Haute Ecole

Groupe ICHEC – ECAM – ISFSC

Enseignement supérieur de type long de niveau universitaire

Sustainability Awareness Framework: how could information-based solutions promote strong sustainability in the coffee value chain.

Mémoire présenté par :

Yabili Marvin Daniel

Pour l'obtention du diplôme de

Master en gestion de l'entreprise

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Promoteur :

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For building the person that I am and will be, I express to you all my complete gratitude and affection.

Je soussigné, Yabili Marvin Daniel, 2 ème Master en Gestion d'entreprise, déclare par la présente que le mémoire ci-joint est exempt de tout plagiat et respecte en tous points le règlement des études en matière d'emprunts, de citations et d'exploitation de sources diverses signé lors de mon inscription à l'ICHEC, ainsi que les instructions et consignes concernant le référencement dans le texte respectant la norme APA, la bibliographie respectant la norme APA, etc. mises à ma disposition sur Moodle. Par ma signature, je certifie sur l'honneur avoir pris connaissance des documents précités et que le travail présenté est original et exempt de tout emprunt à un tiers non-cité correctement.»

24/05/2021

I dedicate this thesis to you, my Country, the Democratic Republic of Congo, for you have given me birth among a people full of love and resilience. To my brothers and sisters may you keep your head up high for even the darkest night comes to an end, the sun always rises but your hearts, soul, and pride are eternal.

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PART 1: INTRODUCTION & METHODOLOGY

The story of this thesis started after a lucky family winter escapade under the Covid pandemic. One morning while I was getting ready to study my class of environmental economics for my term's evaluation, I followed my daily routine of starting my coffee machine, stretching, and listening to a podcast. That fascinating podcast elaborated on the benefits of enjoying the little moment of the day and their impacts on our mental health. During that inspiring talk, the narrator tackled his passion for coffee and mentioned a quote that caught my attention:

"As long as there is coffee in the world, how bad could things be?"

Cassandra Clare

Effectively, my morning coffee on the process, how bad could things be? Such a trivial routine brings me joy and happiness every morning, especially when I enjoyed the fantastic specialty coffee of my brother and sister-in-law. I finished my stretching with a smile on my face, and then the drama hit me; I instinctively turned on the coffee machine without knowing that there was no more coffee in the house. No more coffee in my World, so how bad could things be?

I was caught by naïve mindset. To enjoy the little moment we have in life, of course, we must have them in the first place. Every morning I want my cup of coffee, but nothing guarantees me that I will tomorrow. Actually, I never really thought about the origins of my coffee.

Therefore, the question burned my mind: What is the structure of the coffee value chain, and how can I know if I could enjoy that morning cup of coffee in the future? I, therefore, started reading on the subject with curiosity. My findings were shocking. Based on recent studies (Christian Bunn, 2015), more than 50% of the total area suitable for coffee production will disappear due to climate change before 2050 and the environmental changes catalyze the development of new pests and diseases that are alternating the taste of coffee. My morning coffee would be impacted both in terms of volume and quality in such a short period. The reality is simple and quite frustrating, and if I wanted to paraphrase the quote that I heard that morning, I would have said:

"Soon, there will be no coffee in the world, so things must be terrible!"

As a consumer, I was stunned by my ignorance of a commodity that I consume every morning with passion, and as a business student, I could not understand how such a big market with so many big players can vanish day by day without anyone making a strong voice about it.

After some research and face-to-face exploratory interviews, I understood that the lack of action and information on the subject was mainly the cause of misalignment between interest and power. Effectively, the coffee value chain has a large volume of small-scale producers

bargaining with a low number of large buyers. That asymmetry prevents cooperation among the different actors of the value chain. Not only the bargaining power of those who are producing the coffee that I love is low, but they are also living on a thin line of profit that is endangered by climate change which reinforces the social injustice of their situation.

The specific issue of asymmetric bargaining power has been mainly handled by certification initiatives such as Fair Trade, UTZ, rainforest, or 4C designed to provide socio-environmental standards. As a consumer, I was convinced that I was doing my share of good action for a Better World by purchasing my Fairtrade coffee. Unfortunately, more and more research (Haight, 2011) points out that the certification requirements bring economic disadvantages for producers and decrease quality for consumers. Indeed, those initiatives tend to reinforce the asymmetry mentioned above and fail to achieve their promises.

My internship at the Trade for Development Center, an Enabel project that aims to promote the "Fair Trade" commerce, under the mentorship of Samuel Poos, allowed me to experience proximity with local producers, their expectations, and their realities. That closeness confirmed my interest in the subject and helped me refine my thesis's perspective.

For my last academic work, I decided to join my passion for sustainable management and coffee by questioning how solutions that lever the information could achieve a strong sustainability in the coffee value chain by decreasing the environmental tensions and increasing the social conditions of the workers in the coffee production. For the specific cases of this research, we will focus on the aspects of the farmers' living income.

This thesis aims to exploit the concept of strong sustainability and a boundary approach under indicators presented in the "Doughnut economics" (Raworth, 2018) to leverage information theories in neoclassic and behavioral economics in order to create a framework that allows the evaluation of sustainability targets and the development of information-based solutions to solve them. We will then seek to introduce the reader to the concept of strong sustainability compared to weak sustainability. The Sustainability Awareness Framework and the Sustainability Awareness Canvas will then be introduced to the reader before jumping into the analysis of the coffee value chain and the climate change impact on it. With the information collected, we will evaluate the Fairtrade certification scheme for the case of Ugandan coffee farmers through our framework. Ultimately, we will leverage all the knowledge gathered and the framework to suggest new information-based solutions to help reach a living income for farmers inside the coffee value chain. I may quote that:

"Sustainability is not a goal to be reached but a way of thinking, a way of being, a principle we must be guided by."

Giulio Bonazzi

CHAPTER 1: ISSUE STATEMENT

The coffee value chain is fueled by Arabica (61.6%) and Robusta (38.4%), which account for 99% of the World's total coffee production. To be produced, coffee requires specific environmental conditions to survive and a perfect setup to thrive. Those demanding conditions make coffee production highly sensitive to climate change. Recent studies forecast a 50% reduction of coffee's suitable production areas by 2050 with significant losses in consumers and producers' most favored regions. Climatic changes, environmental knock-on effects, economic pressures, and social tensions push the industry's low-end into an already thick wall. Due to the low level of responsiveness capabilities, the climate change impact on the social structure leads the coffee farmers into a vicious cycle of further increasing climate change. For the many coffee farmers relying on coffee production for survival, we should consider innovative ways to deal with the rising issues of climate changes and social tensions by implementing solutions to support and reinforce the resilience of the value chain while informing and mitigating the issues faced along the way.

Voluntary initiatives aimed at resolving climate change and social justice by leveraging the power of information through certification schemes. These certification schemes developed around neoclassical economic principles face more and more critics regarding their promises and limits. Effectively, we will introduce the reader, through the Fairtrade certification scheme analysis in part 5, to the fact that the actual framing induced by weak information systems increases social injustice and environmental tension.

This thesis aims to understand the logic behind information-based solutions (a solution that seeks to meet their goal by leveraging information) to provide a framework for analysis and improvement under the philosophy of strong sustainability. The concept of strong and weak sustainability will be introduced in part 2, chapter 1 of this thesis. Using lenses that go beyond the reductionist view of the economy and its actor, we expect to paint a more realistic view of the coffee value chain structure and issues. To achieve that goal, we will introduce, in chapter 3 of the second part of this thesis, the “Sustainability Awareness Framework,” which have been created in the context of this thesis to understand how information and its framing could ultimately impact the “awareness” of an entity in terms of its willingness to act on sustainability issues.

The ultimate goal of this thesis is to provide information-based tracks that could induce strong sustainability in the coffee value chain. To meet that goal, we will analyze the ins and out of the coffee value chain in parts 3 and 4 of this thesis. The elements collected in these two sections will serve as the basic empirical data for the analysis. The Sustainability Awareness Framework developed in this paper implies that gaps between what we expect in terms of sustainability and what we observe could be closed by leveraging the necessity to act on sustainability issues, the ability to act on sustainability issues, the opportunity of acting on sustainability issues, and the information that frame the issues. To fuel that framework, we took inspiration from the "value proposition design canvas" (Osterwalder, 2014) to produce a “Sustainability Awareness Canvas” that aims at structuring and scaling down the sustainability awareness analysis.

The data and canvas will then be used to set living income goals, evaluate the ability of the Fairtrade certification scheme to reach that goal, and suggest alternative information-based solutions that could bring strong sustainability in the coffee value chain.

CHAPTER 2: METHODOLOGY

This chapter presents the approach used in this thesis and the methodological choices that have been made. To do so, we will explore the philosophical lenses used to tackle the issue, the research approach, and conclude with the data collection method.

2.1 PHILOSOPHY OF SCIENCE

Economics handles four main issues that vary in terms of importance depending on the economic "school" considered. Those four main problems are:

FIGURE 1:NEO-CLASSICAL VS. ECOLOGICAL VIEW OF THE ECONOMY

SOURCE: OWN CREATION BASED ON (ROMAN, 2020)

The philosophy of this research lies in ecological economics, which is centered around the questions of scarcity, uncertainty, and change (Bartkowski, 2016). In ecological economics, environmental and social degradation is not considered an external exception of the market. At the opposite of environmental economics that considers nature through neoclassic eyes, ecological economics considers that the economy lies inside a network of material and energy flows of extraction, transformation, and rejection. Therefore, the leading philosophy is to see the economy as embedded inside its environment (Roman, 2020).

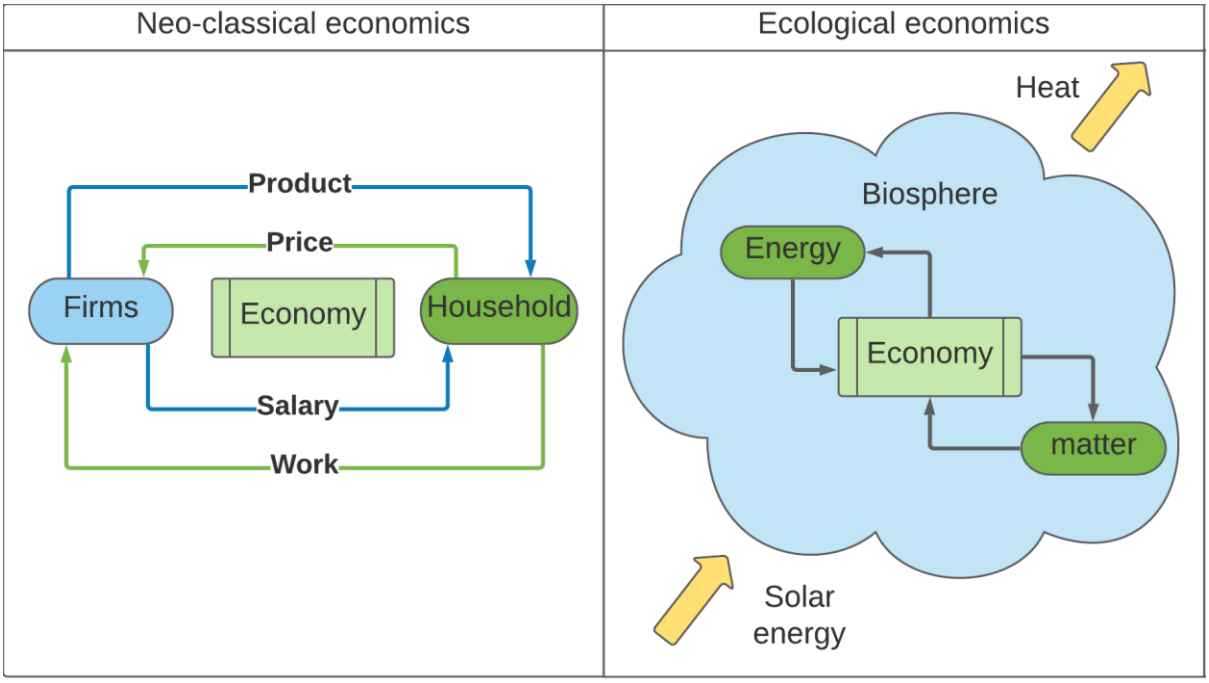


FIGURE 2: WHICH PROBLEM IS CENTRAL TO THE ECONOMY?
SOURCE: OWN PRODUCTION INSPIRED BY (EXPLORING ECONOMICS, 2021)

Environmental economics seeks to integrate nature inside the economic models through market-based solutions by considering the natural capital substitutable by human and material capital. Ecological economics considers that there is a constraint on all material and energy - economic activity should be seen as a complex exchange of energy and matter with the environment.

To go a bit deeper into the philosophy of the study, we add, in the socio-ecological economics view, the variable of social constraint on top of environmental constraint. The link of the two can be observed in the "Doughnut economics" framework (Raworth, 2018) , which aims at recentering the economy around its fundamental question: "how, as a human society, could we reach qualitative living standards within planetary boundaries." To do so, we consider that the goal of any economic activity is not to bring financial wealth but to reach a “social foundation” for all. The economy is therefore not a goal but only a means to reach that goal.

For this thesis, the main philosophy will be to analyze the coffee value chain as an economic activity aiming to provide qualitative living standards under an ecological ceiling and to provide insights into how that goal could be reached under the ecological economics consideration of strong sustainability.

2.2 RESEARCH APPROACH

According to Dubois and Gade's paper on systematic combining (Anna Dubois, 2002), the research approach for this thesis is an abductive reasoning approach. Abduction reasoning refers to drawing conclusions based on the explanations that best explain a state of events rather than from evidence provided by the premises (Thagard, 1997). Therefore, the study will not be inductive nor deductive but will move back and forth between data and theory. As explained in Dubois and Gade's paper on systematic combining (Anna Dubois, 2002), "Systematic combining is a process where theoretical framework, empirical fieldwork, and case analysis evolve simultaneously." This approach has been chosen to enable this thesis to mix empirical data, theoretical knowledge, framework, and case information to create new knowledge. The research process of this paper has therefore combined theory, case studies, empirical data, and framework to provide the following structure:

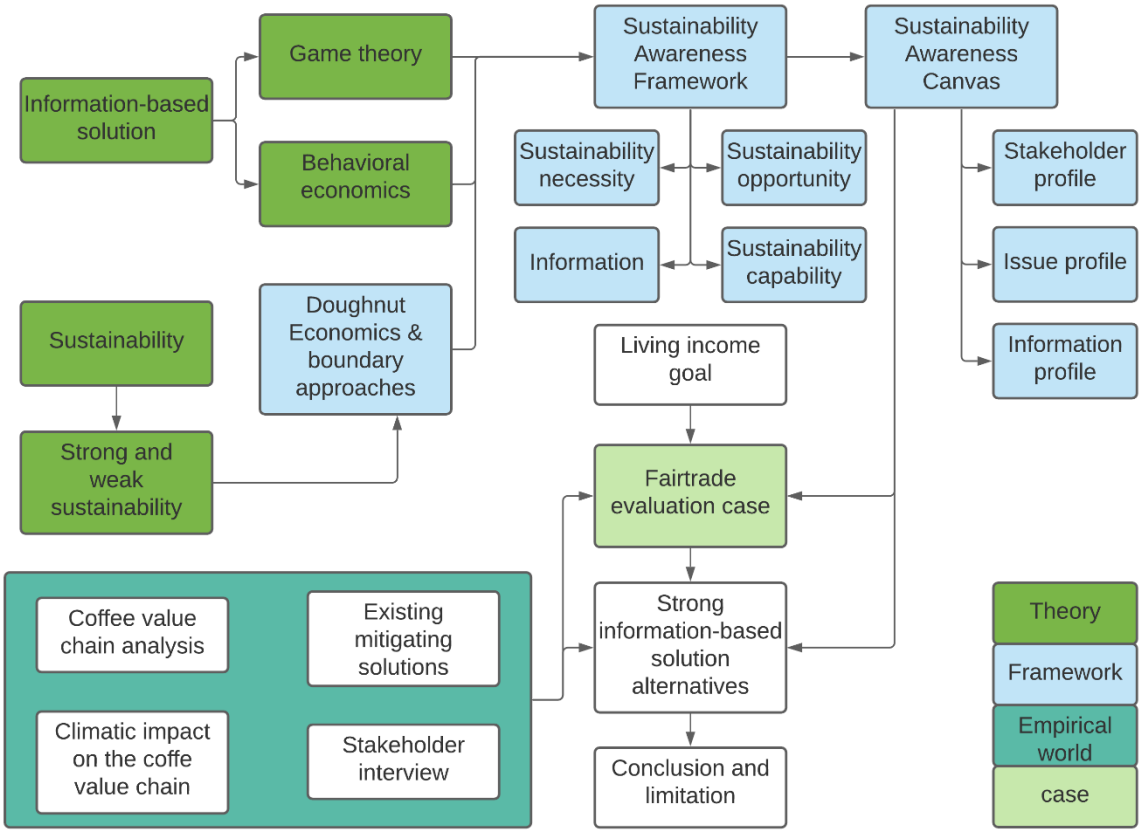


FIGURE 3: RESEARCH STRUCTURE

The limited time for the master thesis and access to information during the pandemic makes the abductive approach ideal to raise knowledge. The research will provide generalization through case analysis. However, accurate verification of the generalization outcomes of this thesis in a positivist approach would be the following logical step.

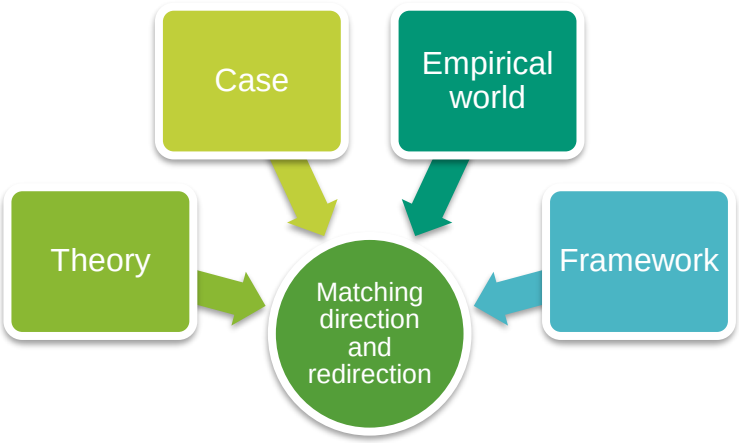


FIGURE 4: RESEARCH APPROACH
SOURCE: SOURCE: OWN CREATION BASED ON (ANNA DUBOIS, 2002)

This approach will influence the fit for qualitative vs. quantitative research data. Effectively, following the research approach, quantitative research will be used to make assumptions, insights, and hypotheses that will be levered for qualitative research to bring up new frameworks and solutions. Therefore, it is fair to assume that the subdivision of the research question will be based on the proposition of hypothesis instead of pure quantitative hypothesis measurement.

2.3 RESEARCH PLAN AND DATA COLLECTION

In order to answer the research question, we have divided the research into sub-research questions that were subject to quantitative and qualitative research.

The following methodology was therefore used to collect insights for those research questions:

TABLE 1:RESEARCH OVERVIEW

Research question			Research Method		
Main research question	General Research Question	Sub-research questions	Quantitative	Qualitative	
			Existing data	Interview	Existing data
Sustainability Awareness Framework: how could information-based solutions promote strong sustainability in the coffee value chain?	1.How can we differentiate a strong vs. a weak sustainability	a.What are the elements that characterize weak/strong sustainability		x	x
		b.What is a boundary approach, and how the Doughnut economy framework provides indicators for strong sustainability		x	x
	2.How could we analyze the “sustainability level” of a specific issue	How can we root the lack of sustainability actions to specific, actionable categories		x	x

	3. How could we create a logical framework that allows the analysis and development of information-based solutions	a.How could we define the profile of an entity			x
		b.How could we relate external/internal issues to the entity profile?			x
		4. How could we define an information-based solution, and how could we evaluate its ability to bring value to the entity regarding its profile			x
	7. What are the forces that pressure coffee farmers?	5. What is the dynamic of the coffee value chain in terms of demand & supply?	x	x	x
		6.What is the cost-revenue structure of the global value chain, and what does it tell us about farmers?	x		x
	8.How does climate change impact the coffee farmers' revenues, and how that impact influence the social structure?		x	x	x
	9. How can we segment existing solutions that seek to support coffee farmers?			x	x
	10. How could we identify the living income for Ugandan Coffee farmers?		x	x	x
	11.What is the wage baseline for an average Ugandan farmer that trade Robusta at the market price		x	x	
	12. What is the profile of Ugandan coffee farmers?	a. What are they expecting to gain when looking for an income in the coffee market?		x	x
		b. What are the risks and obstacles they face when looking for an income inside the coffee market?		x	x
	13. Climate change issue profile	a. How is climate change reducing or preventing (present-future) income gains?		x	x

		b. How climate change is increasing obstacles and risk		x	x
	14. What is Fairtrade certification?	c. What does it seek to accomplish?		x	x
		d. What is the perceived reliability?		x	x
		e. What is the framing created?		x	x
		f. What behavior does it seeks to incentivize?		x	x
		g. What are the elements that it seeks to inform about?		x	x
	15. What is the Fairtrade opportunity bringing to reduce obstacles and risk of coffee farmers and to increase their gains?		x	x	x
	16.What can we conclude on the Fairtrade certification scheme?			x	x
	17. What strong sustainability information-based alternative can we suggest based on all the information gathered?		x	x	x

3.1 QUANTITATIVE DATA ANALYSIS

The goal of the quantitative data analysis is to establish a baseline of data that will serve as material for the demand and supply analysis of the coffee market, climate impact on the coffee value chain, and metrics used by existing solutions such as the Fairtrade minimum price (Fairtrade, 2021) to come up with new analysis. The selection criteria for the data source were credibility, confirmability, and proximity with the subject on hand.

The data mobilized was sourced from the International Coffee Organization or ICO (ICO, 2021), and the Fairtrade organization (Fairtrade, 2021).

The ICO is the largest intergovernmental organization that handles coffee issues by working alongside exporting and importing governments. The organization gathers 42 exporting countries, representing 97% of world coffee production and seven importing countries, accounting for 67% of World coffee consumption (ICO, 2021). The data collected were the following:

Total Production	Domestic consumption	Retail prices
Export-calendar year		Indicator prices

On top of the coffee market data, which will serve as the baseline for the research, the data of the following Fairtrade Minimum prices have also been collected to provide data for comparing the Fairtrade pricing system with the market price:

Conventional arabica natural	Conventional arabica washed	Conventional Robusta natural
Conventional Robusta washed	Organic arabica natural	Organic arabica washed
Organic Robusta natural	Organic Robusta washed	

We would like to bring to the reader's attention that the data collected above only represent the data that has been subject to data manipulation through excel and power BI to leverage business intelligence practices to provide insights.

2.3.2 QUALITATIVE DATA ANALYSIS

Qualitative research has been used alongside quantitative analysis to provide new insights and improve or refute the assumptions made through quantitative analysis. The motivation of secondary data analysis was to bypass the timeframe limitation of this thesis by analyzing data on issues similar to the issue statement of this thesis. To conduct those analyses, we used a framework inspired by the Mariette Bengtsson plan for qualitative study using content analysis (MarietteBengtsson, 2016).

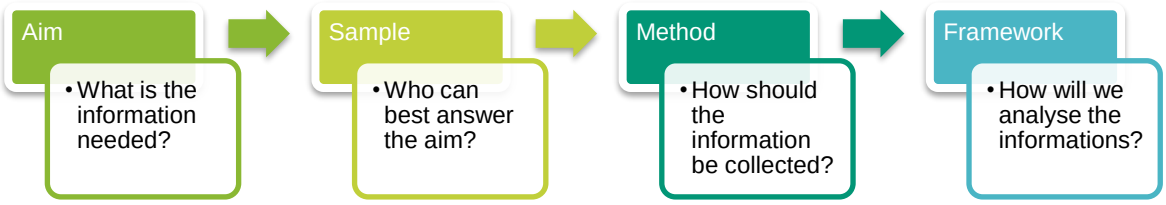


FIGURE 5: QUALITATIVE ANALYSIS FRAMEWORK
SOURCE: OWN PRODUCTION INSPIRED BY (MARIETTEBENGTSSON, 2016)

According to Victoria Sherif's paper on " Evaluating Preexisting Qualitative Research Data for Secondary Analysis," we have used relevance, quality, and sufficiency criteria. The outcome resulted in the following table summarizing the sources used for existing data qualitative research per research question mentioned in Table 1.

TABLE 2:QUALITATIVE RESEARCH DATA SOURCES SELECTION SUMMARY

Research question	*# of keywords*	*# of relevant sources*	*# of selected sources*
(1)(2)	3	20	9
(3)(4)	12	149	37
(5)(6)(7)(12)	22	306	47
(8)(9)(13)	13	110	35
(14)(15)	11	129	11
(16)	6	33	12

SOURCE: APPENDIX 6

2.3.3FACE TO FACE INTERVIEWS

In the context of this thesis, the goal of face-to-face interviews was two-fold:

- Provide insight for qualitative and quantitative analysis.
- Confirm or refute assumptions made during the previously mentioned analysis.

Those interviews were conducted proactively when exploring a new research question and reactively when facing unclear data. Not aiming to conduct market research, the interviews were mainly semi-structured and unstructured interviews to provide as much insight and critical information as possible to explore tracks for possible solutions. The complete guide used for unstructured and semi-structured interviews can be found in Appendix 13 and 15 of this thesis.

The following table sums up the interviews conducted per research questions (Table 2):

TABLE 3:QUALITATIVE INTERVIEW SUMMARY

Date	Communication	Country+ role	Organization	Type	Research question	research goal
20/02/ 2021	Phone	DR Congo (Farming)	Independent (Kasongo, 2021)	Unstructured	5,6,7	Insight
16/03/ 2021 19/04/ 2021	Teams	Belgium (External Support)	Trade for Development Centre (Poos, 2021)	Unstructured Semi-structured	5,6,7,8,9, 10,11,12, 13,14,15, 16	Insight + insight validation
11/04/ 2021	Zoom	Colombia (Farming-Processing)	Finca Los Andes (Cortés, 2021)	Unstructured	5,6,7,8,9, 13,14,15, 16	Insight validation
11/04/ 2021	Phone call	Nepal (Farming-Processing)	Lekali Coffee Estate (Sherpa, 2021)	Unstructured	5,6,7,8,9, 13,14,15, 16	Insight validation
24/04/ 2021	teams	Uganda (Farming-Processing)	Kabonero Mountainous Coffee Growers	Structured	5,6,7,8,9, 1213,14, 15,16	Insight + insight validation

			(MUTHAHINGA, 2021)			
24/04/ 2021	teams	Uganda (Farming-Processing)	Karangura peak modern coffee farmers' cooperative society limited (KAISULE, 2021)	Semi-structured	5,6,7,8,9, 12,13,14, 15,16	insight validation
25/04/ 2021	Teams	France (Market research)	OpinionWay (Bigault, 2021)	Unstructured	15,16	Insight + insight validation
28/04/ 2021	teams	USA (Importer)	Zabuni Specialty Coffee Auction (Njuguna, 2021)	Semi-structured	5,6,7,8,9, 14,15,16	Insight + Insight validation
03/05/ 2021	teams	Colombia (Exporter)	Campesino Coffee (Velasquez, 2021)	Unstructured	5,6,7,8,9, 13,14,15, 16	Insight validation
03/05/ 2021	Skype	United Kingdom (Researcher)	SOAS University (Cramer, 2015)	Professor of Political Economy of Development	5,6,7,8,9, 10,11,12, 13,14,15, 16	insight validation (video)
05/05/ 2021	teams	Germany (Importer)	Love! coffee by HandelsKontorColonia (Timofeev, 2021)	Semi-structured	5,6,7,8,9, 14,15,16	Insight
10/05/ 2021	Teams	Kenya (Roaster)	African Coffee Roasters (Kithika, 2021)	Semi-structured	5,6,7,8,9, 14,15,16	insight validation
11/05/ 2021	Teams	USA (	Chocolate Fish Coffee Roasters (Nieves, 2021)	Semi-structured	5,6,7,8,9, 14,15,16	insight validation

PART 2: SUSTAINABILITY AND INFORMATION-BASED SOLUTIONS

Traditionally, information has been used to inform us but not only. Effectively, in our day-to-day life, we leverage the information to position ourselves mainly to decide to take or not take action. In the context of sustainability, the information we have access to and its framing of the situation can impact how we, as a society, community, enterprise, or human, decide to deal with socio-environmental questions.

This part of the thesis aims to provide the information needed to understand how we could use information to bring strong sustainability in the coffee value chain and, more specifically, in coffee farming. We note that by strong sustainability for the coffee value chain, we express the ability of the value chain to meet the social needs of its actors under environmental constraints. To do so, we will first elaborate on the notion of sustainability and differentiate the concepts of weak vs. strong sustainability. We will then explore the notion of information in

behavioral economics to identify key elements that will be the building blocks of a new framework of analysis.

Based on the elements gathered both from the notion of strong sustainability and the assumptions from the place of information in the economy, we will introduce the “Sustainability Awareness Framework,” which aims at identifying the willingness to act on sustainability issues (social and environmental) based on the stakeholder's ability to act or sustainability ability, the opportunities from acting or the sustainability opportunity, the importance of acting or the sustainability necessity and the information framing of the sustainability issue on hand. For disclosure, the Sustainability Awareness Framework presented in this thesis shares the same name as the SuSAF (The Karlskrona Manifesto for Sustainability Design, 2021) (which aims to raise awareness on sustainability issues) but is not related to it.

That framework has been designed to handle different sustainability issues for different entities by leveraging the previously mentioned components. For the context of this thesis, we will focus especially on the information component of the Sustainability Awareness Framework. To do so, we will conclude this part of the thesis by presenting the “Sustainability Awareness Canvas” designed to cascade down the concept of sustainability awareness to the level of the stakeholders with the angle of the role of information in the level of sustainability awareness. This approach of analyzing information-based solutions requires a critical approach, therefore allowing us to evaluate the performance of solutions such as labeling schemes more accurately. The Sustainability Awareness Canvas will represent the qualitative framework used to conduct the research and the analysis.

CHAPTER 1: SUSTAINABILITY

This chapter aims to provide the reader the knowledge necessary to reach “strong sustainability,” use the Doughnut Economics to set boundaries, and frame them under specific criteria. Since this thesis will analyze, in part 5, the classic information method used to handle sustainability issues through the Fairtrade certification scheme, we will also elaborate on the concept of weak sustainability to provide the reader with the concepts used for further comparisons.

1.1 DEFINITION

It is easy to be overwhelmed by the great numbers of sustainability's definition that we come across by reviewing the literature. While there are hundreds of different definitions and frameworks on sustainability, very few are complete, and many suggest different perceptions of wealth, consumption, and living standards.

For this thesis, we will use the notion of sustainability in the context of Kate Raworth's approach as presented in the Doughnut Economy (Raworth, 2018). We could therefore say that:

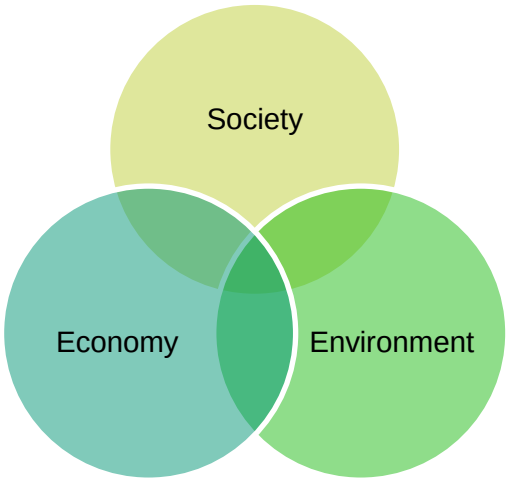


FIGURE 6: TRADITIONAL VIEW OF SUSTAINABILITY
SOURCE: OWN PRODUCTION

FIGURE 7: ECOLOGICAL ECONOMICS VIEW ON SUSTAINABILITY
SOURCE: OWN PRODUCTION

Sustainability is *"the pursuit and protection of qualitative living standards within planetary boundaries."*

Traditionally, the neoclassical view of sustainability refers to the junction of three main variables: environment, economy, and society. Sustainability being the middle point of those three variables. The philosophy implies that each entity (society, environment, economy) is separate and must be organized to reach sustainability. It also implies that one can substitute the other to reach sustainability. The following will be approached in the next section of this chapter as weak sustainability.

The philosophy of this thesis differs from the mainstream approach in the sense that it does not see the society, the environment, and the economy as separate entities but as one environmental ecosystem in which prosper society which operates the economy. The paradigm change allows us to see sustainability as a goal that can only be reached if the total capital of the ecosystem is positive. The following will be approached in the next section of this chapter as strong sustainability.

1.2 WEAK SUSTAINABILITY

The environmental economics approach aims to keep the aggregate monetary amount of capital assets in the economy from decreasing (Roman, 2020). We can sum up this philosophy with the following equation:

$$\Delta K_T = \Delta K_M + \Delta K_H + \Delta K_N \geq 0$$

EQUATION 1: WEAK SUSTAINABILITY

Where K_T represents the aggregate monetary value of capital assets in the economy, K_M represents the manufactured capital, K_H the human capital, and K_N the natural capital. In a

weak sustainability approach, natural capital can be substituted by manufactured capital or human capital to reach sustainability.

The three main concepts of the paradigm are:

- The confidence in new technologies to substitute natural capital.
- The denial of irreversibility or radical uncertainty.
- The belief that growth should be the main focus, and GDP/Impact decoupling is possible.

The idea is to invest the revenues from the exploitation of natural resources in physical-manufactured capital and human capital, which should substitute for the loss of the natural capital. This concept is also called the “Hartwick rule” (Hartwick, 1977).

To evaluate the information solutions in place in the coffee value chain, such as the Fairtrade certification scheme, it is essential to understand the sustainability assumptions upon which they stand. Certifications schemes promote the implementation of specific standards to acquire a “label” valuated on the market in the form of the willingness to pay a premium price for a certified product vs. a non-certified product. On top of it, certification schemes such as the Fairtrade certification promote a “fair trade premium” to invest in local socio-environmental needs. The principle of using price signals to incentivize a form of substitutability between the loss in natural capital, human and manufactory capital lies deeply in the weak-sustainability approach. Effectively, those certification schemes believe in the market's ability to internalize socio-environmental externalities by sustaining growth.

1.3 STRONG SUSTAINABILITY

The strong sustainability approach arises from the ecological economics approach, in which unique and essential natural (K_N) and human capital (K_H) should remain positive at all costs.

$$\Delta K_N \geq 0 \; and \; \Delta K_H \geq 0$$

EQUATION 2: STRONG SUSTAINABILITY

Natural and human capitals cannot always be substituted in that approach, and some capitals are critical for survival. Safe Minimum Standards are therefore required. Effectively, some environmental "sinks" are unique, essential, and cannot be replaced. That concept pushes the fact that heterogeneity exists between the different forms of capital.

The main concepts of this approach are the following:

- The market cannot solve everything, and infinite growth is impossible and undesirable.
- The laws of thermodynamics limit us. The laws of thermodynamics imply that our economic system cannot create nor destroy energy and material resources but only convert them. Material and energy must be taken from the environment to produce goods and rejected to the environment after using it. Georgescu-Roegen proposed the fourth law of thermodynamic (Mayumi, 1995) , which states that “in a closed system,

the earth, for example, material entropy must ultimately reach a maximum value or all matter must ultimately become unavailable".

- Different types of capital are not homogeneous and not substitutable.

A "boundary approach" would be considered in that paradigm since it brings a framework in which economic activities are only possible under social and environmental constraints. An example of this could be the circular economy that aims to close the material and energetic loops by maintaining the value as long as possible and limiting waste by maintaining, reusing, refurbishing, and recycling (Roman, 2020). In that concept, we design business models to work under environmental boundaries, and we try to protect the environmental sink as much as possible.

1.4 DOUGHNUT ECONOMICS AND BOUNDARY APPROACH

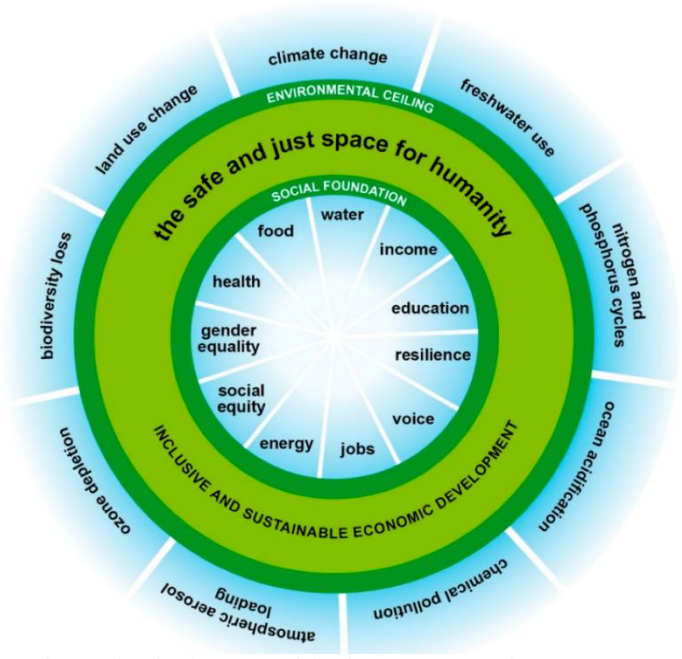


FIGURE 8:DOUGHNUT ECONOMY FRAMEWORK

SOURCE: JYRKI LUUKKANEN, J. V.-O. (2021). QUANTIFICATION OF DOUGHNUT ECONOMY WITH THE SUSTAINABILITY WINDOW METHOD: ANALYSIS OF DEVELOPMENT IN THAILAND. TURKU : FINLAND FUTURES RESEARCH CENTRE.

The following section will define the Doughnut Economics framework (Raworth, 2018) and explain why it provides lenses for strong sustainability.

The Doughnut Economics framework (Raworth, 2018) by Kate Raworth refers to a representation of the World in which we should live to be sustainable and safe. This framework is pictured in the shape of a doughnut, as in Figure 8.

In the middle of the Doughnut lies the space of social deprivation. In other words, the social elements needed to meet the essentials of life. In that framework, the goal of society is to expand those elements above a threshold and ideally infinitely.

However, since we are in a finite world, we have to expand those social elements under environmental boundaries to enjoy the long run's social benefit. Therefore, the outer space of the Doughnut represents the environmental pressure that our social activity is causing.

In the doughnut framework, the economy is not central. It is embedded inside the social, itself embedded in the environment, as for the ecological economists. In that perspective, the increase of social benefits for all under planetary boundaries is considered society's goal.

The Doughnut argues that we should protect a minimal social threshold as a society and set an environmental ceiling above which we should stop growing. Unlimited growth is therefore not possible since it will result (due to the laws of thermodynamics) in exceeding the environmental threshold.

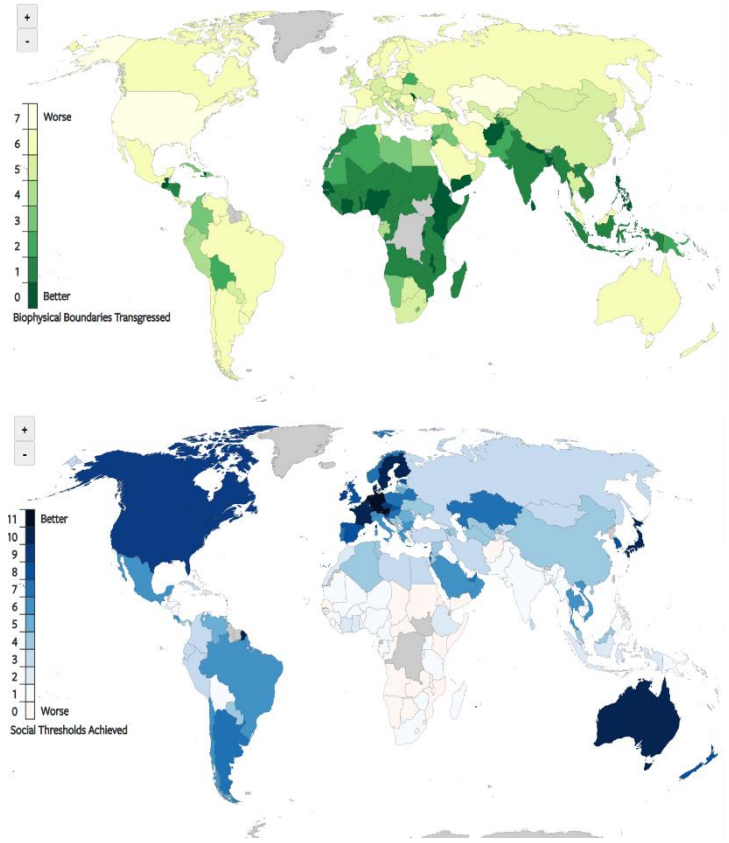


FIGURE 9: BIOPHYSICAL BOUNDARIES AND SOCIAL THRESHOLDS WORLD MAP
SOURCE: (O'NEILL, 2018)

The Doughnut also points out the failure of the mainstream economy to address the questions of social justice effectively, for economic growth has not been correlated with a decrease in inequalities. Pursuing growth at all costs is therefore damaging both for the environment and the social structure. The relationship between growth and environmental pressure can be visualized by comparing the two following maps of the current social thresholds and biophysical boundaries situation per country. We can directly observe that the less well-off in terms of biophysical boundaries are the country in which social structure is the highest while the less well-off in terms of social thresholds are those with the best biophysical environment.

The approach shifts from the vision of a "Homo-economicus" man to a "socially adaptable human," which implies that choices are not rational and driven by the maximization of utility but are socio-dynamic choices in which a human could see the value besides its personal interests. In that mindset, the author of the Doughnut does not seek, as in the neo-classical vision of the World, a mechanical equilibrium. It aims, however, at understanding the dynamic complexity of society.

While weak sustainability frameworks follow the concept of the Kuznets curve (Pettinger, 2019), in which growth will eventually decrease inequality and decouple environmental degradation, the Doughnut has a "growth agnostic" vision in which social inequality can only be solved by a system that would be distributive by design, and environmental damages can only be decoupled thanks to an economic system which would be regenerative by design. The Doughnut's consideration that unlimited growth is impossible, critical thresholds should be protected at all cost, and the focus on "non-market/monetary" solutions allow the Doughnut to operate under strong-sustainability principles.

We will elaborate in part 3 of this thesis on the specifics of the coffee value chain. At this stage, we can inform the reader that the study of the coffee value chain's specificities allowed us to identify, among the 11 social foundation criteria and the nine environmental ceilings visible in Figure 8, 13 key criteria that are critical for the coffee value chain.

TABLE 4:SOCIAL FOUNDATION CRITERIA

Water	Income	Job	Resilience
Education	Voice	Health	Social equity

TABLE 5:ENVIRONMENTAL CEILING CRITERIA

Climate change	Nitrogen and phosphorus cycles	Biodiversity loss	Land-use change
Climatic pollution			

In the context of this thesis, the Doughnut will be used to frame the research around categories critical to reaching strong sustainability. Among all the indicators, the income of coffee farmers and its sensibility to climate change will be the main focus during the research and development of information solutions. At this stage, it is important to understand that the research will first provide a broad vision of the coffee value chain to position the farmer in it. The climate change impacts on coffee farmers' income will then be presented. Ultimately, we will specify our research to the farmers seeking to reach an income level that would allow them to reach qualitative living standards and face climatic pressure. The solutions that will be analyzed (Fairtrade) and developed would revolve around their ability to provide a living income under environmental constraints.

Before introducing the Sustainability Awareness Framework developed for this thesis and the use of Sustainability Awareness Canvas which provides a tool to evaluate and develop information-based solutions, it is important to understand how information-based solutions could be leveraged to tackle sustainability questions.

CHAPTER 2: THE ROOT OF INFORMATION BASED SOLUTIONS

This thesis aims at understanding how principles derived from information theories could be levered to bring sustainability in the coffee value chain. The following chapter will consider the theoretical framework behind the information theories and identify elements that would be the building blocks for developing our framework. Therefore, we will seek to understand why the mainstream assumption of “rational” decision-making is not realistic and how a behavioral approach to the question could help us understand how information or the lack of information could incentivize specific actions. The outcome of this chapter will be a set of key assumptions that fueled the development of the Sustainability Awareness Framework and its specific use for the evaluation and development of information-based solutions through the Sustainability Awareness Canvas in chapter 3 of this part of the thesis.

2.1 INFORMATION AND CHOICES IN THE ECONOMY

Perfect information is one of the founding pillars of mainstream neoclassic economics alongside the rationality of agents or the isolation of actors (Boerger, 2016). Mainstream economics assumes that the choice of one individual consumer is rational (is a Homo economicus), and is made based on perfect information, and made to maximize its utility.

While those assumptions help to fuel economic models, it has been criticized for its wrongful depiction of society. Indeed, humans are not rational beings but are mainly driven by non-rational factors and are subject to many layers of bias as explained by Richard H. Thaler, 2017 Nobel prize of economics in its work on integrating economics with psychology. That criticism created an entire field of economics called behavioral economics.

Behavioral economics is a field of economics that focuses on psychological, social, and emotional variables that influence choice and decision making. The motivation behind behavioral economics is not to refute everything in the mainstream economy but to add another layer of complexity by considering psychological factors as part of the decision process.

One central behavioral economics principle is the concept of bounded rationality defined by Herbert Simon in its work “administrative behavior: a study of the decision-making process in administrative organization” (Herbert, 1947). The concept of bounded rationality implies that limit on information, time or abilities can prevent people from seeking out their best outcome.

A good representation of that cognitive bias is the ultimatum game (Thaler, 1988), explaining the framing effect’s psychologic bias (David J. Malenka MD, 1993). The framing effect explains that preferences and values depend on how the options are presented. The value could be influenced by the perception of justice, revenge, fairness, and more. This concept is important when analyzing the possible failure of weak sustainability solutions such as the Fairtrade certification scheme, which could frame the situation to either incentivize wrong actions or inhibit good actions. The specifics of that comment will be handled in part 5 of this thesis during the analysis of the Fairtrade certification scheme.

Since the perception of our decisions depends heavily on the framing created by the information and its context, we can understand how information could incentivize good or bad actions regarding sustainability. To reach strong sustainability, one must understand the importance of the notion of valuation. Indeed, not like weak-sustainability approaches, strong sustainability considers valuation methodologies richer and more complex than the minimalistic monetary evaluation. Since the perception of value is not defined purely by the rational aspects of a good or bad issue but also by the framing around it, we can say that a valuation that considers the “real value” will provide a framing that includes the complexity of the situation on hand. We would like to bring to the reader's attention that real valuation here means the value perceived by an individual in all its complexity.

Based on the assumptions made previously, we will lever the idea that stakeholders' decisions are not rational for this thesis. Effectively, we know that in front of a situation in which we have

to choose, the decision's framing is critical. The level of information, time, and quality available will influence how we perceive the situation and how we will choose. Therefore, we could promote sustainable actions that aim at reaching a social ceiling under environmental constraint, by framing, through information and real valuation, the issues that we would like to solve in a way that incentivize the desired action and sensitize on it. Those elements will be the foundations of the information profile canvas variable of the Sustainability Awareness Canvas that will be introduced in chapter 3.

2.2 INFORMATION: THE BOTTLENECK FOR COOPERATION

To understand how the framing effect and behavioral economics principle could be levered to bring sustainability, one must first understand the principles behind competition and cooperation.

For Morgenstern and Von Neumann(1994), every economic interaction can be summed up as a game between two or more players.

The limitation of the game theory is what we call a “zero-sum” game (John Lipczynski, 2017). In such a game, the payoffs of one are equivalent to the loss of the other. The choice of that specific framework for this thesis is motivated by the philosophy of science. Effectively, with an ecological economics view, the actions, risks, and rewards of the economic agent are not isolated but interrelated. As for the material flows, payoffs are not created nor destructed but transferred from one stakeholder to another. Therefore, we can broadly say that the payoff among the stakeholder of the same specific limited value chain will mainly differ in terms of its distribution among the actors. We will complexify the notion of resources by assuming that the players, payoffs, and strategies available depend highly on the way of framing and valuing the game. This will be explained in the following section of this chapter. We can take away from the game theory that when facing a “prisoner dilemma,” the individualistic outcome is sub-optimal while the cooperative outcome is optimal and therefore socially preferable.

When considering sustainability issues, individualistic actions, even though interesting, often lead to long-term collective failures, as demonstrated in part 5 of this thesis. Based on the same prisoner dilemma, the information, reliability, and framing could positively or negatively influence the outcome. For this thesis and the framework presented in the next chapter, those statements imply that evaluating a weak information-based solution will lead to a sub-optimal outcome while evaluating a strong information-based solution will lead to an optimal outcome socially preferable all because of the reliability and framing of the information.

2.2.2 CONCLUSION ON INFORMATION, DECISION, AND SUSTAINABILITY

The previously explained game theory allows us to assume that the outcome or payoff should not be considered the minimalistic representation of a rational opportunity. However, the outcome should reflect the real perceived value induced by the framing of the available options.

In the context of global climate change, sustainability issues and possible negative outcomes are known and widely spread. Even if different behaviors could provide an optimal strategy for

sustainability, data on existing solutions (presented in Part 5), let us know that this is rarely the case due to the weak sustainability nature of the solutions presented, which fails in the long term at improving qualitative social standards under environmental constraints. Effectively, sustainability actions tend to be voluntary actions that are limited in scope and impact due to their main focus on market growth. Joint actions that are not motivated by market growth are essential to reach a realistic level of sustainability. If we want to provide a qualitative living standard for all under environmental constraints, individualistic optimal framed under weak sustainability approaches are not enough.

Based on the previously mentioned theories, we can conclude the following:

- The individual strategy is not mainly driven by the rational maximization of its utility or financial value. It is, however, driven by the framing that surrounds the presenting choice of actions and not on intrinsic values. The framing of the situation will depend on the information (type, reliability, presentation), the time available, and the personal abilities. Certain information, time constraints, and capabilities could therefore change the framing and therefore the actions. In the context of our thesis, those facts are essential to support the idea that analyzing the information and the framing it creates help us identify gaps in terms of sustainability and provide action points to fill them.
- We also consider that the notion of payoff or outcome should not be considered as a rational minimalistic value. However, it should be seen as the perceived value by a specific actor, exposed to specific information under a specific time constraint with limited processing ability. For the thesis, we include the notion of complexity by considering that the perceived value will differ for each actor due to the personal nature of its goals and external framing unique perception. When considering the outcome or options of an entity, we will therefore seek to present it in a way that best represents the specificities of its nature and environment. Therefore, the notion of gains (positive outcomes), pains (obstacles and risks) will reflect a mix of intrinsic and non-intrinsic, monetary and non-monetary values.
- We also note that one entity will consider a strategy if the framing of its outcome presents higher payoffs for that specific entity. By considering, of course, that the notion of payoff or outcome is mainly irrational and represents a mix of values. Based on valuation methods for the environment (Roman, 2020), we could say that the value of an outcome is a mix of:
    - Use value
        - the direct (tangible) or indirect (intangible) value
        - the option value: potential future value
    - non-use values
        - inheritance value: the impact on the future generation.
        - existence value: the value of the existence

  That representation of value is, due to our approach, non-exhaustive and only indicative.
- Finally, as in the prisoner dilemma, we consider that having access to information that can be trusted is essential for the different entities to consider possible joint actions. Effectively, in a prisoner dilemma, cooperation is only possible if the two players know the other player's strategy with certainty. The level of reliability and accuracy of the

information will therefore be essential. When considering an information-based solution, the subjective perception of reliability is central since it influences the outcome.

Based on those assumptions, we can say that the optimal system strategy will be the dominant strategy if the perceived payoff or outcome is:

- A provider of a better minimal perceived payoff than the other strategies.
    - If the perceived optimal system outcome is weaker than all the other outcomes, it is not a **necessity** for the stakeholder. Having minimal standards is, therefore, a necessity.
- Reachable in terms of time and capabilities.
    - If the stakeholder does not have the time nor the capability to consider the cooperative outcome, it will by default not be able to reach the optimal system strategy. Having the **ability** to act is, therefore, a must.
- More interesting in terms of perceived value than other strategies
    - If the outcome of the system optimal strategy reflects negative relative payoffs, other strategies can be more interesting. A positively perceived payoff is therefore necessary for the strategy to be seen as an **opportunity**. For this specific, we would like to attract the reader's attention by saying that a positively perceived payoff does not mean higher financial returns but better qualitative social standards under environmental constraints.
- The perception of the outcome is directly linked to the framing induced by the information about it and its perceived reliability. The perception could therefore incentivize good or bad sustainability practices due to the framing created.
    - The optimal outcome could be seen as interesting or not due to the framing created around it. Perceived reliability is critical when considering the framing induced by information as mentioned previously. Having a reliable source of **information** that guarantees the system optimal outcomes is a must.

“It is not what you look at that matters; it is what you see.”

Henry David Thoreau

CHAPTER 3: SUSTAINABILITY AWARENESS FRAMEWORK AND SUSTAINABILITY AWARENESS CANVAS

During this chapter, we will introduce the Sustainability Awareness Framework that has specifically been designed to evaluate the ability of an entity or a system to reach strong sustainability goals by having a top-down approach when identifying the areas of improvement and a bottom-up approach through the Sustainability Awareness Canvas, to evaluate and develop information-based solutions. In the context of the thesis, we will leverage the Doughnut (Raworth, 2018) indicators to set and identify “income goals” for coffee farmers under climate change. We will evaluate the Fairtrade information-based solution through the canvas, identify why it can be considered a weak suitability approach, and develop tracks for alternative solutions that could be considered strong sustainability approaches.

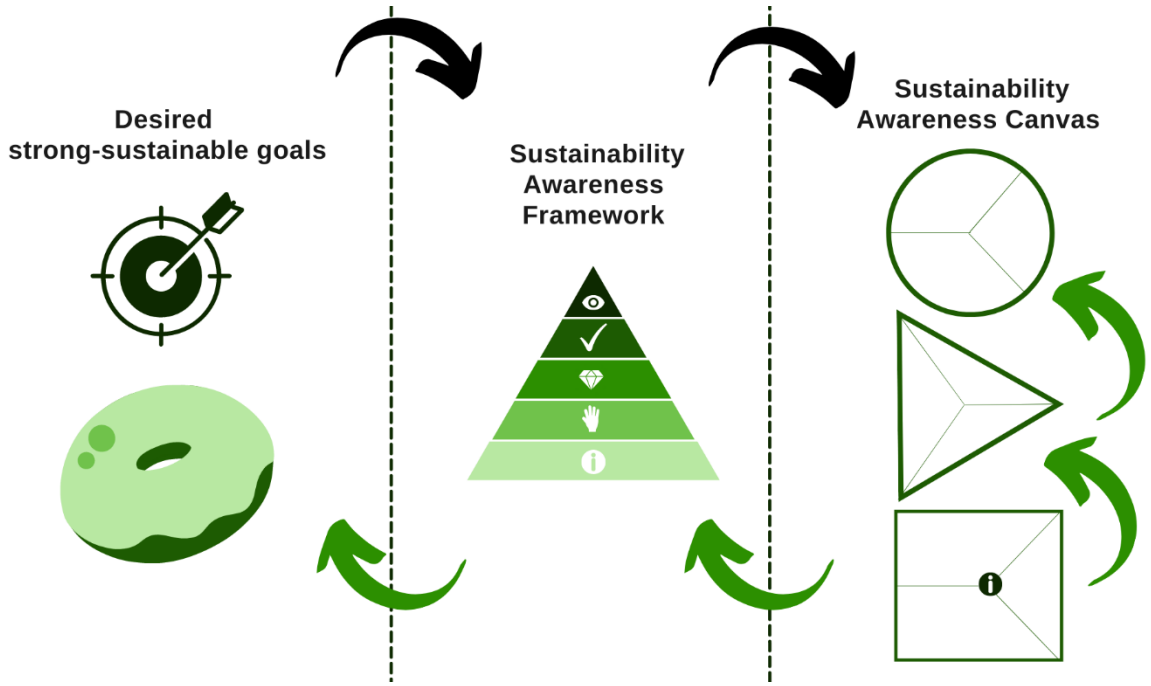


FIGURE 10:SUSTAINABILITY AWARENESS FRAMEWORK AND CANVAS METHODOLOGY
SOURCE: OWN PRODUCTION

As presented in figure 10, the Sustainability Awareness Framework and canvas require three distinct actions type: the definition of desired strong sustainable goal according to the doughnut indicators, the sustainability awareness level through the Sustainability Awareness Framework, and the entity-issue-information relationship through the Sustainability Awareness Canvas.

3.1 STRONG SUSTAINABLE GOALS

This first part of the Sustainability Awareness Framework aims at selecting specific, strongly sustainable goals. As mentioned in chapter 1, we consider that the indicators presented in the Doughnut provide specific areas of action that meet the strong sustainability definition. The setting of those goals will allow making a gap analysis on the performance of a specific

entity regarding its ability to reach those goals. For the context of this thesis, we have decided to focus on the income goal by setting the living income as a strong sustainability goal for coffee farmers in Uganda. The living income has been chosen due to the importance of the question observed during the qualitative interviews

Before selecting specific goals, we recommend having a rich and complex understanding of the situation, the different actors, and the issues causing them an harm to set goals based on observed issues rather than assumptions. Part 3 of the thesis aims at providing an overview of the coffee value chain and its present issues.

With the broad understanding of the situation completed and the goals defined, we can question the sustainability awareness level of an entity through the Sustainability Awareness Framework that will provide insight on the entity's ability to act, opportunity to act, necessity to act, and the information that is framing them. The goal of knowing the sustainability awareness level of an entity will be to understand its willingness to act to reach the predefined goal assuming that the higher the awareness level, the higher the willingness to act.

3.2 SUSTAINABILITY AWARENESS FRAMEWORK

Setting goals that directly relate to the indicators of the Doughnut allows us to stay inside strong sustainability boundaries while identifying the possible gaps between goals and present results.

Once the strongly sustainable goal identified and the proof of its relevance sets, we can ask what prevents the accomplishment of that goal and where to act to reach it.

While looking at the conclusions of chapter 2 of this section, one could find links with the Gibb and Scott (Allan Gibb, 1985) strategic awareness. The two authors define strategic awareness as the sum of four elements:

- Strategic necessity: What is the strategic necessity to take action?
- Strategic ability: What are the strategic capabilities to seize the opportunities?
- Environmental awareness: How is our environment doing, and what are the opportunities?
- Time Management: How the time constraints influence our awareness?

In that paper, the authors conclude that strategy and planning gaps (failure to reach strategic and planning goals) come from a low strategic awareness level. Therefore, a gap in strategy could be reduced by increasing one of the four variables in the strategic awareness framework.

The idea of representing the “awareness” or the willingness to act in an equation of four variables to identify different lever to close gaps was the core inspiration of the framework that will be defined.

Based on the information mentioned in chapter 1 and chapter 2 of this section, and under the consideration of the principle of strategic awareness, we can introduce the concept of **"sustainable awareness,"** which could be defined as follow:

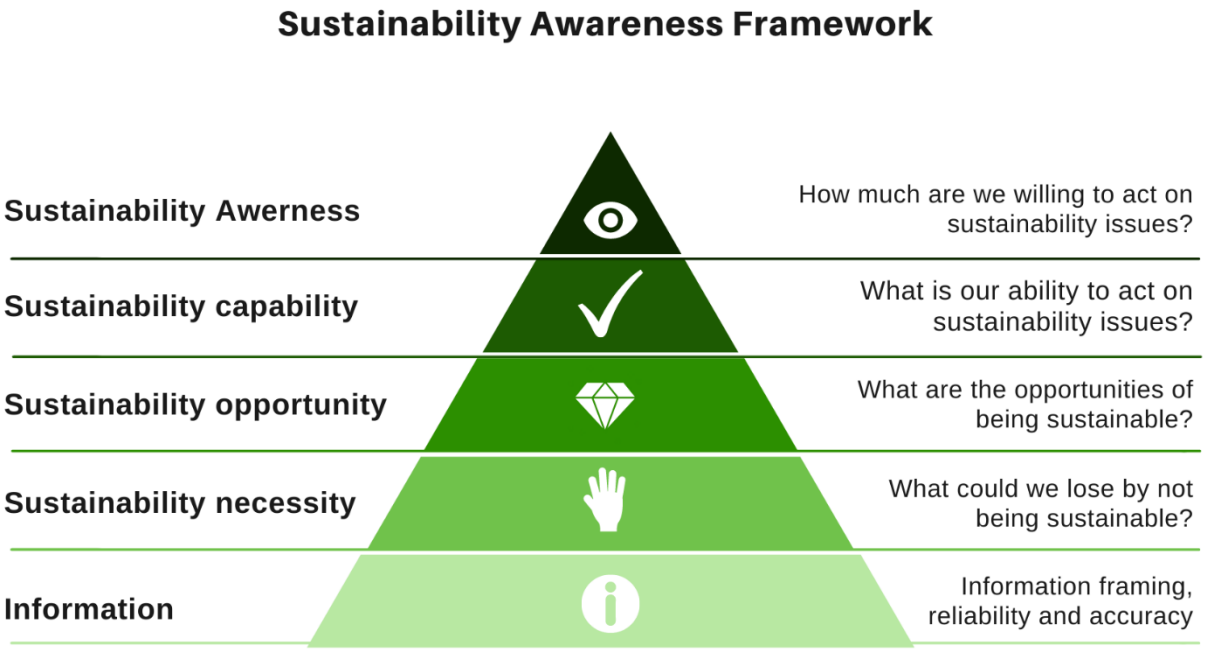


FIGURE 11: SUSTAINABILITY AWARENESS FRAMEWORK

SOURCE : OWN PRODUCTION

Information: This refers to the type of information available and perception's framing. Here we also refer to the completeness of the information in terms of "real payoff" and confidence level attributed to the information.

Sustainability necessity: Refers to the short- mid-and long-term local-global socio-environmental gains and risks the entity faces due to sustainability issues. The necessity is linked to the fact that an external issue can eat the payoff value (in today's value) to the point of no return. In such a case, acting is a necessity to maintain actual payoffs.

Sustainability opportunity: Refers to the solutions used for solving the entity's sustainability issues and the possible increase in net gains and decrease in net risks due to their mitigation. The opportunity refers to the existence of "bridges" that could lead to the system's optimal payoff (this one being higher than the individual dominant strategy since the necessity for it has been proven in the previous point). The Fairtrade certification scheme provides an existing example of a proposed opportunity to mitigate the gaps in farmer's living income by setting a minimum price and a label that guarantees the respect of standards, therefore incentivizing actors to produce "fairly" to seize a market premium price.

Sustainability capabilities: Refers to the entity's ability to seize the opportunities in terms of time, resources, and capabilities. An entity with the right information knows the necessity to act and sees an opportunity will not take action if it does not possess the minimum viable capabilities to do it. Those capabilities could be seen in the form of critical natural, human, or manufactured capital.

Sustainability awareness refers to the willingness to act of a specific entity regarding sustainable issues. The highest the sustainability awareness level of the entity, the highest its willingness to act on sustainability issues. Therefore, a high sustainability awareness level or willingness to act would refer to the strong ability of an entity to seize strong opportunities to overcome its present and future necessities by utilizing the information available.

$$Sustainability\ Awareness = information + necessity + opportunity + capability$$

The Sustainability Awareness Framework aims to root the causes of a gap between sustainability goals and the present results to one of the four elements of the framework. The framework is present in the shape of a pyramid to provide a sense of hierarchy on their importance. The framework, therefore, implies that:

- For a high sustainability awareness to happen, having access to reliable and accurate sources of information is a must. Effectively without information about the entity issue, the strategies of other entities, and the real payoffs, awareness is impossible. Furthermore, the type of information and its form creates a framing bias in which sustainability is perceived as an undesirable outcome or an already reached outcome.
- Based on the information and the framing around them, understanding the pressure of not meeting sustainability is a must. Effectively, only after understanding the missing gains and the increasing risks might one consider sustainability a more promising strategy. We attract the reader's attention to the fact that the necessity to act is broader than the internal pressure and includes external pressure such as governmental regulations or stakeholder's pressure for "greener" production.
- One entity could only act if opportunities for actions exist and if those opportunities could increase the total net gains or decrease the total net risks defined in the following section.
- Once the information is processed, the necessity realized and the opportunities identified, one could only act if one possesses the resources and capabilities required. Effectively. One can only act within the boundaries of its entity.

Therefore, one can decrease sustainability gaps by increasing sustainability capabilities, identifying or creating sustainability opportunities, building sustainability necessities, or strengthening the accuracy and reliability of the information in a more favorable framing.

The logic of the Sustainability Awareness Framework is to evaluate the level of the "willingness to act." We would like to attract the reader's attention to the fact that the awareness alone does not implies an action. Indeed, those links are not obvious and hardly disputed in the scientific literature (Kesting, 2006). However, we can assume that the probability of acting on sustainability issues is higher when the awareness, which is dependent on bias and perception, exists than when it does not. For this thesis, the deliberate choice of the "willingness to act" is more humble than evaluating the action but more realistic.

3.3 SUSTAINABILITY AWARENESS CANVAS

The Sustainability Awareness Canvas is a tool that we have developed in this thesis to scale down the information's influence of the Sustainability Awareness Framework on the existing relationship between the external-internal issues and an entity.

Inspired by the value proposition canvas (Osterwalder, 2014) , the Sustainability Awareness Canvas has been designed to help identify sustainability necessities, relate them to sustainability issues and impacts to evaluate or develop information-based sustainability opportunities. Therefore, the following canvas provides a useful tool for qualitative and quantitative research by structuring the information into categories with predefined logical connections. In the context of this thesis, the following canvas has been mobilized to evaluate the Fairtrade information-based solution regarding the Ugandan coffee farmer's goal to reach higher income under the pressure of climate change in part 5. The canvas has also been utilized to develop tracks for new sustainability opportunities in part 6.

The canvas is divided into three categories:

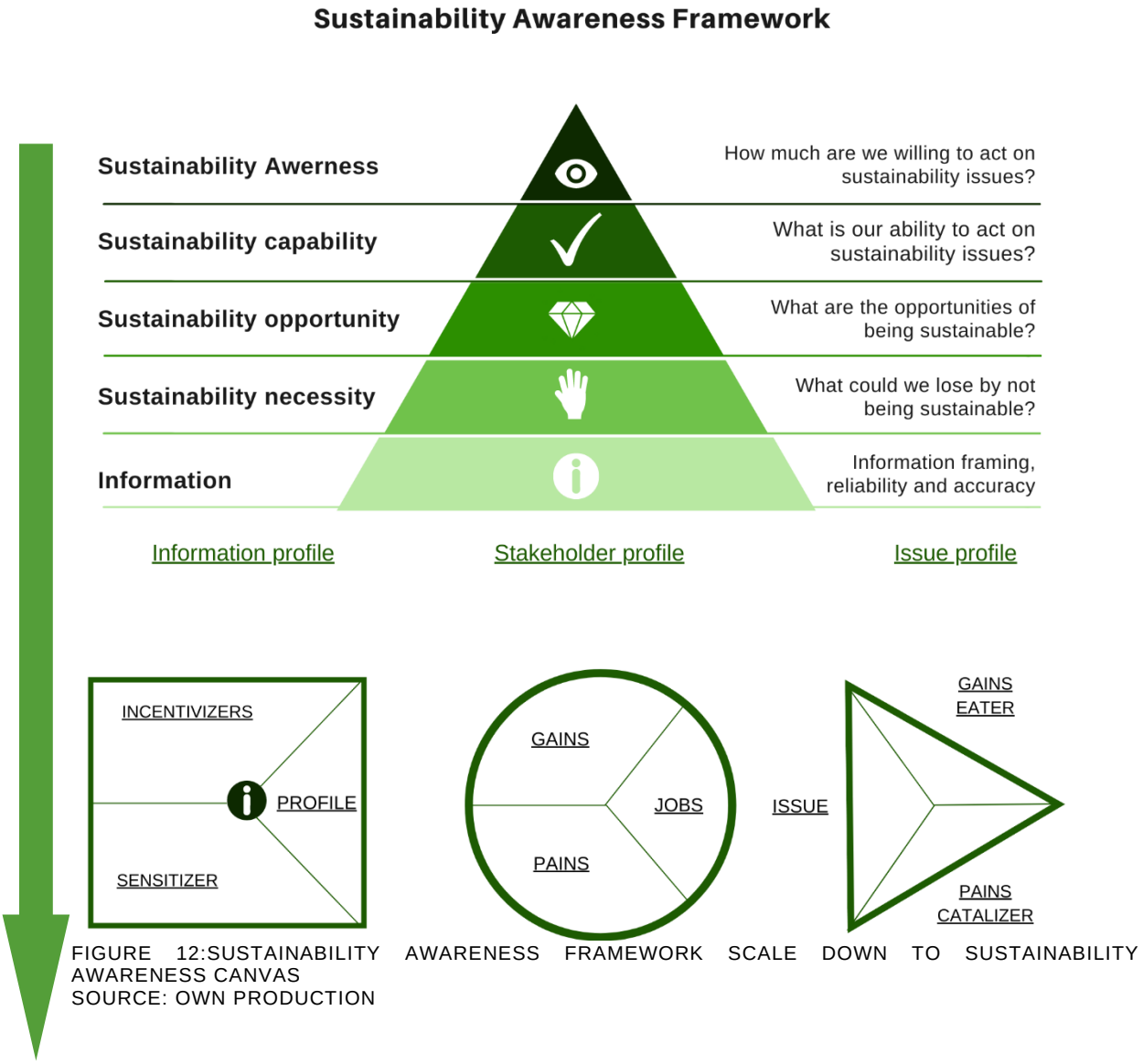


FIGURE 12:SUSTAINABILITY AWARENESS FRAMEWORK SCALE DOWN TO SUSTAINABILITY AWARENESS CANVAS
SOURCE: OWN PRODUCTION

3.3.1 INFORMATION PROFILE

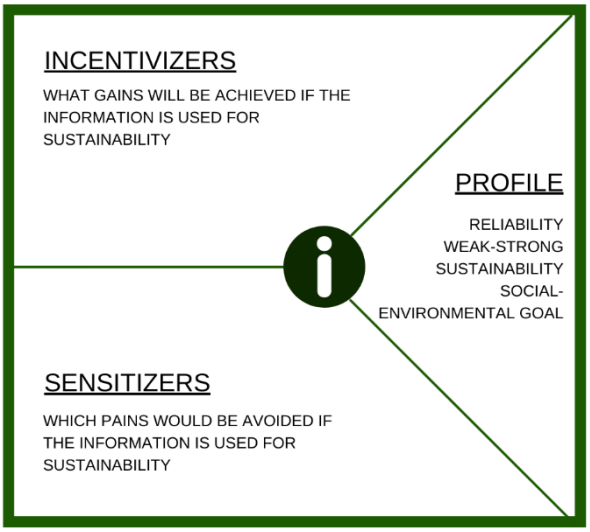


FIGURE 13:INFORMATION PROFILE CANVAS
SOURCE : OWN PRODUCTION

The information profile canvas is design to understand how information could incentivize a stakeholder to act or sensitize him about the necessity for sustainability actions and opportunities.

INFORMATION PROFILE

The information profile is divided into three main categories: its reliability, its approach to valuation (weak vs. strong), and the desired outcome (social-environmental).

Reliability refers to the level of credibility that could be accorded to the information and the level of impendence of the information provider. For example, is the information from a private company initiative, or is it the outcome of state regulation? The higher the level of perceived reliability, the bigger the trust in the incentivizers and sensitizers.

The approach to valuation refers to the way the ultimate goal are valuated. For example, are we in a weak-sustainability approach in which we value market growth and capital substitutability, or are we in a strong-sustainability approach in which we seek to value in terms of critical social or environmental goals to protect at all cost? The closer the perceived valuation is to the stakeholder's personal goals, the more significant the impact of incentivizers and sensitizers.

The desired outcome refers to the ultimate goals of the information, what it seeks to achieve in terms of social-environmental goals, and how it is framed. For example, are we seeking to improve the living standards, are we seeking to reduce CO2 emissions, and how is our desired outcome perceived stakeholders? The desired outcome helps us identifying the present framing and set the desired framing of the information-based solution.

INCENTIVIZERS

The incentivizers refer to the incentives given by the information type in terms of gain. What are the actions that the information is expecting to incentivize? For example, knowing the price and efficiency advantages of a greener energy source can incentivize us to save money and purchase green energy sources. Those elements are listed and are directly linked to the gain eaters, pain catalyzers, gains, and pains explained in the following sections.

SENSITIZERS

Sensitizers refer to the level of awareness created by the information. In other terms, what are the information's system informing on, and how does it position us on the information given. The goal of the sensitizers is to work alongside the incentivizers to understand the framing created by the information.

We note that regardless of the ultimate goal of the information, it could be missed if its nature or framing incentivizes the wrong actions.

For the context of this thesis, we will evaluate the Fairtrade certification scheme and label and develop new alternatives that better answer the goal of reaching qualitative living income under climate change in the coffee value chain.

3.2 STAKEHOLDER PROFILE

FIGURE 14: STAKEHOLDER'S PROFILE CANVAS
SOURCE: OWN PRODUCTION

The stakeholder's profile canvas aims at mapping the entity observed. That entity could be seen as a single individual, community, corporation, country, or even a value chain. The stakeholder profile helps understanding why the entity is doing what it is doing, how he sees perceived the social shortage and environmental pressure (Doughnut), and how he seeks to reach a social foundation.

JOB

The job section of the canvas refers to the activities that the entity is doing. Those activities can be segmented, as for the value proposition canvas (Osterwalder, 2014) in three categories:

- Functional jobs: refers to a specific task that the stakeholder is trying to perform or complete, such as washing grains or planting trees.
- Social jobs: refers to the social goals that the stakeholder is trying to fulfill while achieving functional jobs. For example, one can start a farm to protect its family from food insecurity and provide education to its children. The social jobs refer to the social indicator of the Doughnut.
- Environmental jobs: refers to the environmental conditions needed to achieve social jobs through functional jobs. For example, the same farmer needs to protect wetland to ensure the productivity of its farm.

For the context of this thesis, we will analyze the case of Ugandan coffee farmers that are doing the function job of farming to reach the social job of reaching qualitative income levels in part 5.

GAINS

The gains refer to the payoffs that are sought by the entity. In the philosophy of this thesis, we will consider those payoffs wider than the simple financial gains, and we will consider the social goals of the Doughnut as an indicator of gains. Therefore, a farmer will not seek a financial return but an increase in its income, better access to education, and more. Those gains can be divided, as for the value proposition canvas (Osterwalder, 2014) , into four categories:

- Required gains: which refers to the threshold for the job to be interesting. For example, the lowest expectation for a coffee farmer is to have coffee trees.
- Expected gains: refer to the gains that are expected for doing a job. For example, a coffee farmer expects to have a price and a market to sell its beans.
- Desired gains: refers to the gains that are desired from doing the jobs. For example, an organic coffee grower will expect a higher price.
- Unexpected gains: refers to the gains that go beyond the expectations. For example, a traditional organic coffee grower did not expect its coffee bean to be considered a “specialty coffee bean” and therefore receive an even higher price.

PAINS

It refers to the struggle that the entity is facing before, during, and after doing its job. Those struggles could also include the risks of doing the jobs. In the same line of inspiration as the jobs and gains, the pains could be divided into two categories:

- Obstacles: refers to the elements that prevent or slows the entity from starting the job. In this section, the question of resources and capabilities could be considered.
- Risks: refers to the “what could go wrong” of doing the job. For example, being in a country heavily impacted by climate change could decrease the yield of a coffee farmer or, after planting a coffee tree, seeing that the beans have been attacked by a pest that changed the flavor.

Based on this thesis's philosophy, those pains can be divided into two categories: social pains and environmental pains. In other words, pains can be seen as a shortage in terms of social or environmental resources. That shortage can also be divided into two categories local shortage and global shortage.

3.3 ISSUE PROFILE

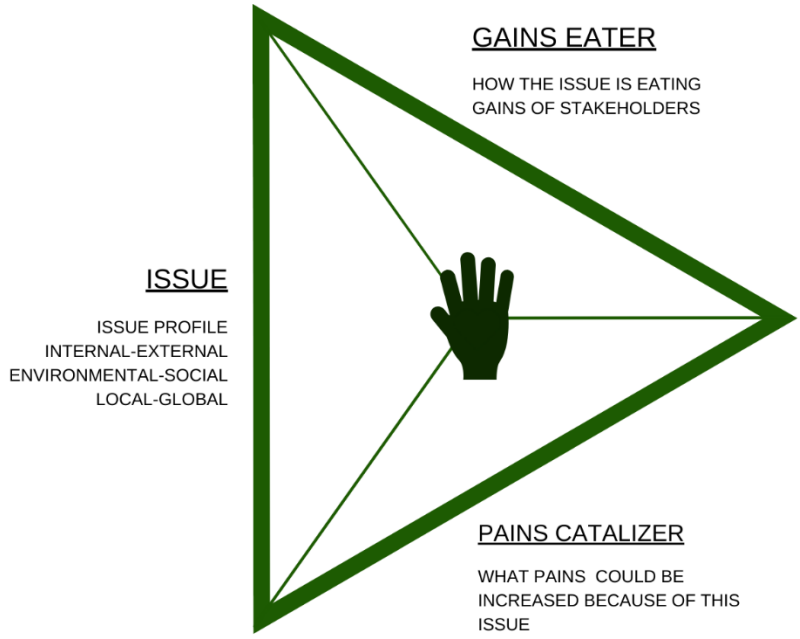


FIGURE 15: ISSUE PROFILE

SOURCE: OWN PRODUCTION

The issue profile seeks to frame the external and internal issues that an entity faces in terms of sustainability. It assumes that the issue faced will eat the possible gains and catalyze the pains and risk of the entity.

ISSUE

The issue profile aims at understanding the nature of the issue faced by the entity. We will therefore enquire if the issue is internal or external. We will also seek to understand where the issue is hitting the entity, whether it decreases the social aspect or increases environmental tensions? Ultimately, we will try to understand the scope of the issue. Is it a local problem or a global problem?

GAINS EATER

Gains eater refers to the entity gains that are eaten out by the issue. What gains are they missing because of the present issue? The goal of the gain's eater is to identify possible missing opportunities and existing necessities while understanding their impact on the entity's gains

PAIN CATALYZER

The pain catalyzers refer to the risk and obstacles that are increased due to the issue. What risk could we face, and what pains will we have because of the problem. For example, if we look at the impact of poor soil on crops, we risk a decrease in yield.

The goal of the pain catalyzer alongside the gains eater is to link the issue to the entity by understanding what he is losing and what he could lose because of the present issue in the short- mid-, and long term. Therefore, knowing what is lost and what could be lost helps define sustainability while creating room for new opportunities in terms of gains increase and pains decrease.

3.4 PRINCIPLE

The logical framework of the sustainable awareness canvas is the following.

If a gap between the desired situation and the actual one can be observed, that gap can be attributed either to the sustainability capability, the sustainability necessity, the sustainability opportunity, or the information access. The canvas provides a framework in which one could analyze a specific element of the canvas or analyze interdependences between different elements.

The sustainability necessity can be observed when the entity gains are at risks and when its pains are increasing or expected to increase. Decrease in gains and increase in pain bring up a sustainability necessity when threatening the predefined “minimal threshold” expressed in strong sustainability indicators (Doughnut). The decrease in gains or the increase in pains can be attributed to an internal or external issue eating the possible gains or catalyzing the undesirable pains, as in figure 16. We note that the necessity could also come from an information-based solution that incentivizes actions that decrease the gains or increase the pains directly or indirectly. In part 5 of this thesis, the Fairtrade label will provide an example of this due to its pressure on coffee farmers' costs/revenue structure.

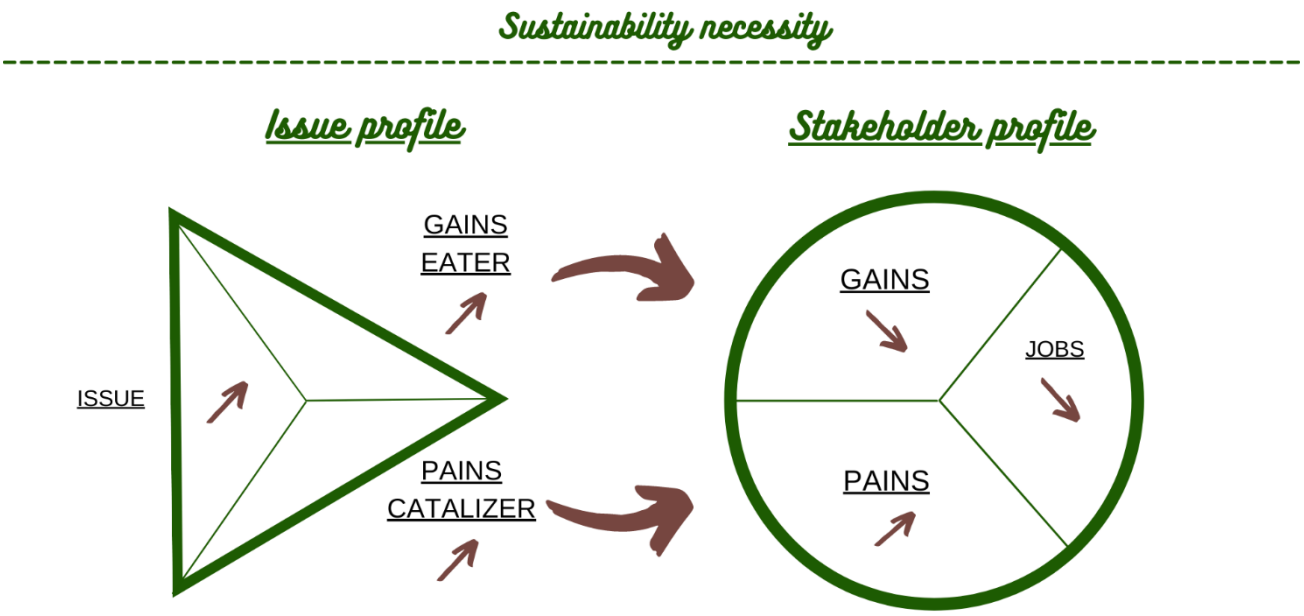


FIGURE 16:SUSTAINABILITY NECESSITY IN THE SUSTAINABILITY AWARENESS CANVAS
SOURCE: OWN PRODUCTION

Therefore, the junction of the issue profile and the stakeholder profile helps root the causes of the necessity for sustainability but not only. It also provides a door for understanding the missing opportunities due to the non-treatment of the issue and understand the scope of the impact. Effectively, a decrease in gains eater elements and pains catalyzer could lead to an increase in gains and a decrease in pains, therefore creating a sustainability opportunity.

We could go a step further and understand how an external entity could influence sustainability opportunities. The information profile provides the elements necessary to understand the existing information and identify the framing in which it positions the issue. By understanding which elements of the information system incentivize the reduction of gains eater or sensitize

the reduction of pain catalyzer, or even directly the pains and gains, one could provide an information-based solution to provide sustainability as in figure 17.

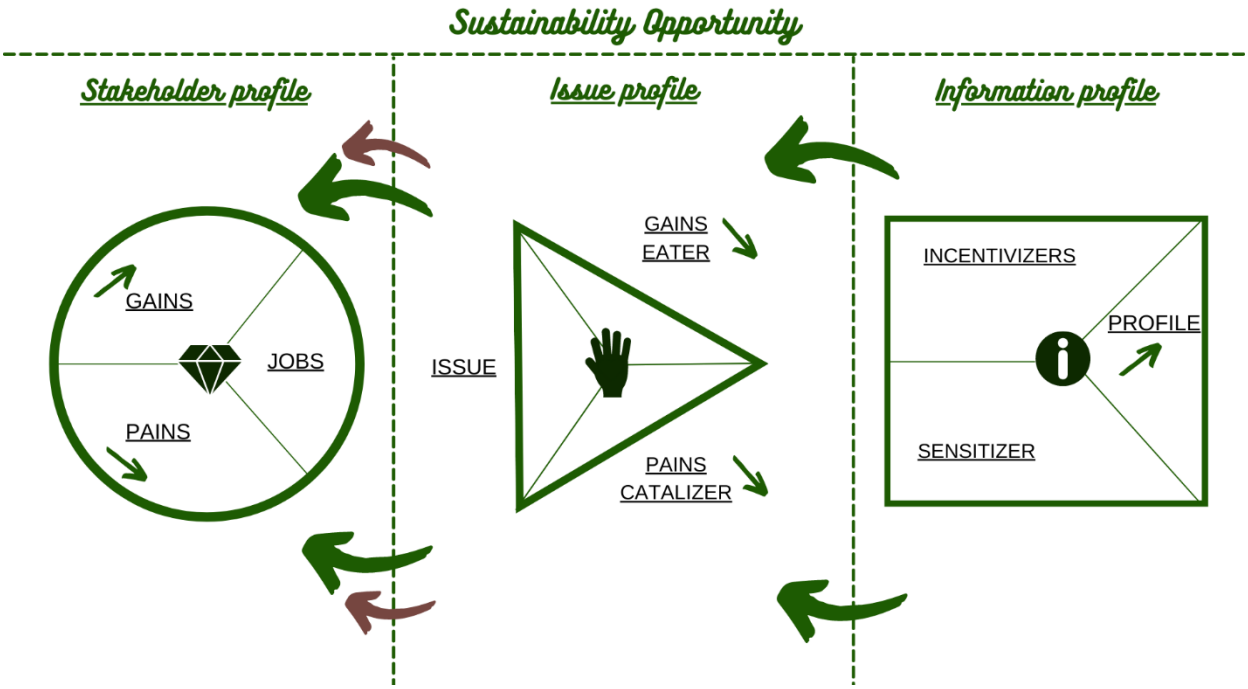


FIGURE 17: INFORMATION-BASED SOLUTION TO SEIZE SUSTAINABILITY OPPORTUNITIES
SOURCE: OWN PRODUCTION

Therefore, an incomplete information system will not provide the incentives nor the information necessary for the sensibilization around the issue.

The model could be used to evaluate existing information, issues, and entities to provide elements for identifying improvements through gaps analysis or a framework for the development of new innovative solutions that could reduce the gap in sustainable goals.

The Sustainability Awareness Framework and canvas will be used to analyze the coffee farmer's income gaps by evaluating the Fairtrade information system scheme regarding Ugandan Robusta coffee farmer is under the external issue of climate change and suggest improved information-based solutions.

PART 3: THE COFFEE VALUE CHAIN.

No matter our position on climate change, we share the same cup of coffee that we enjoy so much when we wake up, and that kicks us up with a shot of energy when we need to. Coffee consumption is part of many daily routines, while for the biggest fans, it is a real passion rich in experience and complexity. However, our way of living and the pressure we put on climate are knocking on, directly and indirectly, coffee production. (Yabili, 2021)

Before going deeper into the impact of climate change on the coffee farmer's income, it is first essential to have a global understanding of the coffee market as a whole. This part of the thesis aims to provide the reader with the knowledge and understanding necessary to grasp

the coffee value chain and its dynamic. The following information sums up the qualitative (interview, existing data) and quantitative (existing data manipulation) research that has been done regarding the coffee value chain and its dynamic. This section of the thesis will be divided into a supply, demand analysis followed by porter's five forces analysis to summarize chapters 1 and 2 regarding the coffee farmer.

CHAPTER 1: SUPPLY ANALYSIS

The supply analysis aims at providing the reader with an understanding of the specificities of the coffee supply. To do so, we will describe the coffee value chain, its actor, and structure. We will also look into the socio-climatic conditions needed for coffee production to exist and a brief overview of coffee export data. Ultimately, we will analyze the distribution of cost and revenue in the value chain to identify the cost/revenue distribution of the coffee market inside the value chain.

1.1 THE WORLD OF COFFEE

FIGURE 18:COFFEE FRUIT STRUCTURE
SOURCE : (PROCAFFEINATION.COM, 2019)

At the opposite of its name, the coffee bean is not a bean. The "bean" that we drink is nothing more than the seed of the coffee fruit, which is, in botanic terms, a "drupe" or "stone fruit" such as cherry, peach, or almond. According to *Dictionary.com* (Dictionary.com, 2021) , drupe is "any fruit consisting of an outer skin, usually pulpy a succulent middle layer and a hard and woody inner shell usually enclosing a single seed."

Coffee farming consists of the plantation and harvesting of coffee trees. On average, 80% of the world's coffee is grown by small farmers gathered worldwide. We account for, on average, 6 million coffee farmers worldwide (Hallie Eakin, 2009), and 125 million people that are dependent on coffee farming (Fairtrade, Coffee, 2021). A coffee plant takes around three to four years to bear fruit, yields on average once a year, and produces on average one pound of roasted coffee per tree per year (NCA, 2021). Thanks to its complex taste and caffeine shots, coffee is a highly demanded commodity. Behind that cup of coffee that we drink every morning lies a 102.02-billion-dollar market that is expanding every year. According to Mordor Intelligence (Mordor Intelligence, 2020), we can expect a 4.22% annual growth rate between 2020 and 2025. In terms of exporting alone, the coffee market is valued at more than 20 billion USD.

Based on the interviews conducted for this research, we can classify coffee farming in two distinct categories:

- **Organic coffee farms** take their value by not using pesticides, fertilizers, and other chemicals to boost the output. According to the USDA organic regulations (USDA, 2021) we can consider a coffee bean organic if coffee is produced.
    - Without using pesticides or chemical fertilizers for the past three years
    - Without alternating soli movement or rain in the farm
    - Fertilizers used are natural.

  By considering the actual certification initiatives such as Fair Trade, UTZ, or rainforest, we can extend the definition of organic coffee farms to "sustainable" coffee farms if the production involves socio-environmental according to their own standards

  Those types of farms have to fill the increasing desire for consumers to have more transparency on their consumption (CBI, 2020). They will therefore seek an external certification to meet that goal. Thanks to the specific requirement of organic coffee farms, a premium price can be expected.

  At this stage, we can also note that the same farms, at a lower scale, are favored by “specialty coffee” (a coffee of high quality and rich in taste) lovers that seek to consume a unique coffee respectful of its farmers and environment.

  The goal of that type of farming is to focus on the quality of the product.

- **High Production Farms** seek to produce as much as possible. Since their goal is to reach profitability through volume, they focus their effort on keeping intrant cost as low as possible and yield as high as possible to provide a competitive price no matter the method. An excellent example of such a strategy was observed during the interviews with Samuel Poos, my internship coordinator and the coordinator of the Trade For Development Centre program of Enabel, around cooperatives in Rwanda. Indeed, it has been observed that in order to have a country's scaled competitive volume of coffee export, the Rwandan government strongly incentivized the use of fertilizers and pesticides to maximize yield and the co-sharing of assets to provide economies of scale. We could say that coffee produced in high production farms tends to have a competitive price and grow thanks to high volume and a good export strategy. The goal of that type of farming is to focus on the quantity produced

1.2 VALUE CHAIN MAP

The qualitative research pointed out that the coffee value chain contains 19 different actors organized to achieve five main activities. The coffee value chain starts with the environment, giving the energy and the nutrient necessary for the coffee production to exist, and ends with the waste generated by each actor and activity. The map of the actors and activity can be found in **Erreur ! Source du renvoi introuvable.**. We define the 19 value chain’s actors as follows:

TABLE 6: COFFEE VALUE CHAIN'S ACTORS

Auditors	Monitor and control the compliance with standards and regulations
Brokers	Incentivize the exchange of goods and services between the different actors
Business Support Organizations	Provide product, services, and finance to support other actors doing their activities
Certification schemes	Establish and promote codes and practices
Coffee consumers	Consume the coffee based on taste and impact
Coffee Traders	Buy and sell the coffee contract and absorb the risks
Environment	Provides the nutrient and energy needed for coffee production
Financial service providers	Provide credit, liquidity, and other financial services directly (through a bank, for example) or indirectly (through a subside).
Governments	Protect, support, regulate and incentivize the coffee value chain's actors and activities
Insurance companies	Provide solution to mitigate the risks
Labor	Performs the task required to produce
Media	Contributes to the framing of the coffee by influencing the public image of actors, activities, and products
Mills	Process the beans after harvesting by removing the fruit, skin, drying, and sorting.
Non-governmental Organizations	Aims at filling the gaps not served by private-public actors
Producers	Use land, sunlight, and water to produce coffee beans
Research institutions	Inquire the issues of the coffee actors and activities
Storage facilities	Provide the physical space to store the coffee between different activities
Transportation services	Transport the coffee between actors and activity
Waste	The outcome of every actor and activity

SOURCE: OWN PRODUCTION

The 21 actors are organized around five major activities, as follows.

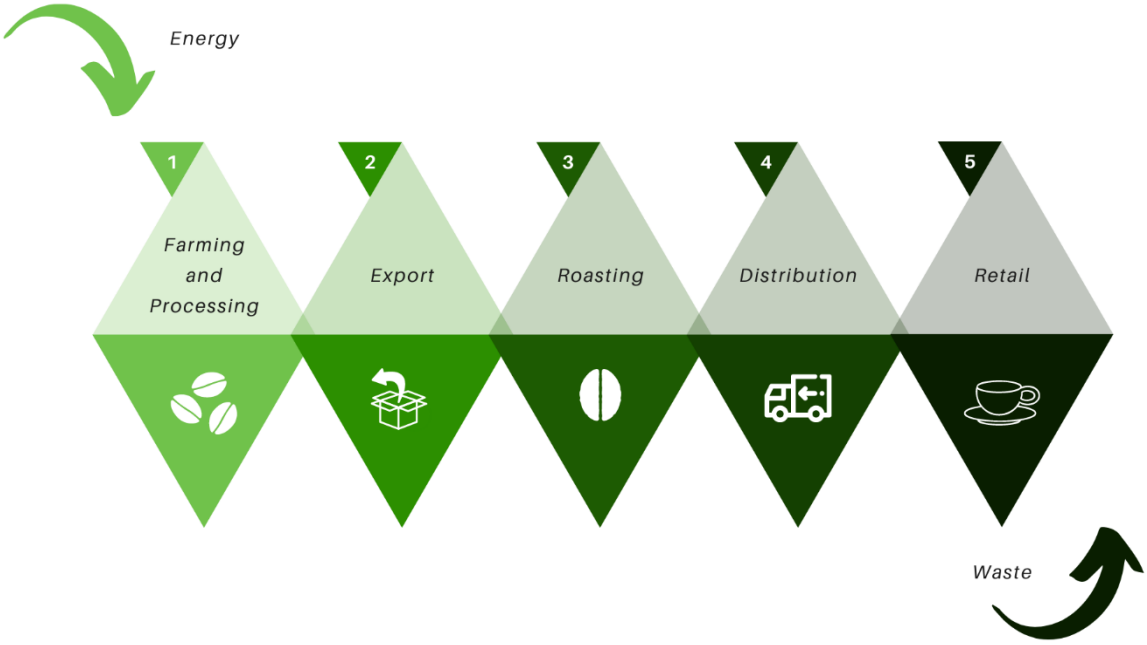


FIGURE 19: COFFEE SYSTEM MAP

SOURCE: OWN PRODUCTION

Farming and processing: refer to the action of planting a coffee tree, tending, harvesting coffee seeds, and prepare them for stable transportation and storage.

Export: refers to organizing the coffee's bean departure from its country of origin and arrival to importing country by coordinating the logistics and absorbing the financial risks in international trading.

Roasting: refers to the heat treatment given to coffee seeds in order to increase their solubility and develop the flavors desired by the final consumer

Distribution: refers to the activity of distributing the roasted coffee directly to the retail place

Retail: refers to the activity of either providing consumers access to coffee in packaging or directly in a brewed coffee in coffee shops.

1.3 COFFEE TYPES

We can identify four quality groups (ITC, 2012) that differ in process type and coffee tree production.

- Colombian Mild Arabica
- Other Mild Arabica
- Brazilian and another natural Arabica
- Robusta's

Together, the Robusta and the Arabica account for more or less 99% of the total coffee production. However, we note that this number only concerns the data of the coffee traded as

a commodity on financial markets. Mild arabica includes coffee that is produced by the wet/washed method. In that process, the fruit and pulp covering the beans are removed before being dried. This method requires the use of a substantial amount of water. Another arabica, such as the natural arabica, is produced with the dry method. With the dry method, the coffee fruit is dried thanks to the sun directly. Once completely dried, the skin and the pulp are removed mechanically.

1.4 CONDITION FOR COFFEE GROWING

Growing coffee is not an easy task. Indeed, an interview with coffee growers in the region of Bas-Congo (Democratic Republic of Congo) displayed that climatic conditions would impact the volume through the size of the beans and the quality through the taste of the beans. Indeed, the traditional coffee growers explained that traditionally, a coffee plantation in the region of Bas-Congo DRC aimed at reaching high yield with a trade-ff on quality. Effectively, with an altitude ranging between 0 and 400m, the coffee beans yield faster but with smaller beans and a sour taste.

Based on an interview, we can distinguish four main variables when considering coffee growth: climate, soil, pest & diseases, and economic condition.

In terms of climate, the coffee beans are susceptible to temperature, altitude, and rainfall. Indeed, to yield high, the coffee beans require a lot of sun exposition, constant rainfall, and specific temperature ranges. For example, The Robusta coffee grows in lowland Equatorial Africa, particularly in the Congo River Basin and the Lake Victoria forests. It requires abundant and consistent rainfall (around 2000mm per year) at an altitude up to 800 meters above the sea. The plants need a temperature between 22°C and 30°C to grow and are highly sensitive to temperatures above or below that range (Bossolasco, 2020). Those aspects will be elaborated on in the next chapter of this section.

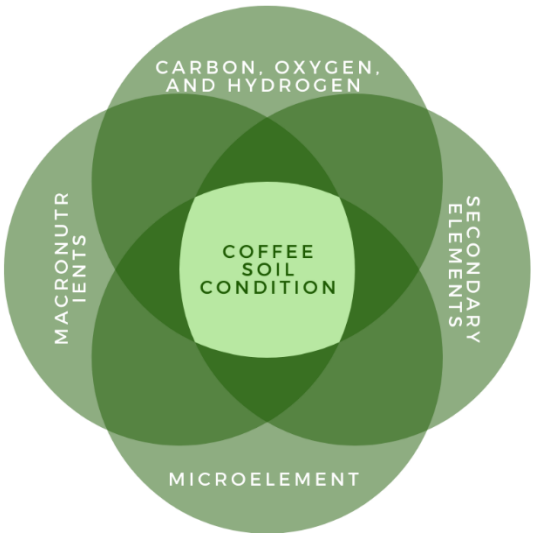


FIGURE 20: SOIL CONDITION FOR COFFEE GROWING
SOURCE: OWN PRODUCTION INSPIRED BY (LLOBET, 2017)

The soil texture needs to be loamy, a mixture of sand, silt, and clay and contains the right amount of nutrients in the top 30 cm. The coffee tree needs around 16 essential elements. That can be divided into four groups based on their function and importance (Llobet, 2017).

- Carbon, oxygen, and hydrogen present in water and air.
- Nitrogen, phosphorus, and potassium are macronutrients needed for a healthy coffee plant.
- Calcium, Magnesium, and Sulphur are secondary elements that function as macronutrients but are required in smaller quantities.
- Zinc, boron, manganese, molybdenum, iron, copper, and chlorine are microelement needed but not as essential as the other groups.

The economic conditions for coffee growing can be divided into labor, capital, transport, and market.

- Coffee production is a labor-intensive production since the coffee is hand-picked. This fact has also been observed when analyzing the economy of coffee (harvest costs represent the second larger cost driver for coffee production). On top of the labor needed for harvesting, labor is needed all around the year for land preparation, cultivating, pruning, weeding, and other activities.
- Coffee plantation also requires a considerable amount of capital, mainly for input cost. Indeed, coffee production requires first purchasing land, coffee seed, and the maintenance of the tree for around four years before bearing fruit.
- Once the coffee is produced, the infrastructure available for transportation greatly influences the economic condition of the production. Therefore, poor infrastructure could be linked with high transportation costs, negative profitability, and therefore no interest in coffee production.
- Without a buyer and a market, coffee production for market purposes is impossible.

1.5 COFFEE EXPORT

In terms of coffee exportation, around 70 countries are coffee producers (ITC, 2012). According to the world Atlas data on coffee export (Szenthe, 2020) , Brazil is leading the market with 2.59 Million metrics of coffee produced per year, followed by Vietnam 1.65 Million, Colombia's 0.81 Million, Indonesia 0.66 Million, and Ethiopia with 0.38 Million. As we can see in the figure below, the top two exporting countries account for 50% of the total global production, and 80% of the global production is reached by the output of the top 7 producing countries. On average, the coffee market employs 6 million farmers worldwide (Hallie Eakin, 2009) , and 125 million people depend on it to survive. According to the International Trade Center (ITC, 2012), coffee is a commodity that contributes highly to foreign exchange earnings and accounts for a considerable portion of tax income and GDP (Gross Domestic Product).

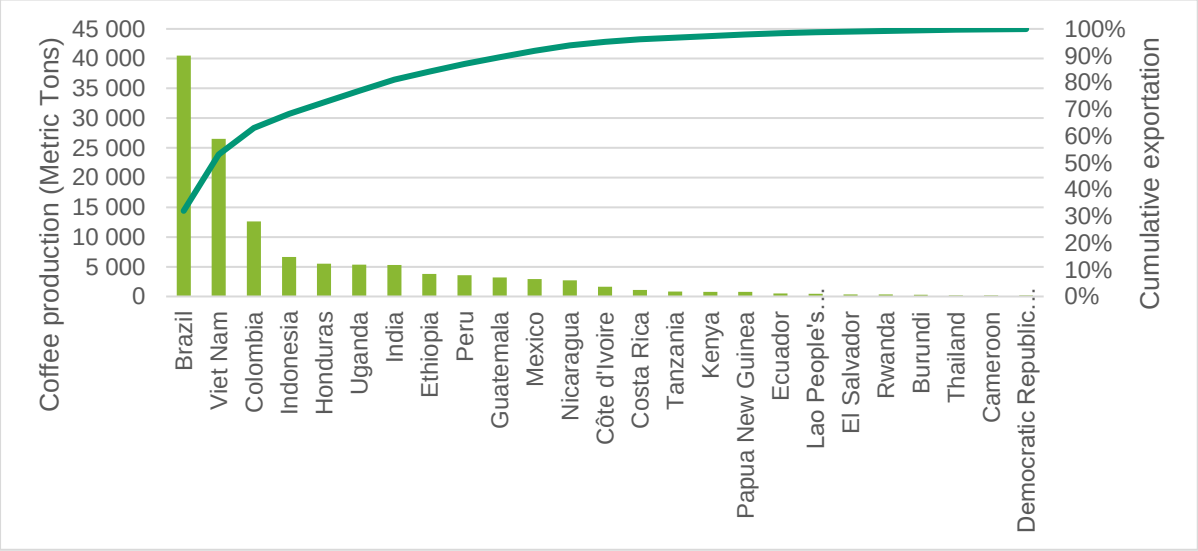


FIGURE 21:VOLUME AND CUMULATIVE COFFEE EXPORT PER COUNTRY AND PARETO ANALYSIS IN 2020
SOURCE: OWN PRODUCTION, DATA (ICO, TRADE STATISTICS TABLES, 2021)

1.6 ECONOMIC OF COFFEE

The term economic of coffee means a cost-revenue presentation per activity across the value chain in us dollars per cup of coffee. The following presented data are based on the assumption that 15 cups of coffee could be extracted per pound of roasted coffee beans. It is also important to note that the distribution step will not be considered in this section due to the lack of information on the subject. We will, however, allocate distribution costs to other activities. We would also note that the cost and revenues presented only considers cost and revenues relevant to the coffee value chain. We will, therefore, only consider the costs that are directly linked to the production of coffee

1.3.1 FARMING AND PROCESSING

The International Coffee Organization composite indicator price (ICO, 2021) provides an average price for the green coffee bean regardless of type and origin. Based on the last values recorded (2019), the price of 1lb coffee can be evaluated at 1.0052$/lb**.** The price fluctuated between 0.5$/lb. in 2001 and 2.1$/lb. in 2011.

Based on 15 cups/ lb., **the price of one cup can be evaluated at 0.067$**

When looking at the analysis of production costs across Latin American coffee producers (Tark, 2018), we can identify the cost of production per pound as the result of the following equation:

$$\frac{Admin\ Costs + Harversting\ Costs + Other\ Labor\ Costs + Input\ Costs + planting\ and\ renovation\ costs}{Pound\ of\ coffee\ green\ beans\ produced\ per\ year}$$

The data collected help us identify an average cost of production of 1.35$/Lb., equivalent to a **cost per cup of 0.09$ per cup.** That surprising number gives us a **net loss of -0.023 $ per**

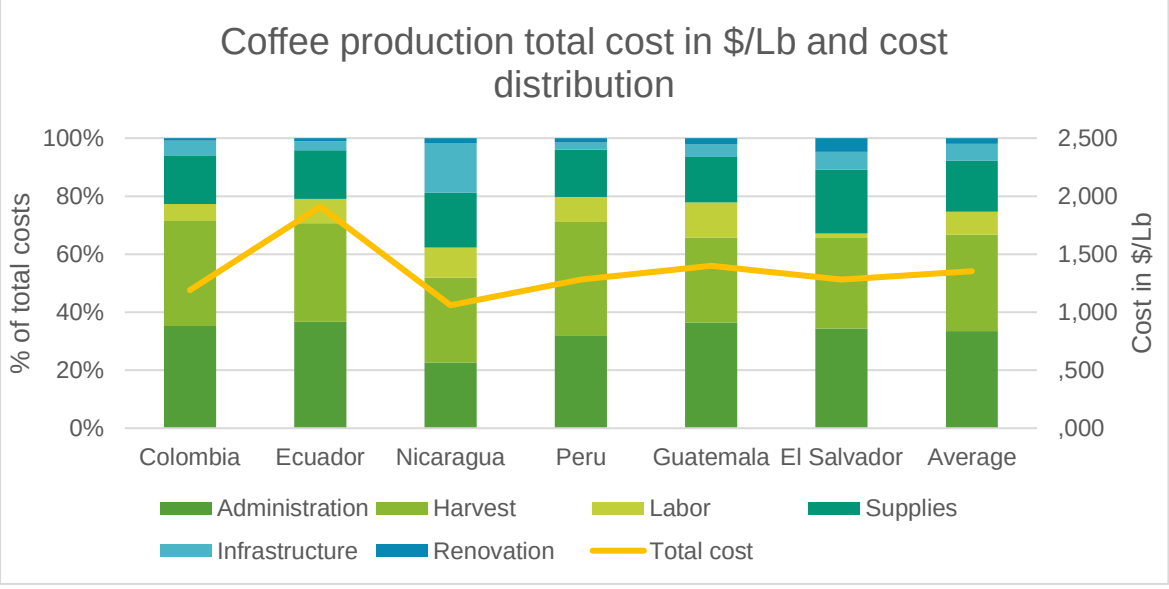


FIGURE 22: COFFEE PRODUCTION TOTAL COST IN $/LB AND COST DISTRIBUTION
SOURCE: OWN PRODUCTION, DATA/ (Tark, 2018)

cup for the average coffee farm. Since coffee producers need a minimum price of 0.09$ per cup, this information tells us that most coffee farms cannot be breakeven with the coffee market price. According to the interviews conducted with farmers, to break even, the majority of coffee producers will rely on premium prices offered through certification schemes such as the fair-trade premium, which is equivalent to 0.2$/Lb.

We can also note that the major cost drivers of coffee production lie in administrative and harvest costs, which account together, on average, for more than 66% of the total costs. We can also see that countries with a cost structure that allows them to break even, such as Nicaragua, also have the least administration costs. The qualitative interviews realized for this thesis pointed out that a considerable part of administrative costs is allocated to certification schemes subscription.

According to the Specialty Coffee Association**,** 0.4$ per pound can be deducted from the ICO indicator price for certification (SCA, 2014). Based on the data presented in Figure 20, certification costs could account for more than 80% of the total administrative costs.

In part 5, we will seek to question the living income. It is important to go a step further from the "farming and process" by wondering the price paid to the farmer to evaluate how it is positioned when questioning the living income. Coffee farmers rarely have the tool necessary for coffee washing or drying and rarely sell to exporters directly due to the low volume of production. Therefore, the price paid to farmers is often represented as "labor cost" at the level of cooperative or business support organization. Based on the data presented (Tark, 2018), we can differentiate two distinct types of labor required:

- Fixed labor: which represents the work needed for planting and maintaining the coffee tree. Based on the previous data, this labor represents, on average, 0.107$ per pound of coffee produced or **7.9%** of the total farming cost.
- Seasonal labor: represent the labor required for the harvesting period. Highly demanding in labor and seasonal, this labor cost center represents on average 0.45$ per pound of coffee present or **33.33%** of the total farming cost.

On average, the total cost of labor represents 41.2% of the total farming cost or 0.556$ per pound of coffee produced or **0,037$ per cup of coffee**

It is important to note that expressing a price in US Dollars does not reflect the real price. Effectively, almost no farmer in the world sells their beans in US Dollars but the local currency. Therefore, the real income is highly dependent on the exchange rates, which is subject to a high level of volatilities.

1.3.2 EXPORTING

Once harvested, processed, and milled, the coffee beans are packaged in bags of 60Kg which is the international standard for coffee export.

We remind that the exporter's cost is the price at which it pays the green beans to farmers, which is 1.0052$/lb or 0.067$ per cup.

According to the Specialty Coffee association Benchmarking & Report and Square Coffee price report (SCA, 2014), the price charged by exporters can be attributed to five categories:

- Green coffee beans: 3.24$/lb.
- Shipping and customs entry: 0.1$/lb.
- Finance & storage: 0.03$/lb.
- Warehouse & logistics: 0.025$/lb.
- Importer margin: 0.15$/lb.

The total price charged by the exporter is 3.545$/lb. The **price per cup is therefore 0.23$.** If we remove the 0.067$ given for the cost to purchase green beans for farming and processing, the **exporter margin is 0.163$ per cup.**

1.3.3 ROASTING

Following the previous steps, the roaster purchases the green coffee beans for around 3.545$ per pound. According to the Specialty Coffee Association (SCA, 2014) we can identify the total roaster cost by adding on top of the price of green coffee beans paid to the exporter:

- Shipping/ releasing/devanning costs: 0.08$/lb.
- Shrink Loss of 18%: 0.8$/lb.
- Packaging Cost: 0.4$/lb.
- Direct Labor Cost: 0.53$/lb.
- Certification Cost: 0.04$/lb.
- Sales and other overhead costs: 2.93$/lb.
- Interest, depreciation, amortization & lease: 0.4$/lb.

Therefore, the total roaster cost per pound is 8.725$/lb, which is equivalent to **0.581$ per cup.** According to the same data source, the roaster selling price per pound can be estimated at 9.4$ per pound, equivalent to **0.626$ per cup**. The roaster, therefore, enjoys a **margin of 0.045$ per cup.**

1.3.4 RETAIL

According to MarketWatch (Settembre, 2019), the average price for a cup of coffee could be estimated between 2.99$ and 4.24$. The Specialty Coffee Association (SCA, 2014) also tells us that the retail cost can be divided into the following cost centers:

- Direct retail cost (cups, lids, sticks,…): 3.6$/lb.
- Labor cost: 8.82$/lb.
- Leasehold: 4.2$/lb.
- Utilities: 1.05$/lb.
- Marketing:1.26$/lb.
- Repairs and maintenance: 0.84$/lb.
- G&A:6.3$/lb.

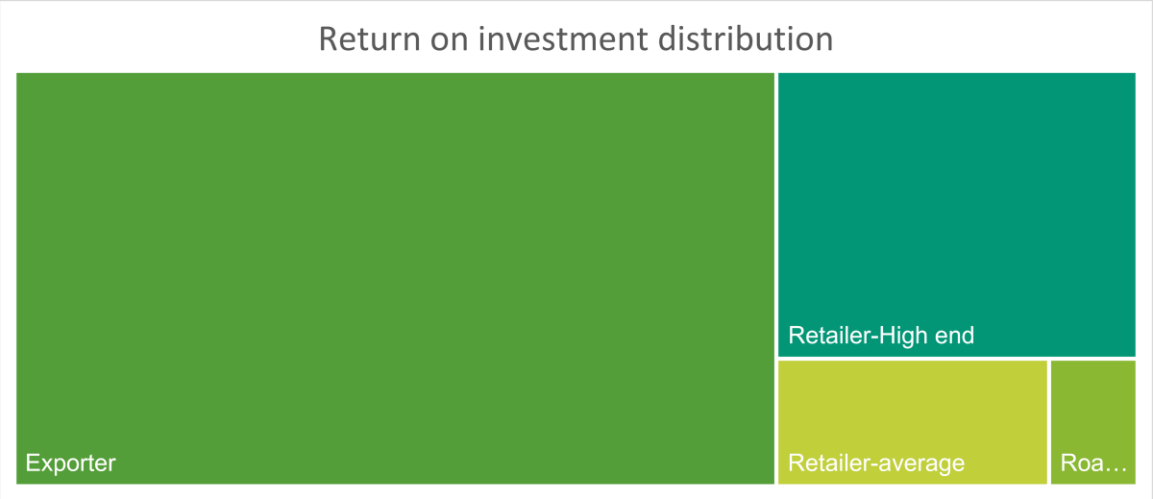
Therefore, the retail cost without the coffee cost is 26.07$/lb., equivalent to a cost of 1.738 $ per cup. **The total cost**, by adding the roasted coffee purchase price per cup, **the total cost per cup is 2.364$**. Considering the selling price per cup, the retailer enjoys a **margin between 0.626$ per cup and 1.876$ per cup.**

1.3.5 ECONOMIC OF COFFEE SUMMARY

The data presented in the previous sections can be summarized in dollar per cup in the following table:

TABLE 7: ECONOMIC OF COFFEE SUMMARY

Value chain step	Cost per cup	Revenue per cup	Margin per cup	Return on investment
Farming and processing	$ 0,09	$ 0,07	$ -0,02	-22%
Exporter	$ 0,07	$ 0,24	$ 0,17	243%
Roaster	$ 0,58	$ 0,63	$ 0,05	9%
Retailer-average	$ 2,36	$ 2,99	$ 0,63	27%
Retailer-High end	$ 2,36	$ 4,24	$ 1,88	80%



We note that the data gathered in this section are not valued in purchasing power parity. Effectively, we have deliberately chosen to provide, with this analysis, a magnitude of the cost-revenue distribution instead of monetary value for comparison between countries.

The following data help us identify where are the biggest return on investment in the coffee value chain. The exporter enjoys the largest ROI with 72% of the total return on investment, followed by high hand retailers with 24%, average retailers with 8%, and the remaining goes to roasters with 3%. We note that the farming and processing part is non-existent since they are losing 7% of the capital invested compared to the total coffee value chain ROI.

CHAPTER 2: DEMAND ANALYSIS

The coffee market can be divided into three categories (Mordor Intelligence, 2020): consumption type, distribution channel, and import geographic distribution.

2.1 CONSUMPTION TYPES

The coffee beans sold to consumers are almost always roasted. However, traditionally, coffee beans are sold to exporters as “green beans.” That preference is mainly due to the variety in taste among consuming regions leaving roasting before exportation a riskier investment.

We can identify whole-bean, ground coffee, instant coffee, and coffee pods capsules in terms of product type.

- Whole-bean coffee: whole-bean coffee is an unground coffee bean. The beans are roasted but not grounded.
- Ground coffee: ground coffee is a coffee that has been roasted and grounded. The size of the ground will depend on the use (fine ground for espresso, coarse for French press,)
- Instant coffee: instant coffee is a soluble coffee beverage derived from brewed coffee beans. The soluble coffee is made by freeze-drying or spray drying, after which it can be rehydrated.
- Coffee pods capsules: coffee pods are single-portion dosages of coffee made to work alongside a specific coffee machine.

From the first to the fourth of those coffee consumption possibilities, we can note a price increase. Effectively, retailers have done a great job at increasing, throughout times, the price they received from consumers thanks to functional and marketing improvements. The price paid for whole-bean coffee is under the price paid for coffee pods capsules for the same green coffee beans.

Despite the selling format, we can evaluate the quality of coffee based on (ITC, 2012):

- Coffee tree variety
- Altitude and region
- Preparation process
- Bean size and color
- Number of defects
- Roast appearance and cup quality
- The density of the beans.

Those pieces of information help us understand which criteria are critical to quality when selling coffee.

2.2 DISTRIBUTION CHANNELS

In terms of distribution channels, we can identify on-trade and off-trade channels. Off-trade channels include retail channels such as hypermarkets, convenience stores, specialist retailers, etc. On-trade channels refer to bars, restaurants, coffee shops, etc. (Hartziotis Trading Co Ltd).

According to the Mordor Intelligence report on the global coffee market (Mordor Intelligence, 2020), market concentration for distributors is very fragmented, making it highly competitive without dominant players. The Dominant players are Kraft Heinz Company, The Coca-Cola Company, Nestle SA, JM Smucker Company, and JAB Holding.

2.3 IMPORTS GEOGRAPHIC DISTRIBUTION

Europe is the highest coffee-consuming region in terms of geography, followed by North America, Europe, Asia-pacific, South America, and the Middle East & Africa (Mordor Intelligence, 2020). Effectively, the ICO data on coffee importing countries (ICO, 2021) tells us that Europe represents 59.3% of the market. In terms of market distribution, nine countries represent more than 80% of world importation, as displayed in the graph below.

That piece of information is highly important since it allows us to assume that the European regulations and consumer patterns have a very high potential to influence the structure and dynamic of the whole supply chain.

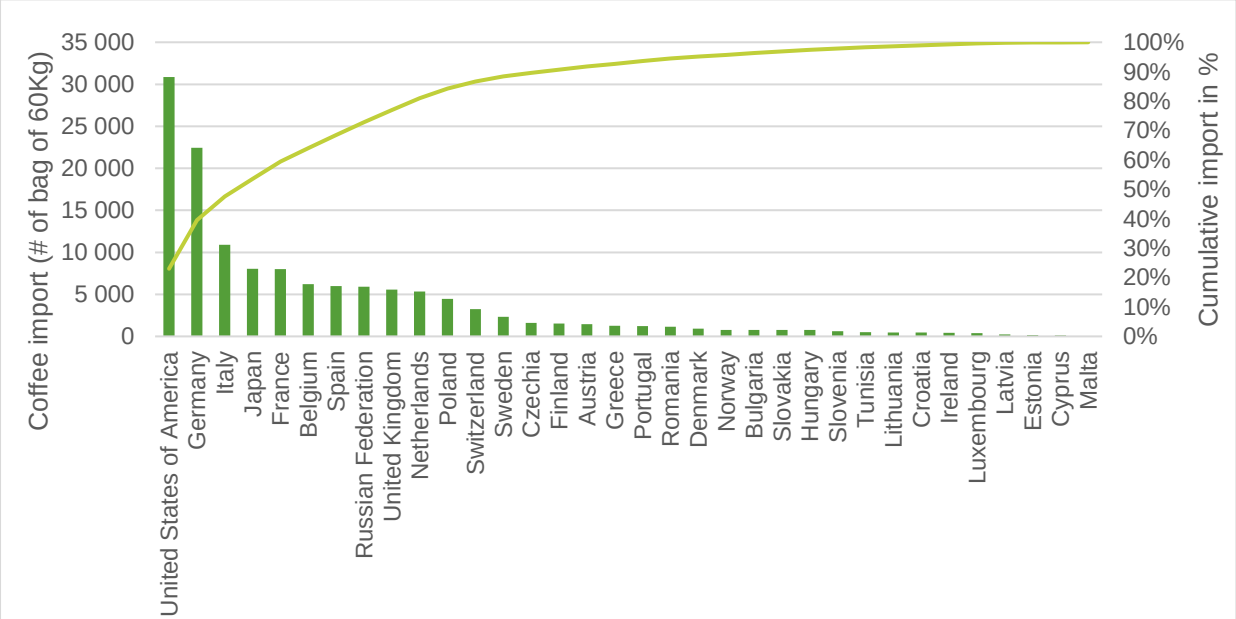


FIGURE 23: COFFEE IMPORT IN # OF 60KG BAGS IN 2019 AND PARETO ANALYSIS

SOURCE: OWN PRODUCTION, DATA (ICO, TRADE STATISTICS TABLES, 2021)

2.4 MARKET TRENDS

The European market is traditionally the most prominent coffee market worldwide. While the market can be defined as mature, it is evolving, and we see the following trends: more

demanding consumers, single-serve and ready to drink coffee, specialty coffee, and direct trading and coffee certification.

2.4.1 MORE DEMANDING CONSUMERS

According to the Centre for the Promotion of Imports from developing countries (CBI, 2020), we can see five waves in the coffee drinkers' market. The first wave popularized coffee consumption in Europe between 1960 and 1990. The second wave introduced the consumption of higher-quality coffee and was marked by companies such as Starbucks and Costa Coffee in early 1990. The third wave arose from a surge in demand for high-quality coffee, focusing on specific taste attributes, and happened in 2010. The third wave was also characterized by "coffee-like-wine" coffee drinkers and direct trade. The fourth wave is currently happening and is characterized by the "science of coffee." For high-end coffee drinkers, it is essential to understand the characteristics of the coffee bean and its influence on taste before drinking it. We can also notice a growing interest in the story behind the coffee.

2.4.2 SINGLE-SERVE AND READY-TO-DRINK COFFEE

We can notice a constant increase in single-serve and ready-to-drink coffee consumption over the last ten years (Business Wire, 2018). According to Mordor intelligence, we can expect this growth to continue with a 6.8% growth rate between 2020 and 2025 (Mordor Intelligence, 2020). The reason behind this trend is mainly the ease of use. Indeed, their strong marketing and the wide variety of choice makes them appealing for consumers. We can note the introduction of specialty coffee in the single-serve market.

2.4.3 SPECIALTY COFFEE AND DIRECT TRADE

Generally speaking, the majority of European consumers purchase cheap mainstream coffee. However, we can notice a growing consumer base that is willing to pay more for a coffee with a "story" and sustainable environmental and social impact. Specialty coffee is mainly define based on grading principles and cupping protocols (SCA, Protocols & Best Practices, 2020).

Unlike mainstream coffee that only has four types of coffee trees, the Specialty Coffee market favors the diversity of coffee trees since the range of taste comes from it.

The specialty coffee market target specifically consumers that, based on the satisfiers (CRACCO, 2020), are looking to satisfy their prestige (+/-5% of the total market) and internal social service dynamic intangibles (+/- 30%-40% of the total market). This means that the consumer of specialty coffee is willing to pay an extra price to levers admiration and envy and another premium to “do the right thing” under a price-quality constraint.

We can note that the price per pound for specialty coffee is way higher than the price for traditional coffee, regardless of its type. Effectively, according to TransparentTradeCoffee (Coffee, 2021), the average price for roasted specialty coffee in 2020 is 23.86 $ per pound, with 17.57$/lb for the lowest-priced coffees and 30.14$/lb for the highest-priced coffees.

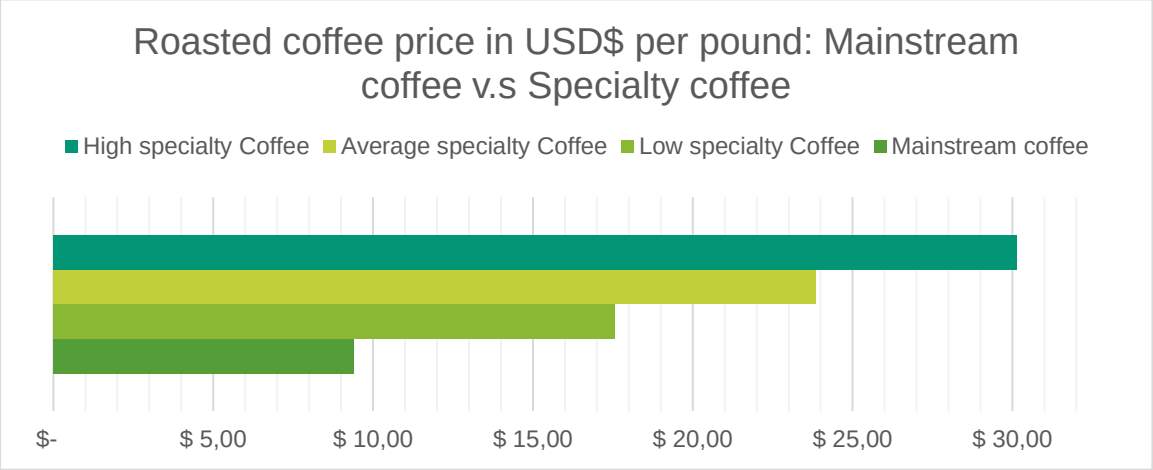


FIGURE 24: ROASTED COFFEE PRICE IN USD$ PER POUND: MAINSTREAM COFFEE V.S SPECIALTY COFFEE
SOURCE: OWN PRODUCTION

That trend will be analyzed in more depth in the third chapter of part 6 of this thesis when evaluating the opportunity of direct trading for coffee producers.

2.4.4 COFFEE CERTIFICATION

We can notice an increasing concern about the socio-environmental impact of European consumption (CBI, 2020). Because of that shift in demand, certification's schemes have become a cornerstone for medium and large companies, therefore, making extremely difficult for the non-certified company to access European markets. On the other hand, we can observe that small companies are increasingly interested in working through direct trade, therefore directly assuring the socio-environmental impact (CBI, 2020). The principal certification schemes in coffee are:

- Fairtrade
- Organic
- Rainforest Alliance
- UTZ
- 4C

We can also note the rise in small certification schemes that aim to meet the requirements of niche markets. Such as:

- Bird Friendly Coffee
- Demeter (biodynamic)
- Fair for life
- …

The growth for certification is the result of a growing number of demands for transparency and traceability. While certification is the path followed by the majority, we can observe the rise of roasters and retailer's in-house sustainable sourcing programs. The goal of those programs is to provide sustainable sourcing by enhancing existing certification such as the Nespresso AAA Sustainable Quality Program (Nespresso, 2012), or simply bypassing them by doing direct

trading. The demand for more transparent products has incentivized roasters and producers to work more closely together to meet consumers' requirements.

The coffee barometer (Pierrot, 2021) tells us that, in 2019, only 50% of the total certified production was sold. This does not imply that the other 50% were not sold at all but means that 50% of the certified coffee is sold on the traditional market with the traditional price. More details on that paradox will be given in part 5 of the thesis while analyzing the case of the Fairtrade certification scheme.

CHAPTER 3: CONCLUSION

Throughout this part of the thesis, we have analyzed the global value chain in terms of supply and demand. We have observed that the coffee market's level of risk and reward depends highly on your place inside the value chain. Indeed, while the exporter enjoys the highest margin, the farmers still struggle to reach profitability and sustain their basic needs. Risk and reward are spread unevenly, increasing an asymmetry in power that catalyzes, as we will observe in part 5 of this thesis, increasing pressure on the farmers' environment and qualitative living standards.

If we had to see the coffee value chain as a global supply chain under social and environmental constraints, the farming and process part would be the bottleneck. Effectively, no matter the effort, in terms of social justice or environmental actions, of the stakeholders that follow in the farming and process step, its impact will be limited in time and insignificant in scope if the farmers' aspects of the value chain are not improved. Bounded by the ecological approach, the actions regarding climate change of the retailer or roaster at the end of the value chain could increase the efficiency of its activity but will never impact strongly the damages done from the production of coffee. In the global coffee value chain, absolute sustainability will never be reached if the first step of the value chain, which takes directly from the environment to provide goods, is not bettered. Bringing social justice and decrease the pressure on the environment is critical to reaching a strong level of sustainability in the coffee value chain. To do so, some socio-environmental elements such as the living income for coffee farmers must be protected at all costs.

Based on those elements and driven by a strong sustainability perspective in which issues of distribution and inequality are of tremendous importance, we have decided to focus on the specifics of the farmers in the coffee value chain. The farmers are the ones that take directly from the environment to produce goods and are the most exposed stakeholder of the value chain in terms of social standards. We will elaborate on the coffee farmers' issues and the existing solutions inside the farming and process step of the coffee value chain in part 4. We will pay special attention to information-based solutions that target the living income of farmers in part 5, where we will evaluate the case of the Fairtrade certification scheme and label. Ultimately, we will provide tracks for developing new information-based solutions in part 6 of this thesis.

To conclude, we suggest going through a short presentation of the pressure in the farming and process part of the coffee value chain through a porter’s five forces analysis.

3.1 COMPETITIVE RIVALRY

Due to the low margin opportunities, coffee production could have a low level of competitive rivalry. That fact would have been true if coffee production were an independent choice and not a necessity. Effectively, many farmers consider coffee production as the only source of income. They are therefore ready to go on fierce price competitions. Furthermore, the data shows us that the production level, especially when considering the Fairtrade market, is way above the “market equilibrium.”

3.2 BARGAINING POWER OF BUYERS

Due to the high level of fragmentation in the coffee market and the low level of differentiation, the bargaining power of buyers is high. That power is increased because many farmers do not have direct contact with buyers and have a very small broker base to go to. The broker’s switching cost is low due to a large number of alternatives. Companies on the market are therefore pulling their sourcing farmers based on the requirements of their buyers. For example, during the last few years, consumers have been more aware of the social-climatic impacts of their consumption. As a result, coffee certification such as Fair Trade or UTZ has increased and become a must for farmers (Mordor Intelligence, 2020).

3.3 BARGAINING POWER OF SUPPLIERS

Due to the specific conditions for coffee production mentioned in section 1.5 of this part of the thesis, the supply of coffee is mainly due to the work of little farmers gathered worldwide (Specialty Coffee Association, 2017). More than 120 million workers rely on coffee production to survive (Slezak, 2016). The data are displaying a decrease in labor available for coffee production and an increase in land cost. The bargaining power of suppliers is therefore increasing.

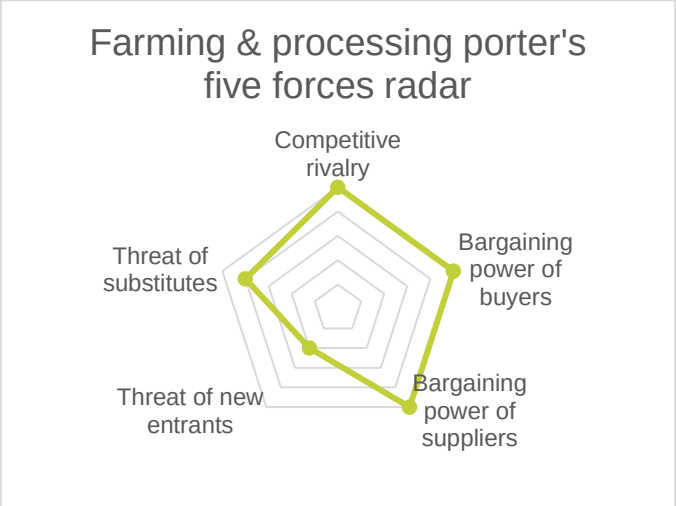
3.4 THREAT OF NEW ENTRANTS

The threat of new entrants could be considered as relatively low. Effectively, as mentioned for competitive rivalry, coffee farming is more a means of surviving than a deliberate choice. Therefore, new entrants are either motivated by a low income or external support for investing in the coffee production market. On the contrary, we could even say that the departure of the youngsters from coffee crops indicates a desire for a market exit.

3.5 THREAT OF SUBSTITUTES

The threat of substitutes in the coffee market is high due to the high consumption of tea and other local hot beverage alongside coffee. In Europe, for example, based on imports, coffee consumption accounted 2019 for 17.4 billion USD (OEC, Coffee, 2019) while tea consumption accounted for 2.04 billion USD (OEC, Tea, 2019).

3.6 PORTER'S 5 FORCES SUMMARY



Based on the previous elements, we can note that the global competitive pressure faced by coffee farmers is very high. Effectively, the high level of competitive rivalry, the high bargaining power of suppliers, their dependence on labor, and the threat of substitutes make coffee farming a very uncertain and risky endeavor.

FIGURE 25: FARMING PORTER'S 5 FORCES ANALYSIS
SOURCE: OWN PRODUCTION

PART 4: COFFEE PRODUCTION AND CLIMATE CHANGE

Now that we have an overview of the coffee value chain, let us dig down the interdependencies between coffee production and climate change. This section of the thesis aims to provide the information needed to understand the interdependencies between climate change, farmer's income, and the social structure. Chapter one of this section will provide the reader with an analysis of the coffee farmer's issue. To do so, we will first seek to understand the link between the coffee value chain and its environment and cascaded down climate changes impact on the coffee production, economic value, social impact, and further climatic pressures. Based on that systemic map of the dynamic between coffee production and climate change, we will, in chapter 2, present four different types of existing solutions to resolve socio-climatic issues inside the coffee value chain. Among the four different types of existing solutions, we will explore information-based solutions more deeply in part 5 of this thesis through the case study of the Fairtrade certification scheme and label.

CHAPTER 1: IMPACT OF CLIMATE CHANGE ON PRODUCERS

While we are walking through our favorite retail store or coffee shop, we could jump to the conclusion that coffee production is easy, fast, diverse, and quite resilient due to the wide range of products available. Brazil, Colombia, Ethiopia, Kenya, Uganda, assuredly the variety of the production must be great, right? (Yabili, 2021) Well, not quite. In reality, even though coffee grows in more than seventy countries, the coffee in our cup only mainly comes from two types of species when considering the global coffee trade in terms of commodity: Arabica (61.6%) with the scientific name of *C. Arabica* and Robusta (38.4%) with the scientific name of *C.canephora* that together account for 99%. Besides those two coffee types, we can find 122 different coffee tree types (**Erreur ! Source du renvoi introuvable.**) sold through direct trading but only represent a tiny bite of the cake.

The use of only two different types of coffee breeds makes biodiversity inside the coffee production deficient. Coffee production requires specific environmental conditions to survive and a perfect setup to thrive on the drastically low bio-diversity level (Yabili, 2021). Effectively, the output of coffee varies upon climatic criteria such as temperature, altitude, or soil and social measures such as access to finance or the labor available, as presented in part 3 of this thesis.

Nevertheless, beyond our coffee cup's comfort, a harsh invisible reality is hitting coffee farmers' livelihoods and communities that strive to maintain profitability in a constantly changing environment (Yabili, 2021).

In theory, it is possible to produce coffee everywhere on earth; however, the cost consideration makes it highly unprofitable in many places. The best lands for production are regrouped in a relatively wide range called the "Bean Belt" (**Erreur ! Source du renvoi introuvable.**), which can be represented on a map between latitudes 25 degrees North and 30 degrees South (National Coffee Association, 2021).

When observing the variation of the coffee price from 1990, we can make two different observations.

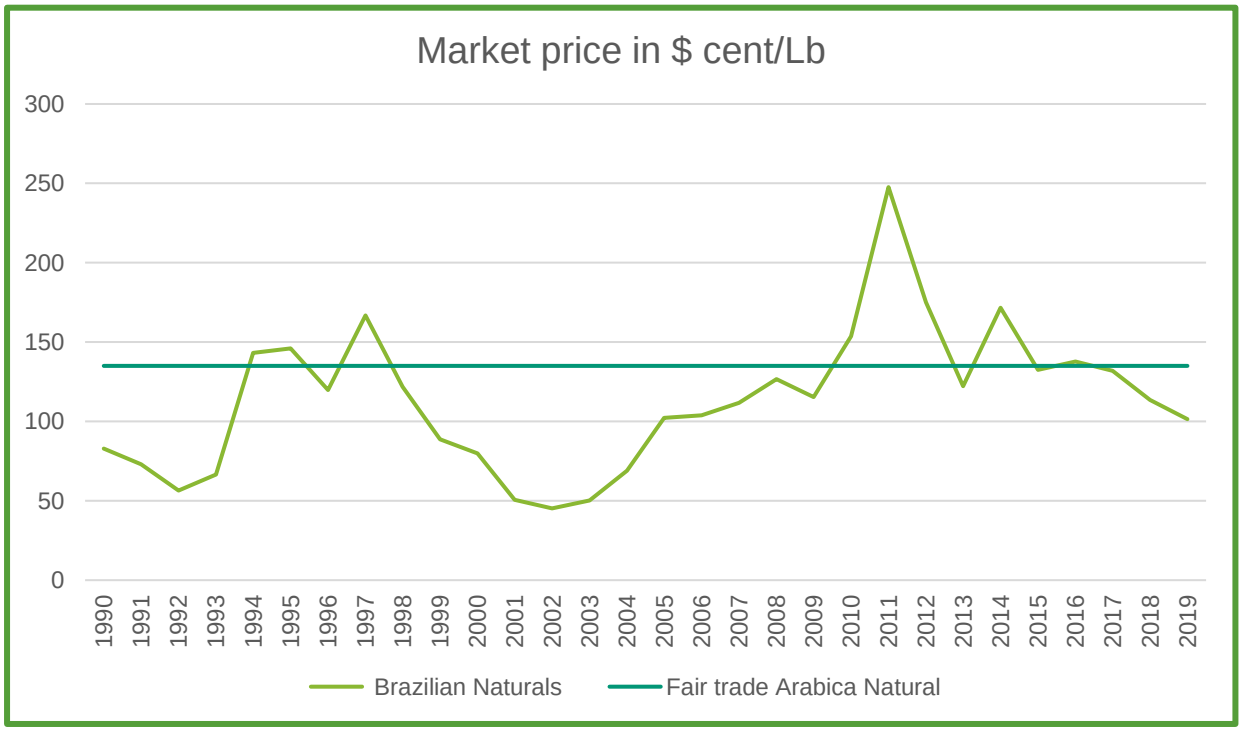


FIGURE 26: MARKET PRICE IN $ CENT/LB OF BRAZILIAN NATURAL COFFEE AND FAIR-TRADE ARABICA NATURAL BETWEEN 1990 AND 2020
SOURCE: (ICO, TRADE STATISTICS TABLES, 2021) AND (FAIRTRADE, FAIRTRADE MINIMUM PRICE AND PREMIUM INFORMATION, 2021)

First, on average, the price of coffee has been relatively low. Indeed, even though the price fluctuates a lot, it stays around 1.3$ per Lb. on average with a constant Fairtrade price which guarantees a minimum price regardless of market fluctuations. Secondly, if we drill down and

try to find the root cause of those fluctuations, we can identify four events that match almost perfectly the spike in the price commodity:

- The 1994 Brazilian frost (Talbot, 2004) reduced the 1995 coffee output by 50%-80% (Markgraf, 2001)
- The 1997-1998 Drought in Brazil (ICO, The "El nino southern oscillation event" and its impact on coffee production, 1998) resulted in a 31% in Brazilian coffee output.
- Poor harvesting season in Brazil and Colombia between 2009 and 2012 **Erreur ! Source du renvoi introuvable.**)
- 2014 Drought in Brazil wiped out 70% of Brazilian coffee production (enancio, 2020)

More recently, according to Dutch bank Rabobank, due to below the average precipitations, Brazil expects for the season 2021/2022 56,2 Million bags of coffee, which is the lowest level since 2018/2019 (Teixeira, 2021) .

The now forecasted 2.6 million bags deficit, 1.5 million more than expected, led to a 4.5% increase in price in late February 2021 for an international market price above $1.36 per lb., which is the highest level since September 2017. Due to the 10.5 million bags carried over from the previous season, the supply deficit will be covered, and the market price will adjust below the 1.3$ per pound in the month following the redaction of this thesis.

The outstanding level of interdependences between the environmental, economic, and social spheres makes the exercise of analyzing the climatic changes impacts on the coffee value chain challenging and complex.

1.1 GLOBAL CLIMATE CHANGES

With climatic events as the root cause of all the fluctuations in the coffee market price, we can reasonably assume that coffee production is highly vulnerable to climate change.

A recent study, which aimed at analyzing the impact of climate change on coffee production areas, points out the sensibility of coffee production to climate change (Christian Bunn, 2015). The study forecast a 50% reduction of coffee's suitable production area by 2050 with significant losses in the most favored regions such as Brazil, Vietnam, or Columbia.

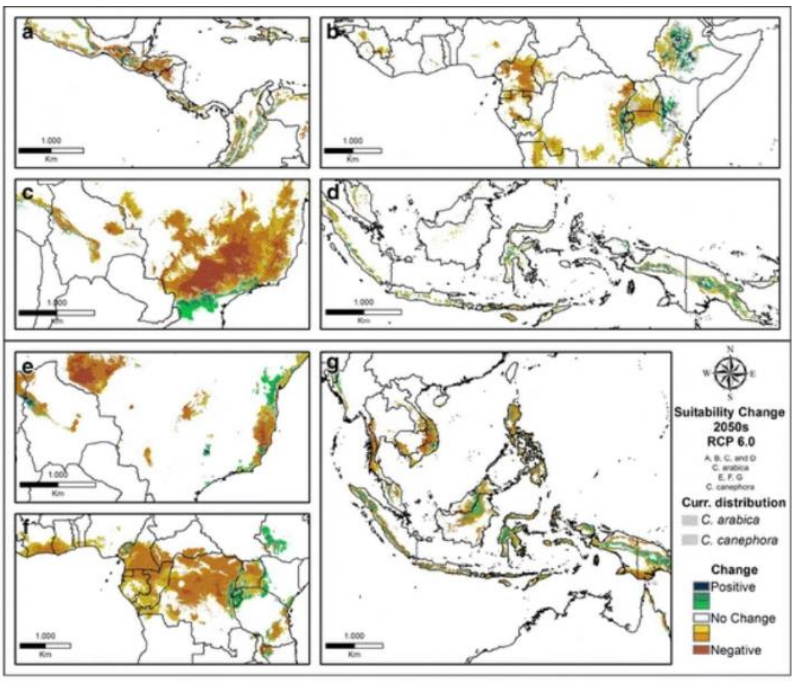


FIGURE 27: SUITABILITY CHANGES BY THE 2050S IN THE RCP 6.0 SCENARIO; A-D: ARABICA, E-G: ROBUSTA
SOURCE: CHRISTIAN BUNN, P. L. (2015). A BITTER CUP: CLIMATE CHANGE PROFILE OF GLOBAL PRODUCTION OF ARABICA AND ROBUSTA COFFEE. *CLIMATIC CHANGE*, 89–101.

The increase in temperature, the rain irregularity, and the high variability between seasons threaten the availability and quality of our most loved coffees (Schroth, 2009).

The high number of variables required to provide a suitable coffee growth environment makes coffee production directly highly sensitive to climate change. The Intergovernmental Panel on Climate Change of the UN or *IPCC* forecast an increase of temperature between 1.1- and 5.4-degrees Celsius by 2100 (IPCC, 2014). Such an increase in temperature implies a shift in the geographic location of lands suitable for coffee plantations.

In addition to warmer temperatures, climate change induces a shift in global weather patterns with an already observed increase in the frequency and intensity of extreme events such as drought or flooding, as mentioned in the first section of this chapter. The inconsistency in terms of rain directly impacts the yield of coffee trees due to their high heat sensitivity (NATIONS, 2010).

On top of the direct impact on the coffee tree, the increase in temperature and the rain inconsistency favors the proliferation of pests and diseases (NATIONS, 2010) such as the coffee leaf rust, coffee berry disease, or the coffee wilt disease (Holger Hindorf, 2011). Some of those pests and diseases have a direct impact on coffee bean appearance and cup quality. The Coffee Berry Disease (Colletotrichum) attacks the pulp of the coffee bean, causing undesirable fermentation and necrosis of the bean (Fabienne Ribeyre, 2012). Such a disease can impact the appearance of the beans by living brown spot and alter the color of the beans but can also affect the cup quality heavily by alternating the flavor, causing astringency, and bringing a taste of ferment, onion, or wine. All those elements coupled with the harder predictability of climate changes push towards a decrease in yield and quality.

1.2 ECONOMIC PRESSURE

Global climatic changes directly pressure coffee farmers' profitability, which account for 70% of the worldwide coffee production (Hallie Eakin, 2009), in terms of revenues and cost. The decrease in yield and quality directly impacts coffee producers' revenues by decreasing sales volume and bargaining power against buyers who are also increasingly struggling to maintain profitability (GUHL, 2004).

As mentioned in the previous section of this chapter, there is a high correlation between rain inconsistency and production output, which directly impacts the top line of producers working on a market at a relatively low price.

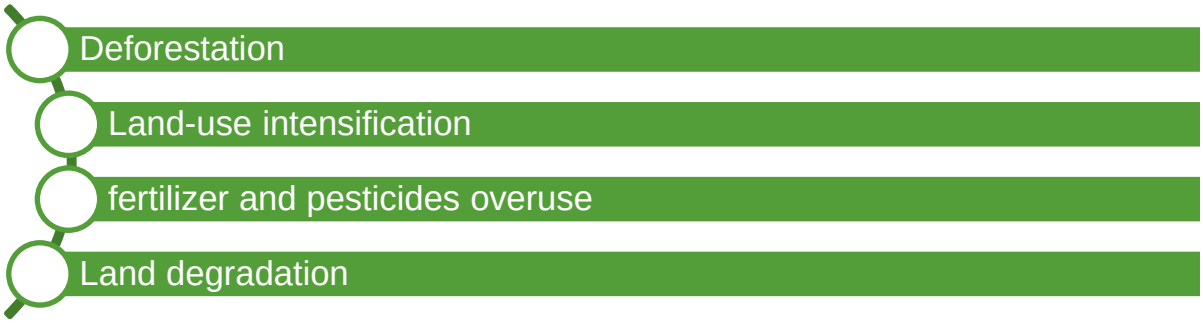
At the same time, two dynamics are affecting the cost structure of small producers. First, to maintain profitability in the short term, farmers tend to increase their production process input. Those input costs mainly represent labor, fertilizer, pesticides, or the diversification through intelligent agricultural practices to maintain yield, such as planting banana trees to shadow the coffee beans, providing cooler temperatures. Ultimately, the area suitable for coffee plantation moves, dragging the need for new production zones, hence demanding investment in land and seed.

Those investments are relatively substantial costs and require capital to implement. The farmers who are not able to do so are facing a more significant decrease in revenue. Knowing that a coffee tree needs on average five years to produce fruits and that the grounds suitable for coffee growth are uncertain in the mid-term to long-term, such an investment bears a risk that not all producers are ready nor able to make.

On top of those two dynamics, a study made by the Specialty Coffee Association (Specialty Coffee Association, 2017) displays that the automatic response to seek an increase in yield to cover the loss in sales is not a viable long-term strategy. Indeed, the quantitative study outlines that the marginal revenue of an increase in output is lower than the marginal cost, at least in the short term. In other words, when a farmer increases its yield by one unit, the extra revenue from it is lower than the additional cost to generate it. That relationship is mainly due to the fact that increasing the quantity requires considerable amounts of investments in land, labor, fertilizers, and pesticides, which, in the short term, are more significant than the possible revenue.

Knowing the struggle to reach profitability presented in part 3 of this thesis, those elements outline the tremendous economic risk induced by the high investment cost for an increase in production without the guarantee of a future return on investment.

1.3 ENVIRONMENTAL KNOCK-ON EFFECTS



The pressure of climate change on farmer's economic situation induces responses that further damage climate.

The decrease in land available for coffee production is a direct environmental knock-on effect of the previously mentioned climate changes. As pointed out by the Specialty Coffee Association in its Coffee Production Costs and Farm Profitability strategic literature review (Specialty Coffee Association, 2017), higher and more excellent grounds are needed to reach profitability and meet the market requirement. The shift in location for coffee production leads to exploiting previously unused lands. Such a transition accompanied by the low level of diversity of coffee seeds could, on top of bringing deforestation to those new areas, generate a drastic decrease in biodiversity.

As farmers face a decrease in yield and quality, an intensification of land use can be observed. Effectively, as mentioned previously, the first coffee farmer's reaction when facing an economic impact is to increase the input by planting more trees and using more fertilizers and pesticides. On the one hand, the intensification of land use directly responds to short-term changes with the extensive use of low-cost fertilizer to increase yield and pesticides to fight pest and disease proliferation. Ultimately, the intensity of land use and the overuse of chemical products are leading to soil degradation (SARFARAZ, 2021), which in the long run, could lead to a further decrease in yield and quality.

1.4 SOCIAL TENSION

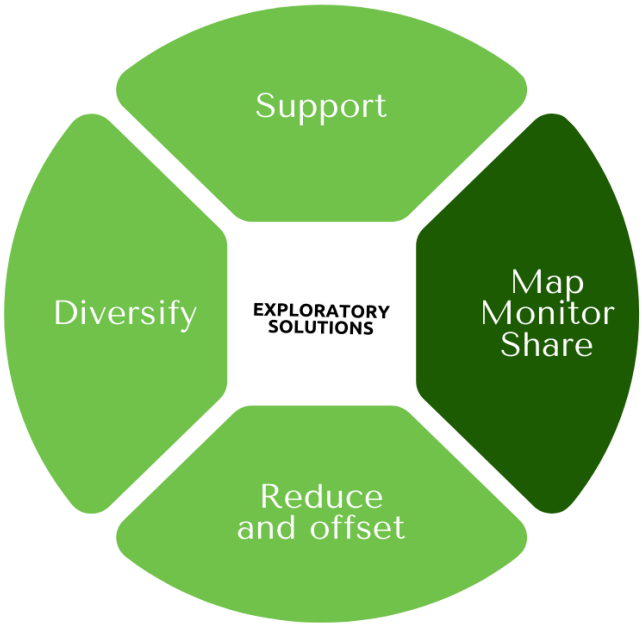
The global climate changes, the environmental knock-on effects, and the economic pressure spill over the social structure (GUHL, 2004). Effectively, as presented in part 3 of this thesis, the coffee production part of the value chain does not provide a high margin and relies heavily

on manual labor paid at a very low price. With that knowledge, it is easy to understand how economic pressure could impact the local social structure.

Firstly, as farmers lack investment capital to adapt their production due to the financial pressure caused by the falling level of yield and quality, illegal cropping and insecurity can be observed (GUHL, 2004). Indeed, without an income to sustain a living, coffee producers might be incentivized to produce on land they do not own or simply get out of business. The interview conducted among coffee cooperatives in Uganda and DRC also pointed out that coffee production has a high impact on decreasing local violence. Effectively, having a source of income provide people with an alternative to violence. Furthermore, the cooperative system under which farmers generally work provides a platform for exchange, increasing understanding among local communities and cooperation. Therefore, we could say that a decrease in revenues can be linked to a decrease in democracy and increased local violence.

Secondly, we can observe the new generation, as time passes, turning away from coffee production, leaving both a shortage of labor and an aging population less resilient to face those new challenges. Indeed, due to the decrease in profitability and poor working conditions, more and more young people seek new careers in cities. The lack of generational replacement is highly present.

Ultimately, climate issues are disrupting production patterns, which have been taught and passed on over generations. Effectively, for traditional coffee production regions, access to agricultural know-how and technology is limited. Therefore, responsiveness to climate change is low, which leads the producers to undergo climatic consequences instead of proactively handling them. Climate drastic change coupled with the inability to predict the future climatic impact and adapt production processes in time slowly leads to the loss of the local production know-how. To conclude, the living standards of coffee farmers are highly impacted by climate change and are expected to decrease in the coming years.



CLIMATE CHANGE IN THE COFFEE VALUE CHAIN
SOURCE: OWN PRODUCTION

In this chapter, we would like to provide the reader with a short presentation of different solutions to mitigate the climatic impact on the coffee value chain.

Climate change is, unfortunately, an irreversible process in the short term. If we want to keep our lovely coffee cup, we must respond to it with bold initiatives that could at the same time reduce greenhouse gas emissions and adapt coffee production to present challenges (Yabili, 2021).

According to the literature and the research conducted, we can divide solutions to mitigate climate impact on farmer's income into four categories.

2.1 SUPPORTING SOLUTION

The more immediate solution to climate impact mitigation is to support the "Climate Smart Agriculture" (Bank, CLIMATE-SMART AGRICULTURE, 2020) best practices or *CSA* in terms of techniques such as soil fertility agroforestry or the protection of watersheds. Such support would ideally be in the form of support to farmer's access to knowledge, inputs, and markets.

The goal of supporting *CSA* projects is to assess the climate change exposure of coffee systems and develop appropriate farmers' practices to increase the community's resilience. Such procedures could be levered to create and implement regional strategies while promoting access to the investment needed to maintain a decent income and a sufficient supply level.

The main impact of supporting solutions is to help producers maintain their place on the market by, on the first hand preventing short-term negative impact thanks to practices that could bring resilience in terms of coffee production and financial resilience and organizational resilience. On the other hand, supporting activities provide finance and advice for the materialization of the cooperative's short-, mid-and long-term strategy. It is important to understand that most supporting solutions aim to support the maintenance of quantity and quality for market exportation.

Organizations such as the Trade for Development Centre have made expertise out of supporting producers by reinforcing their marketing and managerial capabilities thanks to coaching and finance.

Agroforestry, for example, a land-use management system in which trees or shrubs are grown among crops, is one of the possible solutions that could mitigate the scope of the four areas of impact mentioned previously (Bank, CLIMATE-SMART AGRICULTURE, 2020). Effectively, as climate change impacts producers, agroforestry delivers a proven path to secure biodiversity, soil, and plant growth to a certain extent. Most importantly, it keeps lands suitable for production by providing shade and, therefore, cooler temperatures. For the coffee plantations, adding banana plants has been an efficient solution for many producers by first keeping the land suitable for coffee growing and diversifying the sources. Supporting such CSA by identifying the synergies between the coffee plants and other trees and financing the transition is an example of resilient coffee production.

In a strong sustainability mindset, supporting farmers to secure sustainable production growth is a good first step but it is not enough. Effectively, bounded by the laws of thermodynamic presented in part 2, only seeking growth regardless the revenue distribution is not desirable both for the environment and the social structure. For supporting solutions to work, they should be “distributive by design” and “regenerative by design,” as explained by Kate Raworth (TED, 2018).

2.2 MARKET-BASED SOLUTION

The market-based solutions are the neo-classical economics response to climate change. In neoclassical economics, environmental issues are considered a market failure and should be addressed by internalizing those externalities thanks to price adjustments.

The philosophy behind those solutions lies in considering the environment as "ecosystem services" (Stephen Carpenter, 2009) that can be compared with human infrastructure and services.

Among the quantity-based and price-based solutions, the literature suggests a vital consideration for price-based solutions mainly around two types of solutions: internal carbon pricing and the cap-and-trade market.

Internal carbon pricing (NunoBento, 2020) consists of an awareness of the companies involved in the coffee value chain around their climatic impact. Those actions can be categorized as decentralized and voluntary. The goal is to set an internal price for carbon to drives decisions and actions towards a more sustainable activity.

The cap-and-trade (European Commission , 2021) is an international parallel market for emission. The idea of this market is to set a cap (limit) on pollution and create a permit to meet that cap. Those permits can be traded among firms to either offset the over-emission or incentivized emission-performing firms.

The literature on the coffee market suggests setting carbon-neutral targets for the stakeholders involved in the coffee value chain to align the low and high end of the value chain's interests. Those carbon-neutral targets could be met by increasing the carbon efficiency of their activity and using the cap-and-trade market. Indeed, local cooperatives can be certified through the Gold Standard as carbon offsets by planting trees in areas left behind due to their inability to produce coffee beans. Having such a certification could mitigate the

effects of climate change and make coffee plantations less susceptible to the risk of critical climatic events such as flooding, landslides, pests, or diseases. Furthermore, the revenues from carbon credit could help coffee farmers' technical and labor assistance while enabling traders and roasters to invest in the communities' longevity where they buy coffee and account for their carbon emissions.

At this stage, it is essential to note that individual actions do not bring sustainable changes across the value chain since an asymmetry in terms of bargaining power and the lack of legal obligation prevent stakeholders from collaborating. We also emphasize that monetary-based solutions can be considered weak solutions since they rely heavily on market principles to provide an “equilibrium” and consider market growth as the ultimate goal.

2.3 PLANT-BASED SOLUTION

The goal of a plant-based solution is to invest directly in the main intrant of coffee production: the coffee tree.

Diversifying the variety of coffee plants is an alternative that allows, instead of coping with climate change, to select coffee trees that are able to yield in hotter and dryer conditions. The concept underlying those options is that traditionally, we only used two different types of coffee breads. By bio-engineering specific coffee trees among the 124 known (**Erreur ! Source du renvoi introuvable.**) that meet yield and taste requirement, new types of coffee could be introduced into the coffee market, therefore maintaining actual zones of production and giving hope for an increase in total production by enlarging the "bean belt" (**Erreur ! Source du renvoi introuvable.**) due to new areas suitable for coffee growth.

The low variety of coffee plants could result from the low-level national investment in coffee research, the lack of coffee seed diversity knowledge, or the tradition among countries that do not share genetic material (World Coffee Research, 2020). With an input cost critical for profitability, having resilient coffee plants is vital for the coffee value chain's survival.

The international Multilocation Variety Trial (World Coffee Research, 2020) or *IMLVT* is an excellent example of what could be done to improve that aspect. The *IMLVT* works on the potential for existing varieties of coffee trees to address current and future climatic challenges by creating mechanisms for evolving plant varieties and a platform for knowledge and seed sharing across countries.

A strong example of the results obtained through such solutions is the recent Nestle breakthrough in discovering two new Robusta varieties that are drought-resistant (Ferrer, 2021). Effectively, the two discovered Robusta are yielding up to 50% more per try, resulting in a up to 30% reduction in CO2 footprint per tree by reducing the amount of land, fertilizer, and energy needed for production.

Knowing the criticality of coffee farmers' input cost as mentioned above, introducing the best performing varieties as soon as possible at a reasonable price could provide farmers with new natural capital to exploit and a new market to explore while increasing supply and quality without a drastic increase in cost.

The prospect of solving the loss of natural capital thanks to the allocation of financial capital and human capital refers to the concept of weak sustainability if its goal is only to promote an increase in production without seeking better qualitative living standards and promoting the protection of critical natural capital.

2.4 INFORMATION-BASED SOLUTION

Information-based solutions aim at providing the different actors of the value chain with data by mapping, monitoring, and sharing information more among stakeholders.

The general idea is that information drives actions. If a stakeholder has access to information about the socio-climatic threats on its activity, he will act accordingly.

Traditionally, information-based solution in the coffee market has been dominated by labeling concepts that seek to incentivize good socio-environmental productions by providing those who are doing so with a "label" valued at the end of the value chain. During the rest of this thesis, we will focus on those information-based solutions for the case of farmer's income by evaluating the Fairtrade certification scheme and developing new information-based solutions that have the potential to meet strong sustainability goals.

PART 5: SUSTAINABILITY AWARENESS FRAMEWORK CASE ANALYSIS

The previous section of this thesis helps us identify the building blocks for the Sustainability Awareness Framework. We have explained in part 2 the logic and theoretical concepts that lie behind the framework. In part 3, we have analyzed the specificities of the coffee value chain as a whole. In part 4, we have sought to understand how climate change impacts the coffee social structure and how the reaction to climate change brings a cycle of further socio-environmental negative impact. In the last section of the last exposed chapter, we have identified information-based solutions as one of the existing solutions to mitigate the socio-environmental impact of climate change.

This part of the thesis aims to question farmers' income under the Fairtrade certification scheme thanks to the Sustainability Awareness Framework. To do so, we will identify the average wage of a Ugandan coffee farmer and set the living income as a "sustainable goal" that should be met in chapter 1, chapter 2, and chapter 3 will consist of completing the stakeholder and issue profile according to the Sustainability Awareness Framework. The Fairtrade certification scheme opportunity and the Fairtrade label information profile will be developed in chapter 4 with a critical analysis of it in chapter 5. We will conclude this part of the thesis with the sustainability awareness level regarding the farmer's living income under the Fairtrade certification scheme.

CHAPTER 1: COFFEE FARMER WAGES AND LIVING INCOME GOALS

The following chapter will provide the farmer's stakeholder profile and climate change issue profile as defined in chapter 3 of the second part of this thesis. We will consider the profile of a Ugandan coffee farmer due to the information access provided by the Trade For Development Centre during the internship period. During this case analysis, we will make a special focus on the living income. Once the coffee farmer's profile defined, we will establish the baseline of the average income of a coffee farmer and the average living income in rural regions of Uganda. On that baseline, we will define the living income as the "minimum living income goal" that should be reached to be considered sustainable. The following presented results from a combination of the previously mentioned data, qualitative interviews, and existing data research.

1.1 MOTIVATION

The living income has been chosen due to the importance of the question observed during the qualitative interviews. Effectively, all the cooperatives and farmers interviewed mentioned a considerable pressure on income and its social consequences. By focusing on a living income, we indirectly include many of the doughnut indicators. Indeed, we can directly link the living income to income, education, health, food and indirectly to resilience and social equity as explained by Amartya Sen's capability approach (MONNET, 2007) . The income allows us to relate to the interdependencies between climate change and coffee farmers, as presented in part 4. For those reasons, we have decided to take that specific issue as a triggering point for analyzing the Fairtrade certification scheme and provide targeted recommendations in the last part of the thesis.

Following the framework described in part 2, before digging into sustainability awareness, we have to set the baseline in terms of living income and set a goal toward which we should aim. To do so, we have decided to focus specifically on the living income of Robusta coffee farmers in Uganda.

1.1 INCOME BASELINE

The income baseline refers to the average income received by a coffee farmer in Uganda. We note at this stage that the presented data are the revenue of a farmer if he was expected to work only in the coffee farm. In reality, for many farmers, coffee production is not the only source of income. Effectively, most cooperatives have "off-farm" revenues mainly through the bananas and cows trade in Uganda. Therefore, the following calculation considers the "in-farm" revenues that are received against labor.

The total farmer cost and the portion allocated to labor have been expressed in the section "economic of coffee" of this thesis. We can say that the farmer's income is equal to the revenue allocated to the labor (fixed and seasonal) in the cost structure. Since we want to have a local benchmark, we have to consider the value in local currency (Ugandan Shillings /UGX) and the local production metrics (Kg).

The general steps developed for this thesis to find the farmer's income are the following:

1. The market price in $/lb.
2. Price equivalent in local currency/lb.
3. Conversion in Kg to find a price expressed in local currency/Kg.
4. Multiply that price per the average farmer's production per year to have the gross revenues per farmer.
5. Multiply by the labor cost driver allocation rate (calculated in the economic of coffee section at 41.2% of total cost) to find the portion of the revenue allocated to farmer's wages.
6. Net revenue per farmer.

To calculate a farmer's income, we suggest starting by identifying the market price of green beans. According to the Ugandan Coffee Development authority, 83% of Uganda's coffee export consist of Robusta (UCDA, 2019). The ICO provides us a market price for Robusta of **0,7356$/lb**. in 2019 (ICO, 2021). The price for green Robusta beans should then be converted to the price paid per pound in local currency or **2.644,09UGX/lb**. The result in UGX/ lb should be converted in UGX per Kg by multiplying it by 0.454, which gives us **1.200,417 UGX**. That amount should then be multiplied by the average production of Robusta in Kg of coffee per farmer. According to IDH (IDH, 2013), Uganda contains 1.7 million workers producing on average 120Kg of coffee per year. Multiplying the price of green Robusta in UGX per the total Robusta produced can give us an average gross revenue for the whole Ugandan Robusta market in 2019. That gross revenue is **144.050 UGX** (120Kg * 1.200,417 UGX). We could say that multiplying that result by the labor cost allocation described in the section economic of coffee of this thesis will give us the portion of the coffee revenue is dedicated to labor. That portion is equivalent to **59.348.62 UGX per farmer per year.**

The summary of this calculation is the following:

1. Green beans Robusta Price in 2019: 0,7356$/lb.
2. Equivalent in Ugandan Shilling: 2.644,09 UGX /Lb.
3. Equivalent in Kg: 2.644,09 UGX/lb. *0,454 = 1.200,417 UGX/Kg
4. Gross revenue per farmer in UGX: 120 Kg * 1200,417 UGX/Kg= 144.050,04 UGX per year
5. From that 41.2% is allocated to labor cost (fixed and seasonal): 144.050 UGX * 0.412 = **59.348,62UGX per year**

For the readers information, the equivalent in euro the 20th of May 2021 is 13,70€ (XE, 2021)

We take the reader's attention to remind that income refers to a mix of fixed income and seasonal income. Based on the data presented in the section "economic of coffee," we note that the amount of the fixed income accounts on average for less than 20% of the total income, which makes the income flow uncertain. That uncertainty is taken to another level when we consider the volatility of the exchange rate and its impact on the real income perceived.

1.2 LIVING INCOME GOALS

The living income refers to the income needed to cover the basic needs. According to a recent study that aimed at assessing the living income of rural households in low-income countries (van de Ven, 2020), the living income is the result of four main variables:

- Food costs
  - Low-cost nutritious diet costs
  - Miscellaneous costs
- Housing costs
  - Value of owner-occupied house
  - Utilities, maintenance, and tax costs
- Nonfood, non-housing costs (NFNH)
  - Health care costs
  - Education costs
  - Other NFNH goods and service costs
- Unforeseen costs

According to the same paper, the rural food composition for a Ugandan rural citizen can be seen in Appendix 9 and states an average cost of 1,11$ purchasing power parity per person per day, 3.957,18 UGX, or **1.444.370,7 UGX per year per person for food (**purchasing power parity based on USD). The total housing cost can be estimated at 0,85$ purchasing power parity per person per year considering construction costs, routine maintenance and repairs, taxes, and house insurance and utilities, and can be seen in Appendix 10. That amount is equivalent to **1.105.209,05 UGX per year per person for housing** (purchasing power parity based on USD). The average healthcare cost can be found in Appendix 11 and amounts to 0.10$ per day (doctor consultation + medicine from the pharmacy, laboratory test). Therefore, the amount per person per year is **130.023,95 UGX for healthcare** (purchasing power parity based on USD). The amount dedicated to education (primary and lower secondary) considering the clothing, materials, and fees cost can be seen in Appendix 12 and amounts to 0,38$ per day per person (purchasing power parity). The equivalent of the **education cost per year per person is 493.845 UGX (**purchasing power parity based on USD)**. The other nonfood, non-housing cost amounts to 897.170,00 UGX** and **unforeseen costs 494.093,20 UGX (**purchasing power parity based on USD)**.** We can sum up the result in the following table:

TABLE 8:LIVING INCOME IN UGANDA COST CENTER SUMMARY

Cost item	Cost/ year/person (UGX) PPP based on USD	% of the total expenditure	Cost/ year/person (UGX)
Food	1.444.370,7	32%	**548.138,896**
Housing	110.209,05	24%	**411.104,172**
NFNH(Healthcare)	130.023,95	3%	**51.388,0215**

NFNH(Education)	494.093,20	11%	**188.422,746**
Other NFNH	897.170,00	20%	**342.586,81**
Unforeseen	494.093,20	11%	**188.422,746**
Total expenditure	4.560.960,10	100%	**1.712.934,05**

SOURCE : (VAN DE VEN, 2020)

According to the same report, if we want to express the same living income in the local value, we could consider the Living income of an average Ugandan rural farmer at 1,32USD/Day or 4.692,97 UGX/Day or **1.712.934,05 UGX/Year.**

Chapter 2: COFFEE FARMER'S STAKEHOLDER PROFILE

The coffee farmer represents the lower part of the coffee value chain. Due to the specific condition for coffee growing, they generally work alone in farms or in a cooperative that provides centralized administration services and infrastructures.

2.1 JOBS

The jobs that coffee farmers seek to accomplish can be presented as divided into functional, social, and environmental jobs. The functional jobs refer to the specific tasks that the farmer needs to perform during its activity.

In terms of functional jobs, the coffee farmer task mainly consists of fixed jobs and seasonal farming activities, as mentioned in part 3 of this thesis.

The fix job aspect consists of planting and maintaining coffee trees until the harvest season, while seasonal jobs come during the harvesting season and consist of harvesting and processing coffee beans either alone, through a private service, or a cooperative. On top of those two jobs, the farmers need to do administrative tasks for internal reporting purposes or external compliance purposes. Ultimately, they are looking to accomplish commercial jobs in order to sell their beans.

The environmental jobs refer to the farmer's job necessary to grow coffee. Based on the information explained in parts 3 and 4 of this thesis, the coffee value chain is highly dependent on climate change. In order to be produced, farmers seek the right temperature at the right altitude. They also pay special attention to the level of rain consistency and sun exposition, impacting the production. To meet their goal of producing coffee, the farmers are specifically looking at the soil quality and seeking to fight pests and diseases. According to the interviews conducted, even though it is a major point, coffee farmers do not pay attention to the level of biodiversity in their farms and are more interested in the value that could be extracted out of it.

Social jobs refer to the social target that the farmers are looking for while working in the coffee value chain. The interviews outlined the survival condition of the coffee farmers. Effectively, most farmers start their activity or join a cooperative due to the lack of alternative sources of income. Therefore, looking through the coffee production to meets their basic needs in housing, education, water, and food. For the specific case of this thesis, we will consider the social job as the search for a living income, and we will keep our focus on this specific aspect.

We can conclude that the farmer's job is mainly motivated by pursuing a living income necessary to meet their basic needs. To do so, they produce, maintain, and sell coffee under specific environmental constraints.

2.2 GAINS

The gains refer to the expected payoffs from the jobs. In other words, what are people gaining by farming. We can divide those gains into four categories: required gains, expected gains, desired gains, and unexpected gains. For the specific of this thesis, we will only focus on the gains that arise from searching a living income.

Required gains refers to the minimum gains required to become a farmer. During the interviews, we have observed that the minimum required gains from pursuing an income through coffee farming is an income that will cover their basic needs. We could place those required gains in the lower step in the Maslow Pyramid (Maslow, 1943), namely the primary basic needs. Indeed, the qualitative research has pointed out that many farmers are willing to work in extreme conditions to have the revenue to cover their food and housing expenditures.

The expected gains refer to the expected payoff from coffee farming. The majority of the farmers and cooperative questioned aligned on the fact that they expect, by working in the coffee value chain, to increase their social condition in terms of education and health. Once again, this could be seen as the second floor of the Maslow pyramid namely the safety needs.

The desired gains refer to the desired outcome of farming. While interviewing coffee cooperatives, it has come out that once the harvesting season over and the income received, the first desire of the farmers was to purchase and display the money earnt. It has effectively been observed that when farmers receive their income, they seek to organize large events for the community and purchase goods to distinguish themselves in terms of revenue. Based on those observations, we can say that the desired outcome meets the belongingness and love needs and the esteem needs of the Maslow pyramid.

The unexpected gains refer to the gains that go beyond the expectations. In the case of the coffee farmers, we have observed the expression of accomplishment. Those observations were striking inside cooperatives that strongly invest in their community and environment. For example, during an interview, it has been noted that through coffee farming, the members of the Karangura Peak cooperative were able to develop saving habits and a strong desire to protect what was valuable for them, namely their land and their family. During that interview, the members expressed the sense of accomplishment that they did not expect when they started the activity.

The hierarchy of gains follows the logic of the Maslow Pyramid, in which required gains can be associated with physiological needs, expected gains to safety needs, desired gains to belongingness & love and esteem needs, and unexpected gains to self-actualization. We could therefore say that the higher the gains, the higher the income's social impact.

2.3 PAINS

Pains refer to the struggles that the farmers are facing while seeking an income. Those pains could be divided into two categories: obstacles and risks.

The obstacles refer to the elements that prevent or slow the farmers from reaching a qualitative income. They can be seen as social or environmental shortages both in a local or global scope, as presented by the four lenses of the Doughnut (DEAL, 2020). The risk refers to the risk to which coffee farmers are exposed when looking for a qualitative income. To identify those elements, we have interviewed coffee stakeholders' actors on the following elements regrouped in social pains (table 9) and environmental pains (table 10).

TABLE 9:COFFEE FARMER'S SOCIAL PAINS

Social pains				
	Income	Education	Voice	Health
Obstacles				
Local	Land cost	Agricultural knowledge	Bargaining price	Good health to work
	Labor cost	Marketing knowledge	Being considered in community decisions	Being able to work
	Pesticides and fertilizers cost	Financial knowledge	Work with others	
	Labor cost	Personal finance management		
	Living cost			
Global	Market availability	Global market access	Being seen	
	Market standards	Trade standards	Bargaining over price	
	Certification cost	Export strategies	Bringing awareness	
	Market price			
Risks				
Local	Loss of capital	Losing quality	Abusive price	manual labor to work

	Opportunity cost	Losing volume	loss of community value	Fertilizer/pesticides intoxication
	No buyers	losing consumers	Local environment degradation	
	No revenues	Losing profitability		
	Basic needs unmet	Losing gains		
Global	Abusive price	Abusive price	Abusive price	Child labor
	Contract abuse	Weak bargaining power	Weak bargaining power	Losing market
	Losing market standards	Losing market	Wrong image	
			Losing market	

TABLE 10:COFFEE FARMER'S ENVIRONMENTAL PAINS

Environmental pains			
	Land use	Soil	Water use
Obstacles			
Local	Land ownership	Fertile land	Water access
	Available space for growing	Fertilizer	
	Coffee seeds ownership	Pesticides	
	Coffee growing condition		
Global	External standards	External standards	Rain consistency
			External standards
Risks			
Local	Opportunity cost	losing quality	losing quality
	losing quality	Losing volume	Losing volume
	Losing volume	Soil degradation	Soil degradation
		Land overuse	
Global	Climate change		
	Losing market	Losing market	Losing market
	Losing market standards	Losing market standards	Losing market standards

Among those social and environmental pains, four stood out:

- Market access
- Cost structure
- Agricultural knowledge
- Certification standards

Effectively, all the cooperatives interviewed expressed an intense struggle to find a market to sell their coffee. They often rely on few consumers, which requires them to have a high-cost structure to meet market requirements. That profitability pressure is also increased due to the lack of agricultural knowledge to increase quality or volume over time, leading the farmers to lose consumers. We have also noted that almost all cooperatives interrogated (except those with a large structure) expressed a cost pressure due to certification costs.

2.4 CONCLUSION

During the previous section, we have quantified the farmer's income and a living income. We have pointed out why coffee farmers are looking to increase their income and the obstacles and risk while reaching those goals.

When considering the presented data, we can observe that the average income of a coffee farmer in Uganda that perceived the market price only covers less than 10% of the food cost and a bit more than 3% of the total living costs, if we consider that two adults are working per households. Since the minimal standards of living income are not covered, we can say at this stage that closing the income gap is a necessity for Ugandan coffee farmers. The farming activity does not cover their basic needs, making them vulnerable to socio-environmental risks and unable to overcome the obstacles mentioned in section 2.3 of this part of the thesis. We can therefore say that sustainability necessity is very high.

We can also note that the living income is 1.35 times the international poverty line (van de Ven, 2020). Therefore, we can say that farmers in rural areas are exposed to living costs higher than those in urban areas. It is important at this stage to understand that this distinction enlightens on the need for a more precise valuation of farmer income and the poverty line.

To reach the living income at the market price for Robusta, each farmer should produce approximately 3800Kg of green beans (ready to be sold, without defect) per year. This number has been found by dividing the living income by the price paid per Kg to find the Kg needed to reach the living income at the current price.

We can also conclude by saying that the uncertainty of income and its volatility makes the coffee farmers highly vulnerable, which prevents them from having the financial resources needed to seize potential opportunities thoughtfully. With the basic needs unmet, farming is often a survival activity which means that thinking beyond the grim present time is low. We can therefore say that the sustainability capability is very low.

Based on that statement, we will explore in the next chapter the increasing necessity that rises from climate change and seek to understand how those rising climatic events will ultimately impact the coffee farmer’s income.

CHAPTER 3: ISSUE PROFILE

This chapter aims at summing up the climatic change issues presented in chapter 1 of part 4 of this thesis. The information will be summed up through the issue profile canvas introduced in part 2. Therefore, we will assume that the reader has a complete knowledge of the climate change-income interdependencies presented previously, resulting from interviews and literature. The goal of summing up the climatic issues is to understand the interdependencies between the farmer's desire to reach an income and the pressure of increasing climate change through a logical framework.

3.1 ISSUE PROFILE

The issue profile consists of understanding the internal or external issues regarding the catalyzed pains and the eaten gains. For this case, we are focusing on climate change and its social impact in terms of income. Climate change in this context is an **external environmental global issue with internal social local impact**. The following presented data rised from the previous section and have been validated through qualitative interviews.

3.2 GAINS EATER

The gains eater refers to the possible entity gains that are eaten out by climate change. In other words, what gains are lost today and can be lost tomorrow due to climate change? Based on the data presented in the previous sections of this thesis, we can sum up the gains eaten as follows:

- Climate changes reduce the income by decreasing coffee quality (through pests and diseases) and quantity (due to the change in the climatic conditions needed to farm coffee).
- Climate change, therefore, increases the pressure on income, lowering access to food, housing, education.
- The decrease in income due to climate change creates a social rupture by excluding those that cannot provide basics needs. Since some lands are becoming unsuitable for coffee production, some farmers can be taken out of their community due to the fall of their contribution to production.

3.3 PAIN CATALYZER

The pain catalyzer refers to the obstacles and risks in terms of income increased due to climate change. Based on the data presented in the previous sections of this thesis, we can sum up the pains catalyzed by saying that:

- Climate changes directly impact the land requirement for coffee production. That impact catalyzes an increase in the cost structure to purchase or adapt land and invest in pesticides or fertilizers.
- Climate changes increase the need for agricultural knowledge to adapt coffee production to climatic conditions.

- Climate change decreases the quality and volume of coffee production directly, therefore, forcing farmers to:
    - Decrease the price to sell unsuitable beans.
    - Lose consumers for not meeting requirements.
    - Increase land use through pesticides and fertilizers to close the gap.
- The land use decreases the soil fertility, therefore directly decreasing the quality and the quantity of coffee production.
- As global concerns for climate change are increasing, pressure for certifications alongside it.

3.4 CONCLUSION

We can conclude by saying that climate change threatens highly an already vulnerable income level by increasing the costs and decreasing farmers' revenues. Almost all the gains from coffee production are threatened and the risks catalyzed. Therefore, we can conclude that the sustainability necessity is critical for coffee farmers in Uganda, and their sustainability ability is expected to decrease with climate change. Based on their low level of income, we can also say that their ability to invest in sustainable solutions is low. Effectively, since coffee farmers struggle to meet their basic needs, their ability to go further and invest in seizing the opportunity is low.

CHAPTER 4: INFORMATION PROFILE: FAIRTRADE

For this chapter, we will analyze the information-based solution of the Fairtrade scheme and, more specifically, the aspects of the certification that handles the question of living income. This chapter aims to mobilize the Sustainability Awareness Framework to evaluate through the use of the Sustainability Awareness Canvas, the efficiency of the Fairtrade certification, and its weaknesses to provide tracks for improvement.

4.1 FAIRTRADE MODEL AND DEFINITION

Fairtrade International is an independent international non-profit organization that seeks to share the benefits of trade equally thanks to standards, certification, support, and advocacy. The Fairtrade organization is built upon the idea of “trade not aid” philosophy (Gregas, 2019).

The “trade not aid” approach considers that giving money does not help sustainable development. Trade, however, empowers and provides an opportunity for developing poor nations. With a special focus on social, environmental, and economic aspects, the Fairtrade certification scheme seeks to leverage global market trade and laws of the market to meet its goals. They mainly achieve that goal with the notion of “minimum price.”

The minimum price goal is to protect farmers and producers from the speculation and volatility of the financial market. The minimum price is a price guaranteed if the market price falls under a considered price level. If the market price is above the minimum price, the producer will receive the market price. On top of that minimum price, the farmers can also enjoy a premium for investing in community assets such as schools, hospitals, and more. The materialization

of those objectives in terms of information-based solution is the Fairtrade Label that aims to incentivize stakeholders to favor Fairtrade products and suppliers due to the possible premium revenue and “sustainable impact.”

According to Fairtrade International (Fairtrade International, 2021), the consumer’s decision can have a huge impact on the sustainability of a value chain. They argue that decisions are based on taste, quality, and price but not only. Indeed, according to the labelling model if the consumers know that one product is “better for humanity” than an other, they will choose the sustainable product over the unfair product and be ready to pay a price premium. That affirmation must be nuanced. Indeed, recent studies such as the Trade For Development Centre study about responsible consumption (IVOX, 2019), points out that its not because people knows that a product is fair that they will change their behavior for it.

4.2 FAIRTRADE PROFILE

According to the Sustainability Awareness Canvas introduced in part 2, the profile of an information-based solution can be divided into three categories: its perceived reliability, its approach to valuation, and its desired outcome.

Reliability refers to the level of credibility attributed to the information and the level of independence of the information provider. Fairtrade International is a non-profit organization highly acknowledged around the World. Despite its reputation, Fairtrade standards are not guaranteed by public organizations nor laws. The label penetration and brand recognition are very high; however, the understanding of the model is not. Effectively, a study conducted by Enabel about responsible consumption (IVOX, 2019) pointed out that the majority of Belgian consumers prefer local products instead of fair products due to the lack of understanding of what is behind the Fairtrade label. Even though most of the population knows the Fairtrade label, a strong minority understands how it operates and favors local, more understandable products. However, most consumers assume that the Fairtrade label is a good indicator of a “good product,” especially among less-educated people when considering only the labeling principle (IVOX, 2019). Based on that information, we can say that the level of reliability is average when comparing fair consumption to local consumption but high among fair consumption labels. We note here that reliability does not refer to the accuracy of the information but more to the level of belief given to it and the strength of its framing effect.

The approach to valuation refers to the sustainability approach of valuation in terms of weak and strong valuation. The Fairtrade labels seek to communicate around the Fairtrade certification scheme, a market-based solution aiming to utilize the market laws to internalize the socio-environmental externalities. The strong belief in the market, the price-based approach, and the principle of reallocating capital to solve issues are indicators of a weak sustainability valuation. Furthermore, we note that the Fairtrade certification scheme seeks to guarantee a minimum price which, as we will demonstrate later on, does not guarantee a minimum wage, which could have been considered a strong indicator otherwise.

The desired outcome refers to the ultimate goal of the information, and the framing created. The Fairtrade certification seeks to solve the social-environmental goal through market

growth. The label aims at framing specific products with the image of products that do “good for the society and the environment,” therefore incentivizing the willingness to pay a premium.

We can conclude by saying that the Fairtrade Label is the information-based solution of the Fairtrade certification schemes that seek to solve socio-environmental issues by providing consumers the image of “good” products and promoting global trade. That label is well acknowledged and considered reliable among other “fair” products.

4.3 FAIRTRADE INCENTIVIZERS

The incentivizers refer to the incentives given by the information or what the information is promising. According to Fairtrade Belgium (Fairtrade Belgium, 2021), the Fairtrade certification schemes behind the Fairtrade Labels aims at incentivizing social, environment and economic categories.

- Social
    - Development of democratic collectivities such as cooperatives
    - Syndical organizations
    - Better working conditions
    - Interdiction of child labor
    - Interdiction of discrimination
- Environment
    - Biological agriculture
    - Natural resource protection
    - Fertilizer and pesticides control
- Economic
    - Fairtrade minimum price
    - Fairtrade premium price
    - Transparency and traceability
    - Fairtrade Label use

Despite the communication around those three main categories, we can say that the Fairtrade certification scheme and labels mainly target to incentivize an increase in trade intensity and volume and assume that doing so will have a positive economic, social, ecologic impact on the producers. Effectively, when we are looking into the Fairtrade standards for coffee (Fairtrade, 2013), we can observe that even though the standards seek to promote social and environmental criteria, the special focus and indicators is on improving the quality and quantity of production despite the local challenges of living income and climate change.

We remind the reader that this thesis's philosophy does not consider the economic benefit at the same level as the social and environmental benefits. Effectively, in the Doughnut economics philosophy, we consider that economic activities are only a means for achieving social results under environmental constraints.

4.4 FAIRTRADE SENSITIZERS

The sensitizers refer to the awareness created by the information. In other words, what are the elements to which the Fairtrade label and certification scheme are trying to mobilize us around before we decide? We analyzed those elements by identifying the “key data” provided by the organization as the key elements on which they seek to mobilize. The key data on the impact of Fairtrade coffee (Fairtrade International, 2018) provide us information about:

- Number of producer organizations
- Number of farmers
- Production area
- The yield of Fairtrade coffee
- Sales of Fairtrade coffee
- Premium earned.

Based on that information, we can conclude that the Fairtrade certification scheme and labels aim to mobilize us around questions of trade volume due to the specific pieces of information provided regarding those elements. Fairtrade also provides other global elements for mobilization (Fairtrade, 2021) regarding the questions of:

- Child labor
- Climate change
- Decent livelihoods
- Environment
- Forced labor.
- Gender Equality
- Human rights

We remind the reader that the goal of the sensitizer is to frame the information to trigger the actions that we seek to incentivize.

4.5 FAIRTRADE INFORMATION PROFILE CONCLUSION

Based on the previously mentioned element, we can conclude that the Fairtrade certification scheme and label seek to solve social injustice and environmental degradation through the opportunity to leverage global trade and market principles.

The Fairtrade information-based solutions are well acknowledged by the consumers and frame the perception of a product that respects nature and people. The Fairtrade certification scheme seeks to provide better revenues for all the value chain actors and more equity for the lower end of the value chain thanks to a minimum price standard. The Fairtrade certification scheme also promotes the improvement of socio-environmental conditions thanks to strong standards that aim to safeguard a “sustainable” trade. Therefore, they promote democratic organizations and seek to sensitize economic and consequences in terms of socio-environmental impact.

For this analysis, we will focus on the minimum price, price premium, and goal to ensure a decent living for producers and financial resources (through premium) for better resilience. Therefore, the following chapter will analyze if the Fairtrade certification scheme meets its intended goal and how the Fairtrade label frame it positively or negatively.

CHAPTER 5: FAIRTRADE OPPORTUNITY ANALYSIS

Now that we have the building blocks of our Sustainability Awareness Framework for Ugandan coffee farmers under the Fairtrade certification scheme and labeling with the goal of a living income, we can leverage all the information gathered during this thesis to analyze the Fairtrade opportunity in terms of living income to provide tracks for new strong, sustainable alternative solutions.

The Fairtrade model aims at connecting poor coffee producers with markets that are willing to pay a higher price than the global market price. Fairtrade International presents through its label the guarantee that the coffee was produced according to very specific standards and restrictions for coffee growers. On top of those production standards, the Fairtrade label includes that the Fairtrade producers received a minimum price per pound alongside a 0.2$/lb. premium that they can use for the socio-environmental projects.

5.1 COMPETITION AGAINST LABELS

As mentioned previously, the main goal of the Fairtrade label is to stimulate the demand for Fairtrade products. To start the Fairtrade certification scheme and label analysis, we suggest looking at the decision-making environment in which a consumer is looking to purchase coffee. If a consumer has to decide between two different coffees in a supermarket for an equal price and equal quality, the Fairtrade labeled coffee would be more attractive due to the framing induced by the label. Effectively, the Fairtrade label induces the framing in which the one who purchases the Fairtrade coffee is a “good person.” On top of that, for the same reasons, consumers that relate to the prestige satisfier (CRACCO, 2020) are willing to pay an extra price for a coffee that does “good.” That premium is the one that makes it interesting for a retailer to market a Fairtrade coffee in the Fairtrade logic. Unfortunately, as mentioned in Part 3 of this thesis, the Fairtrade Label is not the only one that frames the idea of “doing good by purchasing products that do good.” Next to the Fairtrade label, we could encounter the Organic coffee, promoting an environmentally friendly coffee, or the Rainforest Alliance that promotes the same goals as the Fairtrade label. Therefore, the same consumer is facing choices in which the market for that premium is competitive because of the large variety of labels that promote them. From the consumer’s point of view, all these options could give an equal “warm-glow effect” (Minardi, 2016) , which refers to the emotional reward of giving to others because of the label.

We can note that the Fairtrade label's goal is to increase the demand for Fairtrade products, incentivizing the supply to meet demand. However, the large number of other labels or initiatives that promotes the same things brings competition to catch the consumers' attention and seize that premium. That competition between labels ultimately reduces the willingness to pay a premium and, therefore, the label's goal.

By purchasing a Fairtrade labeled product, the consumer believes that he is investing in “good action for humanity.” Nevertheless, is it the case?

5.2 COSTLY PRICE TO PAY

This research pointed out many factors that deeply questioned the ability of the Fairtrade certification scheme to meet its promises. Effectively, during the face-to-face interviews, almost all of the producers mentioned the cost pressure of the Fairtrade certification. To join the Fairtrade network, the average candidate (individual farmer or cooperative) will have to pay an average application fee of 600 USD dollar (FLOCERT, 2021), with an average total initial cost of 4000 USD and yearly payment to keep the certification 2.800 USD to cover the audit expenses. Knowing the average living income of a Ugandan coffee farmer and its average wage, it sounds counter-intuitive to ask such a big amount of money to producers that are already poor. Ultimately, during Part 4 of this thesis, we have observed that climate change is the main reason for price fluctuation in the coffee market. If we follow the traditional market laws, as prices go up, that new price gives a market signal that triggers an increase in quantity. Seeing the possibility for profit, countries can see the opportunity of investing in coffee production if the climatic condition favors it (as presented in section 3.3 of the second part of this thesis), and labor is ready to be allocated to it. As presented in the data about coffee production, countries such as Vietnam or Rwanda seized that opportunity by increasing their production and therefore compete with traditionally large producers such as Brazil. The desire to seize profit in the coffee market is stronger in the region where coffee is growing because the countries that meet the climatic condition for coffee growing are the vast majority of countries in which rural citizens live in extreme poverty. Therefore, as mentioned previously, coffee production is an opportunity for many workers to decrease their poverty level since the alternatives and opportunity costs of their time are low. However, regardless of the willingness to invest, responding to global coffee trade opportunities cannot happen instantly since a coffee tree will yield only after three years. While coffee production could have been an alternative source of revenue for poor rural citizens, the Fairtrade certification scheme creates a high entry cost for producers already facing strong external pressure.

5.3 OVER CERTIFICATION

The second element that came out in all the interviews conducted were the difficulty for coffee producers to find buyers regardless of the possession of a Fairtrade certification. All the cooperative interrogated expressed explicitly the pain they have to find buyers. Despite the promises, the Fairtrade certification does not guarantee a market. Notwithstanding the current trend for more certification, studies from the center for global development (CGD, 2018) pointed out that there is no clear evidence that certification impacts profitability, productivity, or sustainability. Effectively, the coffee barometer (Pierrot, 2021) shows us that only a small fraction of the Fairtrade coffee produced is sold in the Fairtrade market, providing at the end a Fairtrade label. On the opposite, most of the coffee produced in Fairtrade farms is sold in the traditional coffee market.

Ironically, since the Fairtrade label only guarantees a certain percentage of Fairtrade coffee in a coffee bag (20% in Belgium, for example) (Fairtrade Belgium, 2021), it is highly probable

to drink a coffee more Fairtrade if it does not have the Fairtrade label. We can say that the Fairtrade label is not a good indicator of “good coffee” for the consumers.

5.4 NEW COMPETITIVE THRESHOLD - INCREASING INEQUALITIES

The interviews also pointed out that the Fairtrade certification is almost an “unofficial requirement” to start the discussion with buyers and even international organizations seeking to support cooperative financially or knowledge sharing. Effectively, the cooperatives mentioned that without a Fairtrade certification, it is almost impossible to find decent partners due to the high recognition of the label and the Fairtrade network access. That fact can be explained by the large number of Fairtrade cooperatives that ultimately do not find buyers and are therefore willing to join the traditional market. Since an exporter, importer, or other value chain members can access coffee production that meets the Fairtrade advantages in terms of quantity and quality, and information, it has no interest in taking the risk to work with a cooperative not certified. The Fairtrade certification has therefore become a competitive threshold. The same tendency can be observed for supporting organizations, governmental or not governmental, that consider the Fairtrade certification a good indicator of a structure that meets external support requirements. Therefore, small producers that cannot afford the certification cost are discriminated against well-established cooperatives at all levels.

On top of those elements, the Fairtrade requirements for new applicants regarding coffee production changed in 2020 (FLOCERT, 2020) and now requires Fairtrade applicants to prove existing buyers. In other words, a farmer or cooperative without any buyers will not be able to get into the Fairtrade network if he does not have existing consumers. With the Fairtrade certification perceived by many as a competitive threshold, not having buyers without it is highly frequent. When most Fairtrade applicants are must comply with the standards to find buyers, requiring buyers before being certified is an incredible paradox. Such measures are therefore further discriminating those who are the most exposed.

Ironically, that competitive threshold is a catalyzer for income inequality. Effectively, for most cases, only well-established cooperatives with a certain level of volume and established consumers enjoys the benefit of the Fairtrade certification scheme. Among the cooperatives interviewed, only the Karangura Peak Cooperative reached that level and expressed clearly that the size of the structure is critical to survival. Even though the Karangura Peak Cooperative was large enough to cover the Fairtrade cost and uncertainties, they also expressed that the price received is under the price required to meet all the needs for facing climate change. To grow in term of community, only the Fairtrade premium or specific direct contract gives them the financial ability to give a decent remuneration to the farmers and invest in technologies that helps them mitigate socio-climatic gaps.

5.5 COOPERATIVE INEQUALITIES

The Fairtrade model favors the cooperative model by promoting a democratic way of managing the company. Unfortunately, for many farmers, the cooperative model is more an obligation than a choice. Effectively, as mentioned previously, the low price of coffee combined with the high certification makes it impossible for coffee farmers to trade alone. With the

cooperative model being one of the conditions for the Fairtrade standards, it is easy to understand why this model is highly incentivized. The interview conducted with Professor Christopher Cramer, who did extensive research about the cooperative model in central Africa, pointed out the fragility of the cooperative model. Effectively, Prof. Cramer's research pointed out that Fairtrade audits are yearly audits, known well in advance that last for a very few days and consist of completing a checklist also known in advance. It is, therefore, easy for cooperatives to provide an image of a "democratic" organization. He also pointed out that even though the cooperative model prone "equity" in revenues, the reality is completely different. Cooperative is often the representation of the social structure hierarchical model, with some that earn more money thanks to the preference for their coffee or privilege for interesting contracts while others are left with the leftovers.

5.6 FAIRTRADE MINIMUM PRICE: PRODUCTION COST AND DECENT LIVING COSTS NOT COVERED

Suppose we take a deeper look at the question of the living income and compare the revenues of Ugandan coffee farmers. Based on the same calculation as the one done in chapter one, this section of this thesis uses the Fairtrade Robusta (washed) and Fairtrade Robusta Organic (washed), we find the following figures.

TABLE 11:AVERAGE INCOME PER YEAR PER COFFEE FARMER IN UGANDA (2019)

Market Price	Price in $/lb.	Income	Income + Premium
Market	0,7356$/lb.	59.348,62UGX	-
Fairtrade Robusta (washed)	1,05$/lb.	83.957,01 UGX	99.948,72 UGX
FairTrade Organic (washed)	1,35 $/lb.	109.144,01 UGX	123.936,51 UGX

We can note that based on the cost structure described in the economics of coffee section the Fairtrade price barely covers the cost necessary for coffee producers. Only the premium provides revenue that allows some margin. That fact has been confirmed by the cooperative interviewed and especially by the Karangura Peak cooperative. We can also note that none of the prices provides, under the consideration of all farming costs, an income level high enough to reach the living income for a rural region of 1.712.934,05 UGX calculated in chapter 1 of this section of the thesis. A farm would need an average price of 21.23$/lb. without premium or a price more than 15 times higher than the actual highest Fairtrade minimum price to reach the living income. The Fairtrade minimum price is therefore not sufficient for the average farmer to reach qualitative social standards.

5.7 INDICATORS FOR GROWTH NOT DEVELOPMENT

When observing the data communicated by Fairtrade International or organizations that work alongside them, we can observe that almost all the indicators communicated focus on volume and trade value. As mentioned previously, the Fairtrade certification scheme aims mainly at

increasing quantity and quality by assuming that doing so will increase living standards. By communicating only on economic indicators that target growth, the Fairtrade label and other organizations hide the complexity of development and incentivize an increase in certified farmers, cooperatives, and contracts. With the previously presented information, we can now safely say that volume does not mean impact, especially when talking about the Fairtrade certification scheme, which is only profitable for the very few large enough to profit in a very specific market. The rest are facing high costs, a minimum price well below what is required to be profitable or to have a decent life, and very few markets to export to. Promoting the increase of certification in terms of volume at all costs means ironically promoting less resilience, more poverty, low wages, meaning less capital and knowledge to mitigate climate change and its impact on the coffee value chain.

5.8 FAIRTRADE INFORMATION BASED SOLUTION CONCLUSION

We can conclude the Fairtrade certification scheme and information-based opportunity analysis by analyzing how the opportunity impacts the previously mentioned gains eater and pain catalyzers and how those impacts are felt by the farmer seeking to increase its income level.

Based on the previous section, we can say that the Fairtrade certification scheme provides standards for the maintenance of production volume and quality, but its cost pressure prevents the majority of the farmers from having the financial resilience to react at their level to the challenges that they are facing. A cooperative interrogated gave a decent example of that by saying that the Fairtrade price and premium only gave them the minimum required to keep the certification and only allowed them to invest under the Fairtrade premium but nothing more. The secured remuneration that does not cover the living income presented in this thesis does not secure decent access to food, education, housing, or health. For the majority of the farmers, the pains catalyzers are increased as well as the gain eaters. We can therefore say that the opportunity provided by the Fairtrade certification scheme is very low. On top of the low level of opportunities created by the Fairtrade certification, the initiative's scope created a new competitive threshold that increases the cost structure, reducing their ability to mitigate socio-environmental pains.

Ultimately, the Fairtrade label's information-based solution does not meet its goal of being a seal that guarantees a “good consumption.” Effectively, while the framing effect provides a good element of distinction, the label is competing with other labels, reducing the possible revenues that could have been generated. On top of that, the Fairtrade label does not guarantee an equitable share of premium revenues from that supposed increase in demand since most of the Fairtrade coffee beans are sold in the traditional market.

With the information profile of the Fairtrade label and the sustainability opportunity of the Fairtrade certification scheme completed, we could identify the sustainability awareness level of the coffee value chain under the Fairtrade certification scheme as very low. Effectively, even though the sustainability necessity is critical, the opportunity presented and the information given by the Fairtrade Label further decrease the ability to be sustainable by normalizing high-costs and low-revenues structures, for most cases unprofitable.

The Fairtrade certifications scheme's failure to solve sustainability questions provides a good example of how weak sustainability practices could have a long-term negative impact. Effectively, by only focusing on market-based solutions to solve socio-environmental solutions through pure growth, the Fairtrade scheme cultivated a considerable sum of rebound effects, ultimately leading to the discrimination of those who needed protection from the first place. The Fairtrade certification has only provided a platform for traditional market failure to happen at a larger scale by seeing economic growth as an ultimate goal to solve inequality issues. In the next section of this thesis, we will lever the Sustainability Awareness Canvas, and the failure observed from the Fairtrade certification scheme to provide alternative solutions to reach a living income inside the coffee value chain.

FIGURE 29: COFFEE FARMING UNDER FAIRTRADE CERTIFICATION SCHEME
SOURCE: OWN PRODUCTION

PART 6: COFFEE FARMING AND LIVING INCOME INFORMATION-BASED SOLUTIONS AND CONCLUSION

In the previous section, we analyzed the level of Sustainability Awareness in terms of living income for the coffee value chain under the Fairtrade certification scheme through the case of Ugandan coffee farmers. The result of that analysis outlined the necessity for sustainability action and weak level information, opportunity, and ability of the Fairtrade certification scheme. To increase sustainability awareness, one can act on the ability to be sustainable, the opportunity for sustainability action, the necessity for it, or the information. It is on the latest that we will propose new innovative ways to increase the sustainability awareness level inside the coffee value chain regarding the living income.

This last section of the thesis aims at leveraging all the information gathered in the different sections of this thesis to provide explorative tracks for increasing the sustainability awareness level of coffee production regarding the living income. Therefore, in chapter 1, we will identify opportunities that could be seized and suggest an information-based solution that could lever those opportunities. The last chapter will conclude by providing a conclusion on this thesis alongside the expression of its limitations.

CHAPTER 1: STRONGLY SUSTAINABLE INFORMATION-BASED SOLUTIONS

The goal of this section is to introduce new information-based solutions. The following suggestions of information-based solutions result from the abductive reasoning used in this thesis and utilize all the knowledge gathered during the research. The Sustainability Awareness Canvas has once again been used but with a blank information profile. Therefore, the logic will be to identify, for the information-based solution, the type of issue that we would like to resolve, the framing we would like to give, how we would ensure its reliability, and the type of action that will be incentivized based on key point to sensitize about.

1.1 STRONG-SUSTAINABILITY APPROACH

The following sections will therefore explain the strong-sustainability approach applied to the development of information-based solutions. That knowledge will specifically target the defined sustainable goals in terms of living income.

The Fairtrade certification scheme and label were developed around the idea that growth and markets will solve social inequalities and environmental thanks to an information-based solution that gives the final consumer the feeling of “doing” something good for society. The fact that the core of the model works around growth and market laws catalyzes the failure of the classic market approach by reinforcing inequalities and generating rebounds effects that are growing for every Fairtrade product purchased.

As introduced in Part 2 of this thesis, the strong sustainability approach does not consider growth or markets as an ultimate goal but as means to reach a qualitative social life under environmental constraint. Protecting the market at all costs is, therefore, absolutely not the primary focus. With this thesis, we would like to introduce the paradigm of protecting qualitative social living and environmental sustainability at all costs instead of protecting the market. The solutions available to resolve socio-environmental issues are wider since they are not bounded by the limits of the law of markets.

For the coffee value chain, that means that from the beginning, one should not seek to protect the coffee market at all costs by increasing volume and quality but to protect the people of the market by securing a qualitative living standard and an environment safe to live in. By doing so from the inception of a reflection, we are strongly convinced that the available opportunities for sustainability solutions broaden and that the accuracy and reliability of the information increases. We will, therefore, not consider the coffee value chain or the coffee market as the ultimate goal. However, we will consider the social goal of living income as the ultimate goal to pursue.

1.2 BOUNDARY APPROACH

The strong sustainability paradigm favors a boundary approach to sustainability. Effectively, under strong sustainability lenses, we will seek to protect “minimum safety standards” as the ultimate goal. Based on the Doughnut framework, we have defined the living income as the goal for the specific of this thesis. Guaranteeing a living income will therefore be the starting point of this reflection and the threshold to meet.

During this thesis, we have presented to the reader a living income for Ugandan rural citizens of **1.712.934,05 UGX/Year**. In the next section, we will see that different farmers have different expectations while pursuing an income. We will therefore define specific boundaries and opportunities to protect those boundaries for each of those categories.

1.2.1DIVIDE AND PROTECT

Since we do not seek to protect the coffee value chain at all costs, we can already say that coffee production might not be the right solution for all coffee farmers and should not be incentivized blindly. Effectively, we can already at this stage, based on the information gathered in the other sections of this thesis, divide the rural workers into four categories:

- “No choice farmers”: are the farmers with no other alternative than working in the coffee field to earn an income. Since they have no alternatives and work to survive, they are willing to accept any income available. They will generally be characterized by the accumulation of multiple jobs or farming activities.
- “Short-term farmers”: are farmers who see coffee production as a decent short-term source of revenue. Generally, they own their lands, produce and collect a decent amount of money. They, however, do not seek to fight if they have a strong pressure on profitability and will typically be open to exit the coffee market if better alternatives are proposed to them.
- “Long-term farmers”: are farmers that see in the coffee market a real long-term growth opportunity and are willing to invest all their capital and time in the coffee market.
- “Numb farmers”: are farmers that are “artificially” losing in the coffee market but are kept alive through the input of outsiders that “promises” future cash flows. They typically do not have a real strategy and will stay on the market as long as external factors are there to tell them to.

Each of the four categories of farmers chose to farm coffee for different reasons, have different cost-revenues realities, and should therefore be treated accordingly. Effectively, protecting the sustainability of the coffee production for the “long-term farmers” might ensure a qualitative life for him, but it is not the case for the “no choice” farmers who are highly exposed financially and do not have the resilience to invest in a market as volatile and competitive as the coffee market.

We could set the personal boundaries for each segmented category of coffee farmers mentioned above with an approach in which we see the coffee market achieve strong sustainable goals. Those boundaries reflect the acceptable reason to join the coffee market

per farmer's type. If we consider the revenues of the coffee market as functionality that can bring higher income, we can say that:

- Survival = no choice farmers: The farmers who have no other alternative than working in a coffee farm to find an income. As mentioned before, they rely only on coffee income to live and are therefore highly willing to substitute to an alternative source of income if provided with one but will stick to coffee farming if no alternatives are available.
- Performance = short-term farmers: The farmers who enjoy the benefit of farming at a decent level. As mentioned previously, they will typically exit the coffee market if other natives are presented to them and the coffee market is not profitable.
- Growth = long-term farmers: The farmers who see in the coffee market thanks to their land, heritage, or personal value a decent source of income in the long-term. Those types of farmers are willing to invest in coffee farming to mitigate the issues they are facing and seize the commercial opportunities of the market.
- Compliance = "Numb farmers"; The rural citizen who is not interested in working inside the coffee value chain might be inclined to do so due to external reasons. We note here that the case of the Numb farmers will not be treated in the case of this thesis since the "numb farmer's" situation requires a deeper analysis of the relationship between farmers and external organization.

That segmentation allows us to treat living income with a more tailor-made approach since we can now set boundaries based on the level of interest in the coffee market, therefore leaving "non-market-growth" options available.

To reach the living income, we have already established that working in the coffee value chain will not fit all farmers. Based on the coffee farmer's segmentation presented, we could say that the coffee value chain's level of attractivity could be judged by its ability to provide the income necessary to meet living income goals or boundaries. Since we have pointed out that coffee farming is not a long-term goal for all, we suggest classifying the coffee market's ability to provide an income based on the farmer's stakeholder's profile established in Part 5 of the thesis. Effectively, during the development of the coffee farmer's profile, we had already segmented the gains in term of living income into:

- required gains that relate to the "no-choice farmers" because they seek to cover their food and housing needs
- expected gains which relate to the "short-term farmers." because they seek to cover their food, housing, education, and health needs
- desired gains that relate to the "long-term farmers." because they seek to cover their living income plus a premium for the development of the coffee business.
- and unexpected gains which could happen for all

By joining the two categorizaiton, we can identify key elements embedded inside the notion of living income that farmers are willing to secure at all costs depending on their type. We can, for example, say that a farmer from the category of "no-choice" farmers is attracted into coffee farming to meet their food and housing needs and are willing to accept any price as long as 959.243,068 UGX per year is not covered.

TABLE 12: CRITICAL INCOME PER COFFEE FARMER'S TYPE

Farmer's type	Income gains boundary	% of the living income	Amount in UGX per farmer per year
No-choice	Food/housing	56%	959.243,068 UGX
Short-term	Food/housing/education/ health	70%	1.199.053,835 UGX
Long-Term	Living income + expected premium	100%	>1.712.934,05 UGX
Numb	Not income dependent	N/A	N/A

SOURCE: OWN PRODUCTION

The logic here is that a farmer will be ready to accept any price as long as its needs is not satisfied. This does not mean that a farmer should only receive that amount. On the contrary, it outlines the specificities of each farmer's type and how they could end up sticking to coffee farming even though the price does not cover the living income. We could sum up that information in figure 28 below.

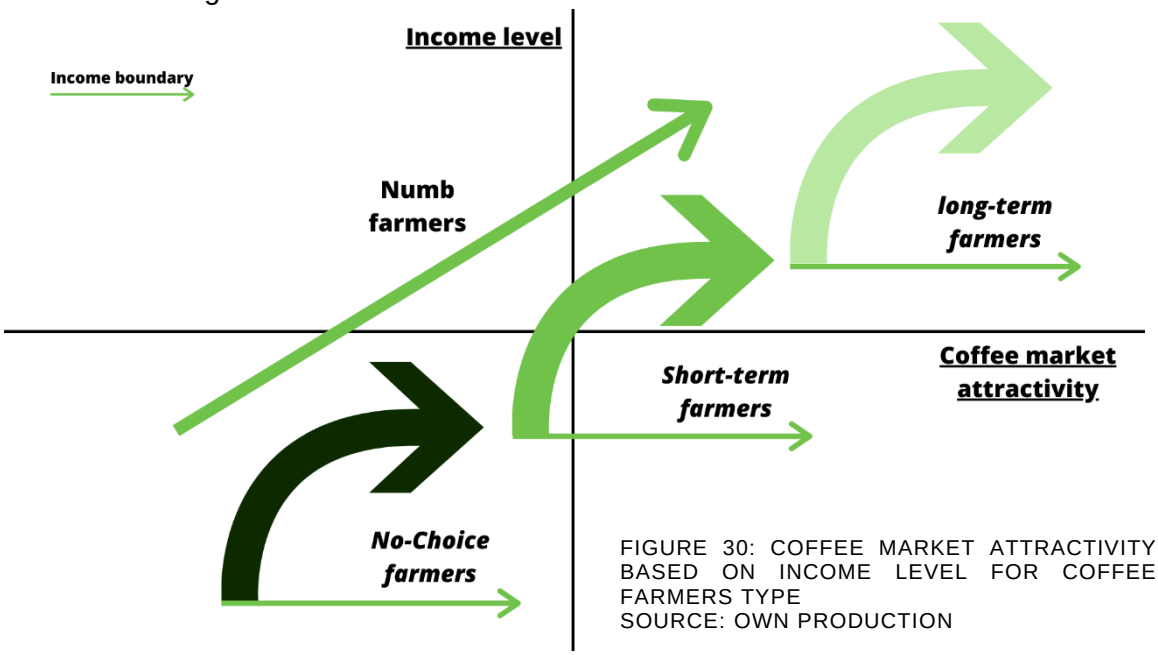


FIGURE 30: COFFEE MARKET ATTRACTIVITY BASED ON INCOME LEVEL FOR COFFEE FARMERS TYPE
SOURCE: OWN PRODUCTION

We would like to bring the reader's attention to the fact that fixing an income threshold does not mean that only the threshold should be given to the farmer. The thresholds only indicate the amount that the coffee market should provide for it to meet the needs of its farmers. The gaps between the income threshold per farmer's type and the living income characterize the challenge we will seek to solve.

1.2.2 MARKET TO PROTECT

Now that we have identified the boundaries (income thresholds per farmer's type and living income for all) that we would like to protect in terms of living income per farmer's type, we can seek solutions to help reach that goal. As mentioned previously, it is a given now that each specific farmer's type will meet their goal with different strategies. Since our ultimate goal is to

reach a living income regardless of the income from the coffee market, we can already say that:

- “No choice farmers” seek a source of income regardless of its nature. Therefore, they will be looking for an immediate source of income and will be likely to substitute to another activity than coffee farming, if available.
- “Short-term farmers”: Have a short-term interest in the coffee market. They will seek to grow in it but lack the income and knowledge to be resilient and be competitive in the coffee market in the long term. If their cost structure reaches a certain level, they will seek an exit option.
- “Long-term farmers”: Are reaching a living income in the coffee market and have the means necessary to mitigate socio-climatic impact while being competitive in the global market.
- “Numb farmers”: Are driven by external factors and will work inside the coffee value chain as long as the external incentive is present.

Since we do not want to promote the sustainability of the coffee market but the living income of the people inside of it thanks to information-based solutions, we will develop opportunities that allow:

- All stakeholders to position themselves in terms of income and living income
- The no-choice farmers to have access to alternative sources of income
- The short-term farmers to have access to exit options
- The long-term farmers to maintain an income that allows them to mitigate socio-climatic issues and provide them with market opportunities for growth.
- The numb farmers to secure the ownership of their income and position themselves among other categories (this topic will not be handled in this thesis due to the lack of information).

Regardless of the coffee farmer’s type, all are looking to reach at least a living income with their strategy in or outside the coffee market.

We now have paths to follow to allow the farmers inside the coffee value chain to reach a living income. The following tracks could be approached individually in terms of sustainability opportunity and capability to increase sustainability awareness. However, for this thesis, we will limit ourselves to developing information-based solutions that allow the accomplishment of the sustainability goal for the four tracks. For each of those options, we will complete the information profile by identifying the desired outcome of the information, the actions that it will incentivize, the element that will be communicated, the framing created, and the best way to ensure its reliability.

1.3 FAIRTRADE IMPROVEMENT

During Part 5 of this thesis, we have evaluated the Fairtrade labeling and certification schemes. The main conclusions from that analysis were the wrongly induced framing of a consumer’s consumption that is doing good and a minimum price too low to cover the living income. On top of that, we observed the discrimination that arises from the standards and

competitive threshold induced by the label. For this section, we would like to provide alternatives.

1.3.1 FROM AN INCENTIVIZED CONSUMPTION TO A REPRESSED CONSUMPTION

As explained previously, labels create a framing that incentivizes the consumption of products supposed to “do good” for society or the environment. However, the information embedded behind labels is vague and does not provide any indication of substantial impact.

On top of using an information-based solution to incentivize responsible consumption, we suggest adding a layer of information-based solutions that seek to repress consumption. The idea here is to avoid consuming products that are unbearable for society and the environment. To do so, we suggest the elaboration of a platform that provides the consumers an indication of coffee price unbearable for the farmers

To do so, we suggest communicating to the consumers the following information:

- Coffee type
- Region of origin (specify the pluri-origin possibility)
- Average income paid to farmers per coffee type per region
- Living income per region
- Range of price
- Impact score

This solution aims to provide the consumers an impact score of a specific coffee based on his ability to secure a living income. With such an approach, coffee at a price under a specific amount would be considered harmful and therefore not favored.

For this solution to work, data about the information communicated must be collected. We suggest using an open database that could be filled free of charge by any value chain actors.

We could then imagine a QR code system that directly allows the end consumers to access that information through an impact score and chose the products that align quality and impact.

1.3.2 A REAL FAIR PRICE

Regardless of the farmer’s type, the actual market price and Fairtrade price are too low to provide a living income. Certifying a company as “fair” while they are maintaining an unbearable price should not continue. Instead, we should set the minimum farmgate price for green beans coffee at the living income level with the possibility to allocate a premium to the needs of a specific farmer’s type. Since, as outlined in Table 12, some farmer’s type will be willing to accept a price below the living income to meet their basic needs, the logic here is to set a price that should cover the living income per region plus a possible premium.

Despite the failure of the Fairtrade label to provide the right price, it is a fact that consumers will be ready to pay a premium for products that are “doing good.” We suggest segmenting the premium into categories to help those who need it the most. That premium should equal:

$$Premium = Living\ income(Farmer's\ region) - Desired\ income(Farme's\ type)$$

EQUATION 3: PREMIUM FORMULA

A long-term farmer will, for example, receive a lower premium than the no-choice farmer. The logic here is that the premium should be proportional to the needs of the farmers so they could allocate it according to the suggestion described in section 1.4.

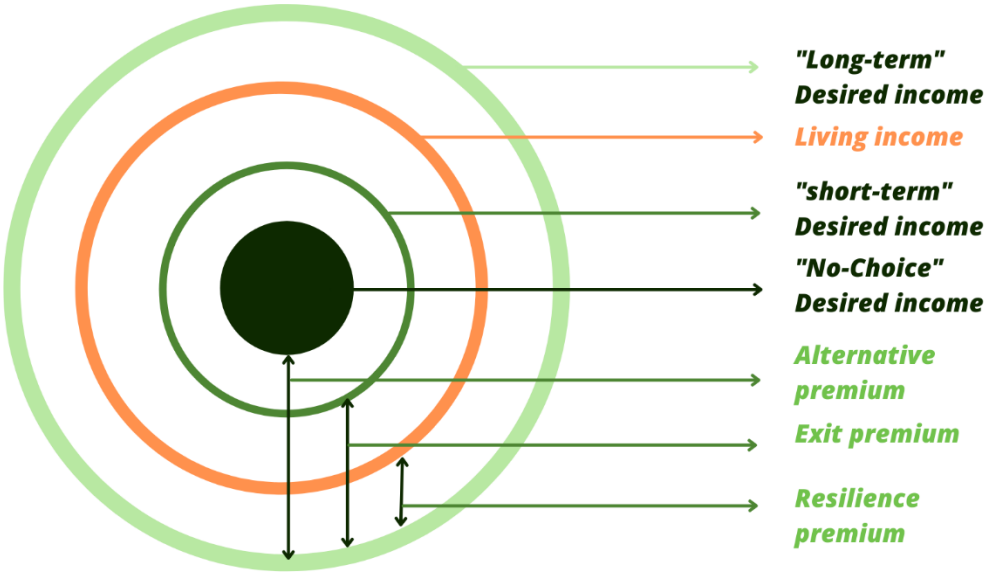


FIGURE 31: FAIR PREMIUM PRINCIPLE

1.3.3 SHIFT CERTIFICATION COST PAYERS

The main outline of our research has been the cost pressure faced by coffee farmers. We have also pointed out that among other costs, the certification costs can represent a significant portion of the cost structure of a farmer if its production volume is low. On top of that, the competitive threshold created by certifications makes it mandatory for farmers to have a certification if they want to find buyers.

We recommend inverting the logic of the certification scheme. Instead of having farmers paying to be certified, the buyers should bear the cost of certification. That logic is similar to the Value Added Tax, where only the last buyers are in charge of paying the value added by a certification. Including that element in a label will align the real demand for certification to the production of certified farmers. On top of reducing the competitive threshold induced by the idea that every farmer should be certified, not putting the cost on the head of the farmers

will reduce the pressure on their profitability, therefore, leaving them more space to increase their income.

1.3.4 ADAPT STANDARDS

The Fairtrade certification scheme requires its candidate and applicant to comply with strict standards regardless of their situation. As mentioned previously, meeting those requirements requires investment and trade-offs that not all farmer's types are ready to make. One controversial example could be the question of child labor. Based on the income analysis, most coffee farmers do not earn enough to cover their food and housing costs alone. If they want to reach the minimum to survive, they have to diversify their activity by doing off-farm activities and increasing the number of workers per household. Effectively, the more worker per household, the closer you get from having enough to eat and have a decent house.

While standards that prevent child labor make sense when living in European standards where work is a choice and not a survival necessity, we can question its meaning when the cost of education is a luxury and the education itself does not lead to steady jobs.

We questioned a farmer in Bas-Congo DRC during our qualitative interviews, which clearly stated that his children were working instead of going to school. He stated that through time they noticed that regardless of their enrolment at school, the children had no higher educational system available and no work available. In his words, "when our kids finish studying, they stay in the village, without jobs and cannot join the farms because they did not learn to do it." That statement points out that for a standard to be realistic, it should not be seen through the eyes of a distant stakeholder. It should, however, adapt to farmers' realities and secure a path towards long-term sustainability. Sometimes the issue is more complex than a bottom-line observation, and that complexity should be taken into account.

By having standards that do not reflect the farmer's reality, those that are the most exposed in terms of revenue cannot join the Fairtrade network, which means that due to the necessity of having a Fairtrade certification to find contracts, their exposure to poverty increases due to structural discriminations.

We suggest normalizing standards that certify the farmers' reality instead of the desired reality of stakeholders. A certification could be given to a farmer who does not meet all the standards if his situation prevents him. For that to happen, we strongly believe that we should stop the perverse use of indicators that do not reflect reality's complexity. Saying that X numbers of women work in a cooperative, for example, does not necessarily imply an increase in gender equality and liberty. Effectively, employing a woman instead of a man does not mean an increase in income since it only means that one person is working in a household that is probably surviving instead of living. However, saying that we are selling "woman's coffee" is interesting only for marketing purposes since it favors the market desired outcome, which is not necessarily the sustainable desired outcome.

We suggest labeling only to guarantee the ultimate goal of providing fair qualitative life and a safe environment to live in instead of providing marketing indicators that do not reflect reality.

1.4 IMPLEMENTATION REQUIREMENTS

When questioning the income of coffee farmers, the vast majority of the stakeholder interviewed, especially in the latest step of the value chain, such as retailers or roasters, mentioned a considerable lack of transparency regarding the farmer's income.

Based on the interviews conducted, the reason for that lack of transparency and traceability comes from the nature of the coffee value chain, which aggregates the coffee from farms to cooperatives, exporters, importers, and roasters to retailers. Since the coffee moves a lot between the stakeholders, it is almost impossible to know where the coffee in the cup comes from at the end of the value chain.

Increasing the transparency and traceability of coffee farmers could help to reach four goals:

- Having a clear understanding of the price required to pay for a qualitative living income
- Allowing the farmer's to position themselves by comparing their income to a benchmark
- Provide to the buyer a more accurate vision in terms of quality or expected quantity.
- Provide the buyer a clear idea of the farmer's cost structure by telling him directly per type of coffee and per region under which price the coffee purchased is unbearable for him.

From the Fairtrade certification scheme analysis, we have identified that one of the main challenges from information-based solutions is to ensure reliable and independent information that does not discriminate against workers based on subjective standards.

For information-based solution to lever their full potential, two elements are prerequisite:

- <u>Governmental laws and regulations</u>
  For information-based solutions to work, the competition on a "sustainable image" should stop or at least be regulated. Effectively, the certification threshold must be removed and replaced by laws and regulations that apply to all stakeholders regarding their sizes and issues. Purchasing coffee should be done by respecting the living income regardless of the size and certification assets of the farmers.

  Since we could expect some government to race-to-the-bottom to provide the most lenient regulation to attract, we believe that only global regulations from international authorities would affect.

  We can also note that since the major market for coffee is in Europe, the European legislative power over the whole market provides a great platform to "Race-to-the-top" by providing strict regulations and requirements in terms of traceability and transparency that will make other regulations or practices obsolete. The actual European legislative environment is providing more and more laws proposition to tackle the issue of "corporate vigilance duty" at the European level (Poos, 2021) and Belgian level (Trade For Development Centre, 2021) with laws proposal such as the PS-Vooruit April the 2 law proposal the Belgian parliament (Christophe Lacroix, 2021).

Governmental laws and regulations are powerful levers to maintain the Sustainability Necessity high across the coffee value chain.

- Blockchain technology

  For a supply chain as decentralized as the coffee value chain, aggregating the data from farm to cup manually provide two challenges:

  - Technical challenge: How to ensure that the data collected are accurate and gathered around the value chain efficiently
  - Reliability challenge: How do we ensure that the data are reliable and have not been compromised

  Blockchain technology offers a solution to the two challenges. Blockchain technology is a distributed ledger completely open to all. One property of blockchain technology is that once data has been recorded, it is highly difficult to change it. Effectively, when information is communicated inside the blockchain, changing one of the values inside the blockchain without the consensus of all the pears that possess the information makes the information obsolete. The technology already provides a safe and secure way to trade money and could, if used correctly, provide a reliable way to ensure the validity of the information communicated throughout the coffee value chain.

  Blockchain technology provides a powerful tool that can increase the Sustainability Abaility across the coffee value chain.

1.5 ALTERNATIVE SOURCE OF INCOME AND EXIT OPTIONS

Finding a source of income is the main priority for farmers identified as “no-choice” farmers, while finding exit options is the main priority of the “short-term” farmer. We suggest a solution that provides access to information regarding alternative use of human or natural capital as a source of income available per region and a platform for developing new alternatives.

The solution is therefore to build an open-access platform that levers the power of knowledge sharing and communities to:

- Benchmark on the gap between the living income and the actual income that has to be filled
- Inform the farmers on alternative use of available capital (human, natural)
- Provide knowledge on best practices to seize those opportunities
- Incentivize cooperation and joint action regarding the financing and development of alternative activities in a crowdfunding like platform
- Provide information on the climatic situation per region and its impact on the coffee value chain
- Benchmark, the cost-revenue structure of the farmers

As mentioned previously, we suggest that the price of coffee includes a premium to directly invest to develop and maintain alternative sources of revenues and exit options. That premium could be allocated to such an online. Doing so could increase the opportunities available for “no-choice” and “short-term” farmers and provide a source of financing to seize those opportunities.

Managing collective financial resources online provides two main advantages:

- The people expressing themselves can be anonymous and allowed to subtract themselves from the social sphere of influence and provide an equal power.
- Any member could directly add an extra sum of money for projects that trigger his attention

We strongly believe that such a platform will shift the focus from a “produce coffee at all cost” activity to a “secure income at all cost” activity.

1.6 BUSINESS DEVELOPMENT OPTIONS

With business development options, we would like to provide those with a strong interest in the coffee market (long-term farmers) with the information necessary to meet their goals. Therefore, the approach here is more business-oriented since the goal is to allow them to continue their activity under environmental constraints.

Based on the interviews conducted, we can safely say that the top three main challenges for coffee farmers that would like to grow sustainably are facing are:

- Access to profitable market
- Climatic information
- Financial and marketing knowledge

Helping those who are willing to invest to produce valuable coffee to connect with those who are willing to pay the right price for it is an option that is now possible due to the increase in the interest for direct trade coffee and specialty coffee. Effectively, direct trading helps the farmer by reducing the intermediaries while trading, which allows him to seize the margins of the exporter by selling directly to the roaster. In the economics of coffee section, we have seen that the farmers and the roasters are the two with the lowest return on investment. Connecting them allows the two to seize the potential revenues from exporters. Knowing that the export margin is the highest in the coffee value chain, that option provides a burst in revenue that, coupled with the price of specialty coffee (23.86 $ per pound on average instead of 1.35$ per pound), provide a source of income that allows farmers to adapt their production to climatic condition.

Furthermore, specialty coffee favors the diversity of coffee trees and close relationships while mass-producing does not. Since specialty coffee and direct trade work around a “coffee-like wine” mentality, the quality of coffee is critical. It is, therefore, necessary to inform about:

- Coffee tree variety
- Altitude and region
- The density of the beans
- Preparation process
- Bean size and color
- Roast appearance and cup quality

To provide the quality required by roasters, farmers have to be aware of the climatic challenges they have to face, the quality standards for those specific markets and must be able to manage their finance and marketing strategy to reach those goals.

Therefore, we suggest an open-access platform that allows the specialty coffee lovers, baristas, and roaster to contact the farmers directly. To do so, the platform will sensitize on:

- Coffee varieties that are valued by the end market
- Price benchmark
- Export guiding
- Quality standards and cupping knowledge
- Climatic challenges and forecast on changes
- Financial and marketing training with a benchmark to evaluate the performance
- Cost-Revenue benchmark

The open-access platform will allow those valuing the right pricing for a good coffee and the farmers seeking to meet the market standards to exchange the critical information to cooperate in a close valued relationship.

That specific option was inspired after interviewing the Karangura Peak cooperative in Uganda which decided to change their strategy by adding, on top of a highly productive farm that sells Fairtrade products in large volume but at a low price, a specialty coffee farming activity that trade in smaller quantity, to smaller buyers but with more quality and at a higher price. On top of the price advantage, the cooperative managed to secure direct relationships with the buyers, allowing them to negotiate directly and with the understanding of their interlocutor.

Thanks to that approach, the cooperative managed to provide extra income to its farmers, which, thanks to the Trade For Development Centre coaches, are used to protect the environment required to produce coffee (wetlands, agro-forestry), infrastructure to increase the living standards of the community (school, hospital,...) and financial training to adopt a saving habits that allows them to be resilient.

CHAPTER 2: CONCLUSION AND LIMITATIONS

This chapter concludes this thesis by providing the reader with the conclusions of this thesis, the limitations of the conclusions presented, and the following steps to complete the research.

2.1 LIMITATIONS AND FURTHER RESEARCH

The following research was design to help to build new knowledge and provide tracks for further research. Therefore, much of the information presented is generalized and should not be seen as data that would provide a clear depiction of the whole reality. They, however, helps to understand the challenges and leverage logical deduction and induction to provide an out-of-the-box perspective on the coffee value chain and information-based solutions. Further research on the subject is needed to verify the relevance of the assumptions made.

We would also like to bring to the reader's attention that the following thesis is by design made to match the academic format of a graduation thesis that is limited in size and time—knowing that we have chosen to present global solutions that could be deepened by future research.

For those we suggest the following subjects:

- Living income measurement: lever the living income measurement model presented to conduct on the ground measurements.
- Governmental regulation: evaluate the scope and the potential of government regulation regarding the sustainability of the coffee value chain.
- Blockchain technology: evaluate, through case studies the feasibility and the implementation strategy for the blockchain technology.
- Development of a VAT-like tax to cover certification cost.
- Crowd-founding: Evaluate how a crowd-funded platform could incentivize the creation of alternatives and exit options for coffee farmers.
- Specialty coffee: identify the specificities of the specialty coffee market, conduct market studies on consumer's perception and stakeholder's expectations, and value the possible gains of providing a higher price.
- Fair indicators: evaluate the use and real impact of Fairtrade indicators.
- Direct-trade market structure analysis: analyze the direct trade potential, conduct market studies on consumer's perception and stakeholder's expectations, and value the possible gains of shortening the supply chain.
- Indicator's development: Identify and evaluate indicators that could help to frame favorably the information-based solutions presented while incentivizing actions and informing on critical issues.
- Consumer's knowledge building communication app: Evaluate the possible impact of a better-informed consumer in purchasing habits. Identify which information could help him chose a product that does the good that he intends to do under quality constraint. Find the technology format to the information easily accessible and sufficient for fast decision making.
- Incentivize vs. prevent: evaluate the potential of an information-based solution that seeks to incentivize actions (such as Fairtrade) versus solutions that seek to prevent actions (such as repulsive messages on cigarette packaging).
- Open access communities and sustainability: evaluate the potential of knowledge sharing. Identify the requirements for such potential to be leveraged by coffee farmers. Develop a platform that could help to do it.
- Export guidebook: evaluate how a coffee farmer could seize the pockets of revenues in the exporter's hands. Build an open guidebook on export strategy and requirements to seize export opportunities.

2.2 CONCLUSION

The goal of this thesis was to provide a track for information-based solutions that would help reach strong sustainability inside the coffee value chain. To reach that goal, we have elaborated on the concept of strong sustainability and the role of the information in the economy to develop the Sustainability Awareness Framework.

The research allowed us to identify the considerable inequality of the coffee value chain. Effectively, we have observed that the average coffee farmer loses about 22 USD for every US dollar invested among all the actors.

When observing the sources of that pressure, we can directly see the huge bargaining power of exporters who enjoys the largest return on investment of all value chain with 243 US Dollar gains for every dollar invested.

While exporters are gaining a considerable amount of money from coffee trading, coffee farmers struggle to reach their basic survival needs. Despite existing solutions to mitigate that exposure, coffee farmers' income level is threatened today more than ever due to climate change.

With the Sustainability Awareness Framework and Canvas as tools, we have presented a complete overview of the coffee value chain. From those informations, we have identified how the coffee value chain is structured, where the pockets of values are residing, which opportunities exist, and how the farmer in the coffee value chain could perceive the pressure in its activity through porter's five forces analysis. Based on that information, we have identified that the farming activity is not a profitable activity for most cases because the price paid to farmers is often under the price required to cover production costs, thanks to an analysis of the cost component of a coffee farming structure. We have identified the specialty coffee and direct trading as providers of a price well higher than the market price among all the market trends.

To understand how vulnerable the coffee farmer could be, we have analyzed how climate change impacts coffee farmers and the existing solutions that help mitigate those challenges. Based on our research, we have seen that climate change heavily impacts coffee farmers in terms of income and quality, ultimately disrupting the local social structure. Those income shortfalls incentivize bad environmental practices such as intensive farming and overuse of fertilizers, further increasing climate change.

Among the existing solutions to mitigate those issues, we decided to focus on information-based solutions. To do so, we levered the Sustainability Awareness Framework and Canvas to evaluate the case of the Fairtrade certification scheme and label for the Ugandan coffee farmers (farming Robusta) regarding the living income. Throughout that case analysis, we have been able to identify the average income of a Ugandan coffee farmer and the living income for rural farmers in Uganda. Those elements helped us identify a goal (living income) and a baseline for analyzing the Fairtrade certification scheme thanks to the market price.

Our analysis of the Fairtrade certification scheme and label helped us identifying weak sustainability approaches that cannot meet the needs for living income due to its focus on market and growth. Effectively, we have pointed out that certification schemes:

- Induce a competition among labels which decreases the premium value from it
- Represent a cost unbearable for those most in need of support
- Have been incentivized but does not guarantee a market
- Create a new competitive threshold that discriminates against those who cannot bear the cost nor reach the standards.

- Do not give sufficient proof of democracy among farmers
- Provide a minimum price that barely covers the cost of production and never the living costs
- Focus on an increase in production and quality, but not in qualitative living standards

With a strong sustainable approach of boundaries, we have used the information gathered previously to identify four categories of farmers that seek different goals and must therefore be protected differently. Since the strong-sustainability approach does not seek to protect the coffee market at all costs, we have considered options outside of the coffee market as long as they help the farmers reaching their goals. For each of the four categories, we have identified a need for better pricing. Effectively, regardless of the farmer's type, neither the market price nor the Fairtrade price provides a stream of revenues sufficient for qualitative living standards. Therefore, we have decided to normalize the fact that coffee farming is not a long-term activity for all. Alternative pricing has been presented to ensure that all could at least reach the living income with or without coffee farming as a long-term strategy.

With that distinction in mind, we have suggested information-based solutions that could help farmers finding new opportunities alongside the coffee market to achieve a qualitative social life.

As a society, we have put considerable pressure on the environment and the people to grow. The coffee market represents the perfect example of the perversity that could arise from a "grow at all cost" mentality. To provide a high level of profitability and growth for some actors, we are closing our eyes on the fact that we are maintaining artificially millions of people under poverty. More shocking, we are conditioning ourselves to believe that we are taking action by following trends such as the Fairtrade labels or other market-based solutions that are ultimately reinforcing the perversity of the market. With climate change as an increasing issue, we are now at a crossroads. As a society, will we decide to come back to earth and take actions that directly aim at solving socio-environmental issues, or are we going to push forwards the chimeres that have brought us into this situation? We believe that growth by itself is not an issue but growing at all costs is undesirable both for society and the environment. If we want to provide qualitative living standards for all within planetary boundaries, we must understand that all should not be treated as marketable goods, all capitals are not substitutable and some elements of our life and environment should be protected no matter the cost.

When considering the sustainability of the coffee value chain, we can conclude by saying that the actual nature of the coffee market and the increasing environmental pressures make the value chain not viable for all. Not incentivizing coffee growth for all should therefore be normalized. Effectively, as we have mentioned previously, not all farmers are willing to invest in a long-term strategy. For many, coffee farming is just an alternative to earn income.

The solutions presented in this thesis supports the idea that socio-climatic issues should be treated by strategies that push for sustainability instead of pulling market desires. The economy and the market are nothing but a means to reach qualitative social life under environmental constraints. Framing the place of the market like that helps us focusing on what is essential, namely the people and the environment that lies behind the numbers.

With this thesis, we have developed a deep conviction that sustainable goals could not be reached by leveraging market growth at all costs. Effectively, we have seen through this research that growing excessively threatens the environment's ability to provide alongside reinforcing social inequalities. By those statements, we do not mean to condemn the market but recentralize the human inside its environment as the main priority. With the right approach, we can create a world in which qualitative livings are reachable for all within planetary boundaries. We would therefore like to conclude this thesis by saying that:

"Sustainability is not a goal to be reached but a way of thinking, a way of being, a principle we must be guided by."

Giulio Bonazzi

BIBLIOGRAPHY

AfricaGeoPortal. (2021). *Average Household Size in Uganda*. Retrieved from AfricaGeoPortal: https://www.africageoportal.com/datasets/7d67a1f9ed68499dbec68b94dc8af8e5

Allan Gibb, M. S. (1985). Strategic awareness, personal commitment and the process of planning in the small business. *Journal of Management Studies, 22*(6), p. 597-631. doi:https://doi.org/10.1111/j.1467-6486.1985.tb00014.x

Anna Dubois, L.-E. G. (2002). Systematic combining: an abductive approach to case research. *Journal of Business Research 55 (2002) 553 – 560*, 1. doi:https://doi.org/10.1016/S0148-2963(00)00195-8

Bank, W. (2019). *GDP per capita (current US$) - Uganda*. Retrieved from The World Bank Data: https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?locations=UG

Bank, W. (2020, October 22). *CLIMATE-SMART AGRICULTURE*. (W. Bank, Editor) Retrieved from Understanding Poverty Topics: https://www.worldbank.org/en/topic/climate-smart-agriculture

Bartkowski, B. (2016). *Ecological Economics*. Retrieved from Exploring economics: https://www.exploring-economics.org/en/orientation/ecological-economics/

Bigault, F. d. (2021, April 25). Le potentiel de la transformation locale de cacao en Côte d'Ivoire. (D. Mathieu, Interviewer)

Boerger, L. (2016, December). *Neoclassical Economics*. (Exploring-Economics-Team, Editor) Retrieved from Exploring Economics: https://www.exploring-economics.org/en/orientation/neoclassical-economics/

Bossolasco, J. K.-H. (2020). Not so robust: Robusta coffee production is highly sensitive to temperature. *Global Change Biology, 26*, 3677-3688. doi:https://doi.org/10.1111/gcb.15097

Business Wire. (2018). *Global Coffee Pods Market 2019-2023.* Retrieved from Business Wire: https://www.businesswire.com/news/home/20181130005213/en/Global-Coffee-Pods-Market-2019-2023-Convenience-Coffee

CBI. (2020). *What is the demand for coffee on the European market?* Retrieved from CBI Ministry of foreign affairs: https://www.cbi.eu/market-information/coffee/trade-statistics

CBI. (2020). *What trends offer opportunities or risks in the European coffee market?* Retrieved from CBI ministry of foreign affairs: https://www.cbi.eu/market-information/coffee/trends#european-coffee-consumers-more-knowledgeable-and-demanding

CBI, C. f. (2020, November). *What is the demand for coffee on the European market?* Retrieved from CBI Ministry of foreign affairs: https://www.cbi.eu/market-information/coffee/trade-statistics#:~:text=Europe%20accounted%20for%2034%25%20of,a%20market%20share%20of%2019%25.

CGD, C. f. (2018). *What Are We Getting from Voluntary Sustainability Standards for Coffee?* Retrieved from Center for Global Development: https://www.cgdev.org/publication/what-are-we-getting-voluntary-sustainability-standards-coffee

Chardon, R. R. (2020). The Benefits & Challenges of Agroforestry For Coffee Farming .

Christian Bunn, P. L. (2015). A bitter cup: climate change profile of global production of Arabica and Robusta coffee. *Climatic Change*, 89–101. doi:https://doi.org/10.1007/s10584-014-1306-x

Christophe Lacroix, V. R. (2021, Avril 2). *PROPOSITION DE LOI:instaurant un devoir de vigilance et un devoir de responsabilité à charge des entreprises tout au long de leurs chaînes de valeur*. Retrieved from La Chambre des représentants De Belgique: https://www.lachambre.be/FLWB/PDF/55/0173/55K0173001.pdf

Coffee, T. T. (2021). *Specialty Coffee Retail Price Index*. Retrieved from Transaprent Trade Coffee: https://www.transparenttradecoffee.org/scrpi#:~:text=The%20average%20price%20for%20roasted,websites%20of%20the%20SCRPI%20roasters.

Cortés, D. (2021, April 11). Coffee value chain and sustainability - Farmer/Processor. (Y. M. Daniel, Interviewer)

CRACCO, E. (2020). Satisfyer concept. *Export Strategy course.* Brussels: ICHEC Brussels Management School.

Cramer, C. (2015, July 10). Coffee value chain and sustainability - Researcher. (G. Journalist, Interviewer) Retrieved from https://www.youtube.com/watch?v=6M4-ondrq9Y

David J. Malenka MD, J. A. (1993). The framing effect of relative and absolute risk. *Journal of General Internal Medicine*, p. 543-548. Retrieved from https://link.springer.com/article/10.1007%2FBF02599636

DEAL, D. E. (2020, september). *The Four Lenses*. Retrieved from Doughnut Economic Action Lab: https://doughnuteconomics.org/tools-and-stories/100

Dictionary.com. (2021). *drupe*. Retrieved from Dictionary.com: https://www.dictionary.com/browse/drupe

enancio, L. F. (2020). *Impact of drought associated with high temperatures on Coffea canephora plantations: a case study in Espírito Santo State, Brazil.* Sci Rep. doi:https://doi.org/10.1038/s41598-020-76713-y

European Commission . (2021). *EU Emissions Trading System (EU ETS)*. Retrieved from European Commission: https://ec.europa.eu/clima/policies/ets_en

Exploring economics. (2021). *Compare the perspectives of economics*. Retrieved from Exploring economics: https://www.exploring-economics.org/en/orientation/

Fabienne Ribeyre, J. A. (2012). *Specialty coffee : managing quality Impact of field pests and diseases on coffee quality.* Oberthür Thomas (ed, Läderach Peter (ed, Cock James H. (ed.

Fairtrade. (2013). *Fairtrade Standard for coffee for small producer organizations and traders.* International, FairTrade. Retrieved from https://www.fairtrade.net/standard/spo-coffee

Fairtrade. (2021). *Coffee*. Retrieved from Fairtrade: https://info.fairtrade.net/product/coffee

Fairtrade. (2021). *FAIRTRADE MINIMUM PRICE AND PREMIUM INFORMATION*. Retrieved from https://www.fairtrade.net/standard/minimum-price-info

Fairtrade. (2021). *Key Issues*. Retrieved from Fair Trade: https://www.fairtrade.net/issue

Fairtrade Belgium. (2021). *Standards Fairtrade*. Retrieved from FairTrade Belgium: https://www.fairtradebelgium.be/fr/le-commerce-equitable/standards-fairtrade/

Fairtrade International. (2018). *KEY DATA: FAIRTRADE COFFEE*. Retrieved from FairTrade International: https://www.fairtrade.net/impact/key-data-fairtrade-coffee

Fairtrade International. (2021, May). *HOW FAIRTRADE WORKS*. Retrieved from Fair Trade: https://www.fairtrade.net/about/how-fairtrade-works

FAO, F. a. (2018). *New Food Balances*. Retrieved from Food and Agriculture Organization of the United Nations: http://www.fao.org/faostat/en/#data/FBS

Ferrer, B. (2021). Nestlé scientists uncover low carbon and drought-resistant coffee varieties. *Food Ingredients First*. Retrieved from https://www.foodingredientsfirst.com/news/nestle-scientists-uncover-low-carbon-and-drought-resistant-coffee-varieties.html

FLOCERT. (2020). *cocoa-and-coffee-entries*. Retrieved from FLOCERT: cocoa-and-coffee-entries

FLOCERT. (2021). *Fairtrade Cost calculator*. Retrieved from LOCERT Assuring Fairness: https://www.flocert.net/solutions/fairtrade/cost-calculator/

Government of Uganda, t. U. (216). *Uganda Demographic and Health Survey (UDHS).* Kampala. Retrieved from https://dhsprogram.com/pubs/pdf/SR245/SR245.pdf

Gregas, P. (2019). Spécificité de la gestion dans les pays du sus. Brussels: ICHEC.

GUHL, A. (2004). COFFEE AND LANDSCAPE CHANGE IN THE COLOMBIAN COUNTRYSIDE. *University of Florida*. Retrieved from http://etd.fcla.edu/UF/UFE0003960/guhl_a.pdf

Haight, C. (2011). *The Problem With Fair Trade Coffee.* Standford Social Innovation Review. Retrieved from https://ssir.org/articles/entry/the_problem_with_fair_trade_coffee

Hallie Eakin, A. W. (2009). Nested vulnerability: exploring cross-scale linkages and vulnerability teleconnections in Mexican and Vietnamese coffee systems. *Environmental Science & Policy,, 2*(Issue 4), 398-412. doi:https://doi.org/10.1016/j.envsci.2008.09.00

Hartwick, J. (1977). Intergenerational Equity and the Investing of Rents. *American Economic Review*, p. 972-974.

Hartziotis Trading Co Ltd. (n.d.). *Off Trade & On Trade.* Retrieved from Hartziotis Trading Co Ltd: https://www.hartziotis.com.cy/cyprus-trading-operations/sales-marketing/off-trade-on-trade/

Haughton, J., & Khandker, S. R. (2009). *Handbook on Poverty and Inequality.* Washington, DC: World Bank. Retrieved from http://hdl.handle.net/10986/11985

Herbert, S. A. (1947). *Administrative Behavior: A Study of Decision-Making Processes in Administrative Organization.* New York: Macmillan.

Holger Hindorf, C. O. (2011). *A review of three major fungal diseases of Coffea arabica L. in the rainforests of Ethiopia and progress in breeding for resistance in Kenya* (Vol. Volume 2). Journal of Advanced Research. doi:https://doi.org/10.1016/j.jare.2010.08.006

ICO, I. C. (1998). *The "El nino southern oscillation event" and its impact on coffee production.* International Coffee Organization.

ICO, I. C. (2021). *Members of the International Coffee Organization*. Retrieved from International Coffee Organization: https://www.ico.org/members_e.asp

ICO, I. C. (2021). *Trade Statistics Tables*. Retrieved from International Coffee Organization: https://www.ico.org/trade_statistics.asp?section=Statistics

IDH, i. S. (2013). *THE SUSTAINABLE COFFEE PROGRAM: A business case for sustainable coffee production, UGANDA.* IDH. Retrieved from file:///C:/Users/myabi/Desktop/M%C3%A9moire/Ressource/UG_two%20pager.pdf

International Trade Center. (2011). *The coffee Exporter's Guide Thrid Edition.* Geneva: International Trade Center. Retrieved from https://www.intracen.org/The-Coffee-Exporters-Guide---Third-Edition/

IPCC. (2014). Climate change 2014: Synthesis Report 2014. Retrieved from https://epic.awi.de/id/eprint/37530/1/IPCC_AR5_SYR_Final.pdf

ITC, I. T. (2012). *THE COFFEE EXPORTER'S GUIDE* (THIRD EDITION ed.). International Trade Center.

IVOX. (2019). *Consommation responsable.* Brussels: ENABEL.

John Lipczynski, J. O. (2017). *Industrial organization: competition, strategy and policy* (17 ed.). Harlow: Pearson education limited.

Jyrki Luukkanen, J. V.-o. (2021). *Quantification of Doughnut Economy with the Sustainability Window Method: Analysis of Development in Thailand.* Turku: Finland Futures Research Centre. doi:https://doi.org/10.3390/su13020847

KAISULE, B. (2021, April 24). Coffee value chain and sustainability - Farmer/Processor. (Y. M. Daniel, Interviewer)

Kasongo, J. (2021, February 20). Coffee in west congo. (Y. M. Daniel, Interviewer)

Kesting, P. (2006, january). The Meaning of Intentionality for Decision Making. *SSRN Electronic Journal*. doi:10.2139/ssrn.887088

Kithika, J. (2021, May 10). Coffee value chain and sustainability - Roaster. (Y. M. Daniel, Interviewer)

Kuznets, S. (1955). *Economic Growth and Income Inequality.* American Economic Review 45.

Llobet, A. (2017). *A Coffee Producer's Guide to Soil Management & Farm Conditions.* Retrieved from Perfect Daily Grind: https://perfectdailygrind.com/2017/11/a-coffee-producers-guide-to-soil-management-farm-conditions/

Manager GO! (2021, March 22). *Diagramme de Kano*. Retrieved from www.manager-go.: https://www.manager-go.com/management-de-la-qualite/diagramme-de-kano.htm

MarietteBengtsson. (2016). How to plan and perform a qualitative study using content analysis. *NursingPlus Open, Volume 2*, p8-14. doi:https://doi.org/10.1016/j.npls.2016.01.001

Markgraf, V. (2001). *Interhemispheric Climate Linkages.* Academic Press.

Maslow, A. (1943). A theory of human motivation. *Psychological Review*, p. 370–96. doi: doi:10.1037/h0054346

Mayumi, K. (1995). Nicholas Georgescu-Roegen (1906-1994): An admirable epistemologist. *Structural Change and Economic Dynamics*, p.261-265. doi:10.1016/0954-349X(95)00014-E

Mighty, M. (2017). We Likkle, but We Tallawah: Maintaining competitive advantage in the crowded spacialty coffe market. *Journal of international food & agribusiness marketing*, 70-91.

Minardi, S. (2016). How to Explain Warm-Glow Giving? (H. Paris, Ed.) *Knowledge@HEC*. Retrieved from https://www.hec.edu/en/knowledge/articles/how-explain-warm-glow-giving

MONNET, É. (2007). La théorie des « capabilités » d'Amartya Sen face au problème du relativisme1. *Open Edition Journals*, p. 103-120. doi:https://doi.org/10.4000/traces.211

Mordor Intelligence. (2020). *COFFEE MARKET - GROWTH, TRENDS, COVID-19 IMPACT, AND FORECASTS (2021 - 2026).* Telangana: Mordor Intelligence. Retrieved from Mordor Intelligence: https://www.mordorintelligence.com/industry-reports/coffee-market

Mordor Intelligence. (2020). *Europe Coffee Pods and Capsules Market Snapshot.* Retrieved from Mordor Intelligence : https://www.mordorintelligence.com/industry-reports/europe-coffee-pods-and-capsules-market

MORGENSTERN, O., & VON NEUMANN, J. (1944). *Theory of games and economic behavior.* Princeton University Press.

MUTHAHINGA, E. (2021, April 04). Coffee value chain and sustainability- Farmer/processor. (Y. M. Daniel, Interviewer)

National Coffee Association. (2021). *Coffee Around the World*. Retrieved from NCA: https://www.ncausa.org/about-coffee/coffee-around-the-world#:~:text=The%20ideal%20conditions%20for%20coffee,North%20and%2030%20degrees%20South.

NATIONS, F. A. (2010). "Climate-Smart" Agriculture: Policies, Practices and Financing for Food Security, Adaptation and Mitigation. Retrieved from http://www.fao.org/3/i1881e/i1881e00.htm

NCA, N. C. (2021). *10 Steps from Seed to Cup*. Retrieved from National Coffee Association: https://www.ncausa.org/about-coffee/10-steps-from-seed-to-cup#:~:text=Harvesting%20the%20Cherries,one%20major%20harvest%20a%20year.

Nespresso. (2012). *NESPRESSO AAA SUSTAINABLE QUALITY™ PROGRAM.* Retrieved from Nespresso: https://nestle-nespresso.com/news/nespresso-aaa-sustainable-quality-tm-program-a-triple-win-collaboration-between-nespresso-and-the-rainforest-alliance

Nieves, E. C. (2021, May 11). Coffee value chain and sustainability - Roaster. (Y. M. Daniel, Interviewer)

Njuguna, C. (2021, April 28). Coffee value chain and sustainability - Importer. (Y. M. Daniel, Interviewer)

NunoBento, G. G. (2020). Determinants of internal carbon pricing. *Energy Policy, Volume 143*. doi:https://doi.org/10.1016/j.enpol.2020.111499

O'Neill, D. F. (2018). *A good life for all within planetary boundaries. Nature Sustainability.* Leeds: University of leeds. doi:10.1038/s41893-018-0021-4

OEC, O. o. (2019). *Coffee*. Retrieved from OEC World: https://oec.world/en/profile/hs92/coffee

OEC, O. o. (2019). *Tea*. Retrieved from OEC World: https://oec.world/en/profile/hs92/tea

Osterwalder, A. P. (2014). *Value proposition design.* John Wiley & Sons.

Pettinger, T. (2019, September). *Environmental Kuznets curve*. Retrieved from economicshelp: https://www.economicshelp.org/blog/14337/environment/environmental-kuznets-curve/

Pierrot, S. P. (2021). *Coffee Barometer 2020.* ethosagriculture. Retrieved from https://coffeebarometer.org/

Poos, S. (2021, March/ April 16/19). Coffee value chain and sustainability - External Supporting Organization. (Y. M. Daniel, Interviewer)

Poos, S. (2021, March 15). *Devoir de vigilance des entreprises : les députés européens demandent une législation ambitieuse*. Retrieved from Trade For Development Centre: https://www.tdc-enabel.be/fr/2021/03/15/devoir-de-vigilance-des-entreprises-les-deputes-europeens-demandent-une-legislation-ambitieuse/

Procaffeination.com. (2019). *The Many Types of Coffee Beans*. Retrieved from Procaffeination.com: https://procaffeination.com/the-many-types-of-coffee-beans/

Raworth, K. (2018). *Doughnut Economics: Seven Ways to Think Like a 21st-Century Economist.* Random House Business.

Roman, P. (2020). Topics of economics and environment. Brussels: ICHEC Brussels Management School.

SARFARAZ, I. (2021). *The Effects of Chemical Fertilizers on Soil*. Retrieved from www.hunker.com: https://www.hunker.com/13427782/the-effects-of-chemical-fertilizers-on-soil

SCA, S. C. (2014). *SCA Benschmarking & Report and square coffee price.* Specialty Coffee Association.

SCA, S. C. (2020). *Protocols & Best Practices.* Retrieved from Specialty Coffee Association: https://sca.coffee/research/protocols-best-practices

SCA, S. C. (2020). *The Coffee Systems Map*. Retrieved from Specialty Coffee Association: https://sca.coffee/coffee-systems-map

Schroth, G. L. (2009). Towards a climate change adaptation strategy for coffee communities and ecosystems in the Sierra Madre de Chiapas, Mexico. . *Mitig Adapt Strateg Glob Change*, 605–625.

Settembre, J. (2019, July). *Why the price of your morning coffee could get more expensive*. Retrieved from MarketWatch: https://www.marketwatch.com/story/why-your-latte-costs-nearly-5-despite-plummeting-coffee-bean-prices-2019-04-26#:~:text=The%20average%20price%20consumers%20are,cent%20hike%20from%20last%20year.

Sherif, V. (2018). Evaluating Preexisting Qualitative Research Data for Secondary Analysis. *Forum Qualitative Sozialforschung, Volume 19*(No.2), Art. 7. doi:https://www.qualitative-research.net/index.php/fqs/article/view/2821/4211

Sherpa, N. T. (2021, April 30). Coffee value chain and sustainability - Farmer/Processor. (Y. M. Daniel, Interviewer)

Slezak, M. (2016). Climate change predicted to halve coffee-growing area that supports 120m people. *The Guardian*. Retrieved from https://www.theguardian.com/environment/2016/aug/29/climate-change-predicted-to-halve-coffee-growing-area-that-supports-120m-people

Specialty Coffee Association. (2017). Coffee Production Costs and Farm Profitability: Strategic Literature Review.

Stephen Carpenter, H. A.-Y. (2009, February 3). Science for managing ecosystem services: Beyond the Millennium Ecosystem Assessment. *Proc Natl Acad Sci U S A.*, pp. 1305–1312.

Szenthe, A. (2020). *Top Coffee Producing Countries*. Retrieved from World Atlas: https://www.worldatlas.com/articles/top-coffee-producing-countries.html

Talbot, J. M. (2004). *Grounds for agreement: the political economy of the coffee commodity chain.* Rowman & Littlefield.

Tark, S. (2018). *Examining coffee production costs across Latin America*. Retrieved from PERFECT DAILY GRIND: https://perfectdailygrind.com/2018/07/this-is-how-much-it-costs-to-produce-coffee-across-latin-america/

TED (Director). (2018). *A healthy economy should be designed to thrive, not grow | Kate Raworth* [Motion Picture]. Retrieved from https://www.youtube.com/watch?v=Rhcrbcg8HBw

Teixeira, M. (2021). Global coffee supply deficit seen up on lower Brazil output -report. *Reuters*. Retrieved from https://financialpost.com/pmn/business-pmn/global-coffee-supply-deficit-seen-up-on-lower-brazil-output-report

Thagard, P. a. (1997). *Abductive reasoning: Logic, visual thinking, and coherence.* Ontario: Philosophy Department, Univerisity of Waterloo. Retrieved from http://cogsci.uwaterloo.ca/Articles/Pages/%7FAbductive.html

Thaler, R. (1988). Anomalies: The ultimatum game. *JOURNAL OF ECONOMIC PERSPECTIVES*, p.195-206. Retrieved from https://www.aeaweb.org/articles?id=10.1257/jep.2.4.195

The Karlskrona Manifesto for Sustainability Design. (2021). *SusAF Taster - workbook - V3 - english*. Retrieved from https://www.ida.liu.se/: https://www.ida.liu.se/~TDDD96/info/SusAF%20Taster%20-%20workbook%20-%20V3%20-%20english.pdf

Timofeev, M. (2021, May 05). Coffee value chain and sustainability - Importer. (Y. M. Daniel, Interviewer)

Trade For Development Centre. (2021, February 4). *60 entreprises demandent au gouvernement fédéral un cadre juridique sur le devoir de vigilance*. Retrieved from Trade For Development Centre: https://www.tdc-enabel.be/fr/2021/02/04/60-entreprises-demandent-au-gouvernement-federal-un-cadre-juridique-sur-le-devoir-de-vigilance/

UCDA. (2019). *Report 2018/19 Issue 10.* UCDA. Retrieved from https://ugandacoffee.go.ug/sites/default/files/monthly-reports/July%202019.pdf

University, Y. (Director). (2014). *4/14/12 Ben Polak - Game Theory and Staying Alive* [Motion Picture]. Retrieved from https://www.youtube.com/watch?v=ONL2QcOXw4A

USDA. (2021). USDA organic regulations. In D. o. agriculture, *Code of Federal Regulations* (p. 7 CFR part 205). USA.

van de Ven, G. d. (2020). Living income benchmarking of rural households in low-income countries. *Food Sec.* doi:https://doi.org/10.1007/s12571-020-01099-8

Velasquez, D. (2021, May 03). Coffee value chain and sustainability - Exporter. (Y. M. Daniel, Interviewer)

WageIndicator. (2019). *WageIndicator Cost of Living Survey*. Retrieved from WageIndicator: https://wageindicator.org/salary/living-wage/wageindicator-cost-of-living-survey

WCED, W. C. (1987). *Report of the World Commission on Environment and Development: Our Common Future.* Geneva: United Nation. Retrieved from UNESCO: https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf

World Coffee Research. (2020). *INTERNATIONAL MULTILOCATION VARIETY TRIAL*. Retrieved from World Coffee Research: https://worldcoffeeresearch.org/work/international-multilocation-variety-trial/

XE. (2021, May 20). *Convertisseur de devises XE*. Retrieved from xe: https://www.xe.com/fr/currencyconverter/convert/?Amount=59349&From=UGX&To=EUR

Yabili, M. D. (2021). *Coffee and Climate*. Retrieved from Trade for Development Centre: https://www.tdc-enabel.be/en/2021/03/02/coffee-and-climate/

youmatter. (2020). *Carbon Pricing And Carbon Credits: Definition, Examples And History*. Retrieved from youmatter: https://youmatter.world/en/definition/definitions-carbon-price-carbon-credit/