

Maria Antonia Rojas Garzón

Polytechnic of Turin

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The Coffee Value Circle



**Multi-stakeholder strategy for improving
distribution of value in the coffee industry**

*Systemic design project considering coffee value chains and stakeholders
in producing and processing countries, with a special focus in Colombia and Italy.*



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Acknowledgments

To Coffee, which always brought me a delicious moment to live the best memories with my family, friends and colleagues

To my family

To my friends

To Miche

To my relator and co-relator Silvia Barbero and Alessandro Campanella





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Candidate: Maria Antonia Rojas Garzón
Relator: Professor Silvia Barbero
Co-Relator: Research Alessandro Campanella
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Abstract

The following systemic design research paper examines the **global coffee supply chain along with the activities, dynamics, value creation, income and margin inequalities** between the different and most direct actors in the system.



With particular emphasis on the perspectives of producing and processing/consuming countries, namely Colombia (3rd largest coffee producer) and Italy (3rd largest processor), which are interesting countries and are part of

the top 6 global coffee exporters. This approach led to a **more balanced perspective**, and the objective of this research is to create a methodology for the discovery of the needs and problems, interests and opportunities of the different actors involved in the supply chain, that could help set baselines for multi-level strategy formulation that can certainly contribute to the creation of value and the reduction of inequalities between actors.

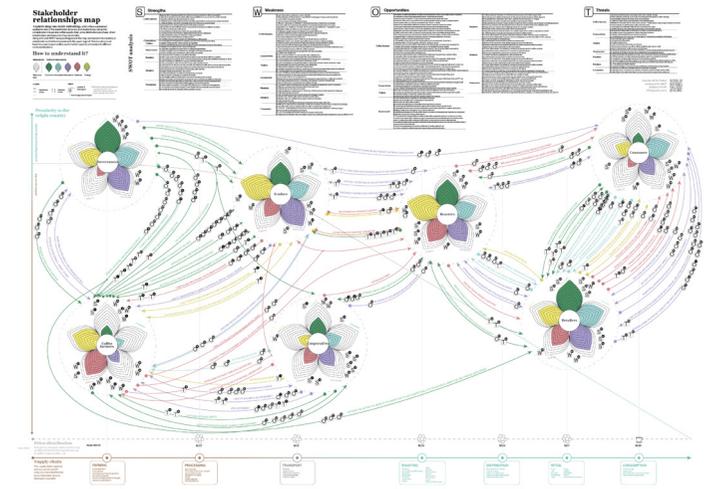
The findings of this thesis reveal a stark contrast in the distribution of power and benefits in the dynamics and relationships between stakeholders and the coffee supply chain, in which middlemen,

roasters and retailers share most of the profits, while coffee farmers constantly face economic instability, poverty and environmental degradation.

Subsequently, the most valuable output of this research, after an exhaustive literature review on the coffee industry and stakeholder dynamics, is a **new tool and complement to the systemic design methodology**, called the holistic diagnosis of stakeholders (figure1) with an approach that starts with an awareness of their relationships and exchanged resources, and then provides a basis for establishing guidelines, designing and developing multi-stakeholder strategies for upcoming

projects. The previous tool was developed following the principal methodology used in the research called **Systemic Design approach**.

In this particular case emphasized on producing holistic diagnosis on the global coffee supply chain and territories of interest, for then analyzing factors through SWOT, then applying them to the new methodology proposed, scouting out challenges and opportunities in a new way, then formulating the systemic project guidelines and evaluating them.



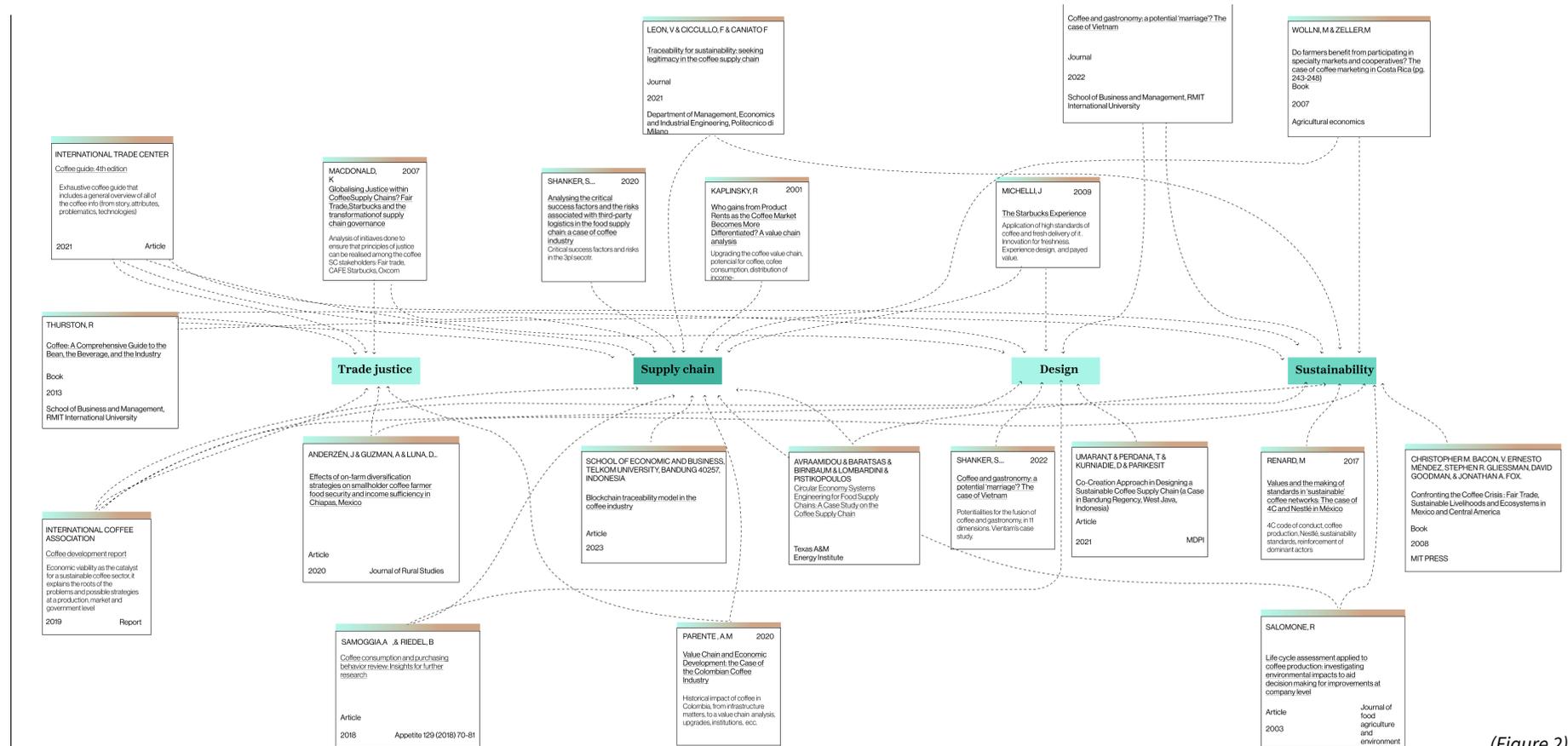
(Figure 1)

Keywords

In order to limit the search field of the literature review, the most relevant keywords were defined according to the abstract and the objective of the thesis. (figure 3)

Below there is a content map with initial papers and how they relate with the most relevant keywords. (figure 2)

Coffee industry



(Figure 2)



Introduction

Coffee plays an important role in the daily lives of around 1 billion people, making it one of the world's most widely consumed beverages after water and tea (M, 2023).

Characteristics such as socializing, providing energy and taste have placed coffee firmly at the forefront of millions of people's minds.

Today, the coffee industry, whose annual value will exceed \$120 billion in 2022 alone is characterized by its incredible reach and impact in so many different countries and at so many levels. All of this happens through the coffee supply chain, which is generally long, complex and variable, starting with the cultivation of the coffee cherry, through its processing, roasting, distribution

and brewing.

There are so many activities, processes and stakeholders involved from all over the world, typically including coffee growers, cooperatives, processors, roasters, retailers and consumers. However, the full panorama of the coffee industry is often hidden behind a delicious cup of coffee, and there are so many challenges that coffee has to overcome before it reaches the final consumer.

For years, the coffee industry has been in the spotlight for recurring global issues such as the lack of social sustainability, with more than **50% of coffee farmers living in poverty**, many of whom are food insecure and don't have access to a minimum basic income. Added to this are the effects of climate change on crops, pests and soil degradation,

which have definitely increased the unpredictability and cost of production.

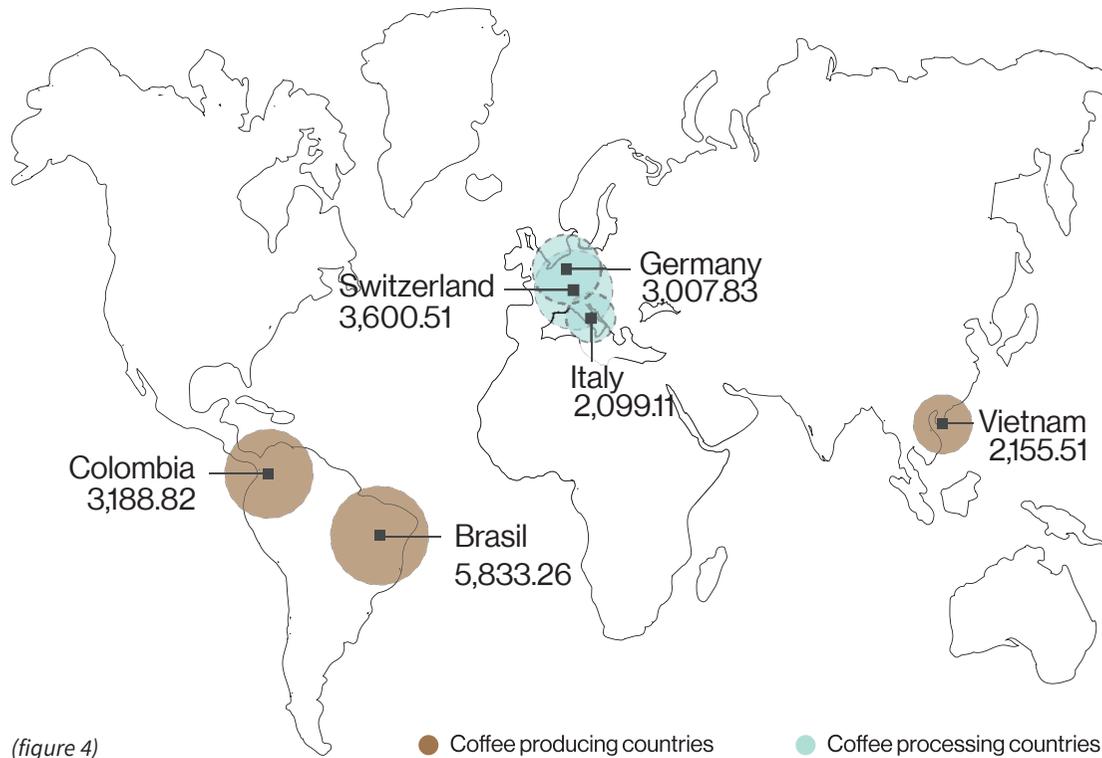
Without doubt, one of the most relevant and crucial factors in the systemic crisis of the sector is the inequality or trade justice, followed and related to the power imbalances of the related actors along the supply chain,

subsequently compromising the economic, social and environmental sustainability. In other words, we can recall the concept of the “**coffee paradox**”, in which there is a definite development problem, a dichotomy between the boom of coffee in consuming countries and the crisis in producing countries (Daviron & Ponte, 2005).

This gap between the realities of producing and consuming countries is something that is of interest to address, and looking at industry indicators, we found that the top



The coffee industry is expected to grow even more by 6.7% from 2023 to 2028(Coffee Market Insights, n.d.)



(figure 4)

8 coffee consuming countries per capita (Finland, Norway, Iceland, Denmark, Netherlands, Sweden, Switzerland & Belgium) and three of the **top 5 most coffee consuming** countries by volume (United States, Germany, Japan, France & Italy) are European countries. At the same

time, CBI (2022) states “Europe is the world’s largest exporter of roasted and ground coffee, accounting for 85% of the world’s total volume of roasted coffee”. Furthermore, an analysis of the top coffee exporters in dollar value reveals an interesting panorama:

Top coffee exports by value in millions of dollars

Coffee report (2022)

of the top 6 exporters, half are coffee producers (Brazil, Colombia & Vietnam), while the rest are dedicated to coffee processing (Switzerland, Germany, Italy).

In other words, the coffee paradox takes place between producing and consuming countries, and this was



a key point for the delimitation of the project.

Going back to the earlier point about issues and sustainability, the spread of awareness has led to the development of initiatives that help to stabilize the coffee supply chain and its actors, such as sustainability schemes such as Fair Trade, Organic, Rainforest, UTZ, Bird friendly, among others. These are excellent examples of



how the supply chain can be regulated, tracked and made more sustainable while working within a framework. In spite of these efforts, the assessment of coffee production and trade governance is discrete and limited in other dimensions, and in many cases adheres to one of these frameworks. There is therefore a need for initiatives that coordinate the responsibilities of decision-makers (institutions and traceability

tools), together with new conceptual models or frameworks based on coherence and enforceability that can be a guarantee of justice between workers and producers. (Macdonald, 2007) The problems in the coffee supply chain are systemic and should be

approached from the panorama of the current situation, not only of the production process, but also of the stakeholders, their needs, their limitations and their compromises. Consequently, this research aims to explore, analyze and provide a different perspective on the



dynamics of the coffee supply chain, revealing not only different types of stakeholders but also the complex web around them and their influence. The coffee industry is a rich and complex system that needs to be analyzed from a global to a local perspective, therefore in this thesis we use a systemic design approach to fully understand the coffee supply chain, the selected territories and the stakeholders involved in it.

We will then be able to provide actionable insights and a new methodology for policymakers, industry leaders and stakeholders in the coffee supply chain to effect positive change. By fostering more equitable and sustainable practices within the coffee supply chain, the thesis aims to improve the livelihoods of coffee farmers, promote environmental sustainability and improve the quality

of coffee consumed by individuals worldwide.

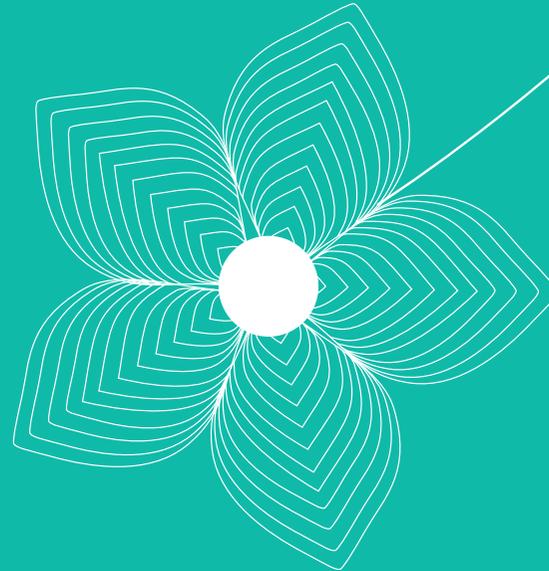
Effectively targeting ideas and strategies that work towards the through this systemic design analysis that acts as a catalyst

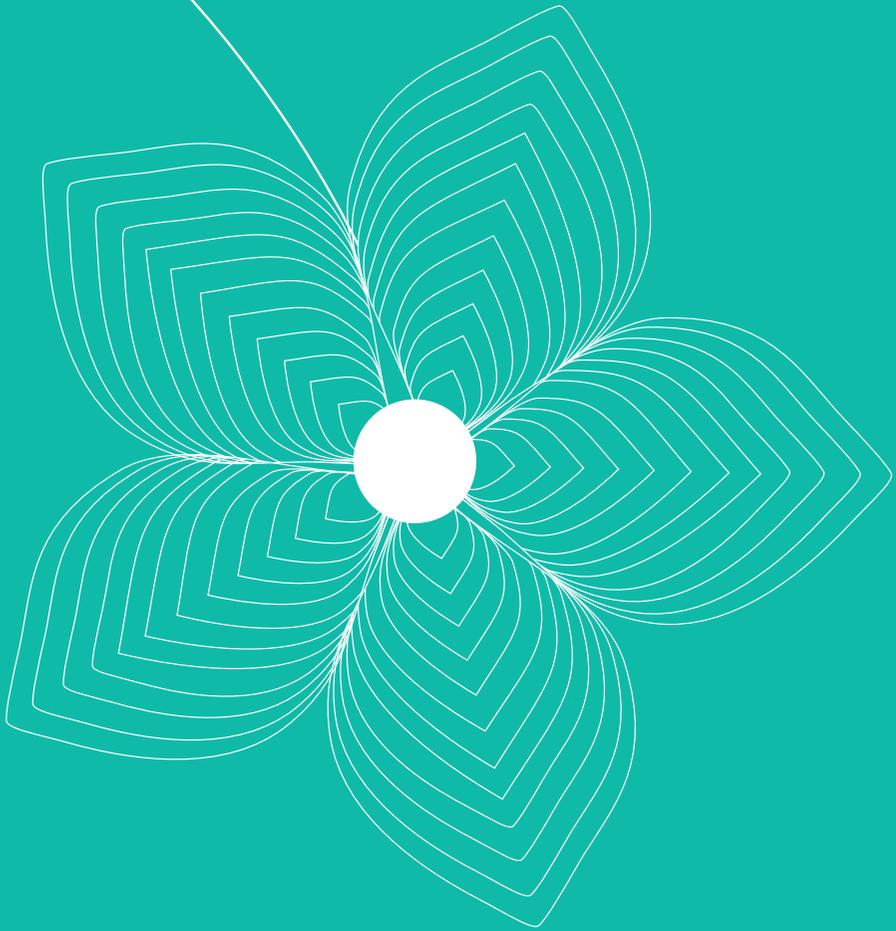
empowerment of marginalized stakeholders, defined as “a process in which they are able to exercise a meaningful degree of control over the progressive realization of their own well-being (Macdonald,2007)

for change in the coffee industry, inspiring stakeholders to work together to create a fairer and more sustainable coffee supply chain for the benefit of all stakeholders and the global community.

Research question

Can lower-level coffee stakeholders join forces with higher-level stakeholders to extract more value from the traditional supply chain?





Complementary questions

What are the current dynamics of relationships between stakeholders in the coffee supply chain?

What are some possible multi-level strategies that can benefit the value and economic distribution of stakeholders?

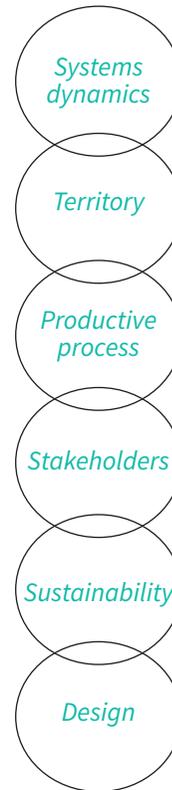
Systemic design methodology

Systemic design represents an emerging field of design, which combines systems thinking, human-centered approach, and design. It is used for tackling complex and intricate situations, and to tackle alternative solutions and dynamics in a more systemic, or circular way, different from the actual linear systems.



Systemic Design lab is a referent in the discipline, with over 10 years in the projection of sustainable systems

It takes into account multiple elements involved in the activities, productive process, such as information, matter, economical, and energy flows, and how it connects to the system and stakeholders, from suppliers, producers, distributors, and finally consumers. Therefore, systemic design can definitely be a way to



address complex problems in a holistic way, and act as a mediator. Regularly the industries have linear economic models, in which there is a resource exploitation, product creation, consumption, and disposal when the product becomes obsolete.

With systemic design instead, we advocate a circular approach where the outputs of one system serve as inputs for another. Systemic design can work in multiple industries, contexts, economic sectors, business, always taking into consideration the community and territory.

Five key pillars:

Outputs/Inputs: This involves repurposing the outputs of one system, normally the waste, as inputs for another, such as using waste as raw material in a different production chain to reduce emissions.

Relationships: The connections among actors within a system are critical for its sustained development. Collaboration among local agents or stakeholders promotes economic growth and context improvement.

Autopoiesis: Ensuring the self-sustainability, cyclical dynamics of a system and its ability to evolve with other systems is essential for the perpetuation of innovative practices.

Acting locally: Emphasizing the local context and communities in the design process is vital for the viability and project realization.

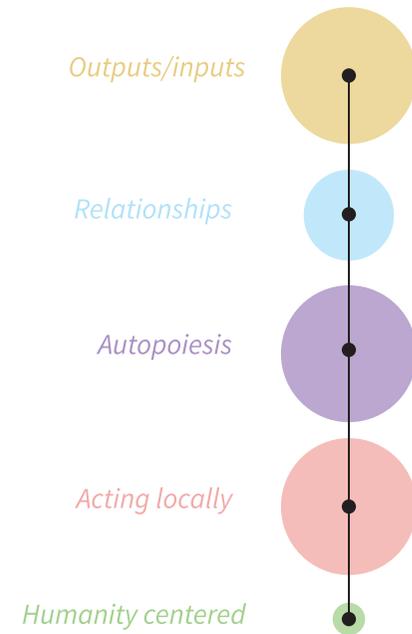
Humanity-centered design: Human beings are the center in any systemic project, with a strong focus on their connection to their territory, society, culture, and context.

It is key to then create a sort of a “blueprint” or state of art of the system, that maps the vision of how the system operates in the context, considering socio cultural, economic and environmental aspects, it is called a Holistic Diagnosis. The data is compiled within a map, offering a clear and understandable

visual representation of data and information. The process behind the holistic diagnosis starts on the assessment of the topic, then the research on qualitative and quantitative information about multiple categories (economy, social, process) from different information sources. Then we collect the most relevant data and develop the most according data visualization strategies through infographics and gigamaps. Lastly after the system is evidenced, the moment for interpreting arrives, and the gathered info must be analyzed and evaluated, to create relations and detect project possibilities. Afterwards, there is a phase of challenges and opportunities in

which there must be an extraction of these elements from the territory and supply chain, so there can be multiple paths to work on, and then we can search for case studies that can relate to each challenge. Then they go through an evaluation of the five pillars mentioned before to harness the viability. When the most important challenges and its case studies are identified, they are then nurtured and become systemic project outcomes. They must be explained and evaluated through a quantitative and qualitative evaluation, along with the different scales of the project (micro-meso-macro scale) and the consequences it will have in a time frame (short, medium and long)

Example of a single graphic used to evaluate opportunities



(figure 5)

Translating all of this into our coffee topic, we can say that systemic design enters into a holistic analysis of the entire coffee production chain and the territorial relationship with it, in order to understand in depth the current system and networks. This is undoubtedly related to the chosen theme, which revolves around the stakeholders and how to improve or stabilize the value chain. Strategies could be developed to optimize and add value to the system at the local, national or international level, through a combination of outcomes, services, products or strategic direction.

Systemic design regularly targets supply chain outputs, and the outcomes normally relate to the

treatment, recycling, reusing, and different waste management strategies for re-integrating them into the same productive process or creating new ones, a great example of this can be the use of coffee grounds (which are critical outputs in the instant coffee production and in the brewing phases) for creating new products, and nurture other industries, impacting positively sustainability at an economical, and environmental basis.

On the other hand, the thesis offers a different perspective and approach, because not only the coffee supply chain will be analyzed but also the stakeholder relations through a formulation of an improved stakeholder relationships map,

which can be a base for diverse project outcomes.

The research thesis was developed around this 5-step methodology for the unique case, going from a global or macro approach in terms of literacy review and analysis of the coffee industry to choose the topic for the development, and then arriving at a specific or micro approach, followed by analysis and synthesis of information, evaluation methodologies and research outcomes.

Scope and limits

Scope

The present thesis scope is to create a new approach for the analysis of the coffee supply chain, from systemic design and stakeholder relationships and diagnosis, and how this method can yield results and formulation of strategies and transdisciplinary projects. This analysis starts from a global perspective, and then is focused on Italian and Colombian territories, bringing more feasibility and preciseness to the methodology.

Limits

Nevertheless, it is a research thesis that won't go beyond the strategies formulation, and so, next steps such as evaluation, feasibility analysis, stakeholder interviews and contacting, and full development of the projects are not considered, but strongly recommended for papers, thesis or projects, as it can definitely open a fresh panorama on the coffee industry interpretation.

A coffee review

The following chapter contains all literature reviews collected through months of investigation, from scientific papers, thesis, journals, news, everything that could help obtaining a better understanding of the evolution of the coffee industry, a description of the supply chain, its actual situation, challenges it faces, and sustainability means.

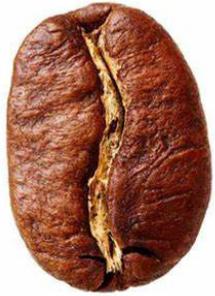
About coffee

Coffee nowadays has become part of our DNA, a crucial must-have in the daily routine of millions of people globally, from America, Africa, to Oceania, and it seems there isn't a place in the world untouched by coffee.

Coffee is in essence *“the beverage brewed from the roasted and ground seeds of the tropical evergreen coffee plants of African origin”* Myhrvold (2023). It is immediately recognized by its dark brown appearance and is normally consumed hot, and it can be brewed in multiple ways, such as electric drip coffee maker, the moka pot, espresso, french press, etc.

Over the course of the years, new variations to coffee also appeared, like decaffeinate, instant coffee, cold or nitrogen coffee, matcha coffee, etc. There are over 120 species of the coffee plant, but the most used and important in the coffee industry are *Coffea Arabica* as Arabica, and *Coffea Canephora* mostly known

as Robusta, and they produce significantly different coffee (see the table below). There are other ones, such as *Coffea liberica*, which MacDonnell (2023) describes as “inconsistent, nutty, woody flavor and sneaky backbite, or burnt”, *excelsa* noted as more fruity and light roast traits, etc.



● **Coffea Arabica**

Subvarieties: Bourbon, Typica, Caturra, Mundo Novo, Tico, San Ramon, Jamaican Blue Mountain

Arabica is grown at altitudes over 1000 m

Grows in colder places 15° and 23.9°

Superior quality beans

Greatest flavor and aroma

70% of the total global coffee (NCA)

1.5% of caffeine per bean

More vulnerable to diseases.



● **Coffea Canephora**

Subvarieties: Canephora var. Robusta, Canephora var. Kouillou, Canephora var. Nganda, Canephora var. Eugenioides

Robusta grows at lower altitudes

Grows in warmer places 23.9° y 29.4°

Inferior taste and quality

Woody and astringent flavor

30% of the total global coffee industry.

2.7% of caffeine per bean

Better resistance to diseases

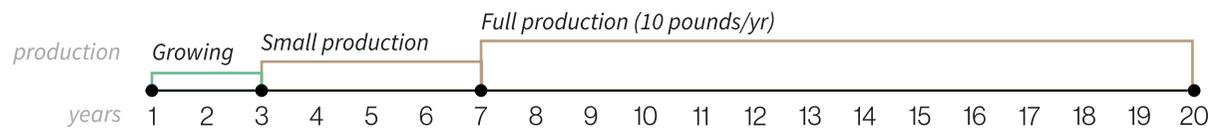


Image source: Oppenheimer, M

Coffee trees

Can grow up to 9 meters high, but normally are kept short to preserve their energy. For the first flowering of the cherry it could take up to a year, and to gather a full fruit production, up to 5 years.

Coffee trees are most productive between 7 and 20 years old and can live until 100 years old. On average, it can produce 10 pounds of coffee cherries which are 2 pounds in green coffee beans. Most of the produced coffee is grown in the coffee belt, a region that covers the equatorial zone which is mainly a tropical area in the globe with the most stable weather and conditions for plants, and comprises South America,



Source: NCA

Central America, South Asia, Africa and India. (What Is Coffee?, n.d.)

On the other hand, coffee is generally traded in formats

commercial coffee or specialty coffee, and commercial means that it is mass produced in terms of quantity by big producers and major companies

corporations. Usually It is sold at a reasonable price and is widely consumed by the audience daily or with continuity. It offers a standard product that can vary in terms of quality according to its price. This typology of coffee is sold in the classic cafès and in the common retail network. All the major brands

specialty coffee on the other hand comes from the small farmers and independent producers and usually from rural traditional production

existing worldwide in the coffee sector have their entire or almost complete production belonging to this category. While specialty

coffee on the other hand comes from the small farmers and independent producers.

Usually it comes from rural traditional production and has different processing that varies more from the mass produced goods. It can be found in specialized bars and coffee houses. These products also have different typologies of brewing. These coffees represent a niche for an expert audience.



Coffee's anatomy

Moving on towards a more specific topic, the coffee bean comes from the cherry or fruit of the coffee tree, and has a very small size in relation to the fruit from which it is extracted.

The fruit is characterized by an oval volume, and contains around 6 components, starting from the stalk, skin, pulp, parchment, silverskin, and bean.



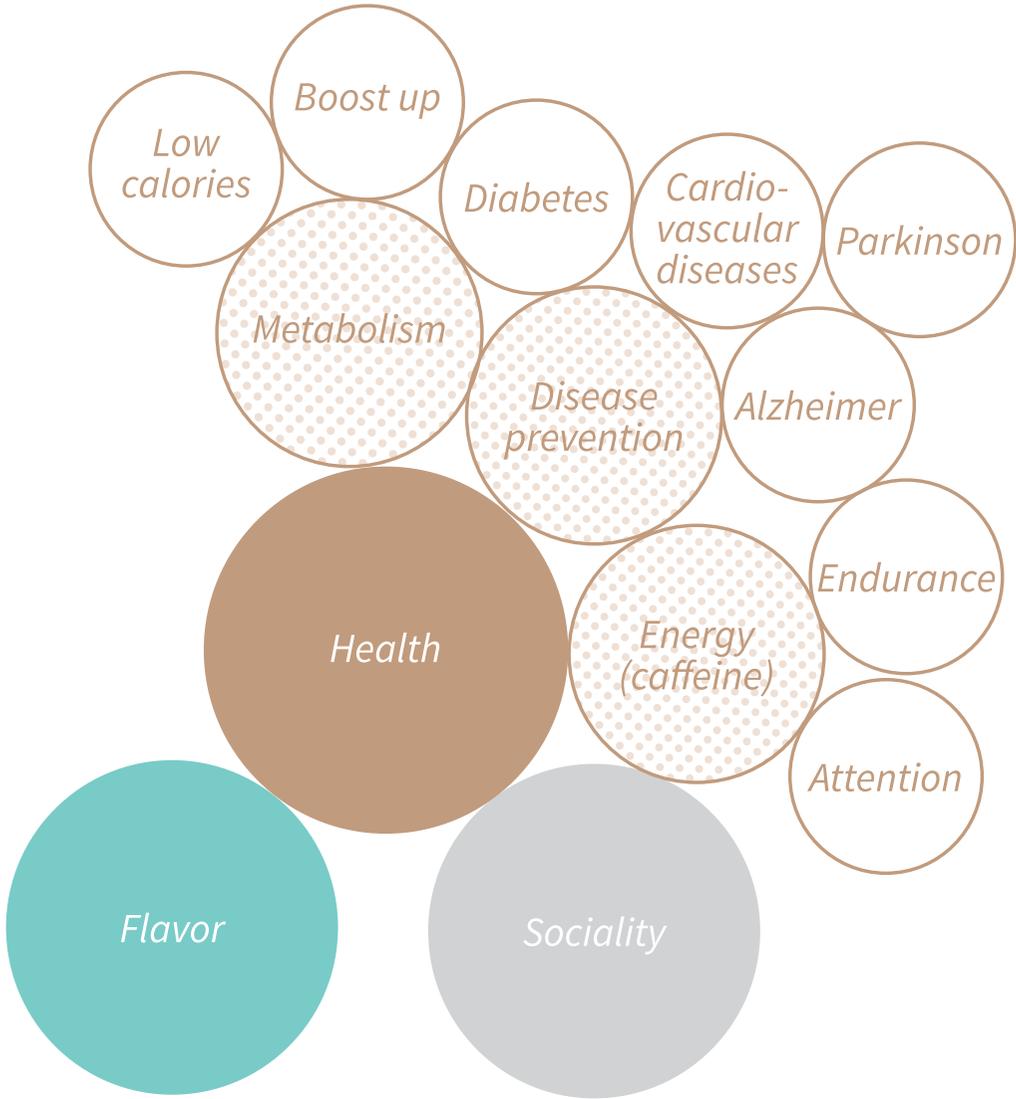
Image source: *Between the Woods and the Water*, 2012



- ① **Skin:** Protective outermost layer of the fruit
- ② **Pulp:** Comprised water and sugar
- ③ **Mucilage:** Inner layer of pulp sticky and sweet , also known as “honey”
- ④ **Parchment:** hull that covers the seed, which then becomes the parchment paper
- ⑤ **Silverskin:** The innermost protective layer
- ⑥ **Bean:** Two seed beans



Image source: M. A. Rojas Garzón



(figure 6)

Coffee benefits

Nevertheless the heart of coffee and what made it so appealing were three motives; flavor, sociality, and health.

Coffee contains highly nutritional components, almost zero calories intake, with caffeine as the main compound 75 to 100 mg per cup (5 cups would be the max dose per day). Thus, thanks to the amount of caffeine, consumers receive an increase of attention and alertness, improves physical performance while exercising, less fatigue

perception.(International trade center, 2021)

Recent studies have stated that consuming caffeine could boost up metabolism, help lose weight and decrease appetite (mindbodygreen, 2023). On the other side, it can help with disease prevention, for instance, drinking 3-4 cups daily can reduce the risk of getting diabetes in a 25%, also cardiovascular diseases, and works against cognitive diseases such as alzheimer or parkinson.(Is Coffee Good or Bad for Your Health?, 2021)

Recent studies have stated that consuming caffeine could boost up metabolism, help lose weight and decrease appetite

Coffee waves

The First Coffee Wave: Traditional Coffee Culture of the 19th Century and coffee as an utility.

The First Coffee Wave, originating in the 19th century, is a crucial part of the rich coffee heritage, marked by the rise of mass coffee consumption, commodity-driven practices, and a surge in the popularity of bulk brew filter coffee, instant coffee, and espresso

It was driven by the concept of coffee as a commodity, in which entrepreneurs and business people recognized the economic potential

of coffee, therefore quality was not the primary concern. The focus was on mass production and profit maximization, so there was clearly an exponential growth in coffee consumption. As the beverage became more accessible and affordable, it began to permeate daily life, marking the inception of the coffee culture we are familiar with today.

The bulk brew filter coffee characterized this wave, allowing brewing for large quantities of coffee to be prepared efficiently, making it ideal for mass consumption. In addition, came the instant coffee, which speeds up the coffee making and easily, eliminating the need for brewing or grinding. Instant coffee's

convenience made it an instant hit, transforming the coffee-drinking experience for millions and setting the stage for future innovations in coffee production and consumption. In the context of the First Coffee Wave, the customer experience was predominantly characterized by "refueling." In which coffee was **seen as a way to energize due to the caffeine intake, rather than a sensory or social experience.** More of an utilitarian perspective in which coffee transitions from being a luxury to a daily necessity.



Image source: Leonetto Cappiello



Image source: Maxwell House

The Second Coffee Wave: Quality and Customer Experience in Coffee Culture

The coffee culture then evolved with the second wave in the 1960s and some debate in the mid-1990s, and it starts when consumers were dissatisfied with the lack of information and attention to quality, they wanted to know where the coffee came from and how it was sourced, processed, and roasted, and this precise curiosity demanded better transparency in the coffee supply chain. (Primer Media Inc., 2017)

Another of the features of the second wave was the emergence of branded coffee chains, which prioritized customer experience and created a coffee shop culture.

For instance, over time, these establishments became known for offering customized espresso-based beverages, a wide range of coffee options, and a welcoming atmosphere.

Offering more than just a place to grab a quick drink; they **evolved into “third places,” friendly and informal places where people would catch up with friends, meet new people (sense of community), relax or even work.**

What added the cream to the experience was that consumers could now order coffee tailored to their preferences, be it a latte, cappuccino, or a personalized espresso shot.



Image source: Primer Media Inc., (2017)



The Third Coffee Wave: Rediscovering Coffee's Essence & artisan approach

The third coffee wave emerged in the mid-2000s, and was significantly different from the rest, it is characterized by a return to the essence of coffee, emphasizing a direct relationship with coffee growers and roasters, the quality of beans, single-origin coffee, light roasting, and a focus on artisanal craftsmanship.(Crosby, 2022)

There is a reconnection with the coffee bean itself, in which there is an aim of transparency and sustainability, along with the coffee bean's origin and quality. Therefore,

direct relationships with coffee farmers became a priority and the ensurement of them receiving fair compensation for their work.

Light roasting is a novelty and allows the inherent flavors of the beans to come out, revealing the origin flavors, which differed from the dark roasting of the previous waves. Furthermore, this wave reintroduces alternative coffee brewing methods, such as vacuum coffee. The coffee-roasting process is also considered, and perfected, introducing the micro roasting, the small-batch approach to coffee roasting, allowing for specialty, precision and consistency. Coffee was no longer just a drink but

Quality is arising and there are unique and exceptional flavor profiles, focusing more on single origin coffee and rejecting blends.

an ingredient for experimentation. This wave inspired the creation of coffee-infused dishes, desserts, and cocktails, pushing the boundaries of coffee's culinary potential. In

the Third Coffee Wave, independent artisan cafés and roasteries took center stage. These establishments were at the forefront of the movement, focusing on craftsmanship, high-quality beans, and direct relationships with coffee producers. Baristas in these places became the protagonists, providing a tailored customer service and even showcasing their skills through latte art and cupping competitions.

Image source: Primer Media Inc., (2017)



Image source: Flawless Milano

The Fourth Coffee Wave: A Scientific Approach to Coffee

The fourth coffee wave, emerges in the 2010s, brings a fresh perspective to the world of coffee. This wave is defined by a commitment to direct and fair trade, organic products, and a strong focus on scientific methods and principles. Emphasizing on the coffee journey, sustainability, and a reinvestment in specific farmers and their families. The goal is to create a mutually beneficial relationship that extends from the source of the coffee to the consumer's cup and

back. On the other hand, the fourth wave could be aptly described as the “**science of coffee**”. **It is marked by a dedication to applying scientific methods and principles to coffee production, emphasizing on precision, accuracy, and a deep understanding of the properties of coffee and its ingredients.** Exploring composition, flavor compounds, chemical reactions during brewing and roasting, and how water chemistry can complement the coffee's flavor. In the fourth coffee wave, custom coffee shops with in-house roasting take center stage. These establishments embody the scientific approach to

coffee, using advanced equipment and methods to create a unique and precise coffee experience. The baristas and roasters are like coffee scientists, constantly exploring new techniques, processes, and tasting profiles to push the boundaries of coffee excellence. Customer experience takes precedence, the focus is on creating an environment where customers feel valued, appreciated, and part of a community, through a personalized service, attention to detail, etc (ICO,2021)

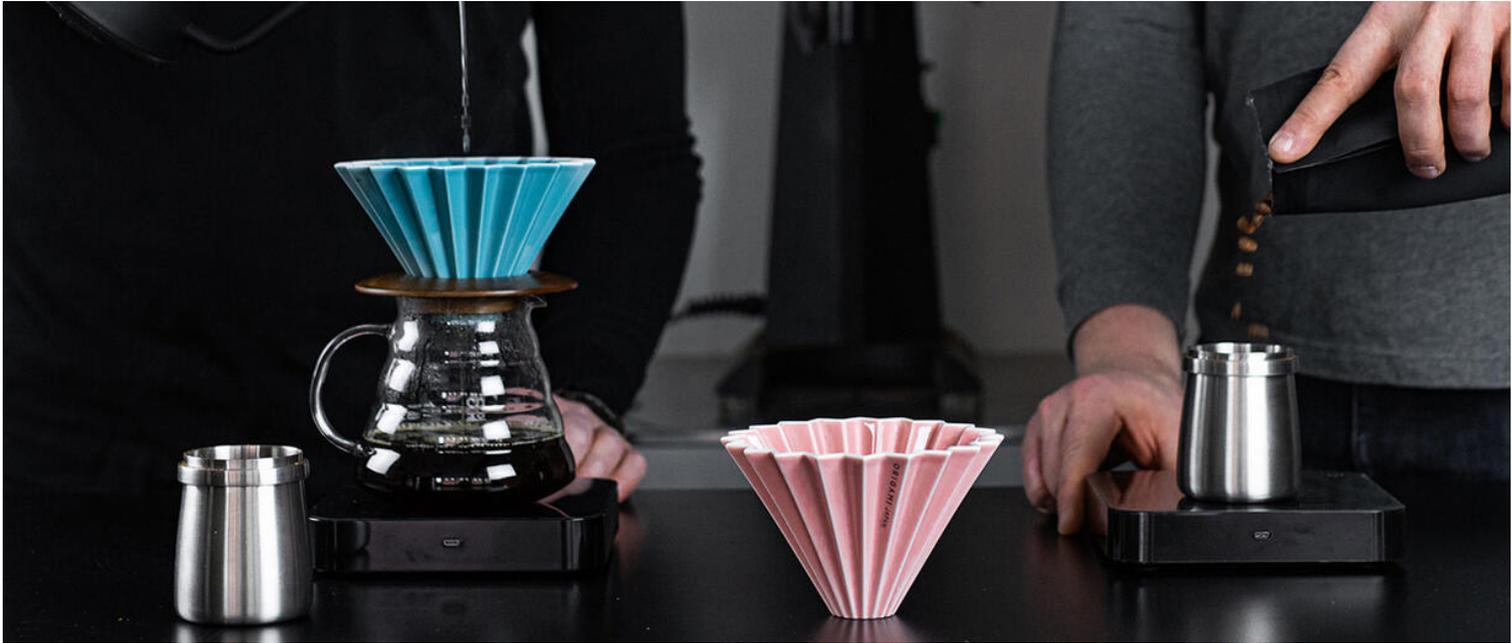


Image source: Robert Paulig Roastery and Artisan Cafe (n.d.)



A panoramic of the global coffee industry

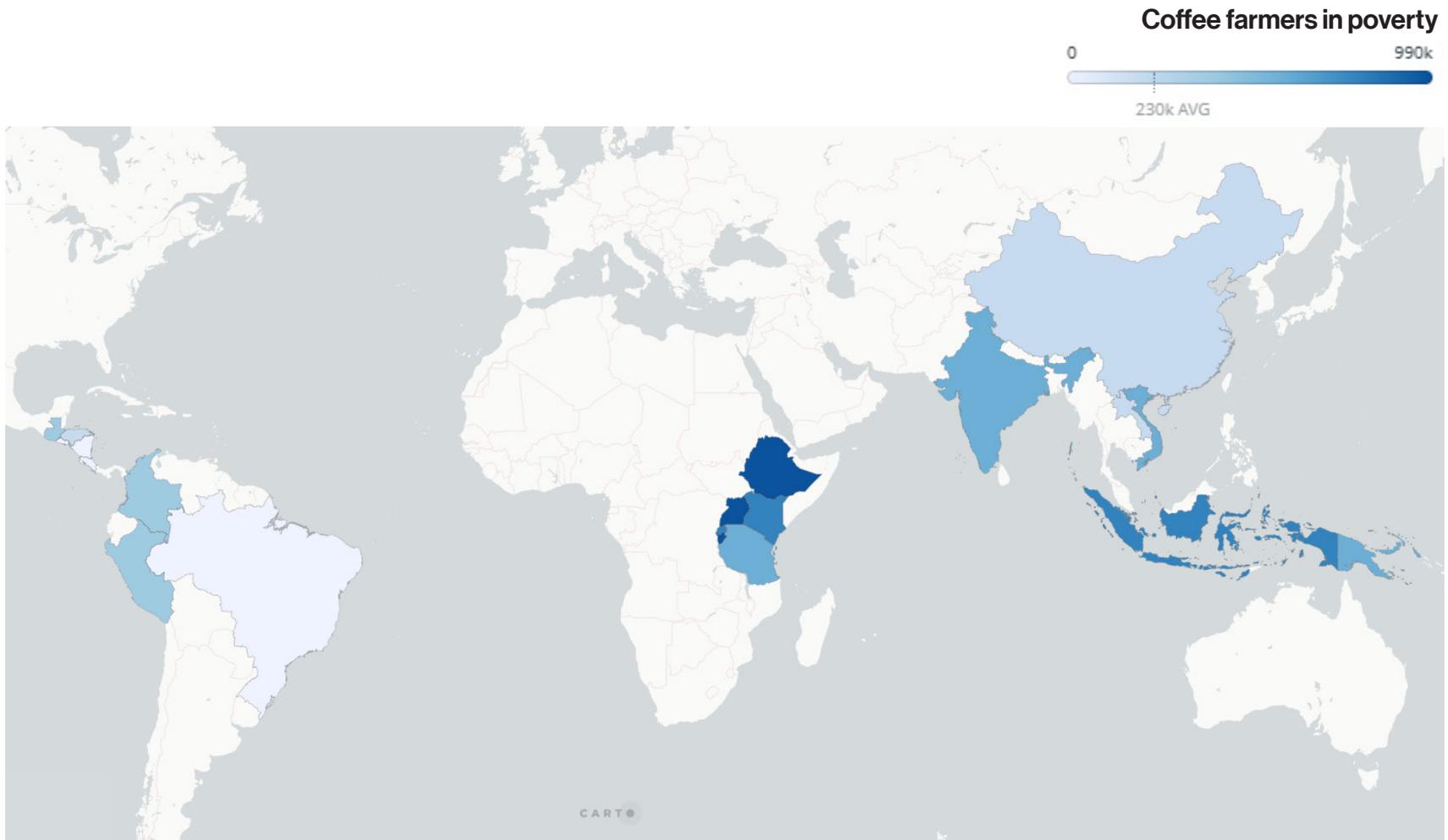
Coffee is one of the most important commodities and has a huge impact on exporting and importing countries. According to the Comprehensive Guide to the bean, a commodity, is anything that can be bought, sold, or traded including labor and services”Thurston et al. (2014, p. 92) For example, in 2017, the exporting obtained value of \$19 billion (70% of the total production of coffee was exported), value that almost quadrupled in the retail market up to \$83 billion. The effects of the coffee economy are immense and provided jobs for an estimate of 125 million people worldwide.

Breaking this figure down, it is estimated that there are around **12.5 million farms mainly dedicated to coffee worldwide, 60% of them are smallholder farms (<5 Hect), 21% large farms or estates (>50h), and finally 19% medium farms or estates(5<50 Hect).** (Rushton, n.d.) Moving towards economical aspects and living incomes we see a complex and challenging panorama in the producing countries, according to Anker research network & Global living wage coalition (2021) living incomes mean “the net annual income required for a household in a particular place to

afford a decent standard of living for all members in that householder”.

Thus, smallholder coffee farmers are most affected, and 44% live in poverty, plus 22% live in extreme poverty, and these indicators are strongly related to countries in Africa (Burundi, Uganda, Etiopia) and Indonesia and Papua New Guinea. (Rushton, n.d) The poverty measures are given by the World Bank statistics, and state the consumption thresholds between \$1.90 and \$3.20 per day.



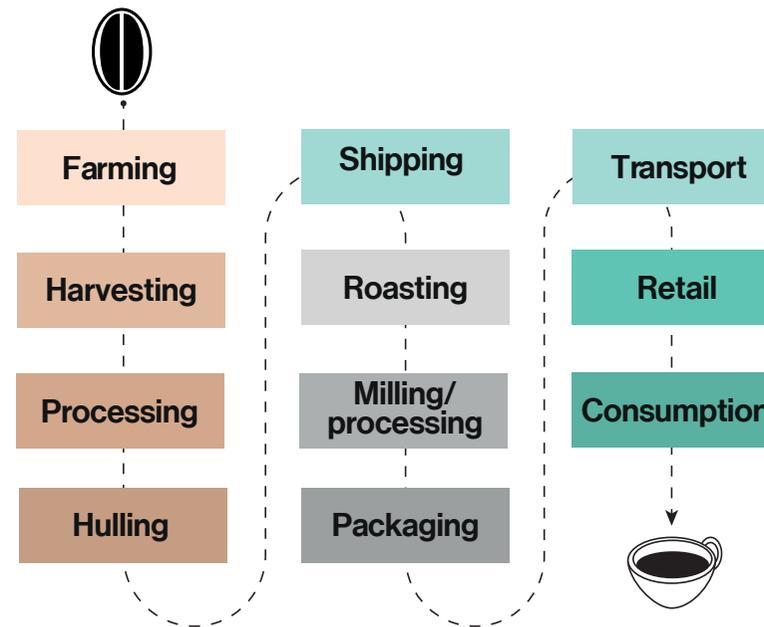


(figure 7) Image source: (Rushton, n.d)

Supply chain



To arrive at the cup of coffee, the coffee bean must travel through many steps, in this case we propose 11 general steps, this applies to the majority of coffee typology, making a small exception for peculiar and niche products. The process applied to obtain coffee is well established and common in many countries and it implies the participation of many actors. See the figure below to get a quick visual on the coffee traveling from bean to cup.(figure 8)



(figure 8)



The coffee belt

Planting: The majority of coffee plantations are in tropical zones of the world, spreading through different countries such as Colombia, Brazil, Vietnam, Indonesia, Mexico, Guatemala, India, Honduras, Peru and Ethiopia. These main players in the production of the cherries (as well as the minor producers that are about 45) are all in an area that has been referred to as “Bean Belt”, to underline the fact that these countries are all in the same belt or geographic stripe. The variety of plants, as well as the temperature, the humidity and the typology of the



Shaded agricultural system (figure 9)

ground and its altitude or the slope of the land have a strong influence on the taste of the final beverage. This all together conforms to the agriculture system, and it varies from farm to farm and to the regions, business model, ground availability and characteristics.

For example coffee farms have either a **shaded or unshaded** agricultural system (see figure below), shaded being rustic, with high plant and animal diversity, in other words preserve best the ecosystem, while unshaded or sun agricultural systems are called that

way because there is not much plant and tree diversity and shade, so the crops are exposed to the direct sunlight and rain.

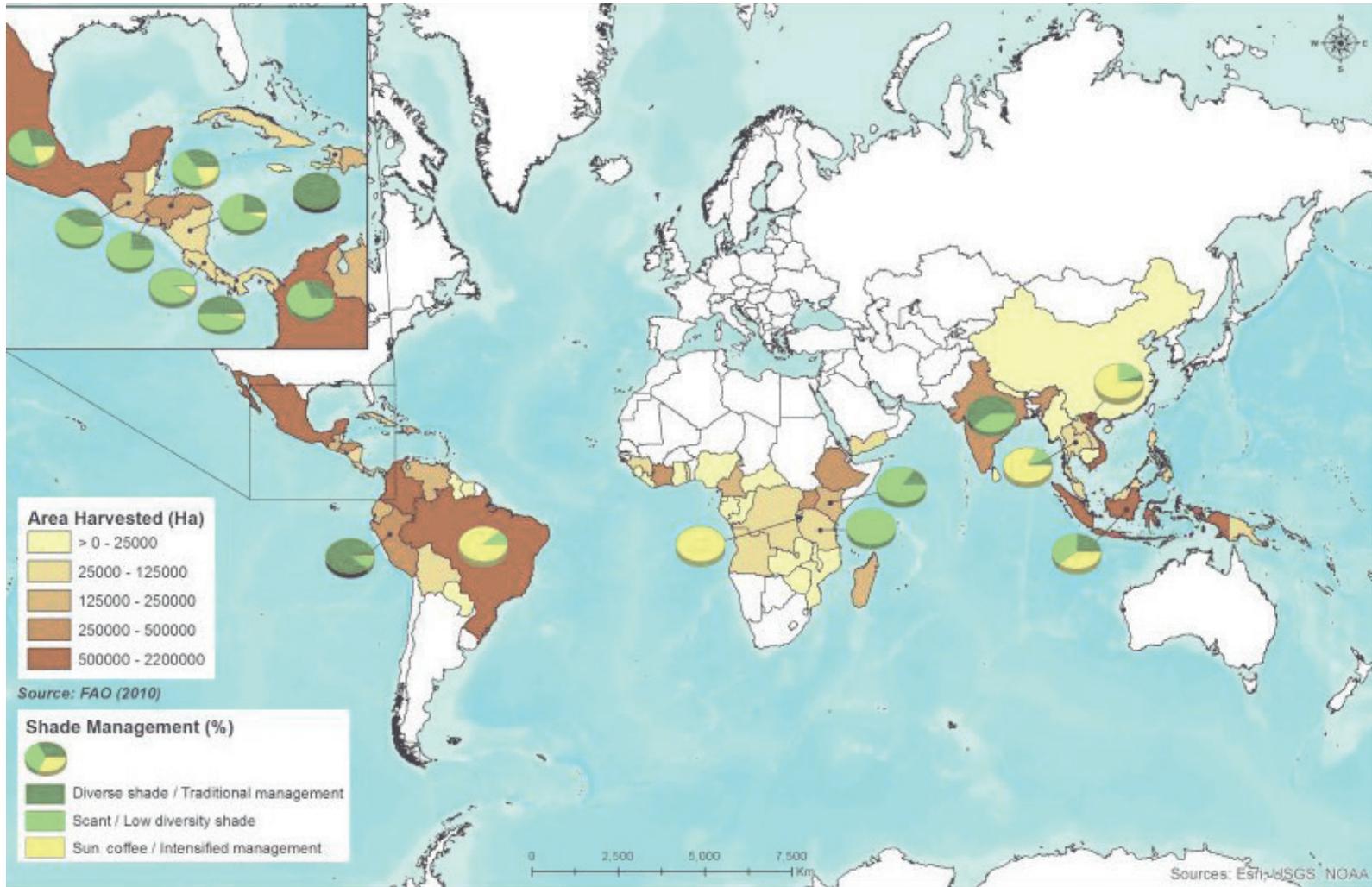
Shaded systems are best for specialty coffees and in general for the sustainability aspects and less use of pesticides (preservation of the soil nutrients, heat regulation, protection of coffee plants, etc) due to its rich biodiversity of birds & bats that consume insects and bore pests that are accountable for huge crop damage, but with the humidity problematic that can cause molding in crops.

Sun agricultural system (figure 10)



On the other hand there are the **sun or unshaded agricultural systems** which are strongly used in African and Asian countries, and are critical to the ecosystem, because they aim for intensification and production efficiency leading to bird extinctions and warming on the areas because of the lack of thermal regulation they have (Monge et al., 2022)

In recent years, there are huge concerns due to the contracting and shrinking of the shaded coffee systems, falling down to 20% since 1996, and it is a very problematic issue because the coffee demand continues to rise and the farmers need to stand the increasing productivity for their livelihoods. (Leahy, 2018)



Percentage of the cultivated coffee and the shade management or agricultural system. FAO (2014) 2010 data set.



The aroma is not only affected by these factors, but also by the quantity of precipitations that occur in the specific countries involved.

The final taste is a result of a very complicated combination of factors that are mostly possible due to the plantations and the coffee origin.

Here we can find a view of how the coffee flavor profiles change according to each producing coffee region. (Del Team Lavazza, n.d.)

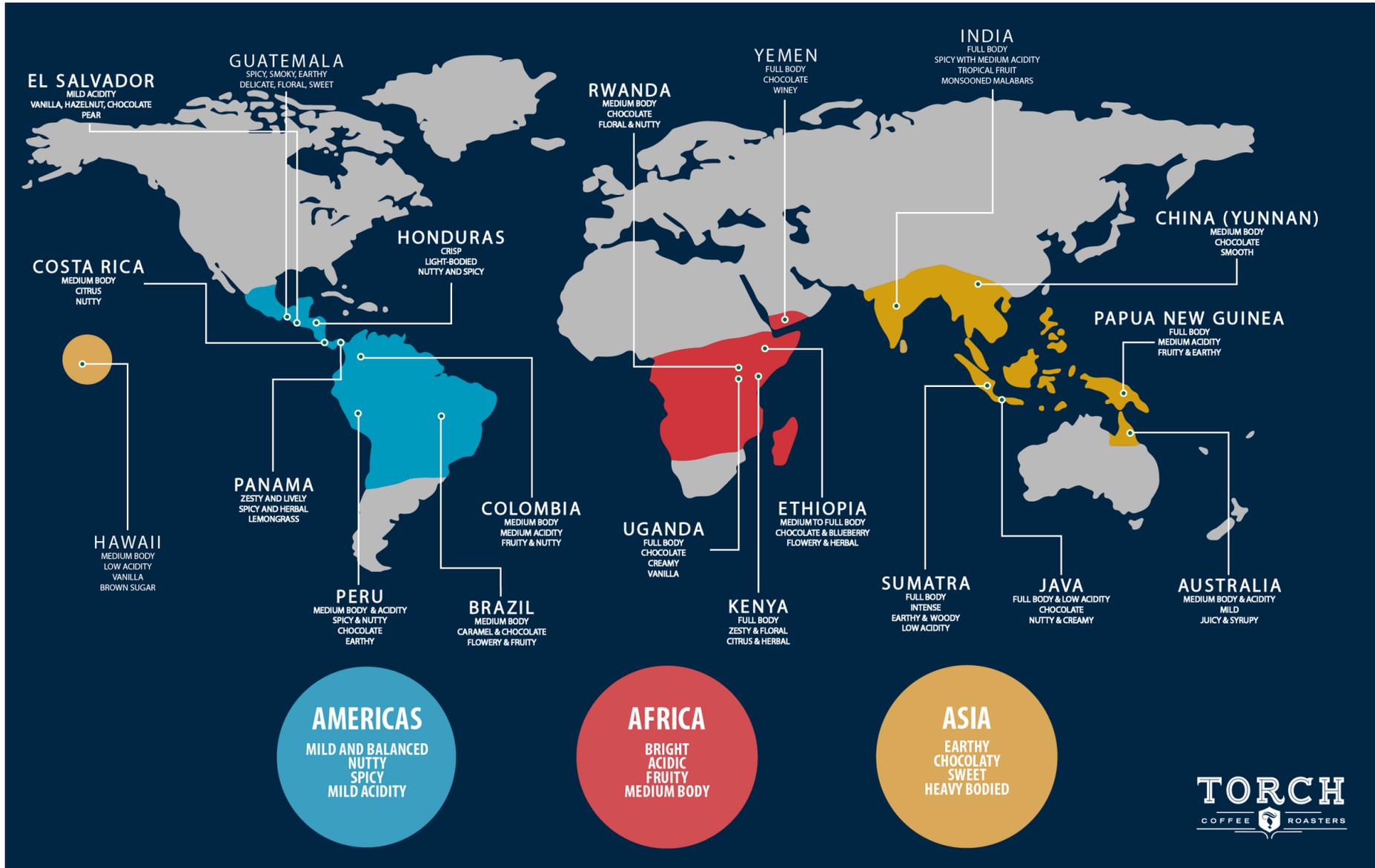


Image source: Torch coffee roasters

Harvesting:

Collecting coffee cherries is extremely important and, even if we have a huge global production that reaches 169.6 million 60 kilogram bags of coffee only in 2020, the majority of the harvesting is still done by hand. This is due to some main reasons that make this solution still the best one.



*Harvesting by hand is called selective picking
Image source: Coffee Affection*

Generally plantations are in fields with an important slope of the land, that doesn't allow the use of machinery that are all very rare, big, heavy and expansive. Also, the cultivations are usually mixed ones and include the production of many other plants (most of the time bananas).

Harvesting machines, that usually are about 4 meters wide, are not able to move across the plants and select only the coffee beans. Lastly, with the hand picking technique there is more control over the cherries, and the farmers can choose the ones that are already red and in full bloom. For coffee plantations in big farming fields it is possible to use machines which can collect up to the equivalent of 150 bags of 60 kg of beans. More recently, some manual tools have been introduced to speed up and facilitate the hand picking, but they don't massively affect the harvesting or the picking time. (Guevara, 2022)

The fact that the majority of countries that produce coffee cherries are developing countries with a very low cost of manpower, doesn't help the transition to an industrial harvesting and "strip picking" remains the most



*Harvesting with machines is known as strip picking.
Image source: Coffee affection*

Processing:

After the harvesting, the next step is the pulping of the coffee bean, and the most used methods to achieve it are, dry, or washed, then honey or semi-washed, and are rarely used the anaerobic, carbonic maceration, giling basah, or kopi process. Image source (Peixoto et al. (2022))

- a) **For the natural or dry process,** the cherries are spread out in thin layers (bricked patios or raised beds for allowing the air flow) and are dried in the sun for around 12-14 days for reducing its moisture percent up to a 15% (Coffee Drying, n.d.) The beans are regularly turned to prevent molding or rotting. Afterwards, the

skin and fruit flesh are removed with machinery and rested. This method is used for achieving a sweet or fruity flavor and to reveal the most flavor, and it is best for farms in countries with water scarcity.

SORTING->DRYING-> FERMENTATION->PULPING

- b) **For the pulped natural or honey processing,** the honey processing is a variation of the pulped natural which was invented in Brazil, and it is an intermediate between the dry and washed process. In the pulp phase just the skin is taken off, its variant is called the “honey” because of the stickiness the coffee bean gets and if the process is done properly

Dry or natural process*Image source: Espresso coffeeguide**Pulped natural or honey processing**Image source: Espresso coffeeguide*

it can get a brownish sugar. The difference is the amount of flesh left in the pulping phase in which some of the cherry flesh is left behind for the drying phase, and the sugars of the cherry give more sweetness and body to the beans. There are 4 types of honey process, black, red, yellow and white, and they relate to how much of the coffee cherry is left after the pulping phase. The process is used constantly in Central America too, and it is a bit expensive and has a water footprint, but definitely gives a balanced flavor and body.

SORTING->PULPING->DRYING->FERMENTATION->HULLING

Ⓒ **For the washing process**, the pulping is done mechanically, and the beans are water sorted by size and density, then the fermentation occurs in water tanks, depending on the climate around they are left from 24-72 hrs (if hotter the weather less the time spent in the tank and viceversa for cold weather). Next, the lot is washed through running canals to remove any leftover material, then placed in raised beds or patio bricks and then sun dried or mechanically dried for 6-7 days. This method is commonly used for specialty coffee, because it assures consistency, brighter, a little acidity, and pleasant flavors. Nevertheless it is a less sustainable process in comparison with the dry method,

because it uses 40L to 45L of water for each kilogram of green coffee (Alemayehu et al., 2019). Countries like Ethiopia are recognized for its extended use of washed technique.
SORTING->PULPING->FERMENTATION->WASHING->DRYING

Ⓓ For the **semi-washed process**, the coffee cherry is pulped to remove the external skin but the mucilage is left, and then the beans are fermented in water tanks, and then the mucilage is removed and dried for 8-9 days. The flavor profile obtained is still bright but less acid. It is highly used in Brasil. (Chief, 2023)
SORTING->PULPING->FERMENTATION->HULLING->DRYING

Washing method



Image source: Clipsandsons

Semi-washed method



Image source: Helena coffee

Other processes like the **anaerobic process**, is similar to the washed, but fermentation is done in oxygen less tanks.

Carbonic maceration: Similar to the anaerobic but the cherry flesh is left, so all the flavors remain and are impregnated in the bean. The resulting flavors are whiny, whisky like, banana, etc.

Giling Basah process: it is similar to the honey, but in the drying phase the moisture level arrives to a 35% and then all the parchment is taken away for then a complete naked been drying.(Coffee Processing Methods – Drying, Washing or Honey?, n.d.)

Rest: The coffee beans are preserved in dry tanks for 1 or 2 months, and thanks to the dried process they won't mold easily.

Hulling/Cupping: Beans have to pass through controls of impurities, and classified (in size, color) through a dry mill the parchment is then removed, then beans are sorted out and graded mechanically, in specialty processes they are frequently cupped into the grades. (Cómo Se Procesa El Café: Del Cafeto a La Cafetera, 2022).

In some cases pulped coffee beans are sent to local millers or washing stations (Dry mills are either from private property or from farmer

cooperative, in Africa for example, where they farms are in very isolated areas)

Countries part of the members of the International Coffee Organization (2018) producers and some importing countries, have replied with their national quality standards for coffee for green coffee that is ready to export, and created this general criteria in the journal

Grading and classification of green coffee FAO, (n.d., p. 1):

- Altitude
- Region
- Botanical type
- Preparation (wet or dry process; washed or natural)

- Bean size
- Bean shape or color (most common criteria stated by the countries)
- **Number of defects**
- Roast appearance and cup quality (flavor, characteristics, cleanliness)
- Bean density.”



Image source: Mabelle house

Packaging/Transport: The coffee is then classified according to their defects in 60 kg-69 kg sacks, and sent in containers to the consumer/ processing countries. Generally the transport times are long, including land and transoceanic shipping.



Image source: Burlap Coffee Sack, (n.d.)



Roasting and milling: When the beans arrive at roasters, they are now ready for the roasting phase, and according to the blend profile of the lot, they can mix green coffee beans with different and desired characteristics (see table 1) where they overcome a toasting process in specialized machinery, and are heated up from 366°F up to 482°F depending on the type of roast desired. Often, for achieving sweet accents, the beans are toasted with glucose syrup. Not all the green coffee beans go roasting, so those lots are then stored in 12°C cold rooms to keep their freshness. The same thing happens when they finish the roasting phase. On the other hand, specialty coffee

roasteries repeatedly work on getting their Q-Grader certificates, which are a tool for trading and understanding quality that buyers and also sellers understand, it works on a 1 to 100 basis and holds certificates for Q Arabica and Q Robusta. (Q Graders, n.d.) Lets remind that ulterior to the ground or whole roasted coffee, there are other fundamental processes, when doing instant coffee, decaffeinated or pods / capsules.

Decomposing a blend profile

An example of blend coffee is the Illy-Arabica Selection-Brasile, which has intense caramel notes.

Etopia: 3/9 floral notes
 Colombia: 4/9 fruit notes

Brasil: 5/9 caramel notes
 Guatemala: 6/9 chocolate notes
 India: 8/9 spice notes



Image source: Own source

Type of roasting	Light roast	Medium roast (house blend, breakfast roast, american roast)	Medium-Dark roast (light espresso, light french, full city coffee)	Dark roast (french, espresso, turkish, italian, dark french, heavy)
Roasting time (variable to the roasting profiles)	5-10 minutes	10-12 minutes	12-14 minutes	12-15 minutes
Temperature	180°C-205°C	210°C-220°	220°C-225°C	240°C-250°C
Caffeine amount	++++Higher caffeine (by volume)	+++	++	Lower caffeine
Color	Light brown	Medium brown		Dark brown
Flavor	Original flavors are most recognizable Obtaining a high acidity, with a floral, fluity taste.	Considered to have balanced flavors Nutty or chocolate flavors with still some of the fruit or floral notes left.	Sweet, caramelized, still acid and bitterness.	Can't taste origin flavors, just the roasting effects on the bean. It has a sweet taste because the sugars have time to caramelize, and a buttery feel. Smoky& hearty
Body	+Less body	++Medium	+++Medium-full	++++full body
Consumed places	England	Average coffee of americans	Popular in Europe, Vienna	Popular in Europe
Brewing method	Used for drip, Espresso, and pour over (accenting methods) An addition of milk can enhance flavors	Most flexible for brewing methods. An addition of milk can enhance flavors	Most flexible for brewing methods, and ideal for cappuccinos, lattes	Suitable for french press and espresso

On the right: table1. General Roasting profiles (Dmcoffee, 2023)



Image source: Café Quindío

Packaging: Arriving at the last steps of the coffee supply chain, the roasted coffee beans are then packaged in lb or kg for the final users, and it is primarily that they have good preservation systems so the shelf life is guaranteed and prolonged.



The coffee valve in packages allows carbon dioxide to go out while avoiding oxygen to get in. It increased freshness up to 6 weeks (Michelli,2009)

The coffee attributes, and processing methods, and certifications are included in the packaging. The Coffee Flavour Wheel by the Specialty Coffee Association, provides the correct adjectives and vocabulary for the users to understand what they are buying.



Image source: Supremo.be

Distribution: The packaged coffee is then distributed to the retail network, and when the processing is done in the consuming countries, the transport is mainly done through camions.



Image source: Didmynails

Retail: Comprises B2B (Business to Business) like coffee shops, bars, restaurants, distribution centers, and B2C (business to consumers) such as retail stores, supermarkets, or directly to the client place when using e-commerce. The global retail coffee had an \$83 billion revenue in 2018, and by nation wide amount Us and Brazil are the largest consumers of coffee, while Europe retains the first places in coffee consumption per capita. (Voora et al., 2019)



Image source: Just for guide

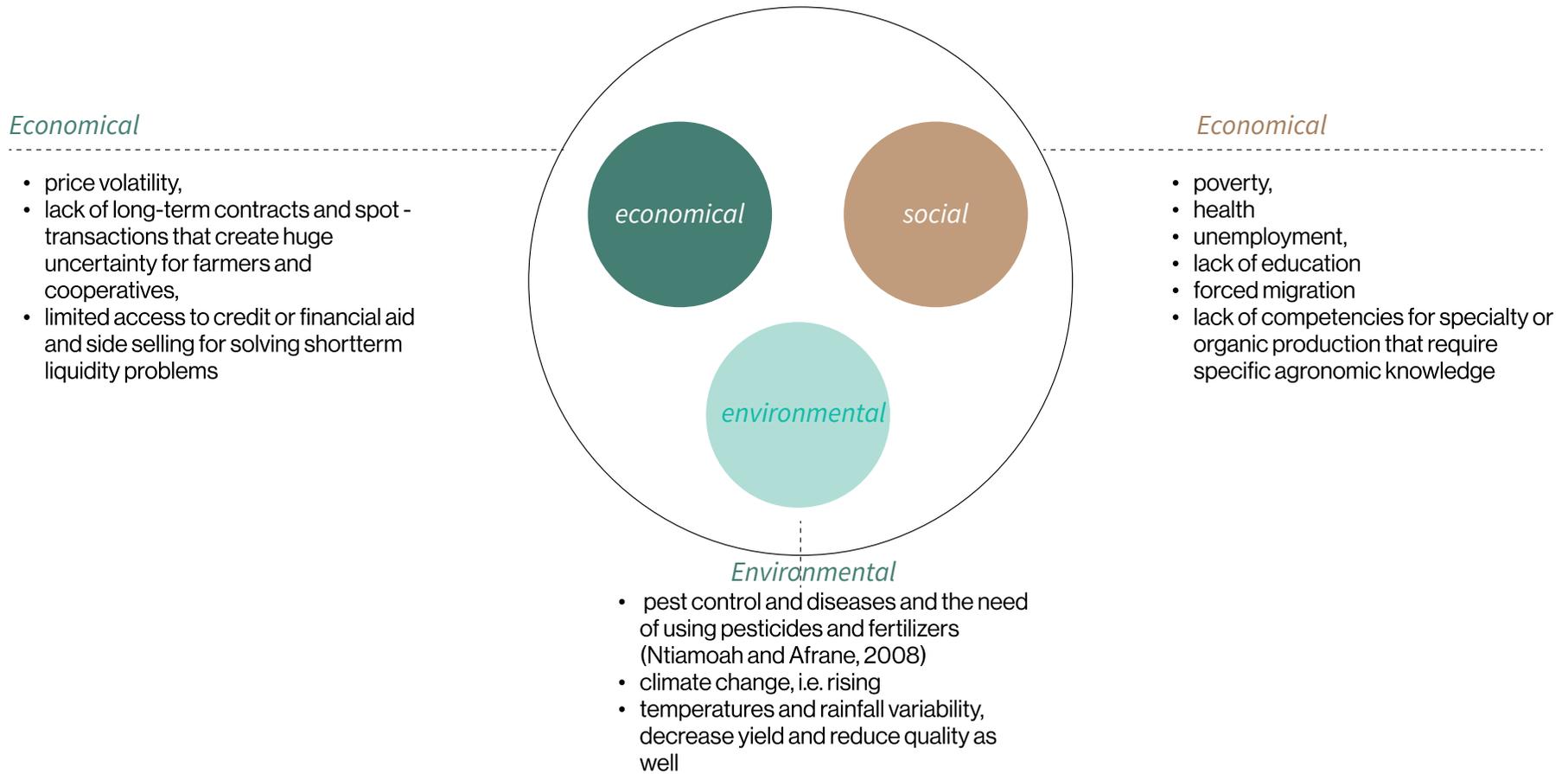
Consumption: Even though many of the coffee supply chain diagrams don't exactly contemplate consumption at the end, there is a particular interest for analyzing it, specially when in the retail phase the product is acquired using e-commerce or at a retail store, and is then stored inhouse and consumed later with particular brewing methods.

Sustainability

Sustainability includes 3 main goals, environmental quality, economic prosperity, social equity, and all together to ensure the well-being of current and future generations. Regarding **environmental quality**, it considers environmental preservation and efficient use of resources and energy. **Social equity** talks about favoring the human condition and the jobs they do. Finally, the **economic dimension** aims at maintaining and improving the economy. (Kirchherr et al., 2017) When we talk about sustainability at the level of the coffee industry, we must understand the significant sustainability challenges the coffee supply chain faces (see figure below) from environmental

concerns like **deforestation for intensive coffee farming which destroys ecosystems**, reduction of biodiversity, soil, etc. Also the intensive cultivation and farms that process coffee with the washing processing methods could increase water scarcity locally, and also pollute the water bodies due to the pesticides and residual water. These impacts contribute (not only) to climate change, which hurts the coffee crops and quality, and affects long-term viability in the planted lands. Furthermore it is predicted that for 2050 the arabica's production will decrease due to warmer temperatures. All of this is then related to the rising production costs that are

directly covered by coffee farmers (sometimes cooperatives), leaving them in inequality, vulnerability, poverty and uncertainty and here is when the social and economic areas connect. As mentioned before in the section "A panoramic of the global coffee industry" an estimated **44% of the coffee farmers are in poverty and they are generally smallholder farms**, and it's not only an effect of the mentioned reasons but also because of the insufficient wages. In the paper, "*Effects of on-farm diversification strategies on smallholder coffee farmer food security and income sufficiency in Chiapas, Mexico Anderzén*", 71.0% of the farmers who participated in the study and lived in Chiapas, suffered



(figure 11)



1-2.5 months of food scarcity in between crops, and some even 8 months, and what those farmers had in similar was the lack of crop diversification and diverse incomes. (Anderzén et al., 2020). According to The Borgen Project (2020), in Guatemala farmers make roughly \$3 dollars per day and when harvesting season arrives, child labor increases. The U.S Department of Labor reports “an estimated 34,131 children laborers growing coffee in Vietnam, 12,526 of which are under the age of 15, and 5,000 children under 14 working on coffee

plantations in Brazil, often without a contract or protective equipment” The Borgen Project (2020) Another huge issue to take into consideration is the commercial (sometimes also specialty) coffee as a commodity, and when being a commodity they are subject to prices and the volatility of the stock exchange, so following the market demands if there, let’s say an overproduction globally the prices will drop, and viceversa, for instance the Brazil’s drought in the 2021 caused almost 60 cent raise in the commodity price (as they take great part of the coffee

production worldwide) (Evans, 2021)

There are multiple ways in which the reviewed sustainability issues have been partially tackled, such as initiatives and certifications labels, among which Fair Trade, Rainforest Alliance, Organic. They all have in common the creation of new frameworks for the coffee supply chain that promotes environmentally and socially friendly practices, emphasizing in the fair wages obtention, better working conditions for the most vulnerable actors in

the chain, and the promotion of traceability and transparency of activities and resources implied in the processes. This all works for enabling consumers to be more informed and support sustainable practices.

Certification schemes

Like the most important global industries, coffee production and processing is going through a lot of changes to adopt a more sustainable approach in its processes. One of the most important is to go through a

certification scheme, to allow the consumers and the audience to know about the origin and the paths of the product, with different standards of coffee and that can create a picture of the quality of the final product. One of the most known is the “**Rainforest Alliance/UTZ**” one. This name started being used in 2018, when Rainforest Alliance and UTZ merged together. Their activity started in 2020 and their goal was to offer mutual recognition options for coffee worldwide. The companies that produce coffee beans and powder

are able to obtain this double certification of standards, for the full process. (The European Market Potential for Certified Coffee | CBI, 2021) The Rainforest Alliance/UTZ assures standards of sustainability that regard: forest protection and not abusing of restricted cultivation areas, promotion of climate-smart farming techniques in order to reduce emissions and wastes, assuring human rights and sustainable living conditions for the farmers and the workers that process the coffee beans, a very serious issue for the economy



and the social environment of emerging countries that as we said, are the biggest producers of the beverage. The Rainforest Alliance/ UTZ cooperates and gives its standard control to small and big producers and nowadays, even if it is a very recent association, is an internationally recognized label of sustainability in the global coffee market.

Another important label is the **"Fairtrade" one**. This is a worldwide recognized standard certification that aims to assure social and environmental standards of production. The Fairtrade sigil is given to small-scale producers and as well to organizations that employ man labor on an estate. The

FLO, or Fairtrade International, is currently the only organization that can provide a legitimate certification of a healthy procedure in coffee production. They make sure that workers get a minimum salary according to the law and the relative country regulations in the job field. A Fairtrade Premium Table has been created for the specific purpose to set the actual minimum amount of prices for certified organic, premium or mainstream coffee qualities, according to their peculiar typologies. (The European Market Potential for Certified Coffee | CBI, 2021)

Certifications of **organic products** have the function to define both soil quality and treatment and its ecosystem and the involved people's health. To obtain this label, the production has to assure the lack of synthetic nutrients during the growth of the plants and the important requirement of adopting methods and practices for plant protection and soil conservation.

A coffee synthesis



In this chapter, all the information previously collected is condensed and synthesized in order to analyze and highlight the fundamental factors and aspects at the level of the global coffee production chain, identifying and defining the most important and direct stakeholders. Afterwards an analysis of the system and global situation is generated through the SWOT matrix in a particular way on each stakeholder to identify which are the endogenous and exogenous factors of the system that are in respective order the strengths, weaknesses, opportunities and threats. Continuing with the creation of a new methodological tool for the analysis and visualization of

relationships between stakeholders that integrates the previous identification of stakeholders and the SWOT matrix, which will serve as a tool for the subsequent development of the research project.

Global supply & value chain

The global coffee industry contemplates an intricate network which encompasses multiple relationships, territories, stakeholders, input resources, processes and activities, and outputs. All along, starting with the coffee production, then distribution, and ending with the consumption, there is a constant flow of inputs that

go through transformation activities, and then become outputs, and all of this becomes part of an analysis and diagnosis. There is an immeasurable quantity of all the inputs, activities and outputs in the supply chain, but in this global analysis we have tried to include the greatest number of them.

By inputs we intend any resource, data, information, signal, that is inserted into the system, and is used or contributes to any step on the supply chain, focusing on the whole coffee process, inputs consider soil, water, planting materials, agricultural tools, farm machinery, human labor, roasting machines, packaging, ceramic cups, etc.

For transformation activities and processes we refer to the different stages, phases, or sub-activities that lead to the realization of a cup of coffee, starting from the planning and planting of the coffee plants, to the final consumption when the coffee is prepared by a retailer or consumer.

The outputs of the supply chain allude to the result, product, service, information, wastes, generated within or at the end of the operations and processes, and they can be tangible or intangible.

The outputs of the system are generally coffee beans, processed coffee products (green coffee, roasted coffee, ground coffee, instant coffee, decaffeinated coffee,

etc.), packaged coffee ready for distributors, beverage products, coffee grounds, wastewater, husks, and relevant information or data.

Stakeholder identification

The coffee supply chain not only requires multiple resources but also effort, activities, and multiple stakeholders to transport coffee beans from fields to consumers around the globe. These actors are essential to the process because they make sure that coffee is produced, distributed, and consumed. We could categorize the actual stakeholders by role they

have in the productive process in:

Actors from coffee production

Actors from coffee processing

Actors from coffee trading

Actors from coffee consumption

Supporting actors

Hereafter is a quick rundown of the major and more direct stakeholders in the coffee supply chain, they are identified and analyzed, with their roles, needs, thoughts, and challenges they face.



COFFEE FARMERS

Actor from coffee production

Recognized actors: Finca El Puente, El Obraje Coffee Farm, Selva Negra, Fazenda Rio verde

Role/description: In charge of the most fundamental step of the coffee process, the planting, farming, harvesting and even processing of the beans. The Fair Trade organization estimates that 80% of the total coffee production is held by 25 million coffee farmers, and 125 million people have coffee as part of their livelihoods. (The Fairtrade Foundation, 2023)

Challenges/needs & interests:

- Economic aspects can be more important than environmental ones.
- Need to address issues such as adequate prices, climate change and migration.
- Finding international buyers is hard
- Don't achieve enough volumes for direct trade
- Processing, marketing and further negotiation tasks are difficult to execute for them
- Making part of a cooperative can help them increase their revenue and access to new markets

“Paying farmers better prices and buying directly from farmers can be the most important alternatives for the coffee industry to improve the sustainability of farming” Zamora (2023)



Image source: *Humanosphere*

COOPERATIVES

Supporting actor & coffee processing & trading

Recognized actors: Cooxupe, Just coffee cooperative, coop coffees

Role/description: coffee producer organizations or associations that directly help coffee farmers by buying off their coffee production and then distribution to middlemen/roasters, helping with price negotiation. They can act as a mediator or intermediate, most of the time non-profit and are key to regulating the trade, thanks to their formalities, technical and market knowledge, access to

platforms (blockchain, databases, online auctions). An example of a cooperative level database is Dimitra, which is a connected one and helps with the diffusion of methods to raise productivity and business profitability, also real time and track in which collection of items and lot control is done, so tracking and qualitative data is available from farm to distribution, lastly it is thought for being used by various stakeholders. In addition, they frequently give farmers access to low pay-rate credits, pesticides, valuable information, capability building, have buying points close to the farmers area, and often they own dry mills for the hulling and sorting process of pulped coffee beans

(when coffee farmers do not have dry mill stations).(Cafealtura, 2021)

Challenges/needs & interests:

- Recording information
- Establishment of commercial network. -Negotiate best deals and create direct trade networks between smallholders and third wave roasters. -Improve life and social aspects of the farmers.
- Avoid losing freshness -Fluctuating prices -Covering material and administrative costs when being a non-profit. *“The cooperative can connect producers of high-quality coffee to interested third wave roasters so that the producer and roaster can begin their own direct trade relationship”*Petrich (2022)





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Image source: PCC – Paisaje Cultural Cafetero., (n.d.)

MIDDLEMEN/TRADERS

Actor for coffee trading

Recognized actors: Neuman Kaffee Gruppe, Ecom, Olam, Volcaf

Role/description: They are the bridge for the coffee farmers/ cooperatives and roasters, in charge of the logistic operations including management of the transporting of coffee shipments and/or supervising their journey from producing to consuming/ processing countries. Sometimes they also invest in dry mills so they can perform the hulling and cupping phase of the pulped coffee.

Challenges/needs & interests:

- Facing increased hidden costs, leakage of confidential data, control loss or mismanagement in operations, lack of customer info and communication, difficulty to fulfill expectations, direct trade.
- Critical success factors: for third parties are the effective inventory management, a trustworthy transportation system, live information sharing, strategic facilities, and having price strategies. (Shanker et al., 2021)

“We are compromised with delivering great, certified, and traceable, green coffees to your doorstep from multiple origins” Trabocca (2021)



Image source: Van Asseldonk (2016)

ROASTERS

Actor for coffee processing & also trading or retail

Recognized actors: Nestlé, JDE Peets, Starbucks

Role/description: Their duties include roasting the green coffee beans, performing any additional processing (such grinding or other operations), packaging the coffee in 1 pound or 1 kilogram format, and selling it through online subscriptions, wholesale, customers or retailers. In some cases, when following up to the 3rd wave, they open their own coffee bars/shops.

Challenges/needs & interests:

- The unstandardized product quality, along with unpredicted product availability, and unorganized middlemen are challenges they have to face.
- Equipment require a lot of energy and technical improvements/high equipment can be the difference
- Affected by the volatile product price
- Risk of getting low quality products if the green or roasted lose freshness or do not count with the expected organoleptic traits. (Umaran, T., Perdana, et al 2022).

“For us a problematic is the unstandardised green beans quality and the uncertainty of supply origin/quality brought by different middlemen” Umaran, T., Perdana, et al (2022)



Image source: Better Coffee At Home (2017)

RETAILERS

Actor from coffee consumption & trade

Recognized actors: Starbucks, Tim Hortons, Dunkin, Dutch Bros, McCafé, Costa coffee, Lavazza

Role/description: Retailers are in charge of selling the coffee (ready to consume or packaged) directly to the customer B2B(restaurants, coffee bars) or B2C(retail coffee shops, coffee drive thru, supermarkets) they do so through physical channels, or also e-commerce platforms mainly of their own. They cover many activities, from logistics, inventory

management, marketing, and if they are coffee shops or bars, they also incur in machine maintenance, facility management, brewing, and client service. They also tend to have a big employee base such as baristas, sales employees, operations managers, inventory employees, etc

Challenges/needs & interests:

- High power of negotiation due to the amount of providers/options for buying coffee
- Small retailers suffer of lack of network and information
- They are very attentive to packaging and brand's communication at every aspect (Umaran, 2022).



Image source: Nast, (n.d.)

CONSUMERS

Actor from coffee consumption

Role/description: Consumers are key and the most indirectly influential stakeholder of the coffee supply chain, they purchase the coffee products ready to drink or for home preparation. Consumers drink coffee in different contexts and ways, for instance, by location (closeness at home, workplace, or bar) by lifestyle (connoisseurs, enjoying), occasion (after each food, specially breakfast and lunch), socializing (with friends or family, meet new people). (Samoggia, & Riedel, 2018)

Challenges/needs & interests:

- Motives that definitely influence the purchase: "Taste, product design, ambiance, brand influence, location accessibility, and price" Himawan (2020)
- Value blends
- Price rise is a threat to purchase
- Aware of news, new technologies, innovations, and experiences
- Guided tasting sessions and information about coffee (such as caffeine intake) are relevant for their purchase behaviour (Berni et al., 2023)

- Preferred channels for purchase: USA 2019 (Statista, 2020)
 - Supermarket 67%
 - Discount supermarket 19%
 - Online 14%
 - Coffee chain 13%
 - department stores 10%
 - Coffee roastery/specialty shop 9%



Image source: Lane, (2021)



Image source: 9 Coffee Makers to Help You Brew the Perfect Cup of Joe at Home (2022)

GOVERNMENT

Supporting actor & sometimes trading

Role/description: For the government stakeholder we englobe partially institutions, and their role is act as an agent, and regulate indirectly the sale and production of coffee, developing activities like tax management, duty to imports, policies creator (can ban harmful chemicals of pesticides used, and engage in international agreements for commercial exceptions and special treaties. In some countries, for instance the case of Ethiopia, they perform the buyer role,

purchasing the coffee directly from producers or cooperatives and then sell it in auctions. (Super_Admin, 2018) Likewise in Colombia, there is a very important institution named Federación Nacional de Cafeteros that act as almost a government figure, and offer purchasing guaranties to cooperatives and farmers, selling to international markets, strengthening the origin denomination, innovation and technologies promotion, always ensuring high quality standards.

Challenges/needs & interests:

- Difficulty in regulating and monitoring the local industry
- Territorial disconnection and accessibility challenges

- Import taxes and price misregulation can lead into economic problems

National Coffee Association is committed to being the voice of coffee's future and the future of coffee's voice. Whether tackling global challenges like climate change, improving farmer livelihoods, or fighting for coffee in the halls of Congress, NCA has got coffee's back. (Coffee and Health | National Coffee Association, n.d.)



Image source: Parliament of Colombia

SWOT analysis

After analyzing the global coffee production chain in depth, we now turn to the “SWOT” methodology or instrument, a strategic planning tool used to understand and evaluate the internal and external factors that affect a specific organization or situation. The acronym “SWOT” stands for Strengths, Weaknesses, Opportunities and Threats, and is frequently used in the fields of business, project planning and development, marketing, design, among other disciplines, in order to achieve an understanding and breakdown of a particular scenario.

Each of the factors explained are discussed below:

Strengths: This factor comprises the capabilities, positive attributes, advantages and strengths of the organization or situation, everything in which it is valuable, skills, valuable assets, etc. Recognizing the above allows us to use it in favor to enhance competitive advantages.

Weaknesses: These are the opposite of strengths, and it is key to detect weaknesses in order to discover internal limitations and room for improvement within what has been analyzed. They are

generally aspects in which there are difficulties in the performance of activities, structures, materiality. Listing the weaknesses certainly allows later the planning of strategies and development to solve or minimize them.

Opportunities: These are considered external factors that present something advantageous for the organization or situation, for example, market trends, technological advances and innovations, changes in consumer habits, or blue markets would be considered opportunities.

Threats: Threats are thought of as something that could affect, negatively impact, or challenge the current or future dynamics of the organization or situation. It is vital to identify what they are in order to prepare for risks and mitigate impacts. After a complete identification of all the above factors, we proceed to compile them in a more visual way in a matrix, usually with 4 separate squares, and ideally to make the analysis more complete is to find relationships between the factors.(Raeburn, 2023)

The SWOT analysis was performed focusing on the stakeholders at a general level, and was done for each one of them, in order to obtain accurate and relevant information to characterize the strengths and weaknesses of each one and the potential threats and/or opportunities of interest to them. The most relevant and recurring factors of the matrix are summed up in the following tables corresponding to each stakeholder:

Stakeholders : Coffee farmers

Strengths

Coffee farmers have positive impacts in the surrounding territories, they are like motors for the economies.

Most smallholder farms keep the business in the family, resulting in huge tradition and experience knowledge transfer. Also, farmers with a shade coffee system often have beneficial diversification incomes (fruits, vegetables, beekeeping) and it is beneficial for their crops' resistance (birds and bats help eat some pests). Finally, coffee farmers who don't have much area for cultivating, dedicate themselves to the specialty sector and can double or even more in earnings per their production.

Weakness

More than 40% of the coffee farmers face poverty and 22% extreme poverty, with low incomes and consistent incomes.

Coffee farmers rely heavily in exporting their coffee production, as they do not count with the tools, specific knowledge, formation, and economic resources to plan in advance new ways of capturing value such as diversification (beekeeping which is often considered as an economical advantage) so they do not heavily depend on an income between harvests (can be very long, and cause food insecurity), or the lack of addition value when outsourcing the hulling or roasting phases, which specially the last one can guarantee more than three times their actual margin obtained.

In the supply chain there are economic imbalances in which producers receive just around 6% of the sold ground coffee.

Also, the farmers face challenges in terms of quality assessment, use of new technologies, and access to information that could give them more power to evolve and negotiate.

Let's not forget about one of the most problematic challenges, the weather and climate change huge impact on production costs, soil fertility, and damage of crops, furthermore pests diseases and fungi (such as la roya) can cause million dollar damages, and these impacts are generally at the farmers expense, which further weakens their position and power. In addition, farms with sun farming systems destroy the ecosystem and increase the vulnerability of the terrain.

These actors are mostly isolated and disconnected in the supply chain, their role finishes when the production is bought, and they do not have contact with their final consumers.

The coffee business faces a number of interrelated obstacles that severely reduce its operational effectiveness. The fluctuations in coffee prices create uncertainty and threaten the stability of the market especially for cooperatives that purchase coffee farmers production for selling.

Moreover, insufficient transportation infrastructure and inadequate channels of communication with coffee farmers impede easy logistical operations and reduce productive involvement.

For non-profit cooperatives, the financial environment is still difficult since they often struggle to cover fixed costs, which puts a strain on their long-term viability.

Furthermore, as Poole & Donovan's 2014 study emphasizes, coordination within cooperatives is challenging, particularly when it comes to communication and logistical tasks like tracking and container delivery.

Opportunities

There are multiple ways to encourage the coffee industry evolution, such as initiatives that favor local networks for coffee processing and micro roasting (specialty coffee) like private labeling for coffee farmers who want to take further action in the supply chain and obtain more value, especially in countries with emerging markets (like Brazil) and with specialty traders or buyers. Coffee is like wine, it has flavor bouquets and changes according to multiple factors, from the plant variety, processing, roasting and brewing. It can be very flexible for new explorations and product innovations, therefore farmers have multiple options to differentiate their products and add value (single farm, single origin, special processing, etc)

On the other hand, climate change will severely impact the arabica's production by 2050, so efforts in seed processing innovation aim to enhance robusta's organoleptic characteristics by the hand of the exploration of rare coffee varieties such as *Coffea Stenophylla* which possesses arabica-like qualities with the advantage of higher resilience to warmer temperature. To combat crop damage at an initial phase there are banks with resilient seeds, and techniques to prevent this can be disseminated through cooperatives or programs, and in the case the damage results inevitably the exploration of alternative uses for lower grade coffee, such as animal feed, fuel or mulch should be considered. Also, diversification activities should be prioritized, in the crop system contemplating fruits, beekeeping, vegetables, and other commodities with less volatile prices and similar processes such as cacao or tea.

Often quality and best practices adoption represent challenges, and for assuring quality control, defect detection systems prior to the selling can help with establishing enduring contracts and relations. Furthermore, aiming for technological integration, like blockchain and AI for improving traceability and quality verification along with strategic marketing can offer the farmers product differentiation.

Farmers need different types of investments and stable incomes, for short, mid and long term activities, and platforms like NKG Bloom, cooperatives and government initiatives can help them. Thus, adhering to certification schemes (Fairtrade, Organic, Rainforest) may be costly at the start but then produce results.

Coffee farmers alone are the weakest stakeholders in the coffee chain (even though they have the most fundamental role), and they should definitely collaborate with cooperatives or associations for a small period or fixed one, to ensure capacity building in on-farm and off farm activities (such as business model or marketing), exchange practices knowledge, and access to new markets, buyers and networks. Finally, farmers could profit from merging their industry with the tourism or gastronomy sector, taking as a reference the Colombian region "Eje cafetero" highly recognized for the tourism plans on exploring coffee farms and having a unique coffee tasting experience.

Threats

Climate change threatens the Arabica production with forecasts indicating a huge reduction by 2050. Pest diseases and unpredictability of the weather patterns can cause enormous crop damage (as the Central America \$1 billion dollar crisis). Also, mishandling in the process can compromise freshness, produce coffee molding etc.

On the other hand, middlemen or traders often pressure for lower prices and impede farmers to secure higher margins. These market dynamics often worsen with overproduction, when there are picks in coffee production the prices and profits decline. The supply chain is extensive and the huge amount of intermediaries hampers a better economic distribution. Maintaining coffee quality can be unpredictable, making it tough to uphold quality standards and certifications consistently.

The prices of commercial coffee and specialty indicators tend to fluctuate a lot, adding uncertainty to the market. On the other hand climate changes present a crisis for farmers, affecting their ability to produce coffee. Limited finances and resources pose challenges, making it hard to stay stable and sustain ongoing initiatives in the industry.

Stakeholders : Cooperatives

Strengths

In supporting coffee farmers and enhancing their production, various strategies and avenues have emerged.

Buying options tailored to assist coffee farmers, as noted by Balgah (2018), offer avenues for support.

Local alliances forged directly with coffee farmers, emphasizing empowerment and support in various activities, have been championed by Wollni & Zeller (2007).

The significance of territorial proximity to coffee farms facilitates closer engagement and collaboration. Cooperatives, as stated by Wollni & Zeller (2007), serve as hubs for sharing skills, information, and extending small credits, nurturing community-driven support. Accessing and utilizing technology and digital platforms, such as blockchain and databases (Kollmann et al., 2019), not only ease transactions but are increasingly favored by traders and roasters for ordering and striking deals, as observed by Oakley (2023). Additionally, these connections streamline interactions with institutions and governmental bodies, exemplified by the National Federation of Coffee Growers, fostering easier access to resources and support. The presence of facilities like cupping labs, enabling coffee tasting and quality profiling, further contributes to enhancing the overall coffee production process (Which Trends Offer Opportunities or Risks in the European Coffee Market? | CBI, 2022a).

Weakness

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Threats

Maintaining coffee quality can be unpredictable, making it tough to uphold quality standards and certifications consistently.

The prices of commercial coffee and specialty indicators tend to fluctuate a lot, adding uncertainty to the market. On the other hand climate changes present a crisis for farmers, affecting their ability to produce coffee. Limited finances and resources pose challenges, making it hard to stay stable and sustain ongoing initiatives in the industry.

Stakeholders : Traders

Strengths

Middlemen or traders have a high understanding and handling the rules for importing and exporting coffee, as highlighted by Shanker et al. in 2021, which is essential.

They also possess rich networks of various coffee providers which gives them more bargaining power. Additionally, they have systems and technologies in place to ensure the best preservation and transportation of their products.

Weakness

Prolonged travel time to reach farmers and distribution centers adds complexity and delays.

Furthermore, the lack of efficient transmission of crucial market information, including prices, trends, and product requirements, as noted by Umaran et al. in 2022, hampers informed decision-making and planning for farmers.

Sometimes, the unorganized and poorly coordinated middlemen face logistical challenges, while weak relationships between traders and coffee farmers furtherly disrupt smooth operations, affecting mutual benefits.

Although insulators and absorbing gels within shipping containers aid in preserving coffee quality, they are costly and not entirely effective against fungi and insects, as detailed in the article "5 Post-harvest Challenges of Specialty Coffee Roasters." Additionally, implementing tracking systems for documenting the coffee's journey, while beneficial, presents another financial obstacle.



Opportunities

Sharing market information through various methods to all involved parties is crucial for strengthening programmes or new project developments. Investing in coffee farms, as suggested by the International Coffee Organization in 2019, ensures better monitoring and management.

Collective trading initiatives, as highlighted by Umaran et al. in 2022, enhance both capital and marketing strategies for middlemen and farmers.

Additionally, disseminating market information regarding required quality and specific products aids in aligning production with market demands, supporting a more efficient and responsive industry.

Threats

The availability of products can sometimes be unpredictable, as highlighted by Umaran et al. in 2021. Similarly, unexpected variations in coffee quality, noted by Shanker et al. in 2021, can affect the market and relationships with roasters. The fluctuating prices of products add to the uncertainty.

Tight distribution schedules pose additional challenges, impacting delivery times. As transoceanic shipment can take weeks or months, it may compromise the quality of coffee due to extended travel periods. In contrast, direct trade arrangements between coffee producers and roasters offer a potential solution, even though it threatens the traders role

Stakeholders : Roasters

Strengths

Coffee roasters are committed to freshness as a key advantage, as highlighted by Verma in 2023, ensuring quality products for consumers. They possess the ability to cater to diverse client needs by offering a wide variety of customized coffee products through unique blends and tailored roasting profiles, as noted by Uwihanganye in 2023.

Additionally, roasters play an important role in the coffee value chain, significantly enhancing the economic value by purchasing coffee at a price of \$1.89 or a bit more, and then selling it at notably higher prices (approximately \$7.25 per pound of roasted organic coffee), as indicated by Thurston et al. in 2014.

Their extensive knowledge in coffee flavor profiles, cupping techniques, and roasting methods further solidifies their position as experts in the industry.

Weakness

For roasters consistency in product quality is often compromised due to difficulties in tracing the origin of their coffee beans, resulting in the acquisition of lower quality products, as highlighted by Umaran et al. in 2022.

In addition they struggle to maintain freshness and preserve the properties of the product

The inability to effectively track the origin and providers of their coffee beans presents additional hurdles in ensuring quality and transparency especially for certifications. Moreover, roasters encounter significant initial investment requirements for machinery, infrastructure, employee wages, and energy, creating financial strains, as outlined by Mott in 2023.

The considerable energy consumption in their processes, as noted by Mott in 2022, adds to their operational costs

Additionally, they face competition within the market, dominated by the top roasters, controlling 35% of the industry, intensifying competitive pressures for smaller roasters, as detailed in the report on the European coffee market by CBI in 2022.

Opportunities

Engaging in outgrower schemes or contracts ensures better quality and streamlines the supply chain, reducing complexities and intermediaries. Or also, using digital marketplaces, particularly for small specialty volumes, presents a chance to broaden their sourcing options, as highlighted by Algrano in 2023.

Private labeling and smaller-scale roasting offer opportunities for niche market exploration, as seen in nano-micro roasting ventures cited by Kanniah in 2021. Direct trade arrangements also can foster innovation and new flavor profiles, allowing for more unique and personalized offerings. Initiatives such as educational sessions and tasting demonstrations provide avenues for consumer engagement and product learning, and other incomes.

Strategies like freshness extension beyond harvest and the use of sustainable packaging to reduce seasonality impact and chemical dependence, are enhancing product longevity, noted in 5 Post-harvest Challenges of Specialty Coffee Roasters. The growing demand for single-serve and ready-to-drink coffee, as well as specialty capsules, signifies evolving consumer preferences and the product offering, as noted by Danley in 2022.

Roasters can capitalize on signature blends, offering unique flavor profiles from multiple origins, while exploring various factors influencing coffee flavors, thus fostering product innovation. Differentiation through certified coffee buying, sustainability programs, and energy-efficient practices, as seen with Starbucks' C.A.F.E and Lavazza's initiatives, enhances market positioning, ensuring both environmental and business sustainability.

Additionally, innovative technologies like air heat exchangers for energy reuse, as highlighted in Writer in 2020, offer eco-friendly solutions for roasting processes.

Threats

The lack of standardized product quality and origin knowledge can complicate production, grading, and quality labeling processes.

On the same line, obtaining reliable coffee planting schemes for organized production and stock management proves challenging.

The ever-changing coffee trends require constant adaptation and staying updated, which can be demanding.

Climate change and weather-related disasters, highlighted by Lu in 2023, are substantial risks, potentially leading to supply shortages and sudden price spikes for coffee, impacting the industry's stability and profitability.

Stakeholders : Retailers

Strengths

Strong coffee markets in regions like Europe, North America, and Japan, with significant consumption rates as outlined in the “Coffee Consumption by Country 2023,” provide excellent avenues for sales and expansion.

European markets dominate the out-of-home channels, accounting for 81% of retail versus 19% for food and services, according to the European Coffee Federation in 2022.

Renowned brands like Starbucks excel due to their excellent client service and superior customer experiences, as noted by Michelli in 2009.

The increasing interest in value addition and specialty coffee markets, highlighted in the European Market Potential for Speciality Coffee by CBI in 2020.

Retailers secure the most significant margins, with an average of \$2.17 per pound, as indicated by Wallach in 2021, fostering income diversification and offering complementary products to attract consumers. Moreover, their strong emphasis on consumer knowledge and preference studies, coupled with adept use of digital platforms and diverse marketing channels, solidify their foothold and market reach, ensuring sustained growth and visibility in the industry

Weakness

New retailers face lack of resources, networking, trustworthy providers, and information gathering. Also their fixed costs are high, having to pay employees, rental, infrastructure, providers, energy, consumption utensils, etc.

Small or new retailers encounter challenges due to limited networks and information access, hardening the establishment of strong connections within the industry, as noted by Umaran et al. in 2022.

Retailers facing poor visibility in terms of branding and supply chain may experience sales losses, underscoring the significance of visibility emphasized by M'bodj in 2021.

High operational costs impact the retailer's profitability, as outlined by Wallach in 2021. Furthermore sustainability concerns, such as the use of compostable utensils and catering to the growing demand for vegan options, presents additional challenges for retailers, as highlighted in the report “5 Dynamics Reshaping the Global Coffee Shop Market” in 2022.

Opportunities

Retailers can have a wide variety of incomes, such as the offering complementary products alongside coffee, as emphasized by Michelli in 2009, presents an additional economic avenue for retailers to explore. There's considerable potential for more extensive automation, enabling improvements in time management, product quality, energy efficiency, and overall economic effectiveness. An example of this can be the modular coffee machine systems, as showcased in a New Ground Magazine article, which flexibilizes in crafting custom recipes and flavor profiles, catering to diverse consumer preferences.

Collaborations with local roasters, exemplified by Lidl in Ireland, present opportunities for retailers to tap into local expertise and offerings.

Retailers can leverage product differentiation, through brand, photogenic products, latte art and creative marketing strategies to motivate price premiums for their coffee products. In addition, emphasis on sustainable products and educating consumers through storytelling narratives aligns with the actual and evolving consumer preferences for ethical choices and fair trade labels.

Constantly evolving and enhancing client experiences and services remains crucial, helping standing out from the competitors. Finally, innovations in products like cold brews, complementary offerings, and visually appealing items provide avenues for retailers to diversify their product portfolios and engage consumers with unique experiences and products.

Threats

The sector's intense competition, largely dominated by major chains like Starbucks, Dunkin, and McCafe, creates challenges for smaller retailers trying to establish themselves.

Also, price spikes and potential market rejection pose risks, impacting sales and profitability. Additionally, the ever-changing consumer trends and behaviors demand continuous study and adaptation, posing a constant challenge for retailers to stay aligned with evolving preferences and demands in the market.

For instance, traditional retailers who do not stand up to the evolving coffee waves will eventually see a reduction of their clients.

New and constant types of coffee consumption can also threaten the retail system that is mainly physical, such as coffee machines, drive thru, e-commerce, etc.

Stakeholders : Consumers

Strengths

There is an immense consumption of coffee, averaging 2.525 billion cups per day as indicated by M in 2023. Young adults are notably enthusiastic about exploring new and improved flavor profiles and preparations, contributing to evolving consumer preferences, as noted by Samoggia & Riedel in 2018.

Furthermore, there's a rising interest in specialty coffee, particularly in Europe, as identified in the European Market Potential for Speciality Coffee by CBI in 2020.

Coffee consumers are highly connected and are interested in utilizing e-commerce platforms and various channels to access and purchase coffee, as highlighted by Algrano in 2023.

Others rely on coffee as a habitual beverage, often consumed swiftly during breaks or pauses.

Moreover, there's a growing consciousness among consumers regarding sustainability, with an increased emphasis on seeking transparent and labeled products, as observed by Samoggia & Riedel in 2018.

Weakness

Consumers often have a misconception of sustainability and the certification schemes, sometimes when it says Fair Trade, or direct trade, they don't fully understand what they mean, because of the lack of information conveyed. Consumers often prioritize price and convenience based on location, influencing their choices, and specialty or labeled coffee, often perceived as higher priced compared to more affordable alternatives like 1 euro coffee, might stop consumers from purchasing it regularly. Many consumers also lack comprehensive knowledge about the coffee industry, its processes, and the supply chain, impacting their decision-making.

Additionally, there's a lack of standardized communication mechanisms on coffee packages to convey attributes like flavor, brewing method, or origin. On the sustainability level, significant waste is generated during the consumption phase, from cardboard-plastic single-serve cups to the leftover coffee grounds produced after brewing, contributing to environmental concerns and sustainability challenges.

Opportunities

New opportunities using digital channels like marketplaces, because consumers have greater access to diverse coffee offerings beyond traditional coffee bars.

Single-serve and ready-to-drink coffee options in conventional retail spaces respond to their habits and convenience, providing new opportunities for quick consumption. Interactive maps and apps utilizing QR codes offers access points, discounts, and information, facilitating more engaging and informed consumer experiences. Communicating comprehensive product information, certifications, and the coffee journey across multiple channels— from packaging to online platforms and events— facilitates greater transparency and education. Additionally, the growing interest in coffee with new functional ingredients and non-dairy alternatives highlights evolving consumer preferences, for instance matcha latte, curcuma latte , or mushroom coffee.

Improving consumer knowledge about coffee's origin, processing, and attributes presents an opportunity to deepen their appreciation and understanding for accepting price premiums. Establishing a universal language for defining flavors across the coffee journey, distinct from the industry-standard SCA wheel, could enrich consumer exploration, comprehension and value of the coffee world. The surging and powerful market for single-serving methods (like Nescafé, Amodo mio, etc) opens spaces for novel product developments, such as specialty pods and diverse brewing options like coffee balls or composed capsules.

Another potential opportunity are subscription services or curated coffee boxes that enable consumers to explore a range of diverse coffee products, fostering exploration and discovery. Moreover, emphasizing different processing methods for local consumption encourages experimentation and broadens consumer exposure.

Threats

Understanding sustainable and certification schemes can be challenging, leading to confusion or uncertainty about which products align with their values. Rising prices for high-quality coffee may deter consumers, pushing them away for more affordable, commercial, or less sustainable alternatives. Additionally, the availability of alternative beverages with similar flavors, pricing, and experiential appeal— such as tea or sodas— poses a threat by diverting consumers' preferences away from coffee, potentially impacting its market share. These factors collectively challenge the continued preference and consumption of coffee among consumers.

Stakeholders : Government

Strengths

Their high economic resource availability empowers them to influence and support various aspects of the sector. With robust diplomatic capacities and governance over trading agreements, governments play a fundamental role in international trade relations, ensuring favorable terms for coffee production and distribution. Their ability to regulate price markets and oversee production, outlined in The Coffee Guide by ITC in 2021, grants them a crucial hand in stabilizing the industry.

Additionally, governments have bigger visibility, extensive networks with both providers and buyers, and a far-reaching presence, enabling them to foster collaborations and facilitate transactions that benefit the entire coffee supply chain.

Weakness

There's often a lack of proactive initiatives, assistance, and sustained follow-up due to limited territorial connections and constrained resources, as highlighted by Gyllensten in 2022. The difficulty in identifying when and where to allocate resources for initiatives hardens this issue.

Furthermore, countries heavily reliant on commodity trade and pricing struggle with dependency. Bureaucratic processes within governments can impede funding and investment in vital research and coffee farm projects. Moreover, the discrepancy in domestic consumption compared to importer countries, barring a few exceptions like Brazil, as outlined in The Coffee Guide by ITC in 2021, presents a domestic market challenge.

Import tariffs exacerbate difficulties, serving as obstacles to adding value at the coffee's origin and hindering the industry's growth and potential.

Opportunities

The government can create open databases for sharing information globally and nationally, fostering better communication. Strengthening coordination with cooperatives and associations could improve collaboration and support.

Promoting online coffee auctions and strategies that boost domestic consumption, like reduced taxes for local roasters, offer avenues for market expansion.

However, there's potential in merging the coffee sector with gastronomy, culture, and tourism, as suggested by Martinez in 2016, which could attract more interest and engagement from other more performing industries.

Initiatives such as weather insurance and tax policies that incentivize sustainable coffee options can better support coffee-producing countries. Moreover, supporting global multi-stakeholder initiatives and sustainable agriculture projects, along with establishing public-private partnerships for innovation, research, and development, can significantly enhance the industry's sustainability and economic value.

Additionally, offering carbon credits to coffee farmers who preserve and reforest, as proposed by Oakley in 2022, can encourage environmentally friendly practices, contributing to the industry's long-term sustainability. (not only interesting for local government, but also to high carbon footprint emitting countries)

Threats

Governments heavily invested in primary sectors are highly dependent on export partners, making them vulnerable to fluctuations in prices and quantities, amplifying the risks associated with economic dependency.

Additionally, climate change poses a significant threat to countries reliant on primary sectors like coffee production, potentially causing economic instability.



Following, the more detailed SWOT analysis was integrated in QR, and was precisely developed taking also into consideration the resources related to each factor (economical, information, innovation, material, energy resources) as part of a new methodological tool proposed by the research thesis explained afterwards.

Scan the QR for further reading of the SWOT analysis and the bibliography used.



Strengths	Weakness	Opportunities	Threats
1.Experience learning is a constant, and strength, they learn through observing, interacting and practicing with other farmers specially family members. (Ochago et al., 2023)	1. Export dependency & value addition is in importing countries	1. Increase or create local networks of coffee processing (green bean), local roasters, (micro-roasters), to offer alternatives and potential in emerging markets for coffee exporting countries for coffee consumption(ex. Brasil)	1. Arabica's production will be reduced by 2050 (Briggs, 2021)
2. Agricultural systems such as shade coffee have positive effects on crop and terrain, and for diversity (Monge et al., 2022)	2. Pests, diseases, and fungi are an everpresent coffee production challenge. Coffee leaf rust (la roya) is a famous disease that's affected coffee crops for over a century. In 2012, it hit Central America hard. And over the next two years, it caused over \$1 billion in damage (USAID). (Ospina, 2022)	2. Strategies for capturing and generating value in local/regional contexts (The Coffee Guide, Fourth Edition ITC, 2021)	2. Pests, diseases, and fungi cause huge crop damage (central america 1 billion damage (USAID, 2017)
3. Speciality coffee farms often have better incomes (almost the double) than commercial coffee farms. (Wolini & Zeller, 2007)	3. Low formation, education, and skills (The Coffee Guide, Fourth Edition ITC, 2021)	3. Seed-process innovation for improving robusta seed's organoleptic attributes or new use of species such as Coffea Stenophylla, a rare coffee variety has organoleptic properties as arabica, and resists warmer temperatures (Briggs, 2021)	3. Unpredictable weather and pests cause crop reduction
4. Coffee farmers in coffee built towns, have a positive impact in their local economy, community, shops, etc. (Rahman et al., 2023)	4. Lack of access to information & technology (The Coffee Guide, Fourth Edition ITC, 2021)	4. Spread of methods for the prevention of crop damage (techniques, access to resistant seeds) (International Coffee Organization, 2019)	4. Coffee can mold, loose freshness if not handled properly in the processing
5. Coffee as tradition and family knowledge, most of the farms are runned by family (12.4 Mio Smallholder Families Produce 80 % Of the World's Coffee, n.d.)	5. Difficulty in application or fulfillment of good practices (time, investments, Knowledge)	5. Lower grade coffee can become: Animal feed, fuel, mulch or biogas (International Coffee Organization, 2019)	5. Middlemen who often ask for lower prices, and won't easily agree on giving higher margins to farmers (Umaran et al., 2022)

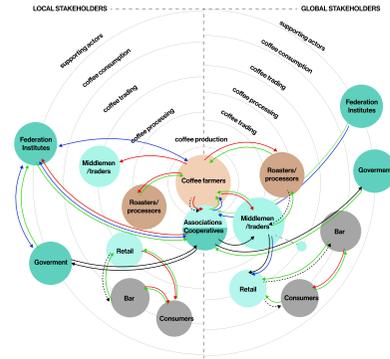
Stakeholder relationship map

One of the main objectives of the thesis is to

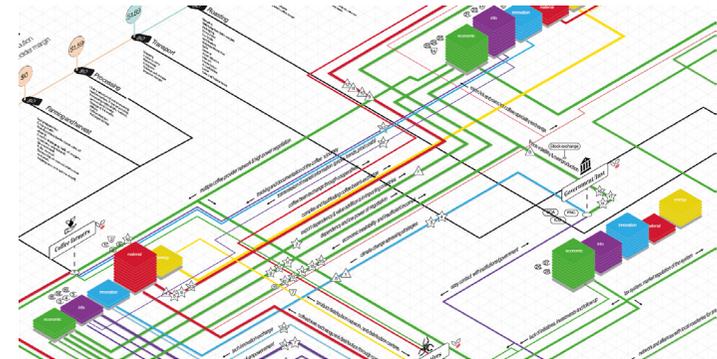
create an instrument for understanding not only the stakeholders of the coffee industry but also how they relate to each other along the production chain, in order to create a new approach and field for holistic diagnosis,

extending beyond the holistic analysis of the territory, company or production process. After months of intense review of existing literature, and classification of the gathered information, efforts for synthesis

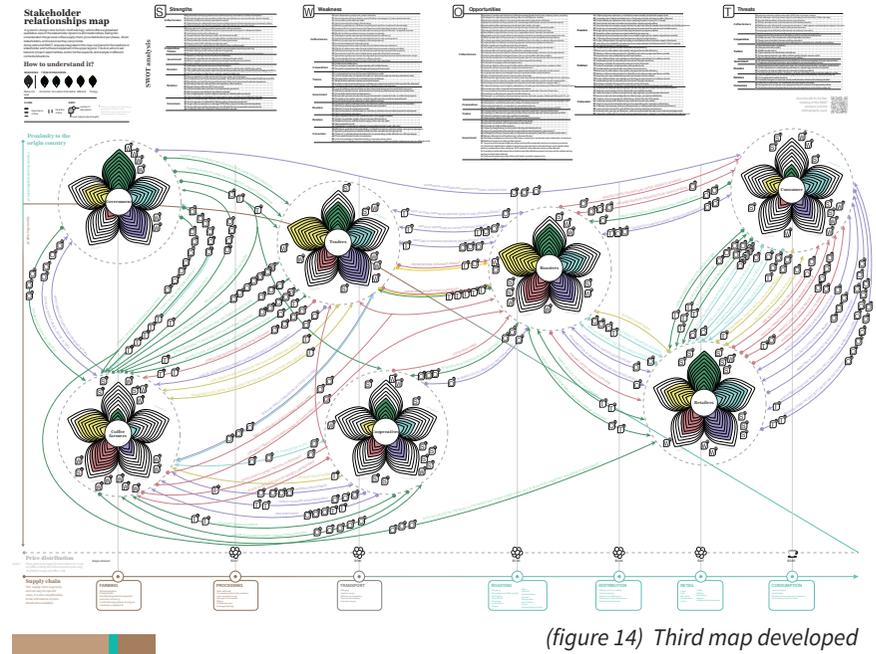
and data visualization were made. Following many iterations, the holistic stakeholder relationship and supply chain map was finally produced, managing to encompass everything mentioned earlier in the most clear and understandable way. It illustrates the current dynamics among the stakeholders and their role in the production chain. In the following pages we can see the process and development behind.



(figure 12) First map developed



(figure 13) Second map developed



(figure 14) Third map developed

The development of the tool

First map developed

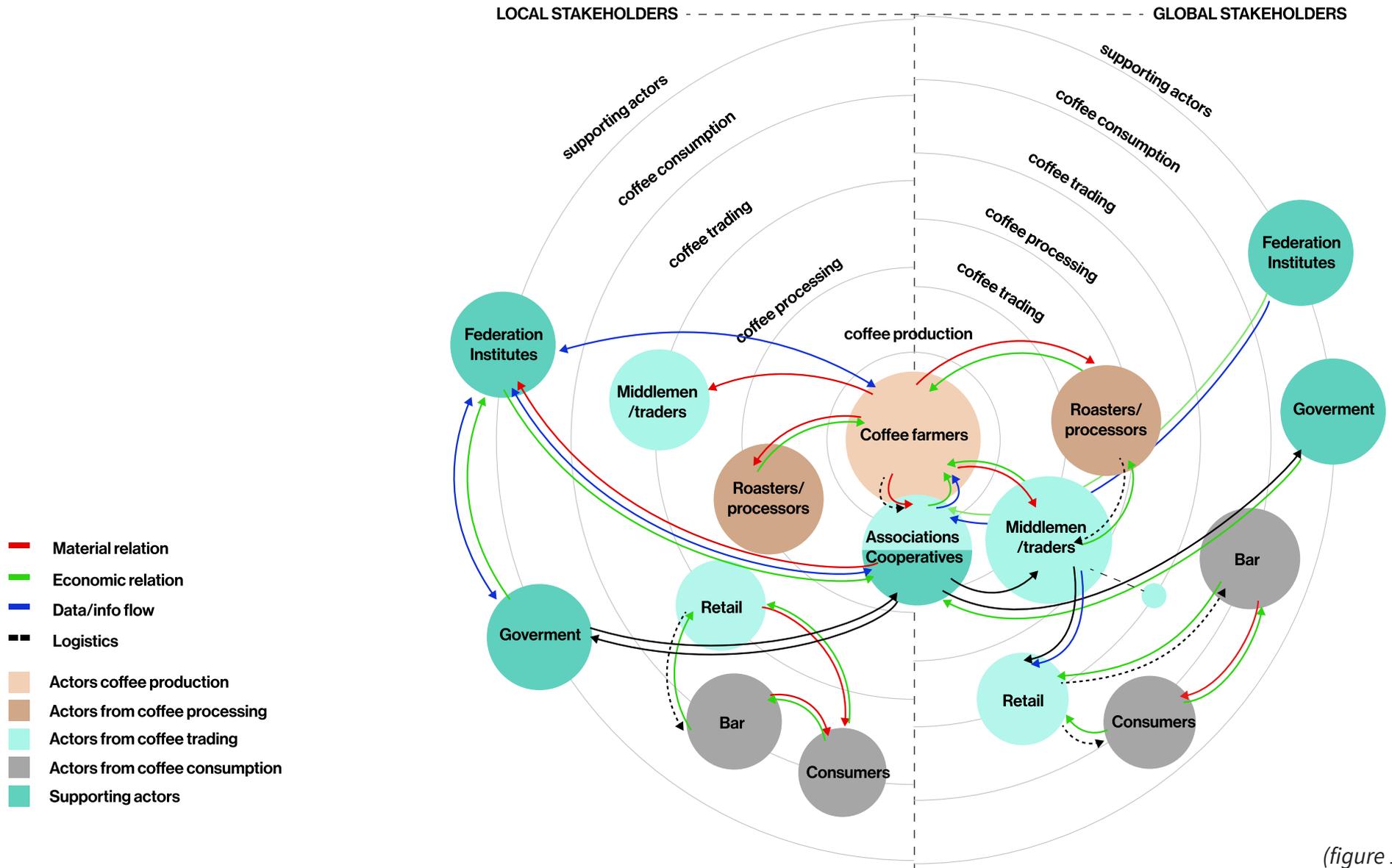
(figure 12)

Initially, a map was constructed to represent the relationships between stakeholders in the coffee production chain, and the flows they shared, so that a concentric representation was divided in half, with the first side representing the production chain with local actors (when the roasting process is carried out locally) and the second when international actors outside the local context are included (when the roasting process is carried out outside the country of origin). It is striking that the number of rings also increases with the longevity of the

process, and each ring represents a type of actor according to its role. The relationships between them are mediated by material, economic, information and logistical resources.

This map was an approximation exercise to understand which actors were more connected and which less, to understand the predominance of some flows, however it was very limited by its typology and it was not possible to obtain qualitative information that characterizes each interaction.





(figure 12)

Second map developed

(figure 13)

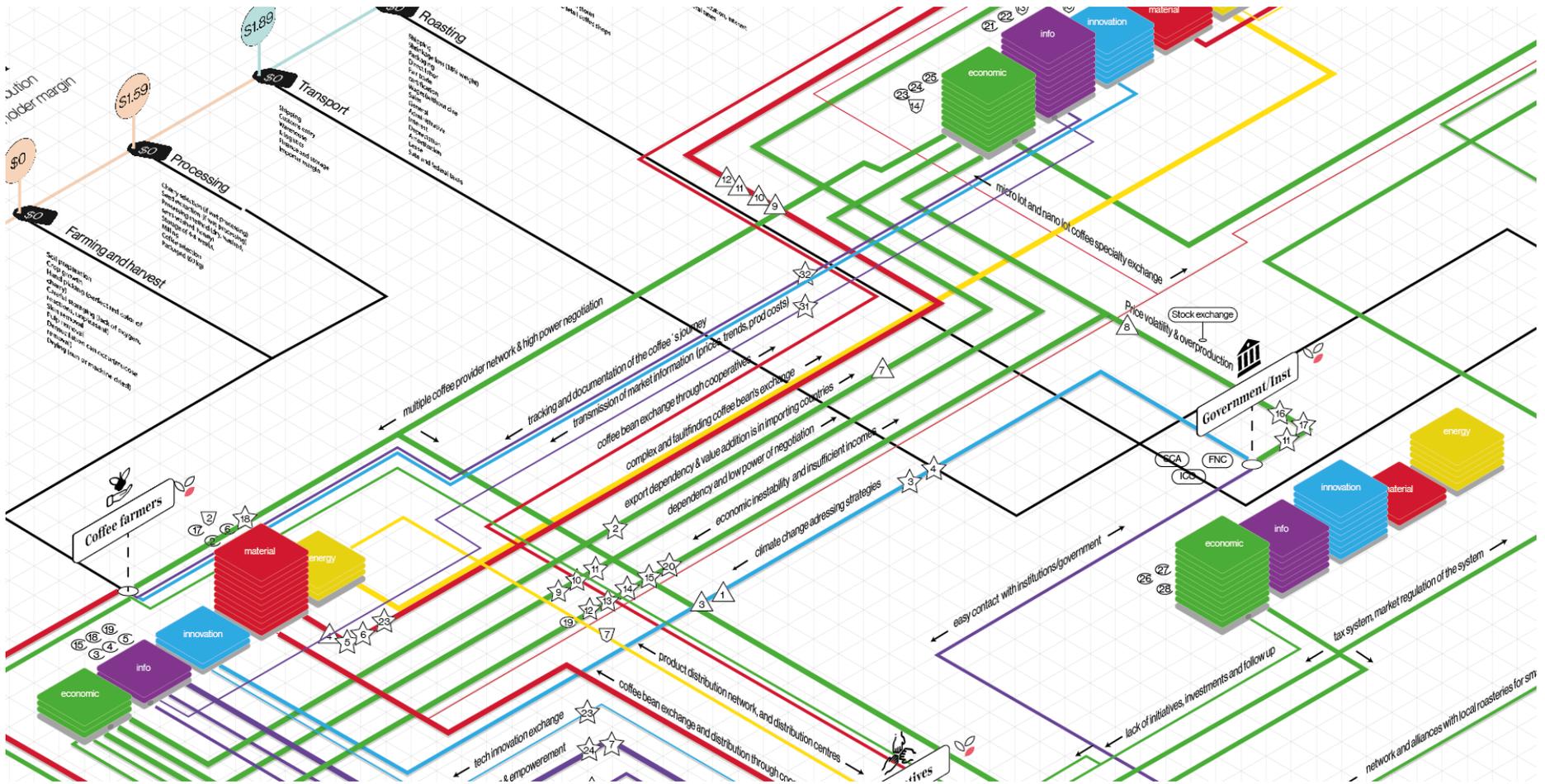
So, the previous map was left on standby, and we continued to explore other methods of information representation. T

The biggest challenge to develop the tool for the holistic analysis of stakeholder dynamics was definitely to find the initial style to represent all the complexity of the information, since there are more than 7 qualitative information variables that had to be graphed and quantified.

Among those variables; the estimated **number of resources** of each stakeholder (economic, information, innovation, material, and energy), the **strengths, weaknesses, opportunities, and threats**, the **proximity** to the place of origin of the coffee (if they are located in producing or processing countries), the **economic value distributed** by phases when processing a cup of coffee, the stages and sub-activities that belong to each one, and finally most importantly the **flows of relationships** and connections

between the stakeholders (which again are characterized if they are economic, information, innovation, material and energy) and the critical description of each relationship.

Therefore, at the beginning we considered using an isometric style that could maximize the use of space using x, y and z axis information, but after several trials and errors, it was concluded that it had problems of legibility, comprehension and visual tracking of the connections.



(figure 13)

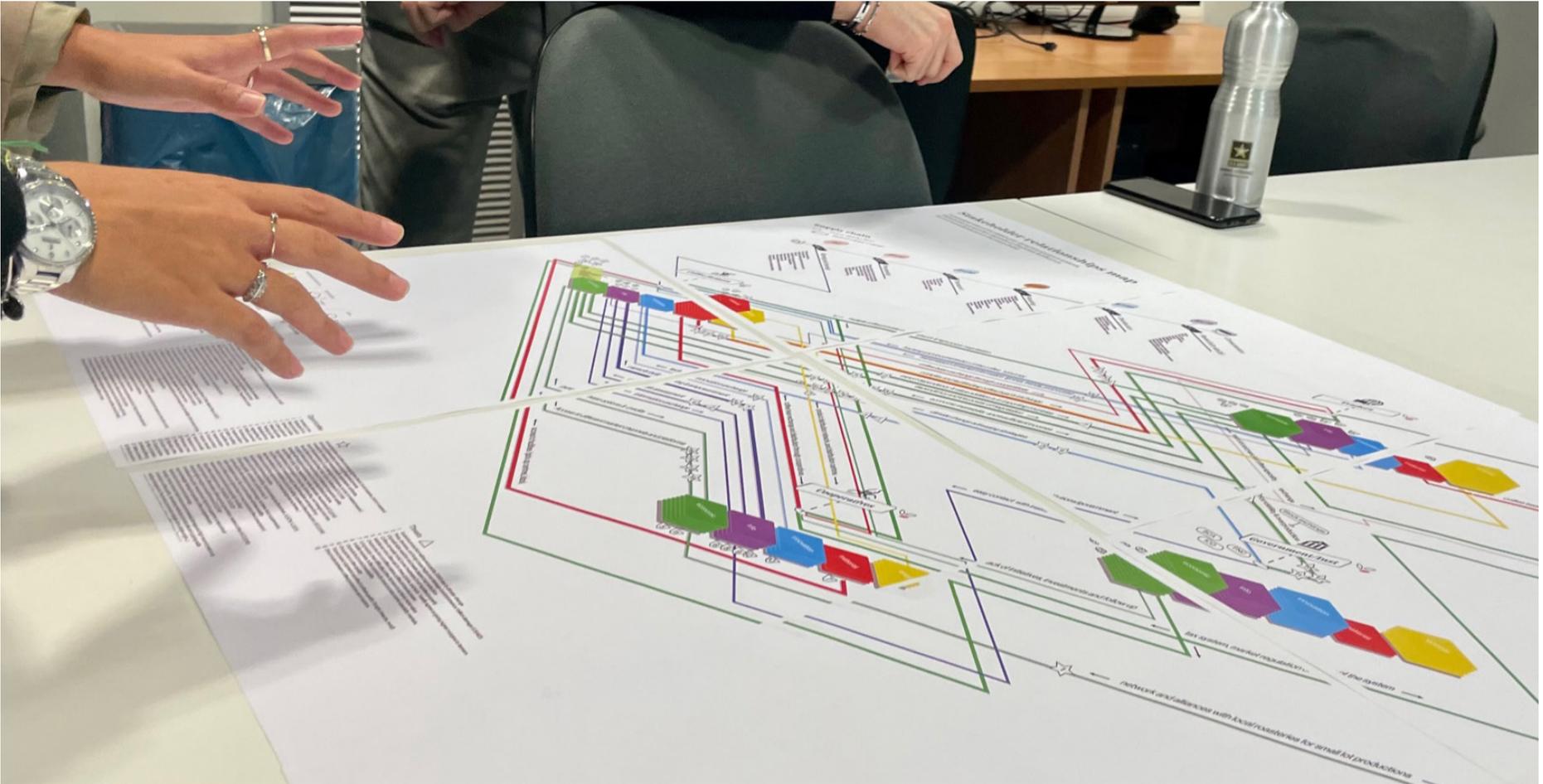


Image source: Own



Subsequently to months of trial and error, and collaboration with Alessandro Campanella and Maria Paola Puglielli, we were able to create a much more understandable map linked to the world of coffee.

We switched to a 2D representation to avoid comprehension problems and simplify the visual movement from one side to the other.



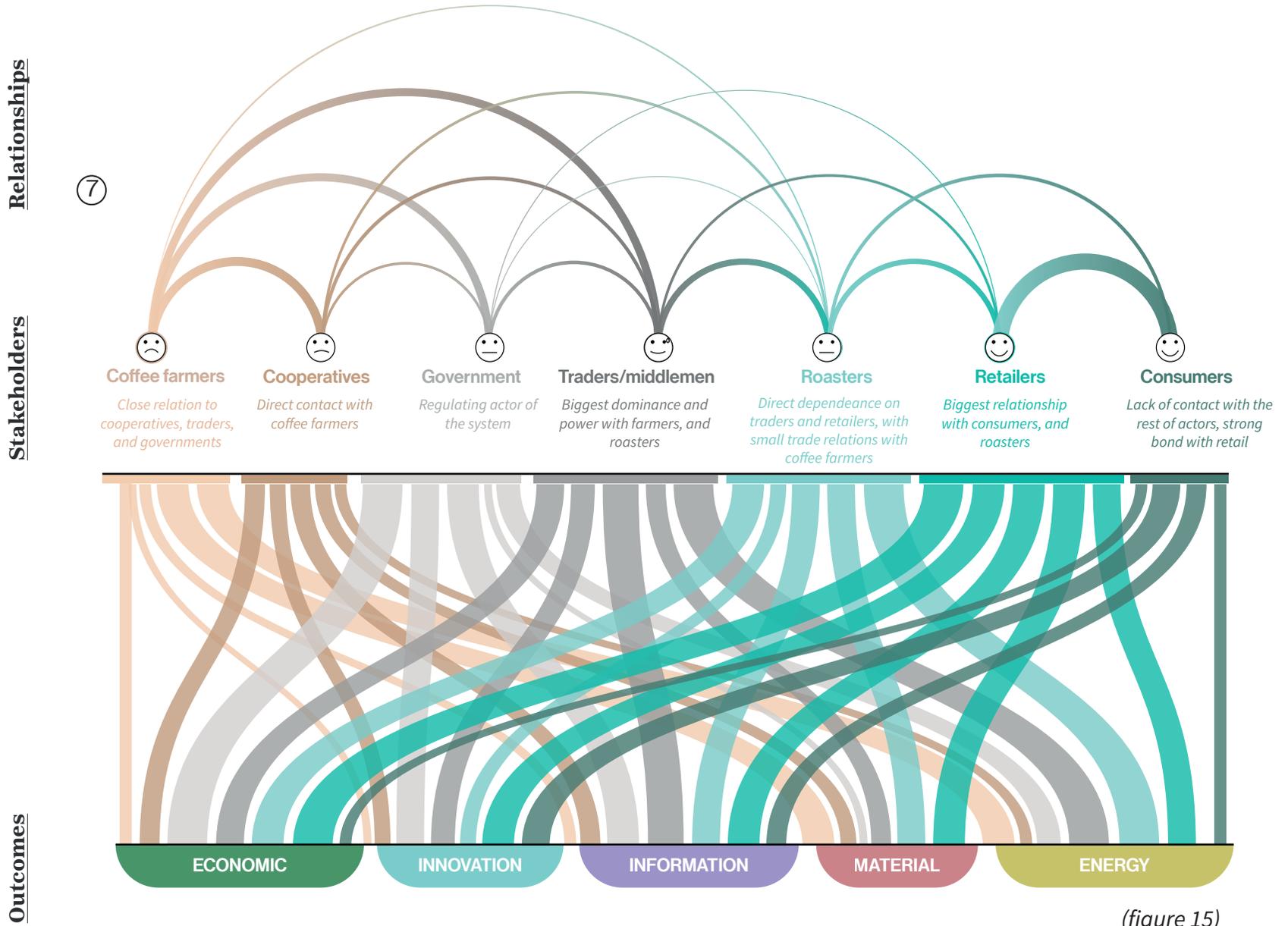
Third map developed (figure 14)

The final tool was inspired by the coffee flower, and it managed to encompass everything mentioned earlier in the most clear and understandable way. It is structured in 5 macro areas: the introduction and legend in the upper left part, the SWOT analysis in the upper right part, on the left side the approach with the country of origin, in the lower zone the economic distribution divided by phases and the partial collection for the price of a cup of coffee, together with the production chain, finally the central part with the relationships and stakeholders.

The qualitative approach was initially born from the lack of quantitative information available on stakeholder exchanges, including the growing need to understand the power dynamics, interests, challenges and problems that, especially in the coffee industry, are a network of consequences at the level of stakeholder management and relationships. Nevertheless it can become subjective if not backed by references.

How to build it?

- ① **Insert** supply chain and value distribution
- ② **Identify** the most direct stakeholders and classify the amount of resources from 1-10 they have (**economy, information, innovation, energy, material**)
- ③ **Illustrate** the connections between them (using ending points of arrows or circle to indicate the direction of the flow) and describe the relation (qualitatively).
- ④ **Color** the type of connection according to resources exchanged. (**economy, information, innovation, energy, material**)
- ⑤ **Evaluate** the connections, if they work, which ones are most important (is optional to increase the width of the lines to evidence it)
- ⑥ The previous SWOT analysis is integrated into the flows (opportunities & threats) and internally in each flower (strength & weakness), in **order to understand and highlight the most critical or significant relationships that contribute the factors**. But when building the map, it **helped reinforce** the SWOT with many new insights obtained, so it serves also for structuring a SWOT tool.



(figure 15)

⑦ Relationships among them

All the previous panorama of relations was then synthesized in an arc diagram, to understand how stakeholders related to each other, and how many relationships are among them (comprising all categories of flows).

Despite the thickness which means higher number of connections, it doesn't necessarily mean they are fully beneficial relationships and they are comfortable with the supply chain,

so the emoji system aims to represent their satisfaction levels according to a study (Umaran, et. al,2021) which interview their

satisfaction levels according to how they feel with the current dynamics of the supply chain. We can definitely observe that retailers have the most strong bonds with consumers as they are the last and direct stakeholders with the consumers, as they have to stimulate the market and purchase with high economic strategies (discounts, promotions, purchase channels) with the retain of information and careful study of their behaviors and preferences. Another strong bond jumped to the eye, between coffee farmers and cooperatives which is highly beneficial especially for farmers due to the economical, information, technological, and facilities they can get through cooperatives. While

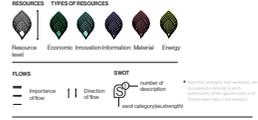
the contact with coffee farmers and traders is almost as close but it is vulnerable and characterized by economical unbalance, due to how complex the bean exchange can get due to several factors generally affecting farmers. Something to point out is that coffee farmers have no contact with the last actors in the chain. Instead what happens with the government, which as we know the government acts as an indirect stakeholder in the system, working as an aid and market regulator for other actors. Lastly, we could say consumers are the most isolated and have less connections.

- ⑧ The next process to follow after the map creation, was interpreting and analyze the existing relationships according to the type of the resources shared between actors, and how are this connection between stakeholders, ex. are the beneficial, vulnerable, what is going on?

Stakeholder relationships map

A systemic design new holistic methodology, which offers a spatialized qualitative view of the stakeholder dynamics and relationships, taking into consideration the general coffee supply chain, pre-distribution phase, direct stakeholders and resources they can provide. Along with the SWOT analysis integrated in the map, numbered in the relations stakeholder and further explored in the user boards. The tool aims to set basis for project opportunities, and to further specify and analyze in different contextualizations.

How to understand it?



SWOT analysis

Strengths	Weakness
<p>Coffee farmers</p> <ul style="list-style-type: none"> 1. High quality and specialty coffee production 2. Access to international markets 3. Growing demand for specialty coffee 4. Diverse coffee varieties and flavors 5. Strong relationships with local communities 6. Growing awareness of coffee's benefits 7. Access to government support and subsidies 8. Growing demand for organic and fair trade coffee 9. Access to international markets 10. Growing demand for specialty coffee <p>Cooperatives</p> <ul style="list-style-type: none"> 1. Strong relationships with coffee farmers 2. Access to international markets 3. Growing demand for specialty coffee 4. Diverse coffee varieties and flavors 5. Strong relationships with local communities 6. Growing awareness of coffee's benefits 7. Access to government support and subsidies 8. Growing demand for organic and fair trade coffee 9. Access to international markets 10. Growing demand for specialty coffee <p>Traders</p> <ul style="list-style-type: none"> 1. Strong relationships with coffee farmers 2. Access to international markets 3. Growing demand for specialty coffee 4. Diverse coffee varieties and flavors 5. Strong relationships with local communities 6. Growing awareness of coffee's benefits 7. Access to government support and subsidies 8. Growing demand for organic and fair trade coffee 9. Access to international markets 10. Growing demand for specialty coffee <p>Government</p> <ul style="list-style-type: none"> 1. Strong relationships with coffee farmers 2. Access to international markets 3. Growing demand for specialty coffee 4. Diverse coffee varieties and flavors 5. Strong relationships with local communities 6. Growing awareness of coffee's benefits 7. Access to government support and subsidies 8. Growing demand for organic and fair trade coffee 9. Access to international markets 10. Growing demand for specialty coffee <p>Roasters</p> <ul style="list-style-type: none"> 1. Strong relationships with coffee farmers 2. Access to international markets 3. Growing demand for specialty coffee 4. Diverse coffee varieties and flavors 5. Strong relationships with local communities 6. Growing awareness of coffee's benefits 7. Access to government support and subsidies 8. Growing demand for organic and fair trade coffee 9. Access to international markets 10. Growing demand for specialty coffee <p>Retailers</p> <ul style="list-style-type: none"> 1. Strong relationships with coffee farmers 2. Access to international markets 3. Growing demand for specialty coffee 4. Diverse coffee varieties and flavors 5. Strong relationships with local communities 6. Growing awareness of coffee's benefits 7. Access to government support and subsidies 8. Growing demand for organic and fair trade coffee 9. Access to international markets 10. 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Limited access to government support <p>Cooperatives</p> <ul style="list-style-type: none"> 1. Limited access to international markets 2. High production costs 3. Limited marketing budget 4. Limited access to government support 5. Limited access to international markets 6. Limited access to government support 7. Limited access to international markets 8. Limited access to government support 9. Limited access to international markets 10. Limited access to government support <p>Traders</p> <ul style="list-style-type: none"> 1. Limited access to international markets 2. High production costs 3. Limited marketing budget 4. Limited access to government support 5. Limited access to international markets 6. Limited access to government support 7. Limited access to international markets 8. Limited access to government support 9. Limited access to international markets 10. Limited access to government support <p>Government</p> <ul style="list-style-type: none"> 1. 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Opportunities

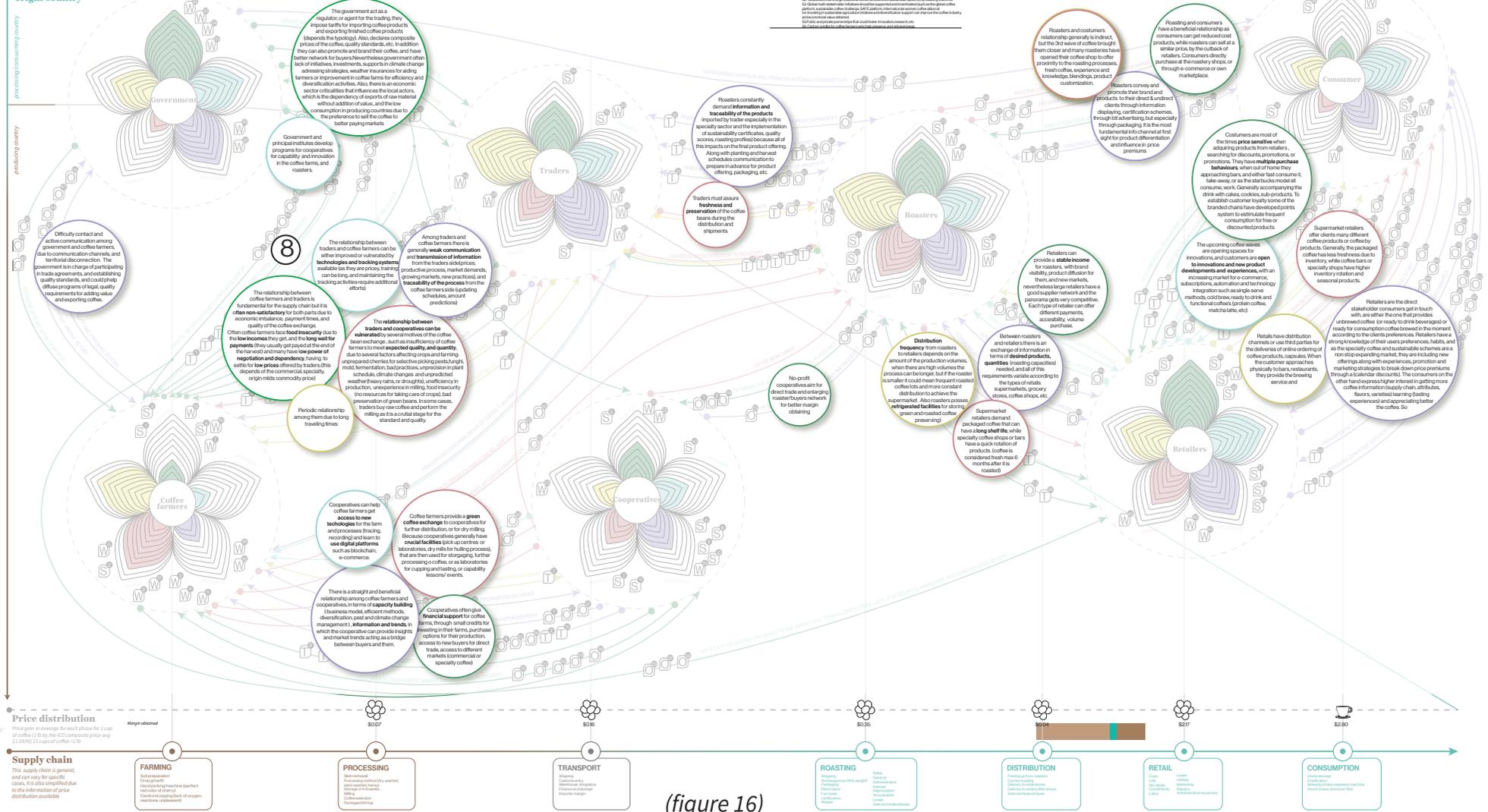
<p>Coffee farmers</p> <ul style="list-style-type: none"> 1. Growing demand for specialty coffee 2. Access to international markets 3. Growing demand for organic and fair trade coffee 4. Access to international markets 5. Growing demand for specialty coffee 6. Access to international markets 7. Growing demand for specialty coffee 8. Access to international markets 9. Growing demand for specialty coffee 10. Access to international markets <p>Cooperatives</p> <ul style="list-style-type: none"> 1. Growing demand for specialty coffee 2. Access to international markets 3. Growing demand for organic and fair trade coffee 4. Access to international markets 5. Growing demand for specialty coffee 6. Access to international markets 7. Growing demand for specialty coffee 8. Access to international markets 9. Growing demand for specialty coffee 10. Access to international markets <p>Traders</p> <ul style="list-style-type: none"> 1. Growing demand for specialty coffee 2. Access to international markets 3. Growing demand for organic and fair trade coffee 4. Access to international markets 5. Growing demand for specialty coffee 6. Access to international markets 7. Growing demand for specialty coffee 8. Access to international markets 9. Growing demand for specialty coffee 10. Access to international markets <p>Government</p> <ul style="list-style-type: none"> 1. Growing demand for specialty coffee 2. Access to international markets 3. Growing demand for organic and fair trade coffee 4. Access to international markets 5. Growing demand for specialty coffee 6. Access to international markets 7. Growing demand for specialty coffee 8. Access to international markets 9. Growing demand for specialty coffee 10. Access to international markets 	<p>Roasters</p> <ul style="list-style-type: none"> 1. Growing demand for specialty coffee 2. Access to international markets 3. Growing demand for organic and fair trade coffee 4. Access to international markets 5. Growing demand for specialty coffee 6. Access to international markets 7. Growing demand for specialty coffee 8. Access to international markets 9. Growing demand for specialty coffee 10. Access to international markets <p>Retailers</p> <ul style="list-style-type: none"> 1. Growing demand for specialty coffee 2. Access to international markets 3. Growing demand for organic and fair trade coffee 4. Access to international markets 5. Growing demand for specialty coffee 6. Access to international markets 7. Growing demand for specialty coffee 8. Access to international markets 9. Growing demand for specialty coffee 10. Access to international markets <p>Consumers</p> <ul style="list-style-type: none"> 1. Growing demand for specialty coffee 2. Access to international markets 3. Growing demand for organic and fair trade coffee 4. Access to international markets 5. Growing demand for specialty coffee 6. Access to international markets 7. Growing demand for specialty coffee 8. Access to international markets 9. Growing demand for specialty coffee 10. Access to international markets
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Threats

<p>Coffee farmers</p> <ul style="list-style-type: none"> 1. Climate change 2. Limited access to international markets 3. High production costs 4. Limited marketing budget 5. Limited access to government support 6. Limited access to international markets 7. Limited access to government support 8. Limited access to international markets 9. Limited access to government support 10. Limited access to international markets <p>Cooperatives</p> <ul style="list-style-type: none"> 1. Climate change 2. Limited access to international markets 3. High production costs 4. Limited marketing budget 5. Limited access to government support 6. Limited access to international markets 7. Limited access to government support 8. Limited access to international markets 9. Limited access to government support 10. Limited access to international markets <p>Traders</p> <ul style="list-style-type: none"> 1. Climate change 2. Limited access to international markets 3. High production costs 4. Limited marketing budget 5. Limited access to government support 6. Limited access to international markets 7. Limited access to government support 8. Limited access to international markets 9. Limited access to government support 10. Limited access to international markets <p>Government</p> <ul style="list-style-type: none"> 1. Climate change 2. Limited access to international markets 3. High production costs 4. Limited marketing budget 5. Limited access to government support 6. Limited access to international markets 7. Limited access to government support 8. Limited access to international markets 9. Limited access to government support 10. Limited access to international markets <p>Roasters</p> <ul style="list-style-type: none"> 1. Climate change 2. Limited access to international markets 3. High production costs 4. Limited marketing budget 5. Limited access to government support 6. Limited access to international markets 7. Limited access to government support 8. Limited access to international markets 9. Limited access to government support 10. Limited access to international markets <p>Retailers</p> <ul style="list-style-type: none"> 1. Climate change 2. Limited access to international markets 3. High production costs 4. Limited marketing budget 5. Limited access to government support 6. Limited access to international markets 7. Limited access to government support 8. Limited access to international markets 9. Limited access to government support 10. Limited access to international markets <p>Consumers</p> <ul style="list-style-type: none"> 1. Climate change 2. Limited access to international markets 3. High production costs 4. Limited marketing budget 5. Limited access to government support 6. Limited access to international markets 7. Limited access to government support 8. Limited access to international markets 9. Limited access to government support 10. Limited access to international markets
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Scan the QR for further reading of the SWOT analysis and the bibliography used.

Proximity to the origin country



(figure 16)



Reflections on the coffee synthesis

In conclusion, the objective of the chapter “A Coffee synthesis” was to analyze the information obtained from the coffee industry and stakeholders, in a more synthetic way using dynamics such as data visualization, swot analysis and stakeholder mapping to obtain a more comprehensive and disaggregated overview.

Depicting the global panorama, as a whole, and evaluating beneficial and/

or challenging relationships, opens doors to intervene and produce systemic improvements in the multiple realities. It is immediately evident how many “weaknesses” currently characterize the groups of coffee growers, and how the immediate relationships with them (intermediaries, government and cooperatives) are the most crucial and fundamental at the level of threats, but at the same time can provide the greatest level of opportunities and initiatives. It is striking that, despite the low level

of economic resources of coffee growers, the relationships that surround them are mostly economic and material exchange, suggesting that these current relationships are unbalanced, not very productive, and even favoring other actors. Also, there is a disconnection and lack of contact between them and the other actors such as retailers, roasters and consumers, who are located in the consumer/processor countries, and have a greater distribution of economic power. On the other hand, it is immediately apparent that at the level of

connections, retailers and consumers stand out in terms of information exchange, innovation, and economics, and all this has a vast number of opportunities and improvements. From another perspective, if we quantify the number of relationships that each stakeholder contains, these would be the most relevant in terms of relationships in the industry: coffee growers, retailers, roasters, consumers, intermediaries, cooperatives and government as the last, and from this we can conclude that the current situation

is completely unbalanced, starting with the government as the stakeholder least interconnected with the industry, when its role is to supervise and promote the industry, while coffee growers have a greater number of relationships that should be reconsidered because of their unprofitable and non-strategic nature.

Then, retailers become incredibly relevant, which is coherent with the portion of economic value received by their activities, but the fact that they and coffee growers, being the most relevant in relationships, are

not connected stands out, and this could be an interesting space for new developments, in the same way the situation is repeated considering coffee growers and roasters.

Undoubtedly the coffee production chain and the relationships between its most direct actors is very linear and disconnected, in which the distribution of the generated value expressed economically does not correspond equitably.

All of this analysis serves to lay the design foundations for the research question solving and application of the systemic design methodologies discussed in the following chapter.

Holistic diagnosis of the territory

The following chapter seeks the transition and application phase of the data and methodologies that led to the global synthesis seen in the previous chapter, to the selection of Italy and Colombia for a holistic review and future identification/development of guidelines, challenges and project opportunities. Italy and Colombia were the territories chosen for their importance in the coffee industry worldwide, both are part of the 6 largest exporters of coffee, and the selection motives depend in their different approaches and

perspectives, Italy being one of the major coffee processors, with important networks of roasters, retailers and huge consumption of coffee per capita, and Colombia being the third country with the largest export volume, second among producers in terms of economic value capture, biggest arabica washed coffee producer, quality outstanding beans exporter, among other reasons.



Image source :Blue parallel



Image source: Zastavki

First territory: Italy

Italy is one of the world's most recognized countries, it holds incredible achievements in historical, cultural, and artistic ambits.

From being the birthplace of the Roman empire, or the promoter of the Renaissance, there are enormous contributions to gastronomy like the famous pizza or pasta, fashion luxury brands as Gucci, Ermenegildo Zegna or Prada, product and automobile design brands such as Fiat, Lamborghini, Ferrari, and technology that continues to shape the world. This

makes Italy one of the top 10 most visited countries in the world.with around 58 UNESCO sites.



Fiat 500l

Image source: Ruote da sogno



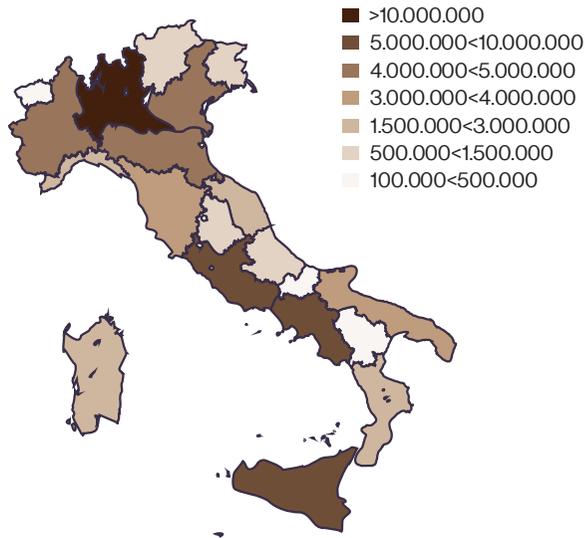
Gucci brand

Image source: Gucci



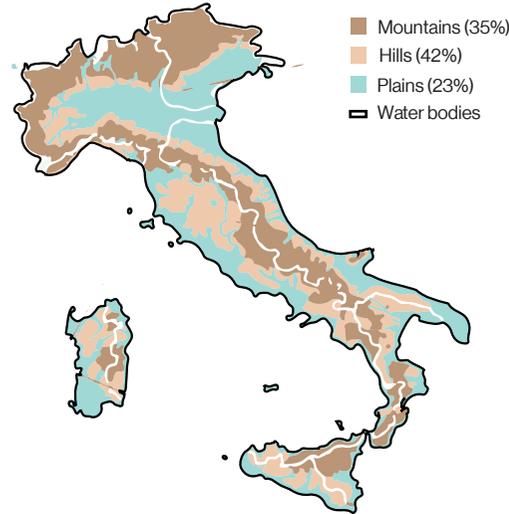
Roman coliseum-UNESCO

Image source: Virginia Diana



Demography

According to ISTAT (2023), Its population is 58,8 million to the date, most concentrated in the Lombardy regions, then Lazio, and Sicily, with an average age of 45,2 years old. There are 17.617.3333 employed italians, and Italy’s economy is suffering from a high disemployment rate with a total of 8,1%, and it especially affects the 15-24 population. The highest number of unemployed are in Calabria, Sicily and Campania.



Geography

The territorial area accounts for 301.340 km², 20 regions and 8101 municipalities according to It has an incredibly rich and varied morphology, with 35% mountains, 42% hills, and 23% plains, and big water bodies, despite that, the country is very interconnected, with an outstanding railway system specially from the center to the north.(IPSIA A.Parma, 2012)

Industry

The industry dimension is big with an estimate of 4.540.634 companies with micro companies having the 95% portion followed by the small ones with 4,33%, mid with 0,54 and big ones 0,09%. By economic sector the industries are 73% services, 25% from the industrial sector, and the 2% for extractive activities.(Curletto, 2023)

Holistics diagnosis

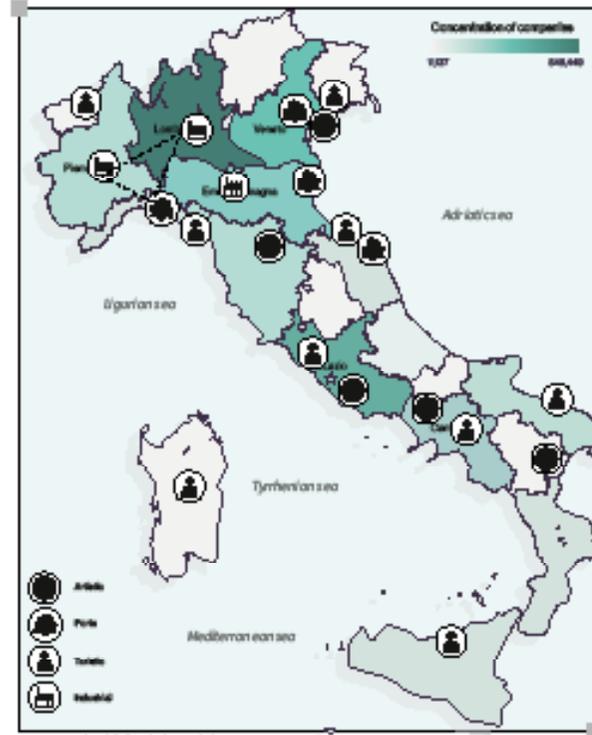
Italy

Population: 59,01M
Area: 301,340M2
Regions: 20
Municipalities: 8001

Italy holds the second largest coffee market in Europe, not only as a consumer but also as a producer. The coffee consumption in the country is 1.8 kg per capita and the production represents 17,000 hectares.

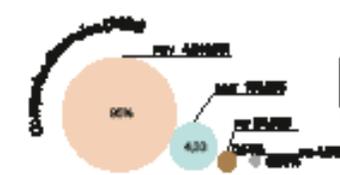


Industry system



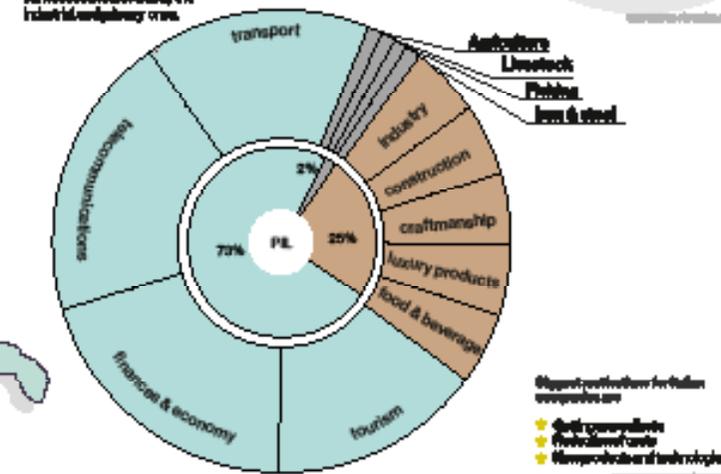
Industry structure

1,838 new companies
4,540,624 companies



Industry by economic sector

Italy's industry is heavily concentrated in the north, with the highest concentration in the industrial triangle area.



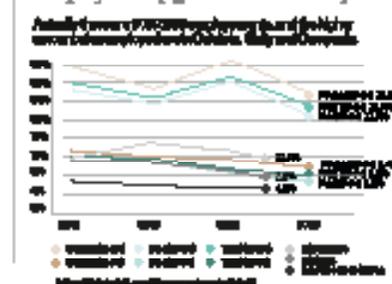
Industry insights

Industry with high turnover and low margins
Industry with high turnover and low margins
Industry with high turnover and low margins

Innovation and design

High innovation and design
High innovation and design
High innovation and design

Employment (age and sector)



Source: ISTAT, Ministry of Economic Development

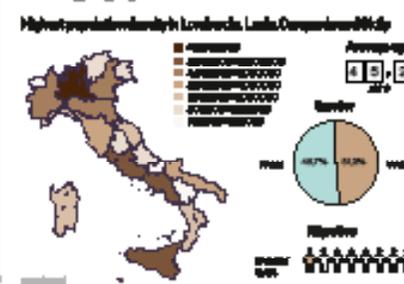
Demography



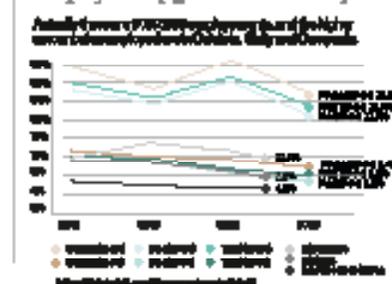
Industry system



Geography



Employment (age and sector)



Source: ISTAT, Ministry of Economic Development

Coffee in Italy

Italians consume 2.8 kg per capita each year
90% of the coffee market are independent bars
9% of total are drink coffee

Habits



Production

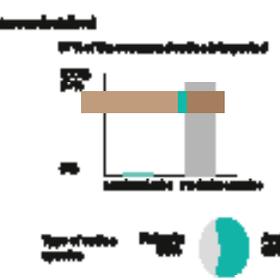
Italy is the 2nd largest coffee producer in the world



Top coffee brands

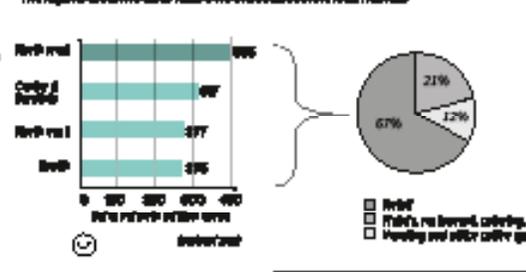
Brand	Revenue (2020)
LAVAZZA	2,800 million
Segno	2,000 million
illy	1,400 million
KIMBO	800 million

Commercial coffee

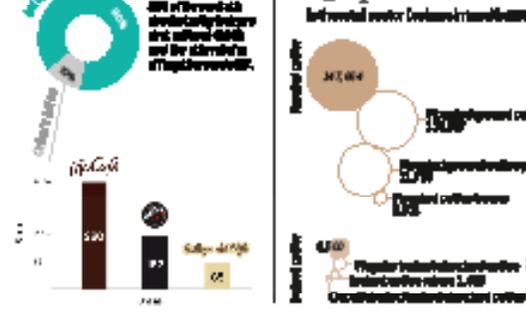


Coffee sales in retail

The regional market is divided into 10 regions



Coffee production



(figure 16)



Italy's coffee landscape

Coffee origins

The first territory analyzed was Italy, and the diagnosis made begins with a history that goes back to the XVI century, when the first batch of coffee beans entered the Venetian Republic from the Middle East, and from the beginning, the Venetians received coffee with open arms, but some time later the clergy asked Pope Clement VIII to ban coffee. He himself decided to try coffee, and expressed "“This Satan's drink is so delicious that it would be a pity to let the infidels have exclusive use of it.” Tribune (2021). This was considered the baptism of coffee and from there

the coffee culture was born, and the first coffee shop was opened in 1676. Later in the XIX century, the coffee business continued to grow and take root in the culture, in spite of the long preparation time (5 minutes for each cup), and after multiple attempts to reduce the time, Desiderio Pavoni presented in 1906 the espresso coffee (see image) which could make 1000 coffees in one hour. This is how the espresso coffee wave expanded and was further improved by Achille Gaggia. En 1882 Caffé Vergnano was born, the company with the largest



Desiderio Pavoni Image source: Espresso Gurus

number of coffee shops today, and later, in 1895, Luigi Lavazza opened his first store in Turin presenting his iconic coffee formula (a combination of arabica and robusta with beans from Brazil and Africa) and a couple of decades later consolidated and expanded with innovations in packaging, marketing and experiences becoming today the largest coffee company in the country. The 20th century witnessed many developments and growths in the Italian coffee culture, since after the creation of Lavazza, in 1933 came another great of the coffee

industry, Illy, which not only created the “Iletta”, but also developed the pressurized packaging and a 100% Arabica blend. On the other hand, the methods and quality of consumption continued to be perfected, and in that same year the famous Bialetti “moka” arrived, which became an icon for coffee lovers and revolutionized the consumption of coffee at home. In the last decades of the century Segafredi and Kimbo arrived, other large companies that dominated the market.



Moka

Image source: Bialetti

Espresso

The espresso is without any doubt the heart of Italian coffee culture, it is named after the speed of the brewing with pressure, and it is served in a small cup to the half and produces a characteristic cream on top.

There are differences in the blend used throughout the country, according to Jonathan Morris, a global history of coffee expert, "in the north there is a lighter coffee style mainly Arabica blends and it is common to add milk, while in the southern Italy coffee is darker and

heavier coffee specially Robusta (ristretto) and sugar dominates, it is more a digestive or energy boost" Morris and Fort (2022).

The north of Italy was once under the Austro-Hungarian empire, and it brought the cappuccino, which was drunk in Vienna, the Italian coffee culture is straightly linked to it, for instance Trieste that was part of Austria before was the port place for coffee importing and characterized the Austrian coffee culture.



Espresso

Image source: SiamHillsCoffee

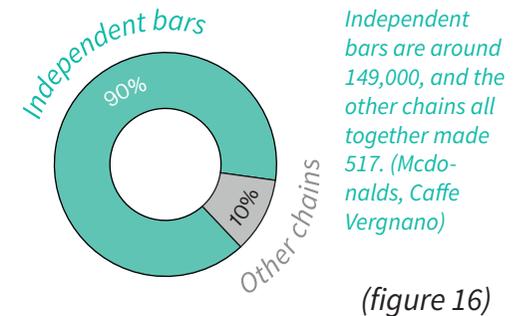
The Italian coffee industry and stakeholders

Italy, the second-largest green coffee importer globally, holds a distinctive position in the coffee market. In 2018, Italy accounted for 17% of the world's green coffee imports, with 97% of this coffee originating from producing countries. The majority of coffee enters Italy through the ports of Genova and Trieste, and it comprises 62% Arabica and 38% Robusta beans. **Key roasters** like Kimbo, Illycaffè, Zanetti, and Lavazza dominate the market,



leveraging mostly dark roasts to maintain a competitive advantage. Economic consumption patterns prevail in domestic bars, with 70% of Italian coffee consumers favoring espresso. Traditional independent coffee bars, constituting 90% of the market, are the go-to choice for 72% of Italians, followed by the workplace. Speaking now of coffee matters, the highest sales volume of retail in million euros are in the North West, following the Center & Sardinia and the north east. The global trend of organic growing markets also replicates in Italian

territory. Between 2017 and 2018, the organic coffee market in Italy witnessed a 5.8% growth. Italians, ranking 14th in the world per capita for organic product preferences, are increasingly valuing sustainability in their coffee choices.



After lunch coffee



Image source: Own

Types of coffee

Image source: (Dani, 2023)



Consuming behaviors (out of home)

The coffee consumption has shaped Italian dynamics, it became a daily ritual and strong tradition for 97% of Italians who on average drink 5,6 kg of coffee per year, and there are coffee bars practically in each corner. Italians think of it as a moment to pause, “caffè al volo” to speak with the baristas (many of them remember clients by name) or to colleagues/ friends, definitely it is all about the experience. As reported by CNBC (2022) , nowadays the Italian coffee

market is worth \$11.8 billion dollars and around 14 billion espressos are consumed each year just in Italy. The consuming behaviors for coffee are generally “morning getting a cappuccino generally accompanied by a brioche (croissant), espresso, or macchiato, after lunch is culturally strange seen to order a cappuccino, for the afternoon a macchiato is frequent and after dinner an espresso is taken. They either drink

Italians value not only the coffee as a beverage, but as a moment of pause and socializing with colleagues, friends, strangers, and most of all, baristas.

their coffee in the counters in search of a social experience, and this exchange is very quickly, (1 minute average) or when with friends they sit. Along with the espresso, most of the time comes a small sparkling water glass for pre drinking and cleanse the palate. In summer, the occasion arrives for drinking ice cold coffee such as shakerato, affogato or coffee cream, there are around 20 italian personalized coffee.



Moka method

Image source: The muse

Consumer behaviors (in home)

On the other hand, consumers in their homes consume coffee using the **moka** but lately this has been transformed by the **single-serve coffees**, particularly in pre-packaged coffee dispensers like pods and capsules, representing the fastest-growing segment in the Italian market.

This segment experienced a remarkable 14% growth from 2017 to 2018, with 37% of Italian coffee consumers preferring pods or capsules at home, and 50% opting for single-serve at the workplace.



Coffee waves in Italy

When speaking about the coffee waves in the Italian coffee landscape, we can say most of the **Italian market is still in the second wave, characterized by the traditional coffee based on the espresso brewing and dark roasting, and the third coffee wave is slowly growing**, with an approximate of 100 specialty shops (The Italian Market Potential for Coffee | CBI, 2020). In 2018, there was an important market disruption, when Starbucks launched its first

coffee shop in Italy with a roasting facility inside, and marked the formal starting point for the third wave, it is disruptive but is thought to be just another site for tourists (95 million in Italy alone in 2019) and will not change local consumption. Yet it has been a success, thanks to the integration of local customs with the addition of innovative, educational offerings, and different coffee options.

Traditional coffee bar in Italy



Image source: Corriere



Image source: Stir Tea Coffee

Conclusion

In short, the Italian coffee culture is very traditional, distinguished and valued by the locals, it is the cradle of espresso coffee, and only by valuing these traditions and integrating them into innovative experiences together with new products, will a gradual transformation towards the third wave of coffee be achieved. It is also necessary to consider the current habits of coffee consumption, which are characterized by the speed of

consumption, a reason for pause and enjoyment in the day, in addition to the accompaniment of meals, taking into account in particular the low cost of espresso ranging from 1 euro to 2 euros.

The second wave in Italy is a heritage that definitely must be preserved, but it also could be evolved, focusing on an experience over transaction paradigm shift, making coffee bars more experiential and for a more paused consumption such as Starbucks

Milano or Bar Torrefazione do. Baristas are incredibly important to consider, as they serve as a point of connection between customers, as bridges between tradition and innovation, and offer opportunities for communication, education and innovation.

Second territory: Colombia

The second territory analyzed was Colombia, one of the most important countries in terms of resources, biodiversity, water bodies, and culture in the world. It is situated in the tropic, between north and south america, with a strategic position and its coastline comprises the pacific ocean and caribbean sea.

Demography

According to the National Administrative Department of Statistics DANE (DANE - ¿Cuántos Somos?, n.d.), the total population in Colombia during the year 2023

corresponds to 52,215,50. The latest national census conducted by this entity during 2018; 51.2% of the total population of the country are women, while 48.8% are men, with a ratio of 100 men to 104.7 women. During this same census it is also highlighted that 68.2 % of the population is in the age group between 16-65 years.

Regarding the distribution of the Colombian population by location, it is recorded that 77.1 % of the population is found in the municipal capitals, 7.1 % in populated centers and 15.8 % is located in dispersed

rural areas.

Employment

For the year 2022, DANE recorded an unemployment rate of 11.2%, the overall participation rate was 63.6% and finally, the employment rate was 56.5%. Represented by an employed population of 22.0 million people compared to 2.8 million unemployed.

Geography

Colombia is located in the northwestern corner of South America and has a total area of 1,141,748 km². Colombia is divided

Colombian landscapes

Image source: Absolut viajes



into six regions: Caribbean, Insular, Pacific, Andean, Orinoco and Amazonian, from which the 32 departments and 1,123 municipalities are distributed throughout the country. (Political and Administrative in Colombian State, 2021)

The grouping of the Colombian departments in a certain region is established by multiple factors such as their location, climate, economy, soils, ecosystems, culture, gastronomy, among others. The mountain system and the oceans that surround the country are the structuring elements of the

territory, which is crossed from south to north by the mountainous formation of the Andes; bordered by the Pacific Ocean in the west and the Caribbean Sea in the north, the Orinoco basin in the east and the Amazon basin in the southeast. (DANE, n.d.) The physiographic diversity of the country, such as valleys, mountains, plains, sierra and highlands (figure 17), has an impact on the diversity of climates, which can vary, in the same period of the year, from high temperatures typical of a hot dry climate, such as in the desert area of La Guajira or a hot

humid climate in the Amazon region, as well as low temperatures in the areas of the snowy mountains and moors, passing through the different climatic floors that can be found in the Andean region.

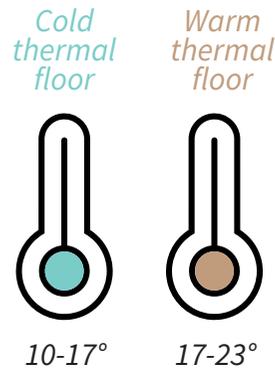


(figure 17)

Climate

Ninety percent of Colombia's territory is located north of the equator. Although the territory is completely in the Intertropical Zone, the climates of the different regions vary considerably due to the different altitudes, which can range from sea level to almost 6 km below sea level. Among these it can be find the warm thermal floor, with an average temperature above 23 °C, temperate thermal floor with an average temperature between 17 °C and 23 °C, cold thermal floor with an average temperature between 10 °C

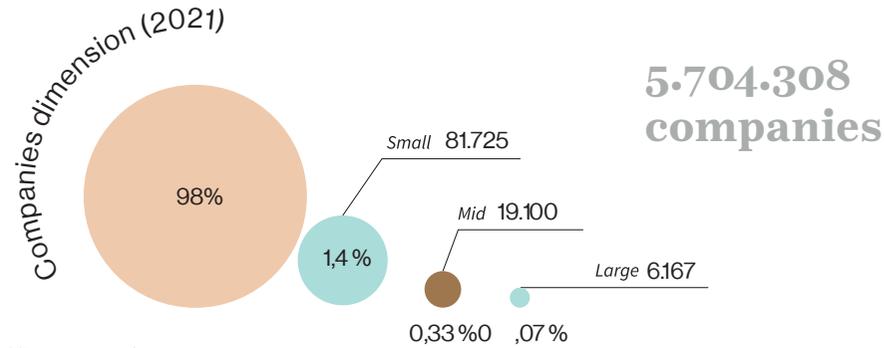
and 17 °C, páramo which refers from 3000 m to 4200 m altitude, with a temperature between 0 °C and 10 °C and from 4200m, snowy areas and peaks, temperature lower than 0 °C.



Industry

According to the 2021 report made by the Directory of Companies and Establishments, DEE, the total number of companies was 5,704,308, of which 84.8% are natural and 15.2% legal.(DANE, 2021)

According to this report, the economic activities in which they were engaged were: Professional, scientific, technical and administrative services with a percentage of 31.7%; Trade and repair of vehicles (20.3%); Arts,



(figure 17)

entertainment, recreation and other service activities (10.4%); and Public administration and defense, education and human health care (9.7%); corresponding to 71.9% of the total.

It is also taken into account that for the year 2021, 98% of the companies in Colombia will be micro-companies, corresponding to 5,597,316, 81,725 small companies, 19,100 medium-sized companies and finally 6,167 large companies. The economic units registered in the country for the year 2021 were

2,548,896 of which the economic sectors are five (5): Commerce, Industry, Services, Construction and Transport. For the year 2021, the commerce sector represented 55.2%, the services sector 40.1%, while the industry, transport and construction sectors were below 5%, with 4.2%, 0.2% and 0.2% respectively.(DANE,2021)



Main trading partners

During 2022 Colombia generated exports of USD 57,088.24 million according to FOB. The top 5 buyers of Colombian products during 2022 were the USA (USD 14,705.62 million), Panama (USD 5,834.34 million), the Netherlands (USD 2,697.79 million), India (USD 2,465.54 million) and Brazil (USD 2,332.41 million). (Redactores Legis, 2023)

Among Colombia's trading partners

in terms of export sales, the country that represents the largest percentage of total exports is the United States.

The most exported products are according to World Top Exports (2022):

- Mineral fuels including oil: US\$22.2 billion (57% of total exports)
- Coffee, tea, spices: \$4.1 billion (10.5%)
- Gems, precious metals: \$3.1 billion (7.9%)
- Animal/vegetable fats, oils, waxes: \$1.1 billion (2.8%)

- Live trees, plants, cut flowers: \$520.3 million (1.3%)
- Miscellaneous food preparations: \$500.1 million (1.3%)
- Fruits, nuts: \$450.2 million (1.2%)
- Plastics, plastic articles: \$430.6 million (1.1%)
- Machinery including computers: \$348.5 million (0.9%)
- Other chemical goods: \$339.3 million (0.9%)

Petroleum



Image source: Pinterest

Coffee



Image source: Image bank

Metals and minerals



Image source: Bureauveritas



Image source: Cafè imports



Image source: Mangeonsbien

Colombian coffee landscape

Colombia is probably the world's best-known arabica coffee producer and ranks third in the global production of coffee beans. It is home to thousands of smallholder farms, mainly family owned and the coffee is a generation to generation pride and tradition, leading into a big coffee growing culture and high standards for excellence.

Colombian coffee is recognized by its well balanced flavors and acidity, and this is due to the country's landscape which is responsible for making the best conditions for planting coffee particularly arabica and a vast number of other plants. (National Coffee Association USA, n.d.)



Exporting

The coffee sector is extremely important for the Colombian economy, as a matter of fact **Colombia is the third largest coffee producing country in the world after Brazil and Vietnam.**

This activity represents 22% of the country's agricultural GDP and the main source of income for more than 550,000 families. In addition to this, it is the most exported agricultural product.

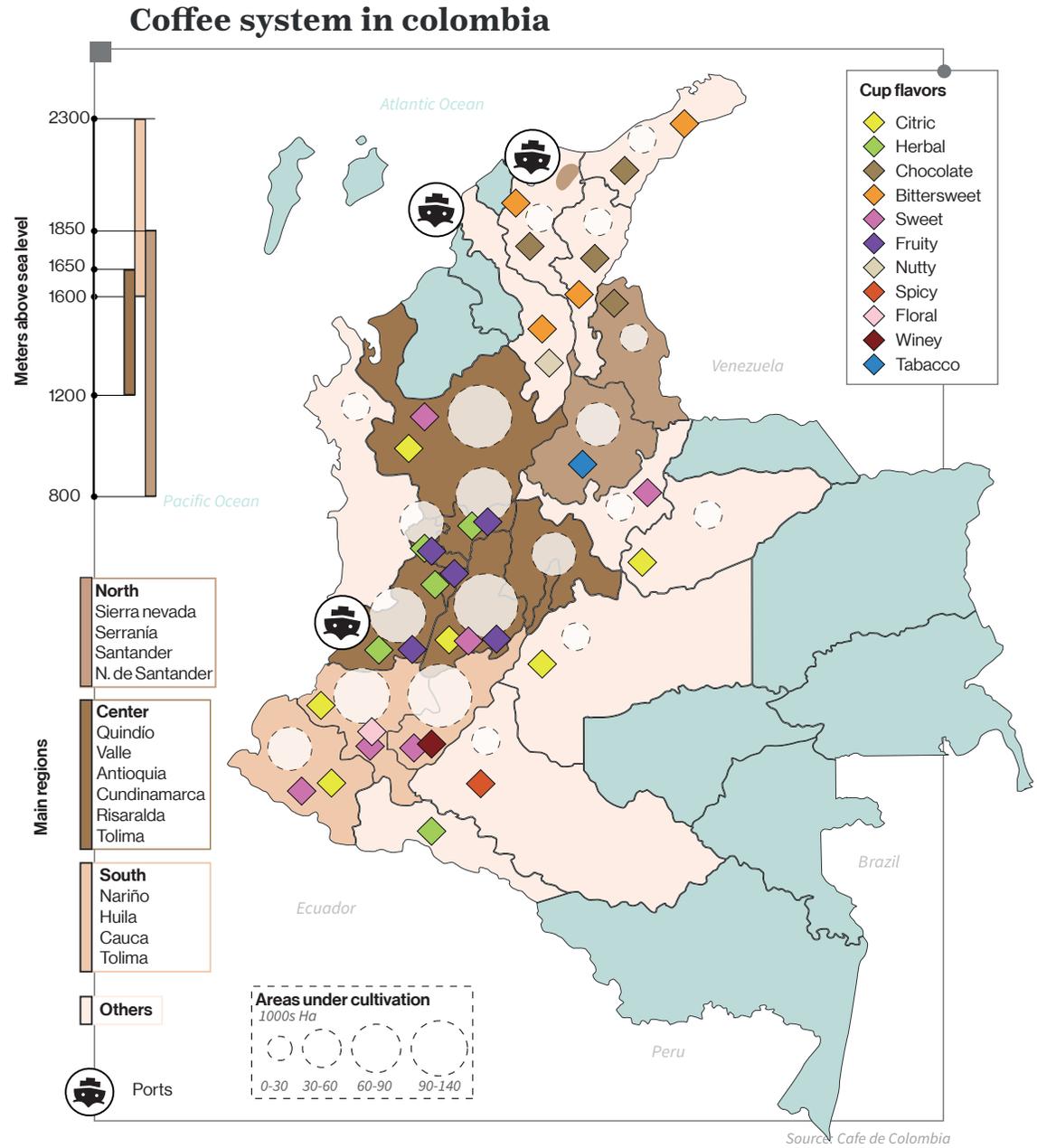
Revenues for the coffee exports in Colombia arrive to USD3,959.29 million, and the **top 5 exporting companies** according to information from the (FOB):

- 1 Federación Nacional De Cafeteros De Colombia: With USD544'075.076.
- 2 Olam Agro Colombia SAS: With \$407'535.310 dollars.
- 3 Sucden Colombia SAS: With \$386'354.959 dollars
- 4 Carcafé Ltda: with \$361'667.635 dollars
- 5 Racafé Y CIA Sca: with \$319'501.429 dollars



Coffee cultivation occupies a very important place in the economy, taking into account 22 of the 32 departments of the country that produce coffee, and of which 96 % are small-scale producers with an average of 1.3 hectares of coffee per farm.

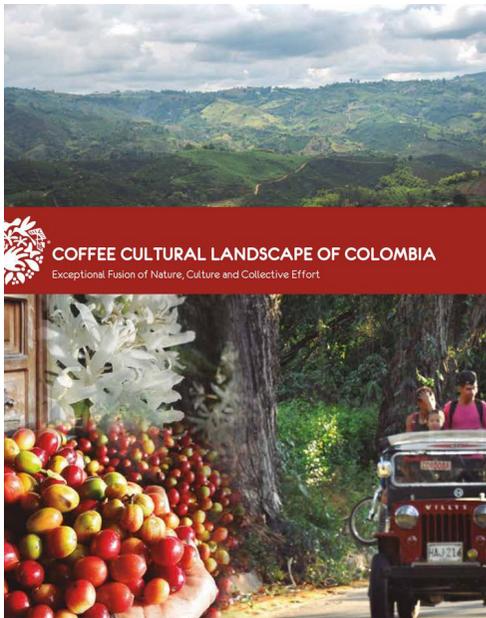
Also, Colombia has been improving the adherence of certification schemes, as reported by Ramírez (2023) the most used ones are "Rainforest Alliance, Fairtrade, Organic Coffee, Bird Friendly, 4C, C.A.F.E. Practices Starbucks y AAA de Nespresso"



(figure 17)



Important stakeholders



Coffee cultural Landscape:
Quindio, Caldas, Risaralda, Valle del Cauca.

Coffee farmers : Located in 22 of the 32 deparments, more than 90% are smallholder farms, and the main regions. There are over 500,000 coffee farmers and the biggest producers are:

HUILA	18,37
ANTIOQUIA	15,81
TOLIMA	13,29
CAUCA	10,46
CALDAS	7,78
RISARALDA	5,44

VALLE DEL CAUCA 5,33
SANTANDER 5,21

Vanegas (2021)

Important coffee cooperatives:
currently 33 coffee cooperatives representing over 77.000 coffee farmers. The cooperatives are mostly divided geographically, either by departments or regions. Some of the most relevant ones are: delosAndes Cooperativa, Caficosta, CadefiHuila, Coopcafer. (Federacion Nacional de Cafeteros, s.f.)

Roasters: There are over 100 authorized coffee roasting partners in Colombia such as Almacafè, Colcafè, Olam Agro, entre otros.

Institutes: Federación nacional de cafeteros: Main association intermediating and representing coffee producers, unites all the cooperatives, helps them organize their product in a financial, law-abided and estructured way for national and international commercialization. The FNC straightly work with Ministry of

Commerce, Industry and Tourism (MINCIT)

National Coffee Research Center (Cenicafé): Líder en investigación científica y tecnológica en el sector del café, y uno de los mejores en el mundo.

CRECE: Centro de investigación que se enfoca en desarrollo regional, economía del café y desarrollo social e institucional.

Agrocafé (Agroinsumos del Café): Ofrece orientación en técnicas

de cuidado de cultivos de café y prácticas de desarrollo.

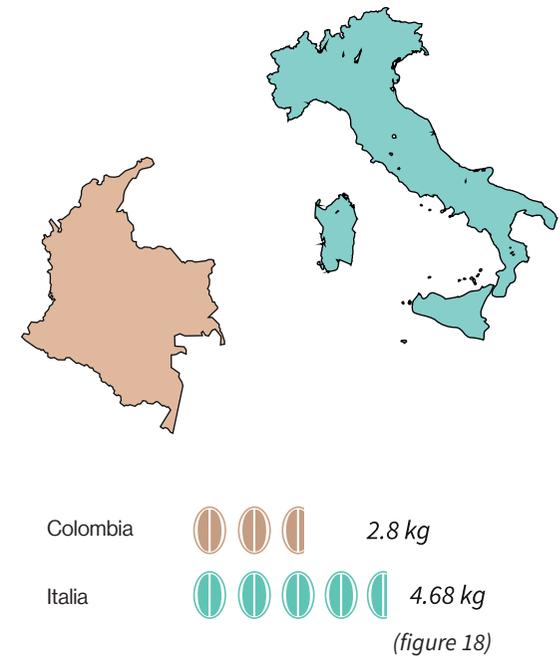
Cafecert: Fundación que ayuda a los agricultores a certificar y etiquetar productos secundarios de café bajo estándares internacionales.

Comparing territories

The next step after getting to know the territorial dynamics of Italy and Colombia was to compare some of the most relevant and common data. The next step after understanding the territorial dynamics of Italy and Colombia was to confront some of the most relevant and common data. We can conclude that these countries are supremely important for the coffee industry and together they rank among the top 6 largest coffee exporters in the world. **They are recognized for their coffee excellence**, with Italy being a roaster and faithful

representative of espresso coffee culture in the daily lives of Italians, while Colombia has positioned itself as the third-largest coffee producer globally, distinguished by the quality it exports, nearly 100% of Arabica coffee, and the premium characteristics the coffee obtains from its territory.

There's a significant difference in coffee consumption between both countries. Italy consumes over 14 billion cups of coffee annually and is one of the countries with the highest per capita consumption, whereas



Colombia doesn't even arrive to the billion cups. Mediterranean country annually. Colombia exports its best coffee to other markets, leaving lower-quality coffee for domestic consumption. This "tinto," similar to an over-roasted, black, bitter Americano coffee, is often accompanied by sugar and milk. Additionally, a significant percentage of **Colombians consume instant coffee, known for its lower quality.** This phenomenon is explained partly by economic factors, as specialty coffees are perceived to have a high price, and there's a lack of knowledge about the attributes and aromas

that the coffee can offer. *"We don't consume our coffee because we don't know it,"* says Juan Medina, the commercial manager of one of the largest supermarket chains. Initiatives have aimed to reduce this issue. Juan Valdez, the largest coffee chain in Colombia (with 303 stores), promotes the sale of specialty coffee within the country. In Colombia, the retail landscape is less fragmented, with around 1,000 stores belonging to major chains and an estimated total of just over 10,000 coffee shops in the country. In Italy, however, there are around 149,000 independent bars that serve coffee.



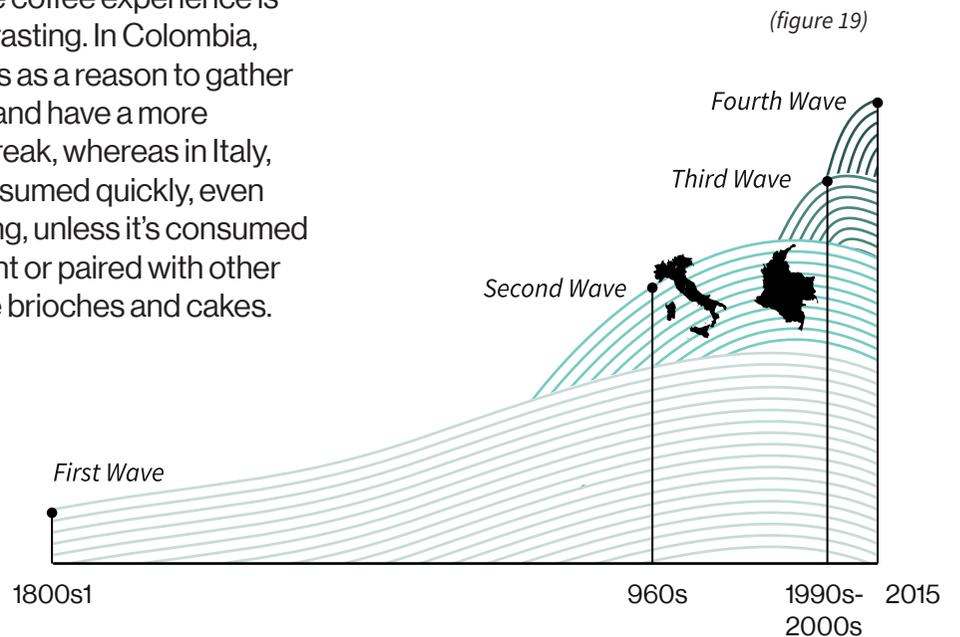
Image source: Yo amo el café de Colombia

Regarding coffee waves, Italy stands out for firmly positioning itself in the second wave of coffee, while Colombia has a large number of third-wave coffee shops, being more flexible with specialty consumption and alternative methods to espresso.

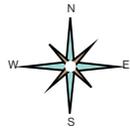
Both countries share a great love for coffee, using it as a bridge for social interaction among friends, new acquaintances, and baristas.

In Italy, there's a high value placed on the relationship with baristas, location, and price, which are typically low (around 1 euro).

However, the coffee experience is slightly contrasting. In Colombia, coffee serves as a reason to gather with friends and have a more prolonged break, whereas in Italy, coffee is consumed quickly, even while standing, unless it's consumed in a restaurant or paired with other products like brioches and cakes.



★ **3rd BIGGEST COFFEE ROASTER** and top 8 consumers per capita of coffee in the world



Small big economy INDUSTRY

Economic fabric of micro companies of services (services, banks) and manufacturing (industry, cars, fashion)

- ★ Getting more clients
- ★ Reduction of costs
- ★ New products and technologies



14 billion drunk coffee cups a year

HUGE COFFEE CULTURE

Italy is home to the espresso method and of the coffee tradition,

3-4 coffee cups a day
5.9 kilograms of coffee per year



2nd coffee wave

RETAIL COFFEE ECONOMY

Retails sell most of the coffee, then hotels, restaurant and coffee shops. Traditional retails are found in every angle and **italians highly value:**



- relationship with baristas
- location
- price convenience

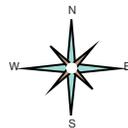
There isn't an outstanding long chain brand due to the elevated fragmentation and profitability margin.



No instant coffee please

PURCHASE & CONSUMPTION

After **roasted ground coffee**, the roasted coffee pods are the most sold. In consumption means, the **moka** in (2016) was the highest method use, followed by pods, espresso, decaffeinated, instant and beans. *Coffee blends are highly used*



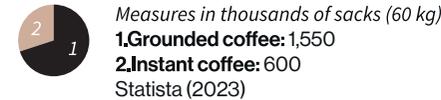
Rising **e-commerce** for food products.

★ **3rd BIGGEST COFFEE PRODUCER** and top quality coffee producer

22,000 million cups a year

99% of colombians drink coffee
2.1 kg per capita yearly

Preferred method: Filter



Clue actors

TRADE REGULATOR
The National Growers Federation **regulates trade and protects** coffee farmers with purchase options and capability initiatives.



Weather challenges

UNPREDICTABLE & DRASTIC
"El niño y la niña" phenomena which distroys or alters crops and harvest times.



Small companies

Industry fabric composed of micro companies, and dedicated to services, public administration and manufacturers and then agriculture.

Focus on quality



FOR COFFEE PRODUCTION
Colombia must focus on providing quality arabica beans due to the **lack of space and morfology to mass produce**



BRANDED CHAINS
Famous character and large coffee chain "Juan Valdéz" highly positioned, and present in 13 countries

Quality for others



FOR COFFEE PRODUCTION
Best quality coffee is exported and the lower quality is left for internal consumption.

"We don't consume our own coffee because we don't know it"
Juan medina, Carulla commercial leader



DIFFERENT COFFEE CULTURE
Consumers drink for sociality but the beverages are not strictly high quality.

Risks

- ⚠ The generational change
- ⚠ **Security issues** and road blockades

(figure 20)



Image source: Perfect Daily Grind

Supply chain

The following is an analysis of the coffee production chain, taking as a reference the global and more general production processes used in the Colombian and Italian territory. Considering the import and export relations of the respective countries and their coffee consumption. Likewise, the coffee waves are considered as a measure of the situation of the coffee consumption industry and innovation-tradition. In addition, key information is added to understand the dynamics of the producing country (Colombia) from the most relevant descriptions

regarding the composition of the farms in Colombia, cultivation heights, types of products derived from coffee, agricultural systems, calendar, etc.

In the coffee processing scheme, 11 general and fundamental stages are considered when the roasting process is done internationally (if done locally the process shortens), which include the price distribution per phase, most important and influential actors, inputs, activities and outputs generated by each stage, in order to later analyze the

environmental impacts and obtain conclusions in this respect.

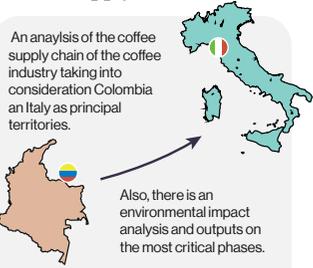
In the next page lies the Holistic Diagnosis of the Supply chain, taking into consideration Colombian and Italian territories.(figure 19)

Holistic diagnosis

Coffee supply chain

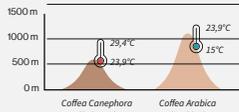
An analysis of the coffee supply chain of the coffee industry taking into consideration Colombia as an Italy as principal territories.

Also, there is an environmental impact analysis and outputs on the most critical phases.



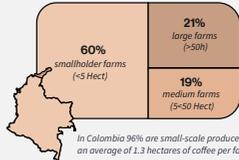
Coffee planting altitude

Ideal planting conditions for main coffee varieties



Coffee farms dimension

There are around 12.5 million farms mainly dedicated to coffee worldwide (Envertas & Carta, 2019)



In Colombia 96% are small-scale producers with an average of 1.3 hectares of coffee per farm

Number of farmers

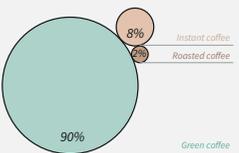


Incomes

- Coffee production
- Cash transfer programs
- Alternative crops
- Subsidies
- Beekeeping
- Animal sales
- PES schemes

Products

Colombia's coffee exports by typology in 2022



Source: Latendyadecolombia

Import and export relation

World's major exporters of coffee in revenue (dollars) World top exports (2022)

- Brazil: US\$8.5 billion (18.4% of total coffee exports)
- Colombia: \$4.1 billion (8.8%)
- Switzerland: \$3.4 billion (7.4%)
- Germany: \$3.39 billion (7.3%)
- Vietnam: \$3.23 billion (7%)
- Italy: \$2.4 billion (5.1%)

Exported coffee sacks (2022)



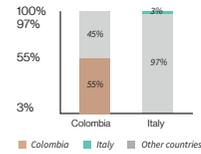
Importing coffee value (2022)



Coffee Geography Magazine (2023)

Consumed coffee

Origin of consumed coffee

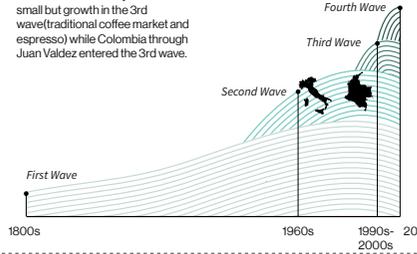


Consumption per capita



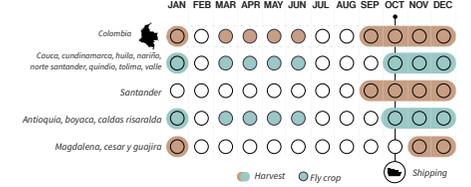
Coffee waves

The coffee evolution has been characterized in four waves, and Italy is still in the secondary wave with a small but growth in the 3rd wave (traditional coffee market and espresso) while Colombia through Juan Valdez entered the 3rd wave.



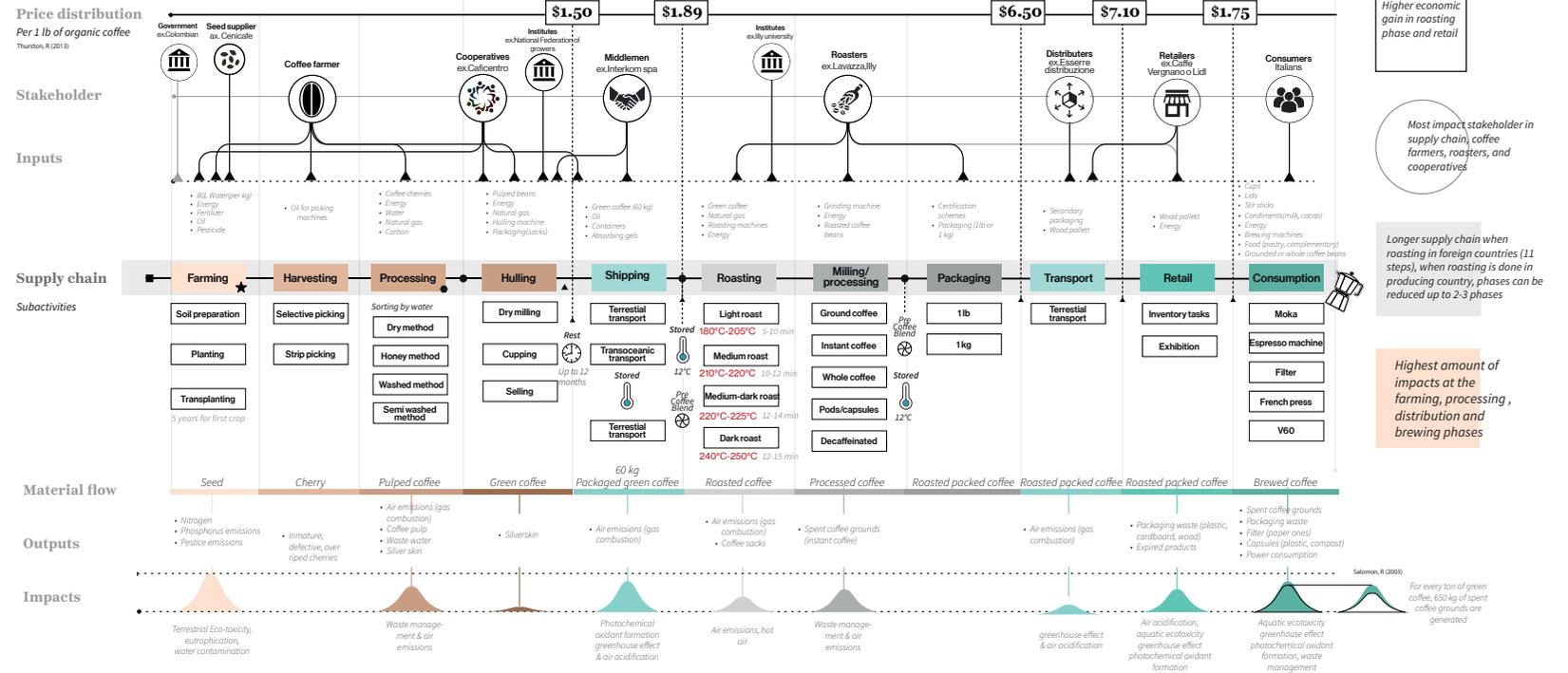
Calendar for harvesting

Colombia's diverse morphology extends the range for the harvesting, having in general 5 months of harvest and 4 of fly crops



Source from: Trabocco.com

Coffee productive process



Higher economic gain in roasting phase and retail

Most impact stakeholder in supply chain, coffee farmers, roasters, and cooperatives

Longer supply chain when roasting in foreign countries (11 steps), when roasting is done in producing country, phases can be reduced up to 2-3 phases

Highest amount of impacts at the farming, processing, distribution and brewing phases

Agricultural system

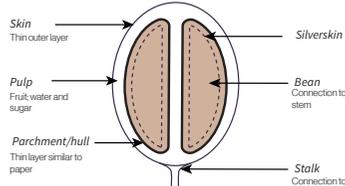
There are two predominant agricultural systems for planting and harvesting coffee, sun grown and shade grown in Colombia



Source from: Café de Colombia & Colombian coffee hub

Coffee cherry's anatomy

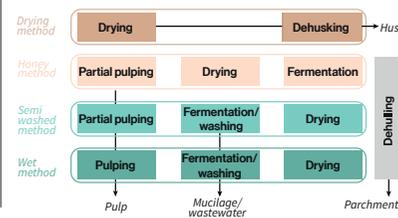
Components of the coffee cherry



https://www.semanticscholar.org/reader/7f89296b961fc33c540b12b2c152a26f222602008

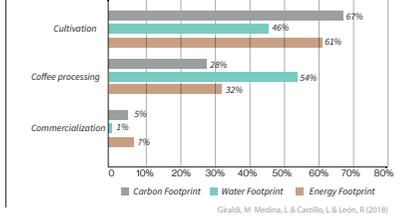
Processing types

Most used processing methods for the coffee cherry



Environmental impacts

Environmental impacts in the ground coffee production



Gialdi, M. Medina, L. & Castillo, L. & León, R. (2018)

(figure 19)

Impact assessment

The coffee supply chain is a very complex matter to analyze, and for starters we can say it is a very long one, it generally is divided into few macro activities which include many sub-activities, but when reviewing the literature, we arrived to 11 fundamental steps, that involve many resources and actors which are key for the development of the activities. Also, the actual supply chains (Excluding direct trade or local roasting) are very linear, and there is almost no circularity in terms

of energy, economy, information, wastes, etc among the stakeholders or different phases.

Now, speaking of environmental impacts, it is a challenge to harness the amount of impacts the supply chain generates because of the great number of factors, variables, and practices

that characterize each supply chain (lets say that if there are 12,5 million farms in the world, there could possibly be 12,5 million different ways of farming, harvesting, processing, etc, thus considering

also the amount of traders, roasters, and retailers in the world, we can say every process is unique)

In the following page we can observe what are the hotspots in the environmental impacts of a cup of Arabica coffee brewed through the filter mode, taking as a reference a Colombian farm

The Coffee Value Circle



Image source: Quantis (n.d)

Then focusing on particular impacts according to the multiple phases, QUANTIS et al., s. f. state:

The cultivation phase dominates contributions to acidification, eutrophication, ecotoxicity, and land use, accounting for almost 70% of the total impact.

The cultivation phase also contributes anywhere from 10-25% to ozone depletion, human toxicity, ionizing radiation, and resource depletion. Distribution of coffee from farm to user is responsible for approximately 40% of the ionizing radiation impact, and accounts for around 25% of ozone depletion, photochemical formation, and human toxicity impacts. The use stage contributes almost 60% to

water use, resource use (fossil and minerals and metals), and to the ionizing radiation environmental impact categories. Manufacturing and packaging process, as well as the end-of-life phase, provide few contributions to most categories, accounting for less than 10% of the total environmental impact.(pag.61)

In Colombia there is a huge water footprint in the coffee processing because the washing method of coffee (most used one in Colombia) due to the humid conditions uses around 15.3 L per kilogram of coffee and, according to Jeisson Alonso Riaño Quintero, Sustainability Project Coordinator in ExpoCafé, the polluted water is

called honeywater and in Colombian farms around 78% is dropped in soil and 22% in irrigation ditches that lead to water bodies (rivers or streams). The honey water is not processed in many farms through solids accumulation or capture treatment for grease and different components, and this slowly will affect the quality and pureness of the surrounding water bodies. Initiatives such as “WRM-Water Resource Management, The Blue Coffee Bean, and the Cooperativa del Sur del Tolima- Cafisur” Bernal (2022) are developing projects for the installment of treating modules in farms, for further reusing the water or depositing it in treatment plants.



Agricultural systems impact ecosystems from shade grown to sun grown (with middle points between them, for example low diversity shade), and in the same order shade grown has much less impact on the ecosystem while sun grown has massive consequences on the environment. Let us remember that shade grown refers to a greater biodiversity on the territory, has lower productivity (manual harvesting method), with a high number of trees and different species of plants, thus protecting the local fauna including birds and

bats that are essential for natural pest control, while sun grown is often implemented on flat land for higher productivity (since harvesting machines can be used), and is associated with deforestation for the predominant use of monoculture and no biodiversity, which causes displacement of animals and possible extinctions. In the case of Colombia, in 2010 according to FAO(2014), it is estimated that the cultivated areas are 63% low diversity shade, and 37% are shade grown. Colombian coffee (which is of Arabica species) is grown in

elevated and mountainous areas, and such areas produce a more special and sweet coffee but being located in irregular terrain makes mechanical harvesting almost impossible and therefore prices are increased and productivity decreases. Due to the above, Colombia aims towards quality coffee, and the plantation of robusta in the Colombian territory is counterproductive, since it could not be competitive with the production costs (time and labor).



In conclusion, the highest impacts are, **eutrophication** (which impacts the water bodies and terrain) because of fertilizers, nutrients, and pesticides, **particulate matter** (related to emissions impacting air quality) because of ammonia emissions in the farming activities, and particulate matter when processing the coffee., **climate change** in terms of N₂O emissions related to the fertilizer used for the cultivation activities, eco toxicity when the soil and water get polluted by chlorpyrifos, finally **land use** because of the great amount of

land destined to mono cultivation of coffee in which deforestation takes place and there isn't natural regenerations for this territories. (QUANTIS et al., s. f.)

Multiple efforts and initiatives have been developed for minimizing the environmental impacts at farm level, because many of them are also related with low efficiency in their productive processes.

Improvements should find a balance in reducing climate change's impact without highly compromising

economic resources, and solutions could go from diversification and planting of alternative species (especially trees) for guaranteeing a better ecosystem and carbon capture, improve water irrigation systems and filtering, transform the coffee pulp and wastes into biomass for creating an energy cycle, improving the fertilizers quality and how they are sumministrated, updating or buying new machinery (it is a high cost investment), and renewable resources systems with solar energy.(QUANTIS et al., s. f.)

Challenges and opportunities

The objective of this next chapter is to filter all that has been investigated and analyzed previously in the chapters of “A coffee synthesis” together with the “Holistic diagnosis” to weave and transform this information into what would be the next step of the systemic design methodology “Challenges and Opportunities” This is a fundamental step that puts to the test what has been investigated, because it is the crucial step to punctuate and give the basis for the development of systemic projects.

The challenges and opportunities map (at the right) aims to analyze and synthesize the coffee industry's challenges and opportunities integrating Colombia and Italy's coffee realities, based on the stakeholder holistic diagnosis, territorial gigamap, and supply chain. The challenges are represented in cups, and the circles inside represent how many and which stakeholders are affected (see legend), then the challenges (cups) are connected to the opportunities found below. The colors refer to the types of resources/categories

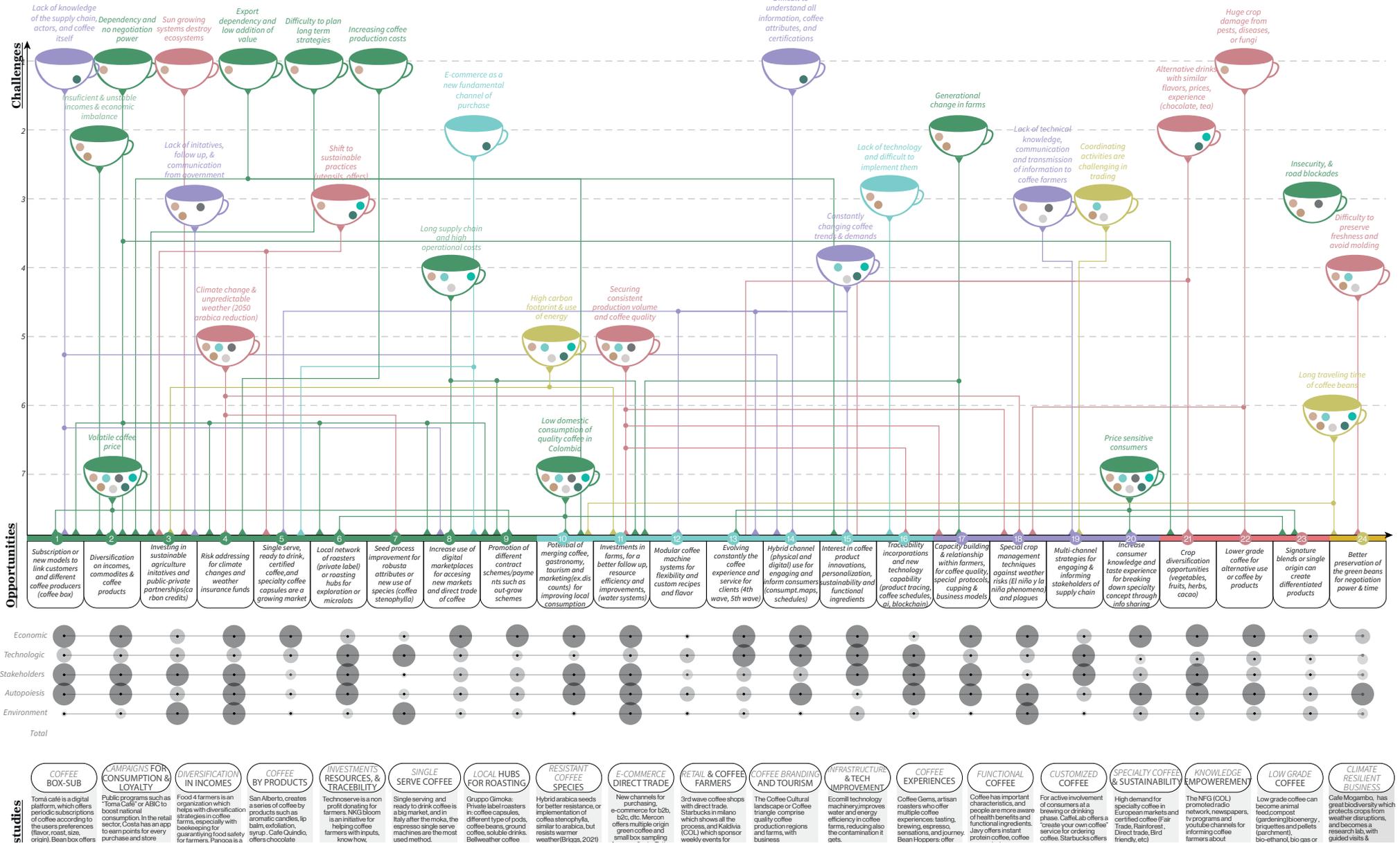
following the information and line of the stakeholder map (see legend). Furthermore, there is an evaluation of the opportunities proposed in terms of how much they are responding to challenges (the cups) and the 5 pillars evaluation (economic, technologic, stakeholders, autopoiesis and environment) Finally, case studies were developed for the most relevant opportunities, and aimed to include the majority of them.

Challenges & Opportunities

Analysis and synthesis of the coffee industry challenges and opportunities integrating Colombia and Italy's coffee realities, based on the stakeholder holistic diagnosis, territorial gigamap, and supply chain. The challenges are represented in

terms of how much they are responding to challenges (the cups) and the 5 pillars evaluation (economic, technologic, stakeholders, autopoiesis and environment). Lastly there are case studies propose for each one.

terms of how much they are responding to challenges (the cups) and the 5 pillars evaluation (economic, technologic, stakeholders, autopoiesis and environment). Lastly there are case studies propose for each one.



Challenges and opportunities

There were so many interesting findings after structuring the challenges and opportunities, firstly, the challenges were developed according to the most relevant and repetitive weakness and threats found in each of the stakeholders SWOT, stakeholder map, and holistic diagnosis of the territories and supply chain.

What is interesting is that the main categories of the problems refer to economic, information and material-matter issues, and this unveils criticalities in the economic balance of the coffee industry with

a lack of information and system disconnection shared throughout the system.

Economic Also we can see that the majority of the economic challenges include coffee farmers, and in almost the half they only affect them which again shows how much vulnerability they face. While the most shared challenges are still economic and refer to the market system dynamics of the commodities, is related to the low domestic consumption in producing countries in particular Colombia, and the price sensitive consumers

which is related to the low value actual perception of coffee. This all is linked to the fact that coffee's economic value in comparison with other commodities or products hasn't grow significantly over the time, while production costs due to climate change and unpredictable weather are increasing, which is a critic situation if we are speaking of smallholder farms which rely on the crops' incomes and the vast majority of them live in poverty .

Material The material challenges are related mostly with the green coffee bean exchange, and its vulnerability



through the productive process, not only due to environmental factors (weather, sun, mold, humidity, pests) but also human intervention (good or bad practices when processing, storing, selecting) and how it is necessary in the trade, the completion of expected demand and most of all, the quality standards and certifications.

Information Another of the imperative demands of this system, is the disconnection among the stakeholders in the supply chain, and lack of communication of vital importance for improving

control of the market, prevention of material shortages, diffusion of new techniques and market demands that if harnessed and communicated could help vulnerable stakeholders prepare and add value. For instance, if there is a future shortage of supply of coffee in a specific country or company, early communications to producers could help them organize better production, or likewise if roasters are planning on selling to a new market with their own sustainable schemes, it is fundamental to organize and collaborate with farmers. We

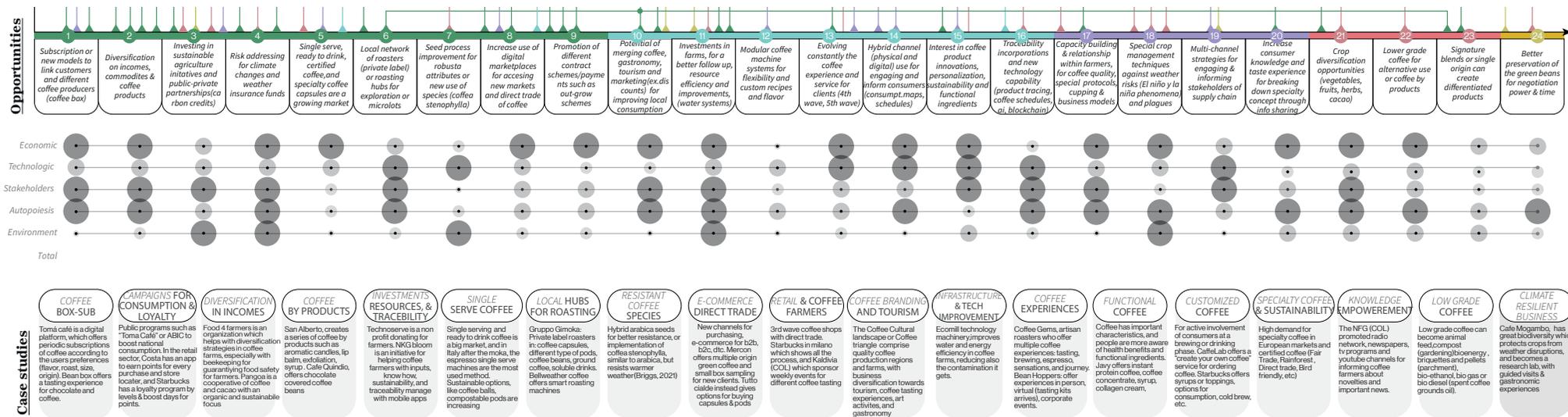
see that the most disconnected stakeholders in terms of information are the consumers, and retailers gain all of the portion of the consumer's purchase behaviors, preferences, price limits and demands.

Innovation When speaking about innovation, there are still issues to address in terms of technology and innovation, at farm level, with improving efficiency, resource management and sustainability, and traceability in production and sales (qr code), at distribution level with preservation systems for the coffee sacks due to long traveling times, at roasting instances for preserving green and roasted beans, guaranteeing exact roasting profiles and improving energy efficiency, and at retail level for adapting to digital channels and e-commerce

and offering better experiences to the client, because they are open to innovations and are constantly updated about the trends.

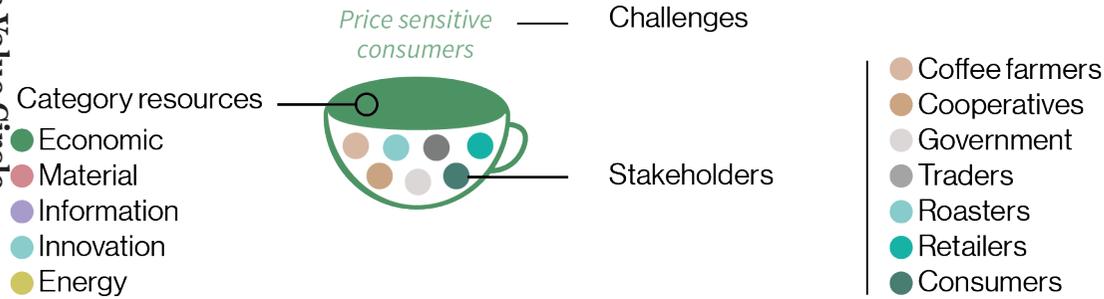
Energy The energy resources usage in the industry are elevated in multiple steps, especially in transforming activities at processing phases in farm and roasting level, distribution comprising ground and ocean transportation, refrigeration for preservation of coffee, and at brewing steps with the espresso, or different machines. Energy includes electricity, fossil fuel, gas, carbon, and other heat producing systems.

At the right we found the evaluation of the opportunities according to the systemic design pillars.



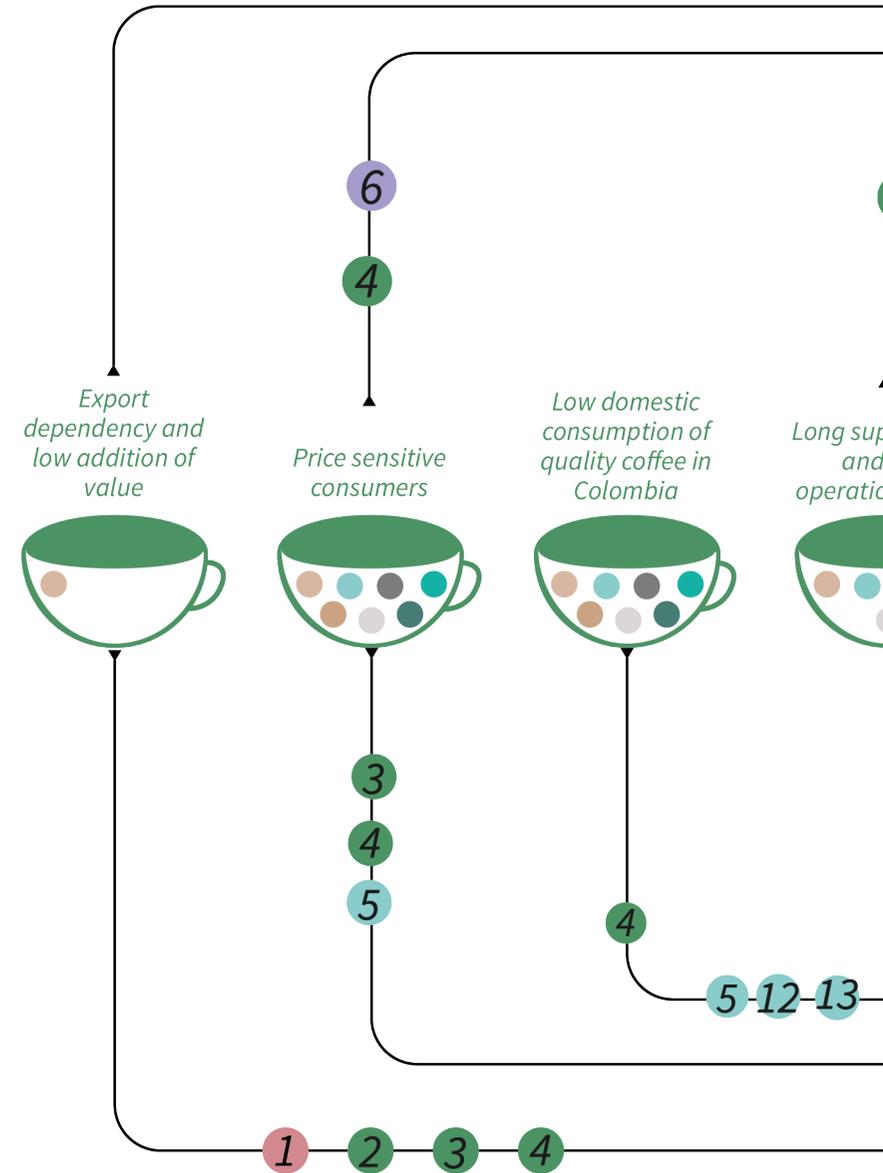
Challenges Italy & Colombia

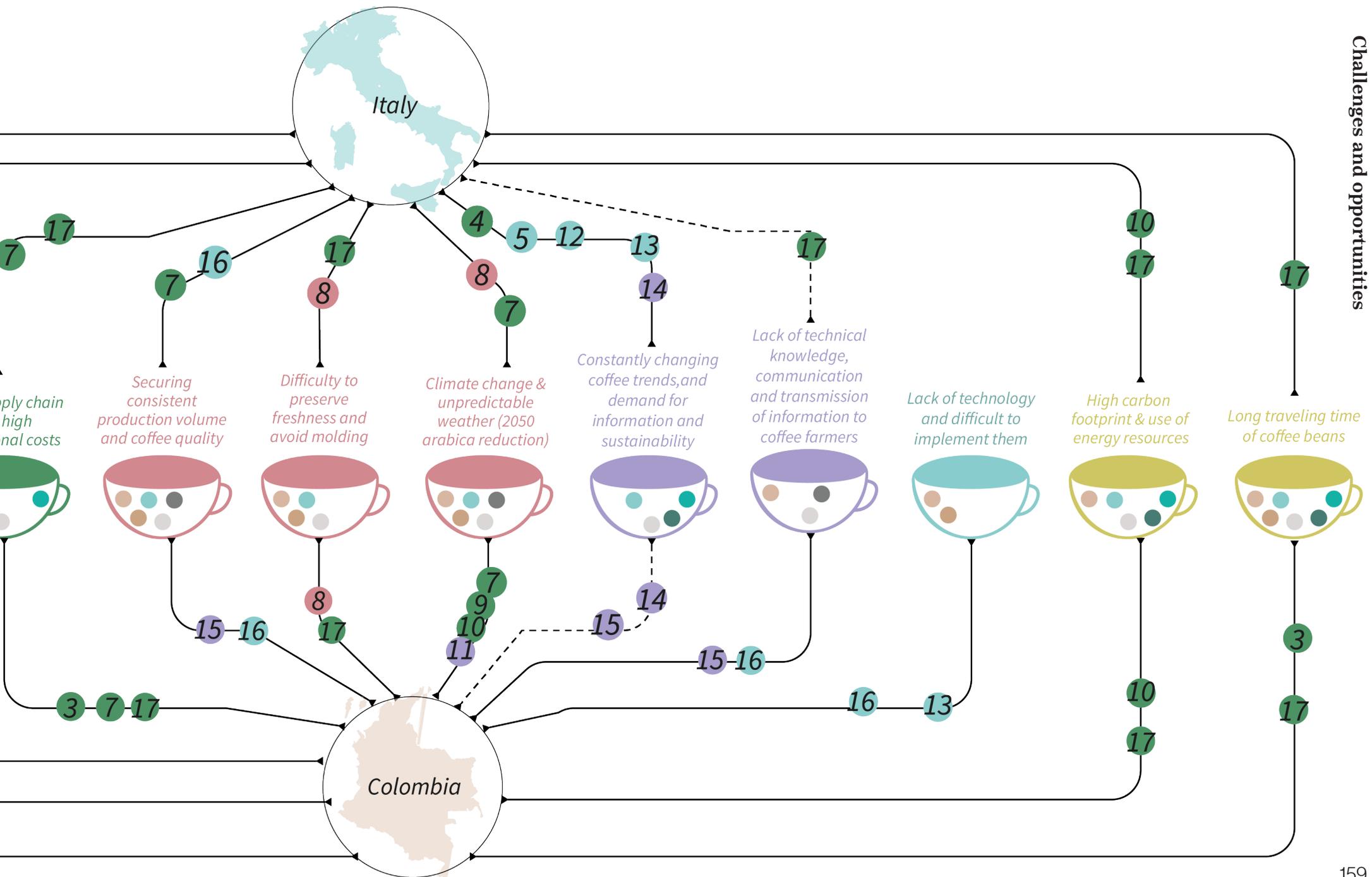
The Coffee Value Circle



Opportunities

1. Crop diversification opportunities (vegetables, fruits, herbs, cacao)
2. Diversification on incomes, commodities & coffee products (green, roasted, instant)
3. Local network of roasters (private label) or roasting hubs for exploration or microlots
4. Subscription or new models to link customers and different coffee producers
5. Evolving constantly the coffee experience and service for clients (4th wave, 5th wave)
6. Increase consumer knowledge and taste experience for breaking down specialty concept through info sharing
7. Investments in farms, for a better follow up, resource efficiency and improvements, (water systems)
8. Lower grade coffee for alternative use or coffee by products
9. Risk addressing for climate changes and weather insurance funds
10. Investing in sustainable agriculture initiatives and public-private partnerships (carbon credits)
11. Special crop management techniques against weather risks (El niño y la niña phenomena) and plagues
12. Interest in coffee product innovations, personalization, sustainability and functional ingredients
13. Hybrid channel (physical and digital) use for engaging and inform consumers (consumpt.maps, schedules)
14. Increase consumer knowledge and taste experience for breaking down specialty concept through info sharing
15. Capacity building & relationship within farmers, for coffee quality, special protocols, cupping & business models
16. Traceability incorporations and new technology capability (product tracing, coffee schedules, ai, blockchain)
17. Shorten supply chain and direct trade with roasters, retailers, or consumers

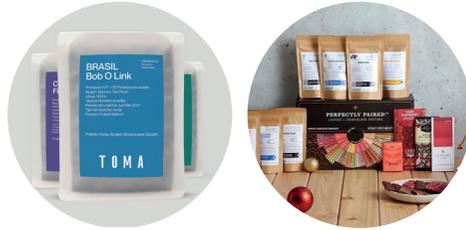




Challenges and opportunities

Case studies

Here we find the relevant case studies visualized in the challenges and opportunities,



COFFEE BOX-SUB
Tomá café is a digital platform, which offers periodic subscriptions of coffee according to the users preferences (flavor, roast, size, origin). Bean box offers a tasting experience for chocolate and coffee.



CAMPAIGNS FOR CONSUMPTION & LOYALTY
Public programs such as “Toma Café” or ABIC to boost national consumption. In the retail sector, Costa has an app to earn points for every purchase and store locator, and Starbucks has a loyalty program by levels & boost days for points.



DIVERSIFICATION IN INCOMES
Food 4 farmers is an organization which helps with diversification strategies in coffee farms, especially with beekeeping for guarantying food safety for farmers. Pangoa is a cooperative of coffee and cacao with an organic and sustainable focus



COFFEE BY PRODUCTS
San Alberto, creates a series of coffee by products such as aromatic candles, lip balm, exfoliation, syrup. Cafe Quindio, offers chocolate covered coffee beans



INVESTMENTS RESOURCES, & TRACEABILITY
Technoserve is a non profit donating for farmers. NKG bloom is an initiative for helping coffee farmers with inputs, know how, sustainability, and traceability manage with mobile apps



SINGLE SERVE COFFEE
Single serving and ready to drink coffee is a big market, and in Italy after the moka, the espresso single serve machines are the most used method. Sustainable options, like coffee balls, compostable pods are increasing



LOCAL HUBS FOR ROASTING

Gruppo Gimoka: Private label roasters in: coffee capsules, different type of pods, coffee beans, ground coffee, soluble drinks.
Bellweather coffee offers smart roasting machines



RESISTANT COFFEE SPECIES

Hybrid arabica seeds for better resistance, or implementation of coffea stenophylla, similar to arabica, but resists warmer weather (Briggs, 2021)



E-COMMERCE DIRECT TRADE

New channels for purchasing, e-commerce for b2b, b2c, dtc. Mercon offers multiple origin green coffee and small box sampling for new clients. Tutto cialde instead gives options for buying capsules & pods



RETAIL & COFFEE FARMERS

3rd wave coffee shops with direct trade. **1)** Starbucks in milano which shows all the process, and **2)** Kaldivia (COL) which sponsor weekly events for different coffee tasting



COFFEE BRANDING AND TOURISM

The Coffee Cultural landscape or Coffee triangle comprise quality coffee production regions and farms, with business diversification towards tourism, coffee tasting experiences, art activities, and gastronomy



INFRASTRUCTURE & TECH IMPROVEMENT

Ecomill technology machinery, improves water and energy efficiency in coffee farms, reducing also the contamination it gets.



COFFEE EXPERIENCES

Coffee Gems, artisan roasters who offer multiple coffee experiences: tasting, brewing, espresso, sensations, and journey. Bean Hoppers: offer experiences in person, virtual (tasting kits arrives), corporate events.



FUNCTIONAL COFFEE

Coffee has important characteristics, and people are more aware of health benefits and functional ingredients. Javy offers instant protein coffee, coffee concentrate, syrup, collagen cream



CUSTOMIZED COFFEE

For active involvement of consumers at a brewing or drinking phase. CafféLab offers a “create your own coffee” service for ordering coffee. Starbucks offers syrups or toppings, options for consumption, cold brew, etc.



SPECIALTY COFFEE & SUSTAINABILITY

High demand for specialty coffee in European markets and certified coffee (Fair Trade, Rainforest, Direct trade, Bird friendly, etc)



KNOWLEDGE EMPOWERMENT

The NFG (COL) promoted radio network, newspapers, tv programs and youtube channels for informing coffee farmers about novelties and important news. Blockchain technologies for traceability



LOW GRADE COFFEE

Low grade coffee can become animal feed,compost (gardening)bioenergy, briquettes and pellets (parchment), bio-ethanol, bio gas or bio diesel (spent coffee grounds oil).



CLIMATE RESILIENT BUSINESS

Cafe Mogambo, has great biodiversity which protects crops from weather disruptions, and becomes a research lab, with guided visits & gastronomic experiences

Systemic design outputs guidelines

“Enhancing Italian coffee tradition while opening new space for specialty coffee experiences “

Overview:

This systemic design project aims to introduce specialty coffee tastings in traditional Italian retail spaces, benefiting not only retailers and local communities but also forging direct trade connections with coffee farmers or cooperatives. The initiative seeks to optimize unproductive hours, blend coffee waves, educate consumers, and establish direct trade relationships for the betterment of all stakeholders involved.

Strategic Approach:

1. Productivity during Off-Peak

Hours:

Utilize less productive hours and weekdays to host specialty coffee tastings, attracting local community members and coffee enthusiasts. Engage local residents during slower hours through events, promotions, discounts fostering a sense of community involvement.

2. Fusion of 2nd and 3rd Coffee Wave Dynamics:

With the Starbucks arrival in 2018

the third wave of coffee arrived, in order to preserve the Italian coffee tradition in retail and espresso culture, the heritage must be maintained but also offer new coffee experiences, integrating innovative brewing methods and specialty beans.

3. Introduction of New Public & Specialty Coffee:

Baristas are fundamental and have a straight relationship with customers as they communicate constantly in each service, therefore they can be the bridge for promoting the project



with them and should receive capability training for the new offers. Provide guided tastings & educational sessions to showcase diverse stories, flavors, origins, and brewing techniques, engaging consumers curious about specialty coffees.

4. Direct Trade with Coffee Farmers/Cooperatives:

Establish partnerships with coffee farmers or cooperatives seeking to expand market access for their specialty coffee.

Create a direct trade model ensuring fair compensation for farmers and to encourage sustainable relationships.

5. Diverse Incomes & Enhanced Margin Sharing:

Introduce a fixed price for specialty coffee tastings, enhancing the margins per cup sold in comparison with the low margins obtained through espresso coffee that usually cost 1-1.20 euro.

Allocate a portion of the proceeds from tastings to support coffee farmers or cooperatives directly

involved in the initiative. Sale of the tasted specialty coffee in package for in home consumption can offer additional incomes for coffee farmers and retailers

Benefits & impact:

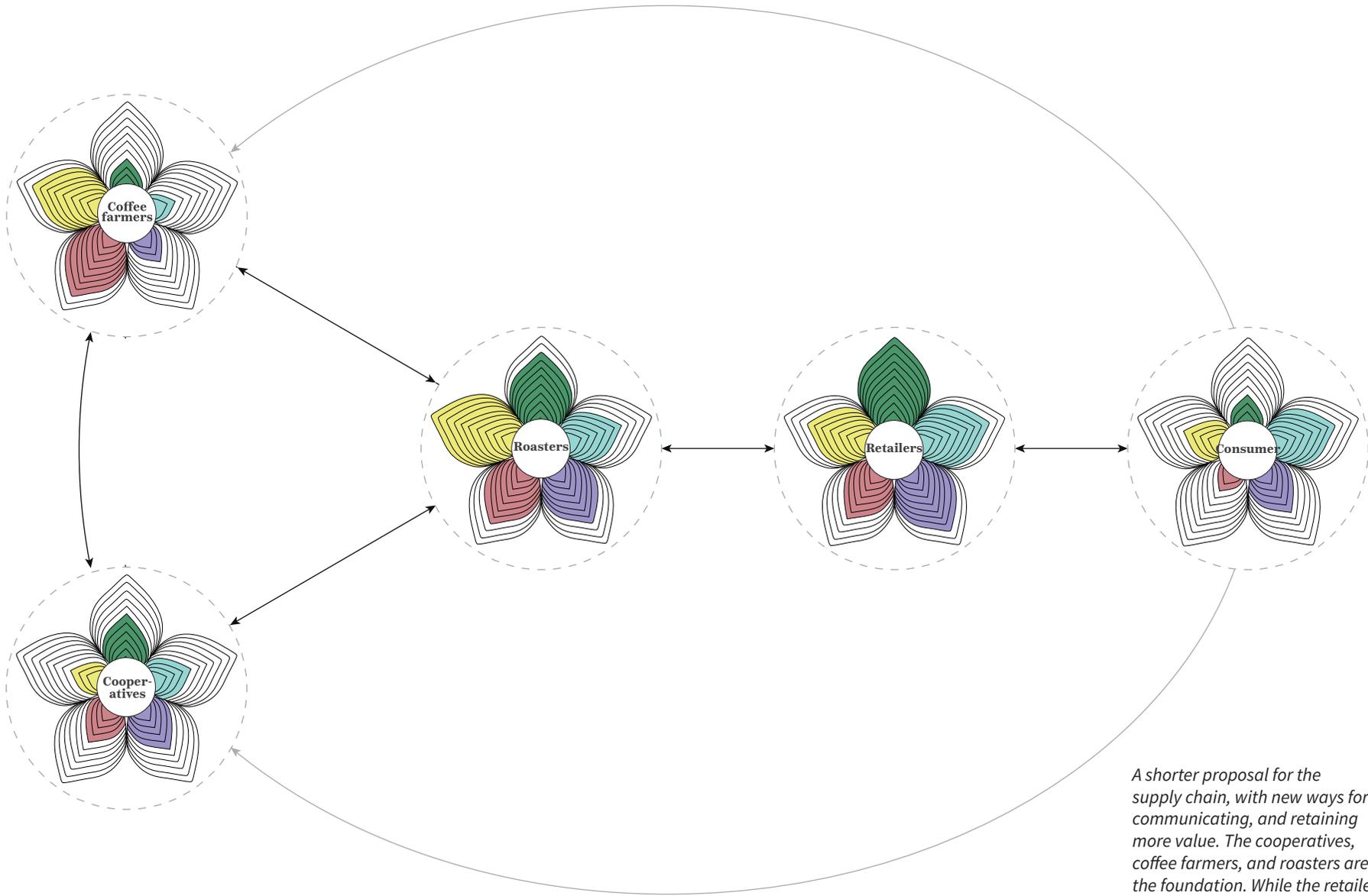
Enhanced utilization of off-peak hours, increasing incomes, engaging local community and new consumers
Preservation of Italian coffee traditions while introducing consumers to new coffee experiences.
Direct support and fair trade opportunities for coffee farmers or cooperatives, aiding in market expansion.
Increased revenue streams for retailers and improved margins due

to the specialty coffee offerings.

Implementation Plan:

Collaborate with Colombian coffee farmers or cooperatives to establish direct trade relationships.
Train staff and baristas in specialty coffee knowledge, and other than espresso methods.
Launch a promotional campaign through multiple channels, and spread the voice with customers to engage customers in the specialty coffee tastings and the direct trade initiative.

This systemic design project aims not only to benefit retailers and local communities but also to create a bridge between Italian retail spaces, consumers, and coffee farmers or cooperatives, fostering a mutually beneficial ecosystem that values tradition, innovation, fair trade, and community involvement.



A shorter proposal for the supply chain, with new ways for communicating, and retaining more value. The cooperatives, coffee farmers, and roasters are the foundation. While the retailers and costumers bond.

“The roasting bridge: empowering farmers through roasting facilities access and direct sales”

Overview

This systemic design project aims to empower coffee farmers by facilitating access to roasting expertise through a network of local roasters or cooperative hubs (that count with electric roasting machines such as bellwether). By providing a platform where farmers can explore their coffee's potential with expert guidance, offering private labeling opportunities, and enabling sales through direct-to-consumer e-commerce models.

The initiative addresses issues of low value addition of the coffee production, lack of knowledge about coffee attributes, and the costly investments for roasting. In addition this strategy aims to include colombian but also italian consumers, which are open to new product ideas and experiences, and are highly in touch with e-commerce and home deliveries.

Strategic Approach

1. Collaborative Roasting Hub/ Network:

Establish cooperative roasting hubs with institutional help from Federación Nacional de Cafeteros, Cenicafe, or AlmaCafé, for acquiring small lot electrical and intelligent roasting machines, and work on the capability training with experts in roasting. As an alternative, there can be network creation with small local roasters who are already equipped with roasting facilities and expertise. Invite coffee farmers to participate



in micro-lot roasting sessions with skilled professionals to explore their coffee's unique attributes.

2. Private Labeling Opportunities:

Offer farmers the chance to label their roasted coffee under their brand, paying an accessible price. Possibility of training in cupping, roasting, and business/marketing models to enhance farmer expertise and confidence.

3. E-commerce Coffee Box Model and Direct Trade:

Use e-commerce platforms by cooperatives to sell these micro-lot roasted coffees directly to

consumers' homes.

Offer subscription-based coffee boxes featuring various farmers' roasts, educating consumers about origin diversity and the stories behind each coffee.

Enable direct trade between consumers and farmers through the subscription service, fostering a transparent and ethical exchange while supporting smallholder farms.

Benefits & Impact:

Increased value addition to coffee by involving farmers in the roasting

process, adding value at the source.

Empowerment of farmers through knowledge of their coffee's attributes and exploration of roasting techniques.

Reduced entry barriers for farmers into the roasting industry by eliminating the need for costly equipment and extensive training. Creation of a transparent, direct-to-consumer sales channel, fostering consumer awareness of diverse coffee flavors and directly supporting smallholder farms through ethical trade.



Implementation Plan:

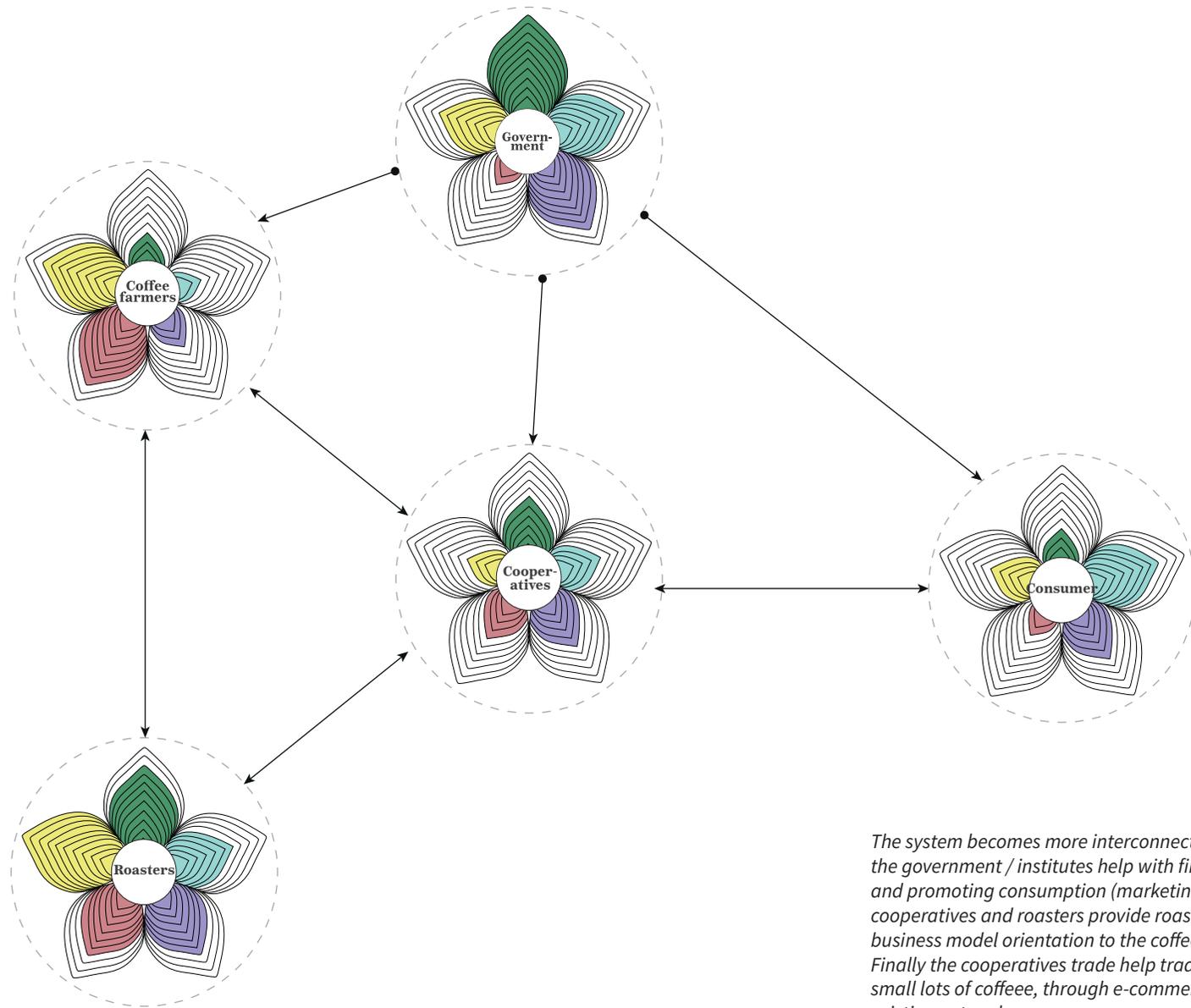
Partner with local roasters to establish cooperative roasting hubs or networks.

Conduct training sessions for farmers on cupping, roasting techniques, and business/marketing models.

Develop an e-commerce platform for selling farmers' micro-lot roasted coffees, offering subscription-based models that support direct trade between consumers and

smallholder farms.

This systemic design project aims to transform the coffee industry by empowering farmers and consumers alike, bridging the gap between them through education, ethical trade, and a direct connection that celebrates the diversity and stories behind each cup of coffee.



The system becomes more interconnected as the government / institutes help with financing and promoting consumption (marketing), cooperatives and roasters provide roasting and business model orientation to the coffee farmers. Finally the cooperatives trade help trade the small lots of coffee, through e-commerce or existing networks.

“Creating Climate-Resilient Coffee Farming: Diversification and Sustainability Initiative”

Overview:

This systemic design project to strengthen the resilience of coffee farms against the imminent impacts of climate change. By addressing the vulnerabilities faced by Arabica crops in Colombia, including susceptibility to mold, fermentation, pests, diseases, and on the other side assessing the risk of food insecurity among farmers between harvests, the initiative proposes a multi-faceted strategy. Its main objective is promoting diversification of income streams through beekeeping or the cultivation

of fruits, herbs, and vegetables, repurpose low-grade coffee, explore coffee by-products for additional revenue, and facilitate the adoption of more resilient seed varieties.

Stakeholders involved:

Coffee farmers

Cooperatives

Agronomy experts

Government

Institutes: Cenicafé, no-profits

Consumers

Strategic Approach:

1. Capability training in risk and climate change in coffee cultivation
Open up spaces, events, radio,

programs, etc, for enhancing information exchange with agronomy professionals and expert coffee farmers about best practices in preventing crops.

2. Diversification of incomes:

Explore alternative income sources like beekeeping or cultivation of trees, staple crops and fruits alongside coffee farming.

Introduce training programs to equip farmers with the skills needed for diversification.

Improving biodiversity and sustainable cultivation can help farms enter carbon credit markets,

as they are expected to grow according to Blaufelder et al. (2021) by a factor of 15 or more by 2030 and by a factor of up to 100 by 2050.

3. Value addition through coffee by-products:

Innovate and create marketable products from coffee by-products such as soap, candles, coffee syrup, or honey, to generate supplementary income.

4. Repurposing low-grade coffee:

Transform low-grade coffee beans into biomass or compost, minimizing waste and enhancing soil fertility. Implement sustainable waste

management practices to utilize coffee by-products effectively.

Benefits & Impact:

Diversification of income streams, reducing dependency on coffee alone, thus mitigating food insecurity among farming communities. Mitigation of climate change impacts on Arabica crops and economic system, reducing vulnerability to mold, pests, diseases, and fermentation. Sustainable utilization of low-grade coffee through composting and biomass creation, fostering

soil health and fueling up internal systems.

Creation of additional revenue streams through innovative products derived from coffee by-products.

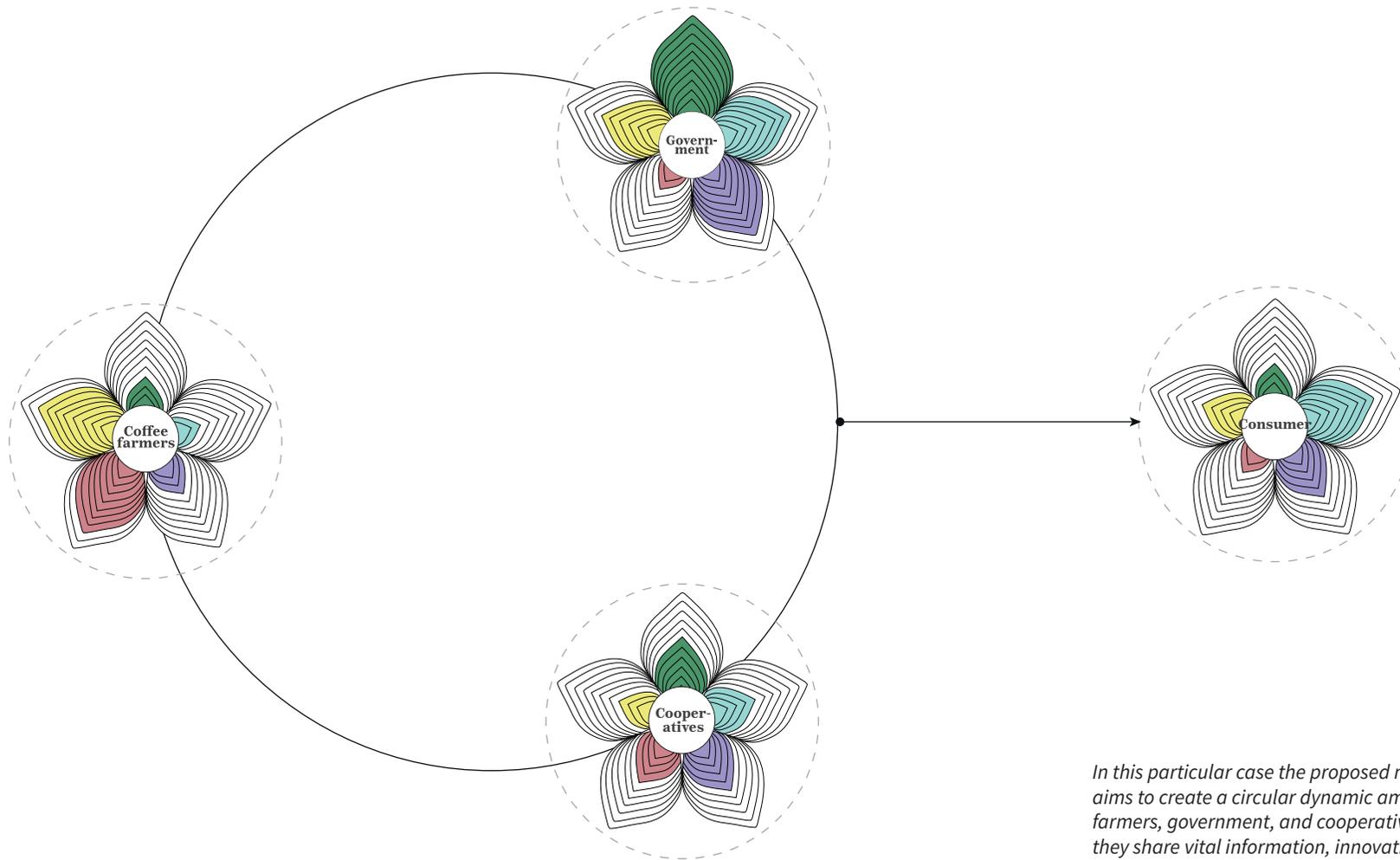
Implementation Plan:

Conduct workshops and training sessions to educate farmers on composting techniques and diversified crop cultivation. Collaborate with experts to develop value-added products from coffee by-products and establish market channels. Distribute resilient seed varieties



and provide comprehensive training on their cultivation and management.

This systemic design project aims to transform coffee farming into a climate-resilient, sustainable, and diversified business model. By mitigating risks posed by climate change, empowering farmers with diverse income streams, and adding value to coffee by-products, the initiative endeavors to fortify the resilience of coffee farms while ensuring the well-being and stability of farming communities



In this particular case the proposed model aims to create a circular dynamic among coffee farmers, government, and cooperatives, in which they share vital information, innovation, and resources for risk addressing and diversification activities. Lastly the consumer makes part when acquiring the coffee by products

Conclusions



Historically, the coffee industry has been entrenched to traditional dynamics, with long and complex supply chains involving a large number of different types of stakeholders (some very vulnerable as coffee farmers and cooperatives, while other strongly settled and dominant), imbalances of economic and information power, an incredible number of relationships, and sustainability issues. Lets remember the most known sustainability problems comprising social issues from high poverty due persistent and non-growing low incomes obtained by coffee farmers thus the suffering of food insecurity between harvests, child labor, among others. Following the same line in the

economic sphere were there isn't always trade justice, the prices are volatile according to the market and trade dynamics, and there is a huge export dependency in producing countries. Finally environmentally speaking, the journey from bean to cup produces an incredibly large number of emissions (carbon, energy and water footprint) and use of resources (water, soil, chemicals, fuels). To address this systemic challenges the coffee world faces, the thesis embarked on an exhaustive literacy review encompassing the global coffee landscape meticulously examining diverse stakeholders, production methods, challenges, innovations, for then focusing on

Italian and Colombian territories for deepening the analysis and formulation of strategies. Employing the systemic design methodology and proposing a groundbreaking tool "the holistic diagnosis stakeholder map" for an amplified understanding of stakeholder relationships, resource flows, qualitative assessment on the connections, and substantial strengthening of the initial SWOT analysis thanks to the new data gleaned from this map. This tool is born from the necessity to comprehend what the holistic diagnosis of territories and productive process can't fully depict, which is the stakeholder dynamics of power, interest

and resource exchange with a qualitative approach, especially when taking as object of study such a complex industry as the coffee one. It serves as a mean to unravel current realities, vulnerabilities, and opportunities among actors, aiming to enhance these circumstances and reimagine innovative spaces fostering value circularity and fair trade practices.

This comprehensive work, spanning supply chain diagnoses, and territory selections using Italy and Colombia as reference points, unveiled common points, which was unexpected because of their background in coffee and industry that would be difficult to pair into alternative supply chain

initiatives. Fundamental points in Italy and Colombia, despite their distinct roles in the coffee supply chain (Italy primarily dedicated to roasting and consumption, and Colombia focused on coffee production) share fundamental challenges and opportunities within their coffee sectors. Both nations encounter price-sensitive consumers seeking value in their coffee purchases, driving the need for competitive pricing strategies or price motivations that break down the premium and specialty coffee through customization, experiences, sustainability or new products. Climate change and weather impacts pose significant challenges to coffee cultivation in Colombia's

regions but it is a systemic problem in all producing nations so Italy's suppliers will be affected by it. Both countries also respond to emerging consumer trends and preferences, witnessing a growing market for specialty coffee, coupled with heightened demands for information regarding origins, sustainability practices, and ethical sourcing. These commonalities in facing consumer demands, environmental challenges, evolving market trends, and the burgeoning specialty coffee sector formed the base for the systemic project outputs, allowing for strategies that harmonized these shared factors despite the distinct roles of the two nations in the coffee supply chain.

Returning to the pivotal question, the thesis unequivocally affirms the potential for collaboration among diverse stakeholders within the coffee industry (finding bonding points for Colombian and Italian stakeholders), as the systemic project outputs revealed, that pioneering novel approaches and alternative systems, there can be a other ways to encourage reduction of inequalities with trade justice and value addition but they generally deviate from the conventional coffee supply chain model. The thesis's outputs envision three alternative supply chain dynamics, that prioritize circularity and direct connections.aiming to create a better communication and resource

exchange dynamics, in first place with the output "Enhancing italian coffee tradition while opening new space for specialty coffee experiences" The aim is to preserve the rich Italian tradition surrounding espresso and independent coffee bars while offering temporary spaces to promote specialty coffee and new tasting experiences, distinct from quick consumption. This approach targets a more leisurely service during non-peak hours or quieter days, aiming to increase profit margins per coffee sold. Alongside the sale of specialty coffee, it aims to raise awareness about sustainable and origin-specific coffee, supporting many farmers

through direct trade. Ultimately, it seeks to educate and cultivate an appreciation for coffee, gradually breaking down price barriers and aiding customers in making more responsible choices.

The first initiative, "The Roasting Bridge: Empowering Farmers Through Roasting Facilities Access and Direct Sales," aims to provide access to coffee roasting facilities and educate farmers on these practices. By fostering entrepreneurial activities among farmers and enabling them to capture more value within the production chain, it seeks to establish relationships between local networks of coffee roasters,

preferably affiliated with authorized roasters by Café de Colombia. These roasters would offer services like contract roasting or sponsorships using machinery like Bellwether for established cooperatives at a low cost. The output produced from this service could then be distributed by cooperatives through ecommerce platforms, promoting origin-specific coffees and allowing farmers to establish a customer base for future investments in on-farm coffee roasting.

The final initiative, “Creating Climate-Resilient Coffee Farming: Diversification and Sustainability Initiative,” encourages preparedness

for climate risks, crop diversification, tree planting for biodiversity preservation, and the utilization of low-grade coffee for composting or alternative products. This output involves early-stage stakeholders—farmers, government, and cooperatives—to reinforce current capacities, potentially including consumers who purchase coffee-derived products.

In conclusion, these three systemic project outputs address the need for information transmission, direct trade, empowerment to add value to coffee, diversification of activities to increase income sources, and climate risk prevention. This visionary approach propels stakeholders toward inclusive,

interconnected systems, fostering a responsive, equitable, and transformative coffee industry. The aim is to shift from traditional value chains to creating circular systems, where the perception of coffee’s value by consumers and collaborative efforts among stakeholders drive the change.





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