sustainability**, to achieve the Doctor's Degree in Agribusiness and Sustainability from the Universities of Évora and Trás-os-Montes and Alto Douro.*

Your answers on a series of questions related to your organic cocoa production, will contribute to this work, which objective is to understand the effect of value chain governance mechanisms and national policies on small cocoa producers in STP, focusing on organic cocoa, and the attitudes towards risks that affect sustainability. All data collected will be treated confidentially.

The Quiz has three sections (A, B and C), please try to answer all the questions. Thank for your collaboration.

Ibrahim dos Prazeres

A. CHARACTERIZATION OF THE HOUSEHOLD

A1. HUMAN CAPITAL

P1. Are you the head of the household?

☐ Yes (GO TO P3) ☐No (GO TO P2)

P2. How do you relate to the head of the household?

_____

P3. Gender (of the head of the household)

☐Female ☐Male

P4. Age (of the head of the household)

_____

P5. Marital Status (of the head of the household)

_____

P6. Please indicate how many people live in your house, specify age gap, gender and workplace (not including the head of the family):

Age Gap	Female (Amount)	Male (Amount)	Works in the family's land parcel (YES | NO)	Works outside the family's land parcel (YES | NO)
Below 5 years old				
5-18 years old				
19-65 years old				
Over 65 years old				

P7. Of the people who work temporarily or permanently in the fields ('roça'), how many are:

- Members of the family who live in your household: _____
- Members of the family who do not live in your household: _____
- People who are not related to you: _____
- Solely the head of the household works in the fields (Yes or No): ____

P8. The people who live in your household, when they work the fields they have (select all the options necessary):

- Permanent job with a fixed salary ☐
- Permanent job with a variable pay ☐
- Temporary job with a fixed salary ☐
- Temporary job with variable pay ☐
- Other, which? _____

P9. The remaining people (relatives who do not live in your household and other workers) when working on the family fields they have (select all the options necessary):

- Permanent job with a fixed salary ☐
- Permanent job with a variable pay ☐
- Temporary job with a fixed salary ☐
- Temporary job with variable pay ☐
- Other, which?_____

P10. People who inhabit the household, when they work OUTSIDE the family fields they have (select all the options necessary):

- Permanent job with a fixed salary ☐
- Permanent job with a variable pay ☐
- Temporary job with a fixed salary ☐
- Temporary job with variable pay ☐
- Other, which?_____

P11. Of these income sources, please identify which ones are permanent (P), temporary (T) or non-existent (I) in your household (select all the options necessary). Additionally, please estimate the percentage these represent in terms of your monthly income.

Monthly income sources	P	T	I	% do Total
Agricultural produce sale				
Agricultural wages outside the farm/fields				
Non-agricultural wages outside the farm/fields				
non-agricultural owned business				
Subsidy | human development				
Family remittances/consignments				
Pension(s)				
Other sources?				

P12. What is the level of education of the head of the household?

- Unschooled ☐
- Primary school☐
- Secondary School ☐
- Higher Education ☐

P13. In addition to formal education, in the last year have you participated in any courses, workshops or training?

- ☐ Yes (GO TO P14)
- ☐ No (GO TO P15)

P14. In what subjects did you receive training?

_____

P15. Could you please state which social class you identify with?

☐ Upper Class ☐ Upper Middle Class ☐ Middle Class

☐ Working Class ☐ Lower Class ☐ Extreme Lower Class

P16. Could you please identify which ethnic group your family identifies with?

☐Mixed Race ☐ White ☐ Black

A2. NATURAL CAPITAL

Please complete the following information:

Produce/Crops	1	2	3	4	5
P17. Which crops/produce did you work on last year? (Identify all you have worked on)					
P18. The land where you worked on those crops was your own (P), rented (A), borrowed (E), community owned (C), other (O)					
P19. The land area devoted to each of these crops was approximately from? (Choose acres/parcels – Scratch what does not apply):					
P20. In the past year (2020), approximately how many kg of those crops did you harvest?					
P21. Of the crops produced, what percentage was used for sale purposes?					
P22. Approximately how much of these productions were marketed (kg, etc.)?					
P23. With whom did you sell these productions: local buyers (CL), international buyers (CI), cooperative (C), association (A), exporter (E), factory (F), other (O)?					
P24. Of the crops produced, what percentage was used for private in-house consumption?					
P25. Of the crops produced, what percentage was used to pay off loans/ other reasons?					
P26. The water used for these plantations derives mainly from: rain water (AC), river (R), piped water (C), other (O)					
P27. During the *Gravana* how frequently did your family had access to water to use for cultivation? Permanent (P), Weekly (S), fortnightly (Q), monthly (M), other (O)					
P28. During the rain season how frequently did your family had access to water for cultivation? (Permanent ,Weekly ,fortnightly, monthly, othe)					
P29. The type of seed used for these products comes from: own production (PP), Cooperative (C), CIAT (CI), Ministry of Agriculture (MA), purchased (A), other (O)					

P30. How many hectares/plots of your own land are unused?

_____

A3. PHYSICAL CAPITAL

Please complete the following information:

1	2	3	4
Activity: _____	P31. For each of the activities in column 1, identify if machinery is used or not (YES or NO)	P32. For those activities you answered YES to in column 2, identify the type of access (see alternatives P32.)	For activities which the answer was YES and with owned access, what was the most important factor for the acquisition? (See alternatives Q33.)
Plow/ Land preparation			
Seeding			
Weed Control			
Harvest			
Grain Drying			
Product Weighing			
Product Packaging			
Product Transport			
Others:			

Please fill in the blank columns with the required information:

Alternatives P32					
Owned	Rented	Borrowed	Public	Common	Others

Alternatives P33				
Own resources	Credited	State Parcel	Inheritance	Others (which?)

Please fill in the blank columns with the required information:

1	2
Options	P34. Indicate whether or not you have access to each of the options in column 1 (YES or NO)
Potable Water	
Electricity	
Crop Storage	
Transportation	
Passable Road	
Landline	
Mobile Phone	
Internet	
TV, radio and other information mediums	
Health Center, Hospital or Clinic	
School, University or Educational Center	
Agricultural/ Veterinary Extension	

A4. FINANCIAL CAPITAL

P35. Where do you normally keep your savings?

Bank Cooperative Savings Bank Normal account/common boxes None

P36. Are you a beneficiary of any State or Institutional Development Subsidy?

Yes No

P37. Are you a beneficiary of any other Subsidy?

Yes No

P38. Do you have a family member who regularly sends you money?

Yes No

P39. Do you have some kind of insurance against production losses due to rain, drought, fire, etc.?

Yes No

P40. Have you or a member of your family applied for a loan that is still in effect?

Yes (GO TO P41 and P42) No (GO TO P43)

P41. The loan was requested from:

Family Neighbors Moneylender Cooperative Private Bank Public Bank

P42. The primary use of this loan was:

Cocoa Renovation
Renovation of other productions
Land Purchase
Home Reparations
Consumption (health, education, goods)
Other use, which?_____

A5. SOCIAL CAPITAL

P43. Do you, or any member of your family belong to an organization (agriculture, neighbors, etc.)?

Yes (GO TO P44 AND P45) No (GO TOP46)

P44. What type of organization do you most actively participate in?

Cooperative CECAB
Cooperative CECAC11
Neighborhood Committee
Other, which?_____

P45. So far, you consider that the benefit you have gained from being a member of this organization has been:

None Little Average
High Very high

How would you rate your level of confidence in:

Options	None	Little	Average	High	Very High
P46. Neighbors					
P47. Organizations you belong to					
P48. Intermediaries /buyers of your products/ production					
P49. District Chamber					
P50. Local Municipality					
P51. Cooperative(s)					
P52. National Government					
Other. Which:					

P53. How did you obtain information regarding the prices of the products you sell?

☐ Neighbors
☐ Through the Cooperative
☐ When meeting buyers (intermediaries, exporters)
☐ Through radio, press, TV, internet.
☐ Through local administration (Agriculture Services, Parish Council, District Chambers, etc.).
☐ Through central government.

P54. How did you learn the ideal times for planting, harvesting and other agricultural activities?

☐ Neighbors
☐ Through the Cooperative
☐ Self-taught
☐ Through radio, press, TV, internet
☐ Through local administration (Agriculture Services, Parish Council, District Chambers, etc)
☐ Through central government

P55. How did you learn about the risks of floods, droughts, fires, other?

☐ Neighbors
☐ Through the Cooperative
☐ Self-taught
☐ Through radio, press, TV, internet
☐ Through local administration (Agriculture Services, Parish Council, District Chambers, etc)
☐ Through central government

Q56. How did you know the best types of crops to cultivate?

☐ Neighbors
☐ Through the Cooperative
☐ Self-taught
☐ Through radio, press, TV, internet
☐ Through local administration (Agriculture Services, Parish Council, District Chambers, etc)
☐ Through central government

B. RISK PERCEPTION AND ATTITUDE

B1. PROBABILITY OF OCCURENCE (LOW=1 HIGH =7)

What are the chances of the following events happening in your farm in the near future?

		Low Probability (1)						High Probability (7)
P57.	Loss of production due to excessive rain	1	2	3	4	5	6	7
P58.	Loss of production due to severe drought	1	2	3	4	5	6	7
P59.	Loss of Production due to plagues and diseases	1	2	3	4	5	6	7
P60.	Excessive reduction of the commercialization price of your produce	1	2	3	4	5	6	7
P61.	Excessive increase of the input costs of your agriculture produce	1	2	3	4	5	6	7
P62.	Low income in comparison to costs, over a long period of time	1	2	3	4	5	6	7
P63.	Unexpected changes in the government's economic policies (farm negative impact)	1	2	3	4	5	6	7
P64.	Cancellation of government agricultural aid programs (kits, insurance, training…)	1	2	3	4	5	6	7
P65.	Disappearance of cooperatives/agricultural associations in this sector	1	2	3	4	5	6	7
P66.	Deterioration of roads and pathways for the transportation of produce	1	2	3	4	5	6	7
P67.	Increase in intermediaries, who obtain greater profit	1	2	3	4	5	6	7
P68.	Registration of National Cocoa Support Policies	1	2	3	4	5	6	7
P69.	Lack of guidance on which cultures to produce/plant	1	2	3	4	5	6	7
P70.	Registration of policies to better the commercialization conditions	1	2	3	4	5	6	7
P71.	Compliance with contractual conditions by companies (Exporters, etc.)	1	2	3	4	5	6	7
P72.	Mixes between national BIO cocoa and others at the time of sale.	1	2	3	4	5	6	7
P73.	Disappearance of government support programs for BIO cocoa	1	2	3	4	5	6	7
P74.	Personal Issues that negatively affect the farm	1	2	3	4	5	6	7
P75.	Discrimination in the delivery of seeds and inputs	1	2	3	4	5	6	7

B2. IMPACT SEVERITY (LOW=1 HIGH =7)

What would be the impact on your farm if the following events occurred?

		Low Impact (1)					High Impact (7)	
P76.	Loss of production due to excessive rain	1	2	3	4	5	6	7
P77.	Loss of production due to severe drought	1	2	3	4	5	6	7
P78.	Loss of Production due to plagues and diseases	1	2	3	4	5	6	7
P79.	Excessive reduction of the commercialization price of your agriculture produce	1	2	3	4	5	6	7
P80.	Excessive increase of the input costs of your agriculture produce	1	2	3	4	5	6	7
P81.	Low income in comparison to costs, over a long period of time	1	2	3	4	5	6	7
P82.	Unexpected changes in the government's economic policies (farm negative impact)	1	2	3	4	5	6	7
P83.	Cancellation of government agricultural aid programs (kits, insurance, training,…)	1	2	3	4	5	6	7
P84.	Disappearance of cooperatives/agricultural associations in this sector	1	2	3	4	5	6	7
P85.	Deterioration of roads and pathways for the transportation of produce	1	2	3	4	5	6	7
P86.	Increase in intermediaries, who obtain greater profit	1	2	3	4	5	6	7
P87.	Registration of National Cocoa Support Policies	1	2	3	4	5	6	7
P88.	Lack of guidance on which cultures to produce/plant	1	2	3	4	5	6	7
P89.	Registration of policies to better the commercialization conditions	1	2	3	4	5	6	7
P90.	Compliance with contractual conditions by companies (Exporters, etc.)	1	2	3	4	5	6	7
P91.	Mixes between national BIO cocoa and others at the time of sale	1	2	3	4	5	6	7
P92.	Disappearance of government support programs for BIO cocoa	1	2	3	4	5	6	7
P93.	Personal Issues that negatively affect the farm	1	2	3	4	5	6	7
P94.	Discrimination in the delivery of seeds and inputs	1	2	3	4	5	6	7

B3. DEGREE OF CONTROL (LOW=1 HIGH =7)

To what extent do you consider that you can influence the occurrence or impact of the following events:

		Low influence (1)					High Influence (7)	
P95.	Loss of production due to excessive rain	1	2	3	4	5	6	7
P96.	Loss of production due to severe drought	1	2	3	4	5	6	7
P97.	Loss of Production due to plagues and diseases	1	2	3	4	5	6	7
P98.	Excessive reduction of the commercialization price of your produce	1	2	3	4	5	6	7
P99.	Excessive increase of the input costs of your agriculture produce	1	2	3	4	5	6	7
P100.	Low income in comparison to costs, over a long period of time	1	2	3	4	5	6	7
P101.	Unexpected changes in the government's economic policies (farm negative impact)	1	2	3	4	5	6	7
P102.	Cancellation of government agricultural aid programs (kits, insurance, training…)	1	2	3	4	5	6	7
P103.	Disappearance of cooperatives/agricultural associations in this sector	1	2	3	4	5	6	7
P104.	Deterioration of roads and pathways for the transportation of produce	1	2	3	4	5	6	7
P105.	Increase in intermediaries, who obtain greater profit	1	2	3	4	5	6	7
P106.	Registration of National Cocoa Support Policies	1	2	3	4	5	6	7
P107.	Lack of guidance on which cultures to produce/plant	1	2	3	4	5	6	7
P108.	Registration of policies to better the commercialization conditions	1	2	3	4	5	6	7
P109.	Compliance with contractual conditions by companies (Exporters, etc.)	1	2	3	4	5	6	7
P110.	Mixes between national BIO cocoa and others at the time of sale	1	2	3	4	5	6	7
P111.	Disappearance of government support programs for BIO cocoa	1	2	3	4	5	6	7
P112.	Personal Issues that negatively affect the farm	1	2	3	4	5	6	7
P113.	Discrimination in the delivery of seeds and inputs	1	2	3	4	5	6	7

B4. PREFERENCE FOR RISK MANAGEMENT TOOLS (LOW=1 HIGH= =7)

To what extent do you consider the following actions adequate or inappropriate to face your crop problems:

		Low influence (1)						High Influence (7)
P114.	Keep money stored away for periods of greater adversity	1	2	3	4	5	6	7
P115.	Plant different products at the same time (diversification)	1	2	3	4	5	6	7
P116.	Keep different sources of income (produce sale, agricultural tourism)	1	2	3	4	5	6	7
P117.	Make produce sale contracts with companies in advance	1	2	3	4	5	6	7
P118.	Earn income outside the farm	1	2	3	4	5	6	7
P119.	Seek help at a farmer association	1	2	3	4	5	6	7
P120.	Invest in better techniques for the farm	1	2	3	4	5	6	7
P121.	Invest in land increase for the farm	1	2	3	4	5	6	7
P122.	Work harder during difficult periods	1	2	3	4	5	6	7
P123.	Quit buying things that aren't for the farm	1	2	3	4	5	6	7
P124.	Contract an agriculture insurance	1	2	3	4	5	6	7
P125.	Avoid taking large bank loans	1	2	3	4	5	6	7

P. 126 In addition to those mentioned above, what other actions would you take in the future to address the problems that normally arise on your property (roça): (open question).

C. PERCEIVED VALUE OF JOINING THE COOPERATIVE

P. 127 What is your assessment of the benefit and cost of working with the Cooperative? (CECAC11/CECAB), please consider what you get from it and what you give to it. Make this assessment based on the scale ranging from "totally disagree" to "totally agree".

Scale		Totally disagree	Highly disagree	Slightly disagree	I don't disagree nor agree	Slightly agree	Highly agree	Totally agree
F1	The work (connection) with the cooperative is as agreed							
F2	The work with the cooperative was well conceived							
F3	The working model I have with the cooperative is acceptable							
E1	The work with the cooperative is one of my favorites							
E2	The work with the cooperative inspires me to keep going							
E3	The work with the cooperative makes me feel good							
S1	The work with the cooperative makes me feel accepted by other people							
S2	The work with the cooperative improves how other people see me							
S3	The work with the cooperative gives other people a good impression of me							
P1	What I get is worth what I give (time and effort)							
P2	Working with the cooperative increases the benefits obtained over the costs							
P3	The work with the cooperative is good when comparing the costs I have to bear							

Appendix B | Statistics

TABLE B1. Variables Definition and Descriptive Statistics

Variable	Description	Total sample					LS1 Mono-crop		LS2 Bi-crop		LS3 Multi-crop	
		Obs.	Mean	Standard Deviation	Min	Max	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Crops	Number of crops	809	2,220	0,922	1,0	7,0	1,000	0,000	2,000	0,000	3,628	0,865
Feminine gender	0=male; 1= Female	809	0,330	0,471	0,0	1,0	0,313	0,466	0,374	0,484	0,217	0,413
Age	Age of farmers	809	48,477	12,291	15,0	88,0	52,896	11,643	48,156	12,042	46,572	12,786
Family size	Number of male and female members	810	4,231	1,962	1,0	12,0	3,643	1,893	4,156	1,896	4,828	2,049
Education level	1=no studies; 2=Primary; 3=secondary; 4= Graduate	764	2,205	0,492	1,0	4,0	2,165	0,396	2,148	0,462	2,401	0,581
Number of professional training courses	Number of training courses enrolled	810	1,183	0,720	0,0	6,0	1,252	0,590	1,202	0,632	1,083	0,980
Number of members on-farm work	Family members with farm work	810	0,886	0,739	0,0	3,0	0,800	0,829	0,868	0,713	0,994	0,744
Number of members off-farm work	Family members with off-farm work	810	0,412	0,538	0,0	3,0	0,313	0,466	0,399	0,506	0,511	0,647
Perception of social class	1=very low; 2=low; 3=low average; 4=average; 5=high average; 6=high	810	2,816	0,731	1,0	6,0	2,739	0,869	2,837	0,603	2,806	0,940
Income from agricultural selling	Percentage of income from agricultural selling	810	54,640	25,585	25,0	100,0	57,548	18,366	58,035	25,440	43,089	26,690
Income from subsidies (human development and others) and remittances from emigrants	0=do not receive subsidies; 1=receive subsidies	810	0,037	0,189	0,0	1,0	0,000	0,000	0,023	0,151	0,100	0,301
Insurances and loans	0=do not have insurance and loans; 1=have insurance and loans	810	0,072	0,258	0,0	1,0	0,052	0,223	0,054	0,227	0,133	0,341
Cacao area	Hectares	810	1,931	0,812	0,5	12,5	2,084	0,422	1,903	0,874	1,915	0,807
Cacao total production	Kilos	782	1110	763,069	1,5	9600	983	877,040	1066	629,593	1341	992,544
Banana area	Hectares	662	1,920	0,839	0,5	12,5	1,625	0,250	1,912	0,836	1,947	0,858
Banana total production	Kilos	658	939	1222,185	20,0	12000	2000	0,000	725	932,667	1520	1676,375
Access to potable water	0=without access; 1=with access	786	0,355	0,479	0,0	1,0	0,200	0,402	0,389	0,488	0,360	0,482
Access to electricity	0=without access; 1=with access	786	0,983	0,128	0,0	1,0	1,000	0,000	0,982	0,132	0,975	0,156
Access to harvest storage	0=without access; 1=with access	785	0,760	0,427	0,0	1,0	0,939	0,240	0,821	0,384	0,438	0,498
Access to transportation	0=without access; 1=with access	785	0,753	0,432	0,0	1,0	0,939	0,240	0,813	0,390	0,425	0,496
Access to roads	0=without access; 1=with access	785	0,768	0,422	0,0	1,0	0,730	0,446	0,821	0,384	0,625	0,486
Access to landline	0=without access; 1=with access	785	0,028	0,165	0,0	1,0	0,035	0,184	0,022	0,146	0,044	0,205
Access to mobile phone	0=without access; 1=with access	785	0,930	0,256	0,0	1,0	0,983	0,131	0,902	0,298	0,981	0,136
Access to internet	0=without access; 1=with access	785	0,173	0,379	0,0	1,0	0,130	0,338	0,145	0,353	0,294	0,457
Access to TV and radio	0=without access; 1=with access	785	0,968	0,215	0,0	1,0	1,000	0,000	0,951	0,265	1,000	0,000

TABLE B1. Variables Definition and Descriptive Statistics (Cont.)

Variable	Description	Total sample					LS1 Mono-crop		LS2 Bi-crop		LS3 Multi-crop	
		Obs.	Mean	Standard Deviation	Min	Max	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Access to health centre	0=without access; 1=with access	785	0,764	0,425	0,0	1,0	0,965	0,184	0,821	0,384	0,438	0,498
Access to schools	0=without access; 1=with access	784	0,902	0,298	0,0	1,0	0,991	0,093	0,910	0,287	0,811	0,392
Access to extension services	0=without access; 1=with access	784	0,711	0,453	0,0	1,0	0,904	0,295	0,786	0,411	0,333	0,473
Belong to CECAB	0=do not belong to CECAB; 1= belong to CECAB	810	0,522	0,500	0,0	1,0	0,800	0,402	0,589	0,492	0,150	0,358
Satisfaction with cooperatives	1=none; 2=just a little; 3=indifferent; 4=High; 5=very high	754	4,507	0,663	2,0	5,0	4,774	0,578	4,496	0,606	4,331	0,831
Trust level in neighbours	1=none; 2=just a little; 3=indifferent; 4=High; 5=very high	799	3,564	0,905	1,0	5,0	3,887	0,542	3,670	0,821	3,040	1,104
Trust level in civil organizations	1=none; 2=just a little; 3=indifferent; 4=High; 5=very high	754	3,935	0,590	1,0	5,0	3,965	0,476	3,974	0,498	3,775	0,878
Trust level in agricultural organizations	1=none; 2=just a little; 3=indifferent; 4=High; 5=very high	799	2,355	0,920	1,0	5,0	2,070	0,558	2,470	0,934	2,207	1,010
Trust level in district council	1=none; 2=just a little; 3=indifferent; 4=High; 5=very high	799	1,070	0,388	1,0	5,0	1,070	0,413	1,041	0,314	1,155	0,531
Trust level in local council	1=none; 2=just a little; 3=indifferent; 4=High; 5=very high	799	1,064	0,350	1,0	5,0	1,052	0,292	1,035	0,305	1,155	0,474
Trust level in cooperatives	1=none; 2=just a little; 3=indifferent; 4=High; 5=very high	754	4,521	0,682	1,0	5,0	4,861	0,560	4,518	0,629	4,254	0,820
Trust level in government	1=none; 2=just a little; 3=indifferent; 4=High; 5=very high	799	0,431	0,220	1,0	5,0	1,087	0,431	1,026	0,220	1,109	0,532
Perception of the likelihood of risks occurring	1=low probability … 7=high probability	809	2,599	0,804	1,3	5,8	2,252	0,454	2,471	0,725	3,185	0,900
Perception of risk impact severity	1=low impact … 7=high impact	809	4,729	0,615	1,8	6,3	4,522	0,520	4,733	0,503	4,852	0,875
Perception of the degree of self-control of the impact	1=low control … 7=high control	809	4,004	0,326	1,6	5,1	3,975	0,391	4,024	0,255	3,965	0,440
Perception of the importance of risk management tools	1=very inadequate… 7=very adequate	809	4,918	0,524	1,5	7,0	4,971	2,917	4,958	1,500	4,771	1,750
Perception of joining a cooperative - functional value	1=strongly disagree…7=totally agree	809	5,705	0,547	3,3	7,0	5,835	0,310	5,717	0,535	5,585	0,667
Perception of joining a cooperative - emotional value	1=strongly disagree…7=totally agree	809	5,848	0,647	2,3	7,0	6,035	0,281	5,867	0,582	5,674	0,904
Perception of joining a cooperative - social value	1=strongly disagree…7=totally agree	809	5,952	0,421	3,3	7,0	6,026	0,283	5,941	0,402	5,935	0,530
Perception of joining a cooperative - monetary value	1=strongly disagree…7=totally agree	809	5,949	0,405	3,7	7,0	5,977	0,210	5,969	0,344	5,874	0,604